Greek and Roman Textiles and Dress

An interdisciplinary anthology

edited by
Mary Harlow & Marie-Louise Nosch

ANCIENT TEXTILES SERIES VOL. 19

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Oxbow Books
Oxford & Philadelphia

Published in the United Kingdom in 2014 by
OXBOW BOOKS
10 Hythe Bridge Street, Oxford OX1 2EW

and in the United States by
OXBOW BOOKS
908 Darby Road, Havertown, PA 19083

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Paperback Edition: ISBN 978-1-78297-715-5
Digital Edition: ISBN 978-1-78297-716-2
Mobi: ISBN 978-1-78297-717-9; PDF: ISBN 978-1-78297-718-6

A CIP record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

Greek and Roman textiles and dress : an interdisciplinary anthology / edited by Mary Harlow and Marie-Louise Nosch.
1 online resource. -- (Ancient textiles series ; VOL. 19)
This anthology is the second volume of two which group interdisciplinary contributions to the field of textile research. The first volume is Mary Harlow, C?cile Michel & Marie-Louise Nosch (eds), Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress: an interdisciplinary anthology.
Includes bibliographical references and index.
Description based on print version record and CIP data provided by publisher; resource not viewed.
ISBN 978-1-78297-716-2 (epub) -- ISBN 978-1-78297-717-9 (mobi (kindle)) -- ISBN 978-1-78297-718-6 (pdf) -- ISBN 978-1-78297-715-5 (alk. paper) 1. Textile fabrics, Ancient--Greece. 2. Textile fabrics, Roman. 3. Clothing and dress--Greece--History--To 500. 4. Clothing and dress--Rome. I. Harlow, Mary, 1956- editor. II. Nosch, Marie-Louise, editor.
NK8907.3
746.0938--dc23

2014040016

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Printed in Malta by Gutenberg Press

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Front cover: The Parthenon east pediment. © Trustees of the British Museum.

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Acknowledgements

Our sincere gratitude to the Danish National Research Foundation for its continued support.

We thank our colleagues at the Centre for Textile Research for their valuable help and advice, especially Dr Giovanni Fanfani. Mary Harlow was granted research leave from the University of Leicester, School of Archaeology & Ancient History, in order to finalise this anthology and we are grateful for their support. The Danish Institute at Athens generously provided us with one month's stay in order to edit the texts. We thank Clare Litt, editor in chief at Oxbow Books, for the always smooth collaboration and professional help. Finally, we thank the authors for their excellent contributions, trust and patience.

This anthology, Mary Harlow & Marie-Louise Nosch (eds), *Greek and Roman Textiles and Dress: an interdisciplinary anthology*, Ancient Textiles Series 19, Oxbow Books, Oxford (2014), is the second volume of two which group interdisciplinary contributions to the field of textile research. The first volume is Mary Harlow, Cécile Michel and Marie-Louise Nosch (eds), *Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress: an interdisciplinary anthology*. Ancient Textiles Series 18. Oxbow Books, Oxford (2014).

Copenhagen, September 2013

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Mary Harlow and Marie-Louise Nosch

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1. Weaving the Threads: methodologies in textile and dress research for the Greek and Roman world – the state of the art and the case for cross-disciplinarity

Mary Harlow and Marie-Louise Nosch

In the recent past the study of textiles and dress has become almost a discipline in its own right.[1] The universal character of textiles and clothing invites us to cross traditional disciplinary boundaries, for example, the semi-artificial divisions between prehistoric and classical archaeology, design and textile engineering, or Indo-European and Semitic language studies. Researching dress and textile history in antiquity presents particular methodological challenges. To be really effective and innovative it needs to combine the approaches of academic disciplines often kept separate in university departments. The standard methodologies of the various disciplines that intertwine to explore and create dress and textile history in antiquity (ancient history, art history, archaeology, classical philology, etc.) are well known and we shall not reiterate them here but rather describe the cross- and inter-disciplinary innovations that arise from this new field, and the necessary ventures it requires into more disparate but cognitively linked academic disciplines (e.g. anthropology, ethnography, sociology, cultural studies).[2] In consequence, we see dress and textile research as fertile ground for using interpretive frameworks from newer areas of scholarship: e.g. fashion studies, New Institutional Economics, trend theory, literary theory and similar approaches more widely used in the field of cultural studies.[3] Another significant institutional characteristic of the field is that textile research is often embedded in museums, departments of conservation, dye analysis laboratories as well as university departments; these represent excellent opportunities to disseminate research and share knowledge not only with other scholars but also to the wider audience of museum visitors.

The scattered and often isolated location of textile researchers in Europe has been partly remedied by two international networks: *North European Symposium of Archaeological Textiles (NESAT)* which gathers archaeologists and textile craftspeople from Central and Northern Europe; and *Centre international d'études de textiles anciens (CIETA)* with a focus on historical textiles and scholars

[1] Taylor 2002, 90–114; 2004. For an excellent survey of late 20th-century developments in the study of archaeological textiles, see Good 2001.

[2] See the seminal work by Weiner and Schneider (eds) 1989.

[3] See the emergence of trend theories, early modern dress and consumption history in Toft and MacKinney-Valentin 2014. Literary theory and dress, see Taylor 2002, 90–114; Hughes 2005. New Institutional Economics is applied to textiles in papyrological material from Roman Egypt in Droß-Krüpe 2011; Temin 2012.

from museums and art history. However, the Greek and Roman world is not entirely embraced by either of these although it has an interest in both.

Textile research and dress history are evolving fast. Across Europe a series of research centres frame this progress[4] and a multitude of PhD and postdoctoral projects deal with textiles and clothing as a new means of understanding society, culture, identity, ethnicity, economy, and politics. In 2013 two large international European funded projects came to an end: *Fashioning the Early Modern* and *Dress ID. Clothing and Identity in Roman Times*.[5] These projects brought together scholars from a range of disciplines to share knowledge, create networks and at the same time develop methodologies for this emerging new way of studying the past. Both projects resulted in publications and museum exhibitions. Historians and archaeologists, it seems, are now exploiting the methods that have traditionally been used by anthropologists working with living cultures and, combined with the knowledge they have of their own period of interest, creating new insights and new research questions. In 2012–2013 alone conference themes on textile and clothing in antiquity ranged from the study of the silk trade in antiquity (Harvard, April 2012), textile as metaphor and narrative device (Copenhagen June 2012, 2013, Basel August 2012, Cambridge September 2012), dress and age and gender (Berlin, September 2012), the Bronze Age wool economies in the ancient Near East (Paris, November 2012), to textile trade and distribution (Marburg April 2013), wool on the Silk Road (Hangzhou, China, April 2013), purple dye, sea silk (Lecce, May 2013) and textiles in cult and sanctuaries (November 2013) to name but some in a plethora of relevant gatherings.[6] The matter of textiles and dress is now becoming embedded in approaches to antiquity, rather than remaining peripheral. The strength and acceptance in academia of this emerging field is confirmed by a rapid recent accumulation of prestigious European grants from the 7th Framework Programme, on the topic of textile research: the status in 2014 is a series of Marie Curie mobility grants,[7] as

[4] For example, The Danish National Research Foundation's Centre for Textile Research (CTR) in Copenhagen since 2005; The Textile Research Centre (TRC) in Leiden founded and run by Gillian Vogelsang Eastwood; The Research Network for Textile Conservation, Dress and Textile History and Technical Art History at the University of Glasgow (with funding from the Getty Foundation, 2010). The research group The Textile Revolution headed by Wolfram Schier in the German Excellence cluster TOPOI, since 2012.

[5] www.fashioningtheearlymodern.ac.uk and www.DressID.eu. Collaborative publications deriving from these projects are, among others; Welch (ed.) forthcoming; Engelhardt Mathiassen *et al.* (eds) 2014; Tellenbach *et al.* (eds) 2013; Nosch (ed.) 2012; Gleba and Pásztókai-Szeöke (eds) 2013; Grömer 2014.

[6] Most of these conferences are currently being published: Michel and Breniquet (eds) 2014; Harich-Schwarzbauer (ed.) forthcoming; Droß-Krüpe (ed.) 2014; Landenius Enegren and Meo (eds) forthcoming; Brøns and Nosch (eds) forthcoming; Fanfani, Harlow, Nosch (eds) forthcoming; Hildebrandt (ed.) forthcoming.

[7] M. Gleba, Textile Fibre in Italy before the Roman Empire (2009–2011); H. Landenius Enegren, West and East: Textile technologies and identities in the 1st millennium BC South Italy and Cyprus; E. Harlizius-Klück, Periphron Penelopeia: Textile Technology and the Tacit Dimension of Thought in Ancient Greece (2012–14); B. Hildebrandt, The Emperor's New Clothes. Power Dressing in the Roman Empire from Augustus to Honorius; S. Gaspa, A Study on the Terminology and the Material Culture of the Textiles in the Neo-Assyrian Empire; M. Vigo, Textile Terminology of Hittite Anatolia; M.-Á. Andrés-Toledo, Zoroastrian Text(ile)s. Regulations, Symbolism, Identity; M. Siennicka, Greek Textile Tools. Continuity and changes in textile production in Early Bronze Age Greece; J. Cutler, Weaving the Fabric of Society: Bronze Age Aegean Economies of Cloth (2013–2015). C. Sauvage, Identities and Transformation in the Eastern Mediterranean: the Late Bronze Age and Early Iron Age 13th–10th century BCE; F. Carraro, Textile Studies: questions and issues between knowledge and knowhow. A case study from archaeological textiles; R. Laurito, Textiles and textile technology in central Tyrrhenian Italy from prehistory to the Roman period; G. Fanfani, Performing the Fabric of Song. Textile Technology and Imagery in Ancient Greek Poetry and Poetics. A Study in Metaphors and Terminology (2014–2016). In addition, the Leverhulme Trust funded postdoc. A. Quercia, Weaving Relationships: loom-weights and cross-cultural networks in the Ancient Mediterranean (2010–2013).

well as two ERC starting grants[8] and one ERC advanced grant.[9] In the Humanities section of the European Research Area (HERA) of the European Science Foundation, of the 19 projects funded under the first HERA joint research programme in 2010–2013, two concerned textiles and dress.[10]

This academic movement is not limited to any single discipline or to a single time frame. Scholars across the world interested in periods as diverse as the early Bronze Age in the Aegean through to classical antiquity and the medieval period to the early modern have all been profoundly impacted upon by recent textile research. It is as if historians had continually and consistently failed to notice how people dressed and used the flexible complex material of clothing and the textiles they are made from, to create individual and group identities, to make statements about status, rank, gender, political and religious affiliation etc.; nor did they take account of the raw materials, labour, time and skill involved in the cultivation and production of textiles and clothing; nor did studies of innovation, technology history, science and engineering etc. explain the role of textiles in technologies, cross-craft movements, or innovations. Such matters were simply not considered of importance alongside the 'big themes' of classical history such as political narratives or warfare and even when the focus was on large scale issues such as the environment, landscape, climate or nutrition, little attention was given to the role of textile production. This should surprise us, given that in terms of technological developments societies were producing textiles long before they were producing pottery or metalwork.

What is special about textiles, why do they merit a place among the 'big themes'?

Outside tropical climate zones the production and use of textiles is absolutely essential for survival for most societies. Even in tropical areas, body adornments of some kind often serve similar purposes to the decorative effects of dress (e.g. feathers, beads, tattooing, etc.). In other climates and cultures, such as peoples living inside the Arctic Circle, the protective nature of clothing is often fulfilled by the use of skins rather than woven textiles. This double function of clothing – physical protection as well as media of communication – is present in all cultures.

Unlike the subjects of other big themes, textiles are the nearest we can come to the human body and therefore have a strong affinity with both group and individual identity and with notions of intimacy and hygiene. 'You are what you wear' and the study of clothing is to a large degree the study of the moving body in space. It concerns the relationship of garment to body and of individual body to the social body; this close connection with the person and individual is perhaps one of the reasons it has been omitted from large scale surveys of other aspects of the past. This may be due to an erroneously perceived gender divide in the method of production. Textiles are traditionally assigned to the realm of women, who are also linked more closely to ideas of the body and bodily adornment, and were mostly not deemed worthy of study by 20th-century urban male scholars, who considered the very idea of dress and ornament subjects that academic minds should not waste time on. It was social anthropologists who noted the importance of adornment in creating identity. It has required a cross-disciplinary nudge to make historians of early periods sit up and take notice.

[8] ERC Starting Grants: T. Weddingen, 'Textile. An Iconology of Textile in Art and Architecture' (2009–2013); M. Gleba, 'Textile Economy and Urbanisation in Mediterranean Europe 1000–500 BCE' (2013–2018).
[9] ERC Advanced Grant: J. Styles, 'Spinning in the Era of the Spinning Wheel, 1440–1800' (2010–2015).
[10] www.fashioningtheearlymodern.ac.uk and http://cinba.net/ Creativity and Craft Production in Middle and Late Bronze Age Europe (CinBA).

Despite its marginality in the 'big themes', textile production, from raw material to finished item, has had a significant impact on society from its earliest history. The production of textiles of quite complex weaves preceded the production of pottery and metals. Thus people spun and wove for many thousands of years before they started to develop and use other technologies, and we must assume that textile technology strongly influenced the emergence of many other later innovations.[11] The continuing centrality of textiles to daily life is an essential characteristic of the claim to establish their study as one of the 'big themes.' For over 10,000 years textiles have been known to cover the human body and remain relevant to everyone, everyday.[12] However, particularly for textiles it is significant that in the last three or four generations the majority of people have become alienated from the craft elements of production. Few Europeans now know how to weave or even understand the principles of weaving, and even fewer of those who do are academic scholars. In the last hundred years in the West, textile crafts have moved from being a fundamental industry to being perceived as a female handicraft and leisure activity: a part of the cultural economy but not highly valued in the wider monetary economy. This attitude probably also partly explains why the field is neglected in academia. In other parts of the world the reverse is happening: textile production in both its traditional and industrialised forms is being seen and exploited as a means of creating an economic base for communities, and sustainable production and corporate social responsibility are becoming themes which shape the new textile consumer literacy.[13] In Europe, however, there is a divorce between textile production and textile consumption in the minds of consumers. In this sense, textile production has followed notions of food production and consumption: while cooking may still be a daily activity in the household, many western children do not understand the origin of food beyond the supermarket shelf.[14] Likewise for textiles: never have we owned and consumed as much fabric as today, yet we rarely know or question where it comes from, how it is made, and by whom.

One of the key aspects for textile and dress history then, is to (re-)establish the recognition of textiles as essential and present everywhere – in the past and the present. Surprisingly, many publications neglect textiles both as raw materials and as consumables of the past. Studies on ancient trade focus on trade in grain, oil, wine, pottery and metals, and rarely mention textiles.[15] Works about agriculture outline in detail crops from antiquity which are still grown today but mention only edible plants, neglecting dye plants, flax and hemp (except when it is for consumption either as food or narcotic).[16] Detailed studies of the logistics of military missions discuss weapons, transportation,

[11] Barber 1991, 4. McEwen 1993 relates the emergence of Greek classical architecture (in particular the peripteral temple reflecting the structure of a warp-weighted loom) as influenced by textile technology. Nosch (forthcoming a) highlights the textual and technological relationship between sewing in textile and leather in the Aegean Bronze Age. Harlizius-Klück (2004; 2014) demonstrates the connections between weaving and mathematics, and the textile expressions used in modern science (Harlizius-Klück 2009). Bertolín 2008 and Nosch (forthcoming b) discuss the terminological, iconographical and technological links between the loom and the ship, between weaving and sailing.

[12] See Gleba and Mannering 2012 for a survey of the earliest textiles in Europe.

[13] UNESCO's Intangible Cultural Heritage initiative: cf. http://www.unesco.org/culture/ich/doc/src/20435-EN.pdf (accessed 5.7.2013). See Tyabji and Das 2008 for some projects in India.

[14] http://www.nutrition.org.uk/nutritioninthenews/pressreleases/healthyeatingweek (accessed 5.7.2013) a British Nutrition Foundation survey 'found that nearly a third (29%) of primary school children [in Britain] think that cheese comes from plants, one in ten secondary school children [i.e. 11–18 year olds] believe that tomatoes grow under the ground.'

[15] Garnsey and Whittaker 1983; Garnsey, Hopkins and Whittaker 1983; Parkins 1998; Osborne 1996; Prag, Snodgrass and Tsetskhladze 2000; Whitby 1998; Andreau, Briant and Descat 1994. Morley 2007. Bresson 2008, 150–160 is one of the few authors who explicitly inserts textiles in the trade networks of classical Greece. See also Nosch 2014b.

[16] Most scholarly works on ancient agriculture focus entirely on the cultivation and procurement of edible crops: Finley (ed.) 1975; Amouretti 1986; 1994; Wells (ed.) 1992; Isager and Skydsgaard 1995.

food and strategy but omit to dress the soldiers.[17] Prolific studies of the ancient economy, if they refer to textiles and dress at all, place it in a domestic context, preferably in the chapter about women.[18]

To expand the point with just one example: agriculture in all its forms has transformed the physical and cultural landscape of Europe since the first planting of crops and domestication of animals, yet the entire sector of textile production as a determinant factor for shaping the European landscape has been neglected. Some pioneering works, such as Elizabeth Barber's *Prehistoric Textiles* (1991) and *Women's Work – the First 20,000 Years* (1994) recognised the concept of the fibre revolution[19] and considered how the very early production of fibres into spun thread influenced gender roles, the division of space in villages and the emergence of craft and task specialisations.[20] Generally, the role of textiles is more acknowledged in studies of prehistory than in classical studies. We now need to recognise how this revolution was amplified throughout history as increasingly complex societies required more and more textiles. In the Greek world sanctuaries, for instance, became huge producers and consumers of textiles;[21] the levy of a fleet demanded long term planning in terms of the production of sailcloth, and the Roman army was a mass consumer of textiles by the end of the Republic.[22] Textiles and clothing did not merely come out of the hands of busy textile workers. They were grown in fields and retted in ponds that fast became poisonous, or produced from the fleeces of hundreds of thousands of sheep grazing off land and pasture. These resources competed with edible crops, fundamentally depleting the soil and modifying the landscape. If the land had not been put to pasture, grazing and transhumance, the ancient landscape would have looked very different; and if textiles had not developed as a major productive element in ancient societies, the cultural landscape would also have looked different. The fibre revolution created growth in the production of raw materials, particularly in the area of the Mediterranean triad (grapes, olives and wheat), as flax and sheep can flourish on land that cannot support other crops.

The question then is how do we access this type of information? In Greece ethnographic studies of the 19th and early 20th century villages and agricultural practices are often drawn on in order to elucidate early, 'primitive', subsistence or simple economies. Such research has the potential to provide clues for how ancient communities dealt with the procurement of necessary goods.[23] However, villagers in even remote areas in the 20th century might, to a large extent, have been self-sufficient when it came to food, energy, combustibles, alcohol, construction materials and transportation; but in terms of textiles, most purchased their clothing commercially, rather than making it at home or with local resources, while some even produced cotton for the global market. Thus, ethnographic sources are rarely reliable evidence for textile crops as part of mixed domestic

[17] See contributions by Raaflaub, Hamilton, Rosenstein and Campbell in Raaflaub and Rosenstein (eds) 1999; Rich and Shipley 1993; 1995; Chaniotis 2005; Gabrielsen 1994. Instead, the textile requirements of the ancient armies are treated in specialised volumes: James 1999; 2004; Sumner 2009; Nosch (ed.) 2012.

[18] This is not the place for a historiographical survey so only a few works serve here as examples for the ancient economy: Finley 1973 and 1977 hardly include textiles, nor women for that matter. In Gehrke 1986 focus is on the rural economy but without including textile production apart from a brief mention of Elis. Leveau (ed.) 1985 gathers contributions but none about textiles as a source of wealth, with the exception of one chapter on the papyri.

[19] McCorriston 1997.

[20] Good 2001.

[21] On textiles and Greek and Roman sanctuaries see Linders 1972; Cleland 2005a and 2005b; Neils 2009; Brøns forthcoming; Brøns and Nosch (eds) forthcoming.

[22] On Roman military demand for textiles cf. Livy 29.36; 44.16; Droß-Krüpe 2012; Liu 2009 and 2012; Nosch (ed.) 2012.

[23] Ernestine Friedl's book from 1962 on the late 1950s Boeotian village *Vasilika* is one example among many. See also Welters 1999.

subsistence farming. Since the 19th century, or even earlier, textile crops were integrated into a global industrial cycle of production and distribution of, for example, Indian or Egyptian cotton, Russian flax and British wool. It is hard to find ethnographic comparative evidence for textile fibre crops as part of the domestic agrarian produce or to find households where sheep were kept for their wool and where this wool was also spun and woven in the same household. Self-sufficiency in textiles ended long before the self-sufficiency in food for the peasant population; this is a worldwide phenomenon.[24] Thus, to investigate textile crops and dye plants as part of ancient agriculture, fieldwork, ancient travellers' reports, ethnographic parallels or comparisons with contemporary yields all risk being misleading methods with the potential to produce misleading results which minimise the role and position of textiles in the ancient landscape, agriculture and economy. This position needs to be rectified in order to bring textile production in antiquity into the spotlight. A source critical approach is vital, informed by intimate knowledge of the craft and its historical developments. Early modern wool output from merino sheep, or flax fibre yields from new species cannot be compared directly to ancient breeds and yields; even less can modern textile fibre crops based on genetically manipulated species and chemical fertilizer. On the other hand, information on sheep rearing – disease, fertility, the annual cycle of the shepherd's work and his skills – can often be gained from modern studies of the time when Europe still produced such fibre for export and larger markets. An example is the French veterinary Louis-Jean-Georges Daubenton and his valuable observations and recommendations for best sheep rearing practice in late 18th-century France, *Extrait de l'instruction pour les bergers et les propriétaires de troupeaux*. Such works demonstrate the importance of textile production, sheep rearing and fibre crops in early modern societies, a fact which we tend to forget. The effects of the fibre revolution are yet to be clearly acknowledged as one of the 'big themes' of ancient history.

It is evident from classical literature that an understanding of textile production, particularly of spinning and weaving was very much part of the common body of knowledge of the general population of antiquity, who were either actively engaged in or close observers of these activities. This close association between methods of production and finished article is something modern society has lost sight of when it comes to clothing and textiles. Despite this, the nature of weaving: the organisation of warp and weft; the need to count in a binary system of odd and even to create the most basic simple weave (a tabby); the innate knowledge of the technical and numerical relationship between yarn tension, weight of loom-weight and its effect on the finished textile etc., spoke to ancient philosophers who adopted many textile terms and used weaving as a paradigm for order and classification in close connection to arithmetic as well as the order of the ideal city state.[25] The association between textiles and technology has been translated into modern science where the use of textile terminology and textile metaphors to describe complex concepts continues today (e.g. DNA string, nodes and histology for the biological tissue, string theory in physics, fabric of the universe in astrophysics).[26] There are numerous examples of modern science's deep interest in textiles and dyes and the potential thereby to create innovations in new areas.[27]

[24] Richter 1968.
[25] See Scheid and Svenbro 1996; Harlizius-Klück 2014 and references.
[26] Harlizius-Klück 2009 and 2014.
[27] Damhus *et al.* (eds) 2011.

Evidence of textiles and dress

At the outset of this chapter we stated that researching dress and textile history in antiquity presents particular methodological challenges. This is not due to a lack of evidence but rather to the fact that there is evidence everywhere, but it is not the same type of evidence. Take textiles themselves as artefacts: in northern Europe, due to the climate and soil conditions, archaeological textiles are preserved to an astonishing degree from the Bronze Age, Iron Age and the Medieval period (Greenland). In southern Europe, scraps and threads must be highlighted to tell the same story. A significant exception is Egypt where burial practices combined with the dry environment allowed the preservation of textiles from the Pharaonic period right up to Ottoman times.[28] The peculiar situation of archaeological preservation biases the investigation of textiles and clothing considerably. For example, it is the remains of clothing found as torn up rags, reused and abandoned in dumps at Roman sites in Egypt that provide us with much of what we know about the Roman soldier's wardrobe. Nowhere else in the world than in the rubbish of these garrison sites and quarries are we given as much concrete archaeological detail about Roman military clothing, despite a clear programme of iconographic depictions in reliefs, statues and wall paintings, and documents which control soldier's a consumption, or historical narratives of his exploits.[29] In the dry conditions of other parts of the Near and Middle East more textiles and garments survive but it is rare to find such material in the rest of Europe in the classical period.[30] Here, textiles are more often found as mineralised deposits associated with metal. These usually small, mineralised scraps can, however, provide a wealth of information when appropriate methods and experience are engaged.[31] Even tiny fragments of a textile can be analysed to establish the type of raw material it was made from, spin direction, type of weave, nature of any dye present, primary or subsequent use etc. All of these elements can help to establish issues, such as provenance, the possibility of trade, use and function. Spin direction, for instance, tends to be culturally determined with Z spun being more common in Northern Europe and the Mediterranean, and S spun found in Egypt, the Levant and the Near East. However, spin direction is also botanically determined since bast fibres grow with a slight S twist, and as more and more textiles are analysed, the picture of spin-direction becomes increasingly blurred.[32] The raw material is also of interest, especially if out of the ordinary for the context of the find. Most clothing and household textiles in the classical period were made from wool or linen, so a find of silk or cotton raises interesting questions of trade and travel.[33] The use of rare or expensive dyes, such as murex purple, can also suggest something about the origin and function of an item. More recently, the development of techniques such as strontium isotope and DNA analysis,

[28] De Moor (ed.) 1993; De Moor *et al.* 2008.

[29] On Mons Claudianus see Bender Jørgensen 2000; Mannering 2000; 2006; on Didymoi see Cardon, Granger-Taylor and Nowik 2011. For Roman army clothing more generally see papers in Nosch (ed.) 2012; Sumner 2009; James 1999; 2004.

[30] There are some notable exceptions for the classical period, e.g. Les Martres le Veyre: van Driel Murray 1999. For a comprehensive 'atlas' of archaeological textile finds in Europe, see Gleba and Mannering 2012.

[31] See for example the surprisingly vast field of information yielded by mineralised textile finds from north European weapon deposits of the Iron Age illustration warrior clothing and ritual practice in Möller-Wiering 2011.

[32] Forbes 1964, 152–153 emphasises the S spinning of Egypt; Barber 1991, 65–68 discusses spin-directions and also emphasises the S-spin tradition of linen thread in Egypt and the Z-spinning elsewhere, but also attributes this pattern to the fact that elsewhere it is primarily wool textiles which are preserved, and wool does not naturally twist in one direction. Wild 1970, 38 mentions that linen fabrics can be Z spun in northern Europe, and Alfaro Giner 1984, 82 mentions linen textiles from Spain which are Z spun.

[33] Margariti, Protopapas and Orphanou 2011.

have allowed textile researchers to consider the origin of the raw materials for clothing and their genetic biography.[34]

The survival of ancient textiles is a great advantage to the study of dress in antiquity, even if the finds tend to be geographically rather specific. The disadvantage is that surviving textiles have sometimes already been taken apart and only the most decorative elements are preserved, separated from the garment they originally came from, as is most often the case for Coptic textiles. The predilections of early museum curators and collectors have left us with a very exotic and somewhat eclectic spread of examples, and it is sometimes hard for curators to identify the status of a wearer, or even the function of a fragment (was it clothing at all?) from the nature of surviving pieces.[35] Archaeological textiles, despite some large collections and recent discoveries, remain the exception and most textile researchers must rely on other sources and other types of evidence to complete the picture.[36]

Visual evidence from antiquity comes from free standing monuments still *in situ* or preserved with other types of art in museum collections. Museum collections are handed down to us by a long process of acquisition, selection and display. The context for iconographic depictions is a central element in understanding the images they may portray of the dressed body. Both the modern and the ancient contexts for visual material present some problems for the viewer. However, it is precisely the vast array of dressed figures that are available to us in a range of media – from Attic vase paintings, funerary reliefs, statues of important individuals, of gods and goddesses to images on silver plate and frescoes – that allow us to visualise the clothed body in antiquity so vividly. The reading, however, is not so simple; clothing in images does not translate easily into clothing as worn in real life. The context and genre of any piece of visual culture creates a particular visual message, and clothing is often used as a signifier: the modest wife, the semi-clad courtesan, the god or goddess with special attributes, the soldier, the old man, the togate Roman.[37] The iconographic wardrobe forms part of the identifying features of the individual depicted, it may be exaggerated in the presentation of certain aspects – did male and female Roman citizens really wear all that drapery? Which categories of Greek women were conventionally veiled, if any? As much as they speak to our imaginations, visual images also constrain our interpretation of both the clothing worn and the body beneath it. Some images are portraits, it is true, but even here the clothed body is often divorced from the head, in the sense that carefully carved head likenesses are set on stock workshop bodies.[38] Yet, visual imagery is seductive, it is hard to resist reading depicted scenes as reflections of 'real textile life' even though they may rather testify to 'ideal textile life'. There are ways to mitigate the temptations, one is to look closely at scenes and establish their often mythological content or inferences, another is to compare archaeological textile remains and think about how a textile may have draped on the body in reality. Classical images, however, do provide information on areas where both literary and archaeological evidence has gaps. Only from images for instance, might we work out how different clothing ensembles might have been put

[34] Frei *et al*. 2009; Ørsted Brandt *et al*. 2011; Friis Bengtsson *et al*. 2011.
[35] See Borego and Vega 2014; Peinado *et al*. 2014; Margariti and Kinti 2014; Bogensperger 2014.
[36] See for example, Cardon, Granger-Taylor and Nowick 2011, 273–362 on textile finds from Didymoi. They make great use of Roman-Egyptian mummy portraits to get a sense of how some of the fragments found might have worked as garments.
[37] See for example Harlow 2004a on female dress.
[38] Koortbojian 2008.

together: did Romans commonly wear more than one tunic for instance? Recent research on the polychromy of marble statues has begun to demonstrate the colourful world of ancient sculpture, and presumably of ancient clothing.[39] Again, however, we must ask how far these colours reflect a real or ideal costume tradition, and the question of stylised fashions versus realities.

The wide ranging written sources of antiquity work in tandem with visual images to allow us to fill the ancient landscapes with clothed people. Literary sources are constrained by genre in much the same way as visual media. Each type of literature will privilege particular and often contradictory images of the clothed body and the use of textiles. Additionally the authors of most ancient written material – from poetry to law codes – were upper class men, writing primarily for an audience of their peers and their interest in dress and textiles went far beyond simple descriptions – in fact, it is arguable that simple description for its own sake was the least of their interests.[40] Describing the clothed body served many other functions in ancient literature: the clothing of an individual could be used as a short hand for their character or their gender or their ethnicity.[41] Cross dressing in Aristophanic comedy, for instance, works as a joke because the audience expects certain gendered norms which the drama subverts to comedic effect; or authors who wish to present moral *exempla* to their listeners/readers ensure that good rulers wear correct clothing and deviations from this suggests an inability to rule and a tendency to moral weakness expressed in dress;[42] and good, chaste wives and mothers do not wear see-through garments or go about with their heads uncovered.[43] Other genres require an equally critical reading although they may at first glance appear more 'factual'. Roman law codes, for instance, suggest that certain garments are only suitable for certain types of people. Dress codes were certainly part of the verbal (and non-verbal) communicative world of Roman society, but how far any individual knew the law, might suffer penalties for wearing the 'wrong' clothing is questionable. However, the law was used to maintain a sense of decorum and identity – in the late 4th century AD the wearing of trousers was banned in the city of Rome, punishable by banishment. This seems a little extreme and fighting a rear guard action in terms of current male fashions but draws attention to attempts to use dress as a means of social control, an aspect only found in the written evidence.[44] Documentary papyri and letters from Roman Egypt provide a rich source of information on textile and clothing production and arguably, taste and fashion. Among these are accounts for estates, for weaving workshops, for dye recipes, for dowry and marriage contracts all of which can be trawled for detailed information on quantities and qualities of wool, particular garments, desirability of certain colours and dyes, apprenticeships of young boys to master weavers and complaints from weavers about the amount of clothing they are expected to produce. Together they provide a very vivid account of often non-elite voices in the textile

[39] Østergaard 2010a; 2011; See Larsson Lovén 2014 for more on visual evidence; Brøns 2014 on fibulae and Skovmøller 2014 on polychromy.

[40] With the possible exception of archaic Greek choral lyric poetry describing actual cultic and religious ceremonies: on the dress of the young girls performing the chorus of Alcman's and Pindar's *parthenoi* see Coward forthcoming.

[41] For the exploitation of textiles as a mark of gender in Greek tragedy see Jenkins 1985; for Greek literary sources dealing with the social habit of exchanging textiles see Lyons 2003.

[42] On dress in Aristophanes see Robson 2005; Swalec forthcoming; on Roman emperors see Harlow 2004b, 2005; Hildebrandt 2009; 2012.

[43] Harlow 2004b; 2012; Hildebrandt 2009; 2012.

[44] Harlow 2004b on trousers in Rome (*Theodosian Code* 14.10.2. AD 399); on adultery and dress codes see Dixon 2014 and her references.

business, in both the domestic and the workshop environment. They are specific to Egypt, it is true, and this is a factor that needs taking into account as it is questionable how far such information may be extrapolated to the wider Mediterranean, but still they provide an invaluable insight. [45] The terminology of ancient dress and textiles is provided by the written sources, but even here the situation is not unproblematic. Inscriptions from both Greece and Rome mention garments or textile related terms that we cannot identify in the material or iconographic record[46] – it is often not clear to the modern reader (especially in translation) just exactly what type of garment is being described or how one rectangular garment, essentially the same shape and function as another should have a series of different names (*khlamýs, khlaína, himátion, tríbōn, ampékhonon, khlanís*) – do these refer to the way it was worn, the material it was made out of, the gender of the wearer or any combination of reasons? How far this literary view of clothing reflects lived social reality is one of the fundamental questions of ancient dress history. It seems that in order to solve the problem of the many dress and textile terms, it is not sufficient for the philologists to trawl through ancient texts, they must also turn to archaeology and to reconstructions (see below) to provide a sense of the experiential nature of ancient clothing.

One of the drawbacks of the loss of craft knowledge is that as modern authors we lack technical knowledge and often miss an essential part of the information. The inter-textual and metaphorical use of the techniques and terms of textile production, as mentioned above for ancient mathematics and philosophy, but also evident in drama, poetry and other forms of literature suggests that the production of textiles in antiquity was fundamental and transcended all areas of life, from the practical to the symbolic: the Fates spin the thread of life, Helen, Andromache and Penelope act as meta-literary weavers in the Homeric poems,[47] the cosmos is thought of as a woven fabric, plots and songs are woven: textile terminology is endemic once one starts to recognise it.[48]

All these examples demonstrate that textile craft was not invisible in the past, but has slowly become so over time. This is partly due to industrialisation which removed textile work from the craftsperson to the factory, removing the element of individual skill. The training to work the early mechanised weaving and lace-making machines required skill but was associated with engineering rather than the craft of textile production. The design and creative element of the process slowly became owned by hand weavers, fashion and interior designers. However, this invisibility has arguably more to do with the perception of textile craft as a gendered entity, belonging to the realm of women. In antiquity the term *lanam fecit* (she worked wool) was used of women to associate them with the virtues of a good wife and mother; modern scholarship, following from a Victorian tradition, has bought into this ideal which has a very old pedigree in Homer's Penelope, weaving and un-weaving while she waits for her husband, Odysseus, to return from the Trojan War. This view of antiquity is a misconception however; in both the Greek and Roman worlds, while spinning remained primarily the work of women and children, weaving became the preserve of men once it stepped outside the confines of the home. Weavers who worked in a workshop situation and for profit were more often than not male workers rather than female.[49]

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[45] On papyri see Droß-Krüpe 2011; Martelli 2014; Droß-Krüpe and Wagner 2014.
[46] Cf. Cleland 2005a, 2005b.
[47] Clader 1976; Clayton 2004.
[48] Scheid and Svenbro 1996; Harlizius-Klück 2004, 2005; Andrés-Toledo 2010; Nosch 2014a; Harlow, Nosch and Fanfani (eds) forthcoming. Rudy and Baert 2007.
[49] Larsson Lovén 1998a, 1998b, 2002; see also Sigismund Nielsen 2011 on the idea that modern scholarship has overplayed

Aligning textile production with domesticity and female virtue conceals both the necessity of domestic production in some circumstances and situates textile production in a seemingly unimportant socio-economic category which makes economists refrain from considering its role and value in the ancient economy. This, however, is paradoxically a vision invented in the late 20th century by a professional academic community, who were distant from the experience of practical life and knowledge of the modes and methods of textile production. Indeed in works from the early 20th century and before, scholarly studies of ancient clothing and costume were recognised as integral to the study of antiquity.[50] Research on the ancient economy undertaken in that period also contains detailed discussion of clothing, textiles, fibres, and labour in textile industry.[51] As Beate Wagner-Hasel has demonstrated, late 20th-century studies of ancient technology history neglect textiles as a field of ancient technology.[52] Indeed a series of scholarly works of the late 19th and early 20th century explore textile technology and its role in ancient technology, its origins and developments,[53] followed by comparative studies of textile technologies.[54] For instance, the construction of ancient looms and their technologies involved historians and archaeologists alike and was a topic of lively debate.

Gender studies have regrettably not done much to improve this situation – we might think that studies of women would highlight and emphasise domestic production and the contributions by women and children to the economy; but gender historians have wished to stress women as authors, women in politics, equality etc. (all of which are valid issues), and in inheriting the 20th-century notion that textile production is a humble domestic production they play down or neglect the domestic sphere and thus the production of textiles. Ironically then, it is still today women scholars who dominate the field of textile research in antiquity in almost all areas: archaeology, iconography and literary studies. A salient example here is the Brauron catalogues. While Greek and Roman epigraphy is traditionally a discipline with many male scholars, this major 4th-century Greek inscriptional corpus concerning dedicated textiles and garments, the Brauron catalogues and their Athenian copies,[55] proves an exception. The garment contents have been investigated primarily by female epigraphers: Tullia Linders, Dina Peppas-Delmousou, and Lisa Cleland.[56] The Brauron Artemis cult is investigated, among others, by Lilian Kahil, Joan Breton Connelly, and Cecilie Brøns.[57] The gendered perception of textile craft as female work is rather compounded by the fact that most academics working in the field of textile and dress research in antiquity are women.[58] The present volume is further evidence of that: in the group of twenty-six authors and co-authors, twenty are women.

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the *lanam fecit* motif (paper presented at the Dress ID workshop on age, gender and dress, Sheffield, November 2011). Already in Mycenaean Greece, men figure among weavers and boys take part in textile production, see Nosch 2014c.

[50] Bieber 1928; 1934; Mongez 1818; Heuzey 1922; Wilson 1924; 1938; Repond 1931.

[51] Textiles are discussed quite extensively in e.g. Francotte 1900–1901 and Glotz 1920; Weigert 1865/66; Heer 1872; von Cohausen 1879; Schröder 1884; Grothe 1885; Buschan 1889; Riegl 1893; Coyon 1903; von Stokar 1934; 1938.

[52] Wagner-Hasel 2000, 306–307 and note 8. She mentions, for example, Landels 1978; Burford 1972; Roebuk 1969; Hopper 1979.

[53] Weigert 1865/66; Grothe 1883; Schröder 1884; Buschan 1889; Riegl 1893; Blümner 1912; Johl 1917; von Stokar 1934; 1938; Forbes 1964. La Baume 1995.

[54] Hald 1946; Ling Roth 1951; Haffmann 1964; Picard-Schmitter 1965.

[55] *IG* II^2 1514–1516, 1517B, 1518B, 1521B, 1522–1523, 1524B, 1525, 1528–1530. We thank C. Brøns for this information.

[56] Linders 1972; Peppas-Delmousou 1988; Cleland 2005a and 2005b.

[57] Kahil 1963; 1965; 1977; 1981; 1988; 1990. Connelly 2007; Brøns forthcoming.

[58] Bender Jørgensen 2010, xx. To highlight this gender situation, we have chosen to include the first names of the authors in the bibliography below.

Asking modern questions of ancient clothing: the case for interdisciplinarity

We could address a list of all the sources and types of evidence and coin them interdisciplinarily by their merger, not that this in itself is methodologically sound. Simply layering different types of evidence alongside each other does not create instant interdisciplinarity, nor does it deal effectively with context or genre. Instead, here we will operationalize interdisciplinarity by compiling a list of the relevant questions to ask of a wardrobe or clothing today and in antiquity, and discuss what sources are necessary and useful to answer these questions. The questions are:

How was clothing worn and used?
Who wears it?
When is it worn and why?
What terms are used for textiles and clothing?
Where do the textiles come from?
How is it made?
Do I look good in this?

The answers are broad and general but they make the point that collaborative research and the willingness to engage with disciplines outside and beyond our own expertise can exponentially improve our understanding of ancient textiles and dress. It also highlights how a narrow focus on only one type of source will necessarily limit the scholar to certain questions.

How was clothing worn and used?

Wardrobe studies are used extensively in museums today to examine the clothing collections of individuals from the early modern period onwards and are created based on actual clothing collections, texts, particularly inventories, interviews where possible, and iconography. Visual evidence aids understanding and interpretation of how clothing was worn on the body and in combination with what accessories. In periods where there are surviving items these can also be very informative, and in living history the owner's opinions on their clothing is enlightening and reminds us that personal taste is a constant in clothing choice.[59] For antiquity we have a far more limited range of available material but for many items we can make assumptions about how they were worn, what clothing ensemble they were part of and how they were used. For the most part our source material comes from iconography and written sources, although archaeological textiles can reveal much about patterns of use and re-use. One example is vase painting with detailed representations of Greek clothing illustrating how fabrics might have been draped and fastened around the body. Another is the fact that without surviving sculpture and iconography, the iconic Roman toga would be very hard to imagine since it is only superficially discussed in ancient literary sources and completely absent in sources such as Diocletian's Edict of Maximum Prices and the archaeological record.[60]

In the archaeological record of burials, more often than not we have no textiles preserved but the exact placement of dress fasteners, fibulae and jewellery on the human remains can help reconstruct how ancient costumes were fixed on the body of the deceased.[61] This reconstructed costume may, however, reflect the dressing of the dead and thus a burial costume rather than the real contemporary costume tradition.

[59] Klepp and Bjerck 2012; see Hayward 2009 on the Tudor period.
[60] On the toga see Wilson 1924; Goette 1989; Davies 2005, 2010 and Harlow forthcoming.
[61] Grömer, Rösel-Mautendorfer and Bender Jørgensen 2013.

In museums, experiential and experimental archaeology and participant involvement now provide the audience with a tactile experience of how ancient dress was worn and used; scholars follow this path with interest and increasingly sophisticated criteria for reconstructing different levels of ancient clothing.[62] Other scholars have drawn on ethnographic parallels for how to wear clothing in antiquity, or included experience of female clothing from today's Islamic costume traditions as the use of draped clothing in modern societies, particularly those which impose certain dress codes for women, play to the ancient historian's imagination.[63]

Who wears it?

This question addresses how clothing expresses aspects of the wearer's individual and social identity: their gender, age, profession, rank, ethnicity, religious affiliation etc. Texts and visual evidence can show how an author or artist chose to represent and stress particular characteristics; it is the relationship between representation and social reality that requires nuancing here. As noted above, dress could be manipulated by ancient authors to create a particular image of the person or group described, and it is sometimes impossible to ascertain how much of this rhetoric was simply literary fiction used for effect. Cicero was particularly good at this in his forensic speeches, while satirists exploited it to the full.[64] Public art also offers a relatively limited repertoire of dressed individuals, implying that a limited range of wardrobe choices was available for the individual when out and about in the community. This limited wardrobe does not match the huge range of items found mentioned in literary sources and epigraphy, nor the range of different textiles found in the archaeological record, suggesting the likelihood of both a public and private wardrobe: clothing that was considered suitable for wearing in private at home, and another outfit that was suitable for official business, for a religious event and the presentation of the public persona. At all times, this may only have been an option for the wealthy and upper social classes – the group that is over represented in the sources. Trying to access the everyday clothing of other social groups is often difficult. Only rarely, and usually to make a specific point, do we see people in rags, in ordinary dress, worn out shoes, or non-matching ensembles. Ordinary, everyday clothing is, in most periods, difficult to grasp and must represent a specific focus for the dress historian.[65] Some groups do appear in art but often in genre pieces: the elderly or poor or labourers are often shown in short tunics worn only over one shoulder for instance, while children are shown in loose tunics. Clothing regulations sometimes suggest that some types of clothing are only suitable for certain groups, and occasionally, there were attempts to control the expression of wealth through ornament in various sumptuary laws.[66]

[62] Demant 2009 on different criteria for different levels of reconstruction: C standard = factory woven fabric, in quality as close as possible to the original, machine sewn, except where the stitching is visible and used for school children and adults who want to experience the feeling of natural fibres; B standard = garments made from hand-woven fabric from machine spun yarn, in quality as close as possible to the original. All material plant dyed. Suitable for museum displays and living history environments; A standard = hand spun fibre from as close to the original as possible, woven on correct contemporary loom, hand sewn, plant dyed. Suitable for research reconstructions; on Dama de Baza see Demant 2011; Grömer 2009 on reconstructions of pre-Roman dress in Austria. Much of this work was undertaken as part of the European Dress ID project (2007–2013) (http://www.dressid.eu). On the theory and use of reconstructions see papers in Staubermann (ed.) 2011.

[63] Barber 1991; Harlow 2012; 2015.

[64] For Cicero see Heskel 1994 and Dyck 2001; on satire see Salles 2003; for the *Historia Augusta* see Molinier-Arbo 2003 and Harlow 2005.

[65] See for example, Diocletian's Price Edict 26.69, 75 on linen listing certain types of coarse linen, suitable for farm workers and slaves (*rusticorum vel familiacorum*). In Greece, the typical clothing for the male slave is the *exōrmís*, a woolen garment especially made in Megara.

[66] Cf. Livy 34.1–8 on the *Lex Oppia,* Digest 34.2.23; 47; Theodosian Code 10.21.3 (AD 424) on the wearing of silk and

Funerary evidence if found *in situ* can reveal how an individual was dressed on the special occasion of their burial, but again the value of this answer depends on the social context of the burial (are clothing and grave goods for the deceased or for the viewers of the burial to demonstrate the status of the living relatives?) and on the nature, recording and conservation of the archaeological material.[67] Some of the closest evidence we have for 'who wears it?' comes from finds from sites such as the Roman garrison at Didymoi and Mons Claudianus, a Roman quarry site, both in Egypt, and from Vindolanda on Hadrian's Wall. We know a little of the population content of these sites, and the clothing items found, including shoes, hats, bags, etc., enhance our understanding of social identities, social relationships and wider elements such as trade.[68]

When is it worn and why?

Most cultures have ceremonial or ritual costumes for particular people on special occasions. These wardrobes tend to be over-represented in the visual and iconographic material, particularly in vase paintings and sculpture. Written texts sometimes explain the prohibition or proscription of particular clothing for occasions such as at religious rituals or by particular priesthoods or at semi-public events such as weddings. From epigraphic material one could mention Greek clothing regulations in sanctuaries stipulating white as an appropriate colour, and often including local traditions such as being bare-footed, not wearing pig-skins or, alternatively, dressing in purple to honour the gods.[69]

And, as already mentioned, burials privilege what a community thought of value when dressing the dead, but archaeological textiles *per se* cannot answer this question without reference to other types of evidence. One instance where the study of archaeology and the visual material have come together to change traditional opinions about dress is in the matter of *clavi*, the stripes that run vertically from shoulder to the hem of tunics throughout the Roman period. Historians who primarily use texts often cite the example from Suetonius that Augustus insisted on the status marking *latus* and *angustus clavi* for those of senatorial and equestrian rank. Archaeological textiles, Roman-Egyptian mummy portraits, wall paintings and mosaics, however, demonstrate that *clavi* were worn on almost all tunics, by all classes and by both men and women. The notion of status marking must have been evidenced in other more subtle ways by Romans of the ruling classes.[70]

What terms are used for textiles and clothing?

Textile terms in antiquity appear in all types (inscriptions on stone, papyri, literature) and genres of written sources (poetry, prose, economic and legal documents, etc.) producing an extensive glossary of clothing and textile terms. Two of the major corpora of textile terms are from the extremities of the chronological span: Linear B tablets of the Bronze Age (*c.* 1300 BC) and Diocletian's Edict of Maximum Prices (AD 301). During this 1600 year period, the basic textile technology does not

purple; for sumptuary legislation in ancient Greece: Blok 2012; Frisone 2011.

[67] See, for example, papers in Carroll and Wild (eds) 2012. For an excellent case study see Van Raemdonck *et al.* 2011 and Van Strydonck *et al*. 2011 on Euphemia, the 'embroideress'.

[68] See note 29 for Didymoi and Mons Claudianus; for Vindolanda see for example Wild 1979 and Wild *et al*. 1998.

[69] See for example: Connelly 2007, 85–116 on dress of Greek priestesses; Brøns forthcoming on Greek sanctuary evidence; Aulus Gellius 10.15 and Festus 92 on the costume of the *Flamen* and *Flamenica Dialis* at Rome; Livy 10.7.9, 30.15.11; Pliny *NH* 8.74.195; *SHA* Sev. Alex. 40.8; Gord. 4.4. on the triumphal dress of Roman emperors; for Roman bridal wear see La Follette 1994; Hersch 2010.

[70] Bender Jørgensen 2011.

change, while the textile terminology does. There are few or no overlaps between the two corpora (*pa-wo* and *phāros*; *ki-to* and *khitōn*). Mycenaean Greek textile terminology is clearly rooted in a Bronze Age tradition influenced by the Minoan language,[71] while the bilingual Greek and Latin of Diocletian's Edict testifies to the multicultural world of late antiquity. Diocletian's Edict of Maximum Prices mentions over 150 textile and garment types and their prices seem to suggest that this is a highly regulated market for textile circulation.[72] As Valentina Gasbarra has demonstrated for the 3rd and 2nd millennia, there are textile terminology loans between Semitic languages and Mycenaean Greek, but these are a special class of loanwords, so-called *Wanderwörter*, and they occur only for traded goods such as spices, textiles and precious metals.[73] Textile terminology is clearly a very dynamic and productive field in terms of loans, adaptions of foreign terms, invention and integration of new ones. Frustratingly, for textile terms, we are mostly unable to identify the semantic shifts which might appear with technological changes.[74]

It is often challenging for researchers in the present to identify a garment from its ancient name. Many textile and clothing names are not securely identifiable in the current visual and archaeological record; others carry an ambiguity in the modern mind that presumably was not present in ancient times. Some garments are termed according to their most prominent feature, particularly the coloured decorative elements. The placement of this decorative element then generated highly visual garment names: *platyalourgés* 'with a wide red band', *peripórphyros* 'with a red border', *mesóleukos* 'with a white element in the centre', or *periēgētós* 'with a coloured border'.[75] On the other hand, generic terms for wrapped clothing or cloaks may also have carried specific meanings in antiquity that are now lost to us. In both Greek and Latin there is a series of clothing items to cover shoulders and upper body and often attached with a metal device (pin, fibula), and they are called *khlamýs, khlaína, himátion, sagum*, *amictus/amiculum, pallium* (to name but a few). We see them everywhere in the iconography but their different and subtle meanings seem to constantly shift and change. One example is Alexander the Great's *khlamýs* (cloak), said to be of Macedonian type which meant with rounded edges to facilitate riding, as opposed to the Thessalian *khlamýs* with squared edges. Scholars have searched for iconographic evidence for both and found it.[76] However, functionally seen, the difference between the two is insignificant and it is probably rather in the political and social dimension of clothing that the different clothing terminologies for male cloaks should be placed. Alexander's strategic use of ethnically mixed dress code of Macedonian and non-Macedonian, e.g. Persian/foreign, clothing was instrumental in fulfilling his political ambitions.[77]

A second challenge is that ancient populations recognised fabrics as a matter of course and did not need to specify different types in detail. However, throughout antiquity, as today, a 'made-in' label for clothing is found in the use of toponyms and their derived forms to indicate the place where clothes were made, traded, or, once the toponym is an accepted part of local terminology, simply to suggest a specific quality. This phenomenon is already well attested in the 3rd and

[71] Del Freo, Nosch, Rougemont 2010.
[72] Barańscy and Janiszewski 2007, 17.
[73] Gasbarra 2014.
[74] Wild 2000, 209; Cleland, Davies, Llewellyn-Jones 2007; Schrader 1886.
[75] See Spantidaki 2014 for the references.
[76] Neuffer 1929; Fredricksmeyer 1997; Saatsoglou-Paliadeli 1993; Kingsley 1984.
[77] Papadopoulou forthcoming.

2nd millennia BC where it is used for textile and garment designations.[78] However, by the 1st millennium toponymic designations also become a wide-spread linguistic and economic tool to designate ranking and qualities of, for example wine and oil.[79] Qualities, types, traditions and places are connected, and places are a useful denominator for remembering and ranking quality and type, and this is especially evident in the Edict of Maximum Prices. Thus a garment might be called *amórgina* and *tarantína*, but it would be futile to search for special techniques, tools or textiles in the Cyclades or in Salento. This does not mirror a politically fragmented classical landscape, but rather reflects a sense of regionalism, *terroir* and locality. Other renowned examples are Coan silk, or, for instance, Pannonian and other locally named cloaks in Diocletian's Edict, and Pliny's list of the best local Italic wool types. This topological generation of textile terms mirrors both places of production, of origin, and sale places, but over time comes to refer to qualities and types as well.

Byssus is another challenging term for clothing worth mentioning in this context. Originally a Semitic term employed to designate fine cloth of silk, cotton, or linen. In modern translations, especially in the Italian translation of the Bible of the early modern period, as demonstrated by Felicitas Maeder, via a misunderstanding and confusion of *byssus* and Italian *bisso* as 'depths of the sea', it was perceived as the technical term for 'sea silk' made of filaments of the *pinna nobilis* mussel. While we have some fragments of a hat made from *pinna nobilis* dating from the 4th century AD, we are unsure what name the ancients gave to such marine textile fibre.[80]

Finally, it is important to consider how far textile terms are to be considered metaphorical images or references to real techniques. Literary texts also provide extensive vocabularies of clothing and textile terms.[81] However, as discussed above, in these genres, clothing terms are often a tool to describe a character, not to describe technicalities of manufacture or quality. Conversely, as Ellen Harlizius-Klück has observed, modern scholars often tend to understand textile terms only metaphorically, and not as real technical concepts used by ancient Greeks and Romans. For modern scholars, the ancient use of textile terms have often been seen as metaphors for mathematics and astronomy, Harlizius-Klück on the other hand, attributes a more concrete meaning to these textile paradigms and demonstrates that the ancient Greeks quite technically and literally compared and exemplified cosmic phenomena to textile technology. The division of odd and even numbers stems from practical actions and theoretical models aimed at solving quite concrete challenges in textile patterns.[82]

Where do the textiles come from?

The new methodology of isotopic tracing of strontium in textiles provides the possibility to trace the locality of textiles and thereby demonstrate their local or non-local origin.[83] This technique gives new impetus to examining the origins of textiles, which were previously established by identifying the fibre and/or stylistic analyses of textile patterns and techniques.[84]

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[78] Michel and Nosch 2010.
[79] Lawall 2011. Greek divinities are also differentiated by their affiliation to different places.
[80] Maeder, Hänggi and Wunderlin (eds) 2004; Maeder 2008; Landenius Enegren and Meo forthcoming.
[81] See, for example, Gallet 1990 on Pindar, and Wagner-Hasel 2000 on Homer.
[82] Harlizius-Klück 2004; 2014.
[83] Frei *et al.* 2009.
[84] See, for example, the Virring textile discussion, Kaczmarek 2014.

Another significant marker of non-local textiles and their mobility are fibres foreign to the place of discovery. In the Mediterranean, finds of cotton or silk stand out as non-local and imported.[85] Silk textiles found in Palmyra with in-woven Chinese signs raise questions about origin and mobility of both materials and craftspeople.[86] Finds of wool textiles in Egypt can be considered a sign of their Roman origin and wool as a Roman cultural marker, against the more common linen of local preference. The remains of cotton fabrics in Egypt indicate trade with India and are interpreted as old Indian cotton sails reused as isolation in buildings, suggesting contact over a longer period of time.[87] Also from Egypt, Dominique Cardon has demonstrated how the composition of dye components of red dye can lead to the exact identification of the mollusc species, in this case the banded dye-murex, *Hexaplex trunculus* which then pinpoints the dye to the Mediterranean, its exclusive biotope.[88] One of the highlights of textile finds testifying to the mobility of styles and patterns comes from the Tarim Basin in China. Here a late 4th or early 5th-century burial costume tailored into a kimono styled garment was discovered to have been woven on a Chinese loom; made of red woollen yarn, decorated with images of Hellenistic-Roman iconographic themes.[89] Another example is the remains of silks and knotted pile rugs found in burials in Pielgrzymów and Zakrzów in Poland which are considered to be of Roman origin; similar contemporaneous items have also come to light in Palmyra.[90]

As mentioned above, spin-direction has often also been used as a tracer of origin or at least as a sign of locality since there are some overall cultural traditions of directional tendency. As much as the overall picture is important, spin-direction cannot alone trace origin, since exceptions and personal styles appear. However, it is evident that researchers have a number of tools with which to track the mobility of textiles and textile techniques.

Recent research has provided new insights into the modalities of long distance textile trade since it becomes increasingly evident that not only textiles and garments, but also fibres, yarn, dyes and even unfinished materials are all traded. For classical antiquity it is particularly the discussion of the extent, distance, and volume of textile trade between the Roman Empire and the world beyond its borders which has highlighted the issue.[91] Textile analyses from the northern regions beyond the limits of the empire have demonstrated that the quality of fabrics increased in the Roman period and decreased again in the later medieval period.[92] However, this does not necessarily imply that high quality was due to the importation of Roman textiles: it is possible that the Romans traded fine-fleeced sheep into areas along the northern borders where they were crossbred with local species; or perhaps wool or spun yarn was imported.

The mobility of the Roman army, and its presence along the *limes* meant an increased demand for clothing and other textile necessities; these were purchased individually by soldiers or collectively as a part of the army logistics.[93] Distribution patterns and mechanisms varied over time and in different provinces or conflict situations but the possibility of exchange of materials, techniques, and styles was present at all times.

[85] Hildebrandt (ed.) forthcoming.
[86] Stauffer 1996.
[87] Wild *et al*. 2008.
[88] Cardon 2010.
[89] Jones 2009.
[90] Maik 1994, 12–13.
[91] Bender Jørgensen and Wild 1988, 65–98; Kaczmarek 2014.
[92] Maik 2001; 2007, 97–105.
[93] Nosch (ed.) 2012; Kaczmarek 2014; Jones 1960–61.

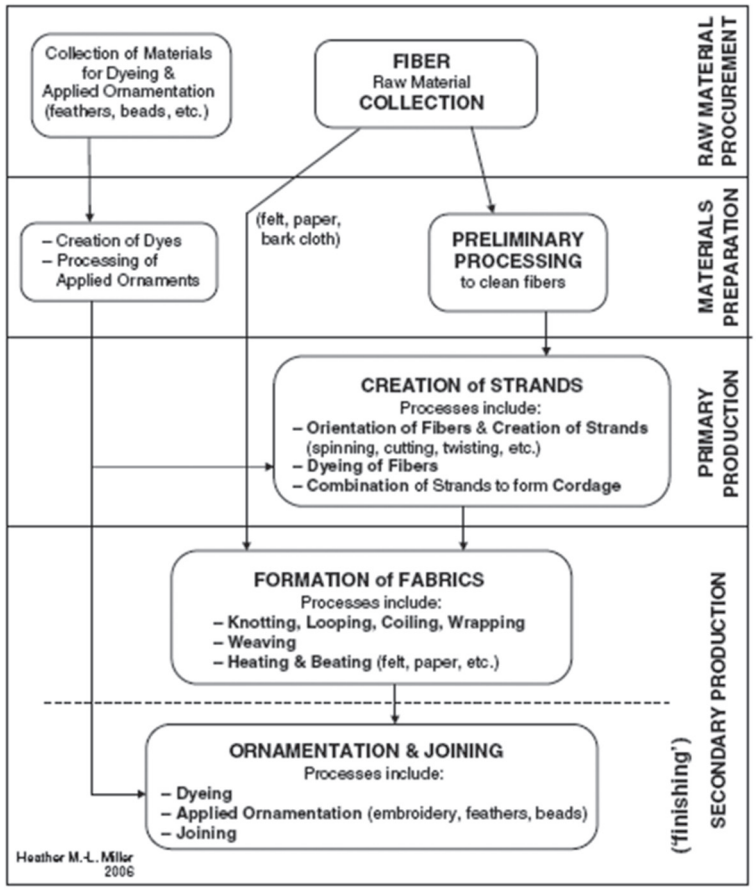

Figure 1.1 Chart of the chaîne opératoire *in Miller 2007.*

The question of the trade and mobility of textiles can only partially be answered through iconography. In both Greek and Roman cultures artists used dress as a visual marker for 'the other', and in local communities along the Roman borders for instance, individuals used dress as a clear marker of local/Roman allegiance (or their rejection of it).[94] Margaret C. Miller has highlighted Persian clothing in Greek vase painting because it is colourful and highly patterned, and therefore a visual marker of non-Greek origin.[95] How far this translates into any real Persian wardrobe is unknown, but it certainly outlines them as foreign and non-Greek to Greek viewers. In written Greek sources, Aristophanes in particular, who must have used the everyday clothing terms for his audience to visualise his characters, a thick coat – without any suggestive patterning it seems – is called a *persis*;[96] rugs from Miletus, *strṓmata milḗsia*,[97] and wool from Miletus *eria*

[94] See, for example, Wild 1968; Rothe 2009; Hendzsel *et al.* 2008; Grömer 2014.
[95] Miller 1997.
[96] *Vespae* 1131ff, where the comic point is brought by terminology and an explicit Greek/Persian dichotomy.
[97] *Ran*. 542.

milḗsia 'Milesian wool'.[98] Aristophanes lists traded items such as 'Laconian shoes', which may have come from Laconia, but the fact that Laconian shoes are so often mentioned, rather suggests that the term simply conveyed a certain type or fashion of shoes.[99]

In Greek sources, female clothing is ethnically coined in the shape of the *Ionian chiton* and the *Doric peplos* (and the dichotomies are highlighted by the fibres: the Ionian *chiton* being of linen and the *peplos* of wool). The dichotomy between Ionian and Doric clothing is emphasised by the use of pins and fibulae in the Doric clothing. After a conflict with Aegina, Herodotus uses this dress element in his narrative to explain the change of female dress: the *peplos*-dressed Athenian women killed the sole surviving soldier with their dress pins and as punishment had to change to the Ionian style without pins.[100] This is again another case of the use of ethnonyms to describe styles.

Lists of wonderful exotic traded goods are preserved in Hermippos' trade list and lists from comic fragments (Antiphanes and Eubulos) from the Hellenistic period.[101] Hermippos' trade list is a catalogue of delicacies and their place of origin or trade in Greece. Most of the products are edible and of rather exclusive nature: species of fish from the Hellespont, pork and cheese from Sicily, raisins and figs from Rhodes, apples and pears from Euboia, acorns and almonds from Paphlagonia, dates and fine wheat flour from Phoenicia. High-end textiles and textile products, are among these traded goods: couches and pillows from Sicily;[102] carpets (*strṓmata*) and pillows from Corinth.[103] Clearly, textiles and clothing seem to integrate well into the trade networks and logistics of long-distance trade.[104]

How is it made?

This question can be answered by standardised textile analysis, verification of weave type, seams, dyes, spin direction and tension, and yarn qualities. The results can be compared to local textile tools and their physical properties to assess whether the fabrics were made with these tools.[105] It is now possible to hypothesise on the range of possible textiles from the tools alone.[106] In this area work on archaeological textiles is essential. The seminal work on weaving-to-shape by Hero Granger-Taylor was possible due to her extensive knowledge of archaeological textiles and her ability to read the signs on the bronze (i.e. moulded) statue of the Arringatore.[107] Granger-Taylor demonstrated that garments in antiquity were made on the loom, requiring only minimal or no tailoring to make them suitable for wear. Since the early 1980s then, scholars have understood the techniques of ancient clothing manufacture in very different ways, and combined knowledge of surviving textiles with contemporary iconography in more meaningful analysis.

[98] *Lys*. 729, and see *Av*. 493.
[99] Aristophanes, *Vesp*. 1158, *Thesm*. 142, *Eccl*. 74, 269, 345, 508, 542, *Thesm*. 421. It is perhaps worth noting that in the French language today women's leather sandals with crossed straps, no matter where they are made or purchased, are termed *spartiates*, 'Spartan' sandals.
[100] Herodotus 5.87.1–3. On pins and fibulae, see Brøns 2014.
[101] Hermippos: fr. 63 (Koch I, 243); Aristophanes: fr. 193 and fr. 236 (Koch II, 92, 115); Eubulos: fr. 19 (Koch II, 171); Knorringa 1926, 74–76, 134–136.
[102] Eubulos Fr. 121 (Koch II, 208).
[103] Antiphanes Fr. 236 (Koch II, 115).
[104] Seland 2014.
[105] Gleba 2008; Andersson Strand and Nosch (eds) forthcoming.
[106] Andersson Strand *et al.* 2009.
[107] Granger-Taylor 1982.

The discipline of experimental archaeology has made an equally significant contribution to research in this area. It is now possible through many tests and experience to gain deeper understanding of how textiles were made and to answer such questions as: how long might it take to make a garment; what level of skill was required; what quality of raw material used; and what resources and techniques were required. Furthermore, archaeologists working together with experienced craftspeople have produced reproductions which have given new insights into how textiles were made and how they might have been used. This allows us to ask how long a garment could last, how often it needed mending and where the wear is first visible.[108] Such experiments and close observation of surviving textiles have also helped in the avoidance of embarrassing anachronisms and mistranslations in philological studies. For instance the modern common misuse of the term embroidery to designate decorated textiles;[109] or the misuse of the term carding for the 3rd and 2nd millennia BC textiles when fibres were actually cleaned and processed by combing instead.

It is far harder to answer this type of question with literary material as ancient male authors tend to assume an understanding of textile techniques omitting any clear explanations, or using wrong or confusing terms. Pliny for instance, expends a great deal of effort on the description of murex-dyeing techniques which seem to reveal that he had good informants but did not know the whole secret of colourfast quality dyes.[110] On the other hand dye recipe books on papyri tantalise in their detail and suggest a good knowledge of the chemistry behind dyeing – even if we cannot identify all the ingredients.[111]

Understanding how a garment is made, and from what type of material, is key to understanding the manner in which it might be worn and how it might be experienced on the body. The properties of any given textile will influence what can be made from it, and how it might be made. Wool can be heavily felted for waterproofing, or it can be light and loosely woven in many colours – as a textile it is extremely versatile. Silk might be valued for its sheen, its colour and in antiquity for its rarity and exoticism. Linen for its fineness, or for its extreme tensile strength. Ancient clothing is often talked about in terms of 'drapery' and it is the relationship of the type of textile and its properties combined with the techniques of its construction that create drape.[112]

Fundamental to all this is the perception of the *chaîne opératoire* or the logic of production. This approach – examining the processes, resources, skills required to move from raw material to finished garment – has been much studied by prehistorians but for the classical period again tends to find itself lost in disparate academic disciplines. For instance, landscape archaeologists tend to stress the effects of sheep rearing and transhumance; other archaeologists might examine the production and placement of dye-works while textile archaeologists examine the finished articles; ancient historians look at the occupations of those involved in textile production. Figure 1.1 is Miller's generic chart outlining the chain of production. Figure 1.2 is rather more complex and based on the various methods examined in the papers in this volume. It highlights the variety of processes that might have come into play at different stages of production. While there is an underlying basic flow (gather material, process for spinning, weaving, finishing) there are a multiplicity of ways

[108] Kelly McLauchlin 1981; Demant 2009; Andersson *et al.* 2008; Andersson Strand and Nosch (eds) forthcoming.
[109] Droß-Krüpe and Paetz gen. Schieck 2014.
[110] McGovern and Rudolph 1987; 1990.
[111] Pliny *NH* 9.124 (60)–141 (66); Martelli 2014.
[112] Losfeld 1999.

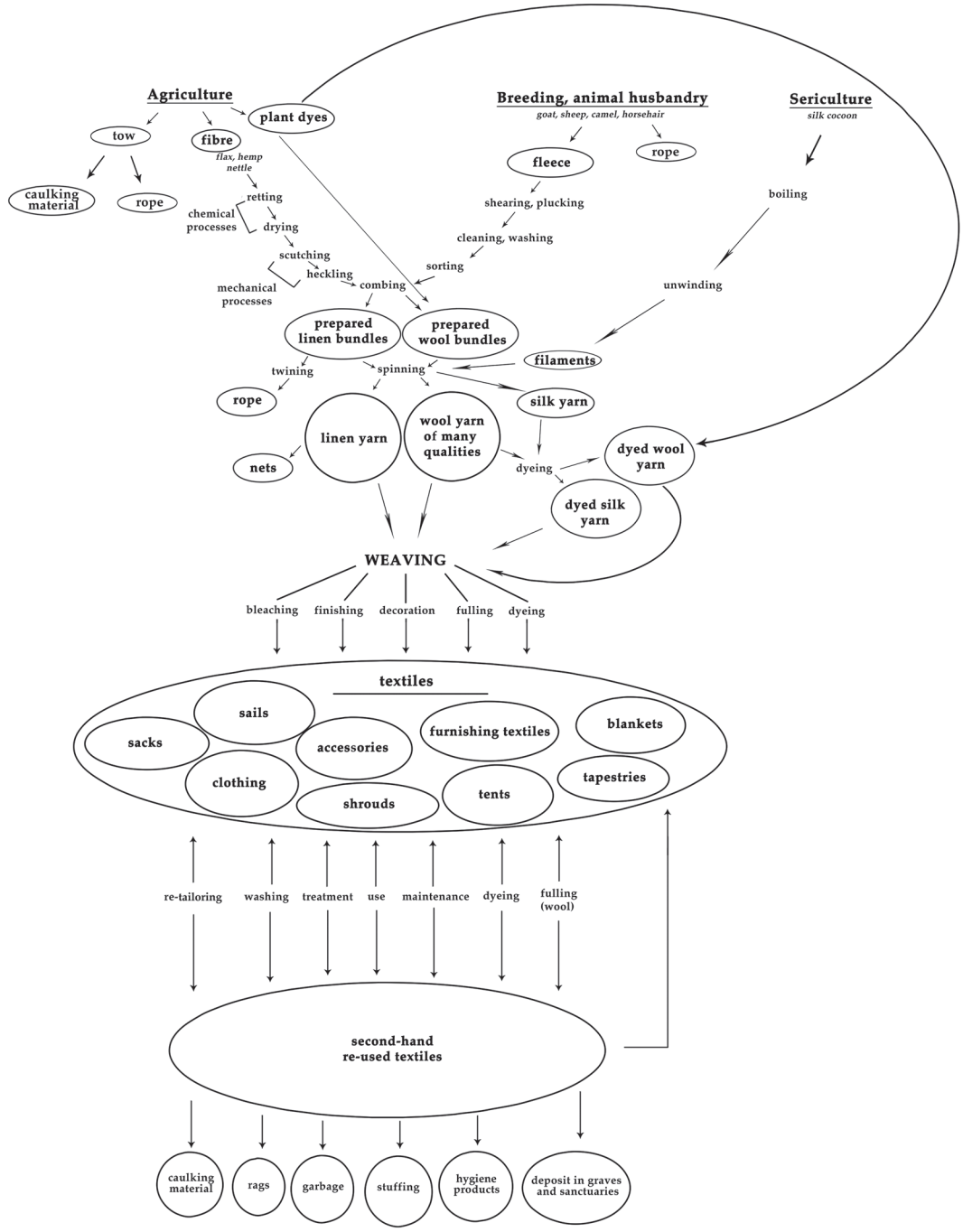

Figure 1.2 Figure of the chaîne opératoire *according to the papers in this volume. Encircled words indicate textile commodities.*

in which the process was nuanced by cultural preference, by pragmatic practicality, by the craft-person's ingenuity, by the desire for a particular finish etc. Textile archaeologists might identify these subtleties but it is important that all those who work on dress are aware of them and their variations in order to fully comprehend what we are looking at.

In recent years with the recognition of the need for more interaction between the sciences and the humanities coupled with the increasing acceptance of the methods of experimental archaeology, more joined-up thinking is becoming apparent in published work. This is a mode of academic study in which the arts and humanities are learning from the sciences.[113]

Do I look good in this?

This is a question most often asked of modern clothing where a 'look', be it uniform, corporate or highly individualistic, has become very much part of the notion of identity. It is far harder to ask this of antiquity and some may argue that it is not a relevant question for the period. However, even in antiquity, individuals desired a 'look' even if one controlled simply by conceptions of gender, and everyone had an intimate relationship with clothes and an experiential relationship with clothing: was it comfortable to wear, smooth or scratchy on the skin, how did it smell etc.?

In antiquity, the shape of textile clothing remains fairly static over hundreds of years and mostly consists of draping and wrapping rather than the modern cutting and sewing and moulding to body shape. However, archaeological finds from northern Europe suggest that skin and leather clothing, shoes, cloaks and hats were instead stitched and fitted to shape. Thus, we have a quite static clothing habit covering a body which over the years changes in size and morphology. How did clothing respond to obesity, pregnancy, breastfeeding, emaciation, physical disability? It seems that clothing must have been adjusted by belts, pins, fibulae and the layering of different garments. In Roman sources at least, it is never said, and never really shown, but iconography reveals layers of folds and the impression of belted garments. The same phenomenon in the Greek world is evident for fibulae. They are rarely shown in iconography where figures wander relaxed about in loose dresses without constraints, but the substantial number of fibulae in archaeological contexts and burials demonstrate that they must have been functional, necessary devices to keep clothing in place.[114] Overall our sources present us with highly normative dressed bodies, and the relationship of the changing body and dress in antiquity is an area that requires more research.[115] Another side to this question is how does this make me beautiful? Ancient literature, particularly the works of Ovid and the debate in antiquity over the dangers of female (and male) adornment alert us to the fact that beautification was part of normal social behaviour. The notion of beauty is highly culturally determined but both the Greeks and the Romans had clear, if not consistent, ideas of beauty and how individuals should look. The basic shaping of garments suggests that women, and men, might

[113] On the *chaîne opératoire* see Wild 1970; Andersson Strand, 2010; 2012; on various processes of the production chain see, for example: Frayn 1984 (on sheep rearing and wool trade in Rome); Flohr 2013 (on fulleries and fullers); Larsson Lovén 2000; 2002 (on imagery of textile workers); Liu 2009 (on *centonarii*); Hopkins 2011; 2013; Boesken Kanold and Haubrichs 2008 (on uses of experimental archaeology). The *Dress ID* project and the *Purpurae Vestes* conferences organised by Carmen Alfaro in Valencia have been instrumental in bringing many disciplines and scholars together and encouraged the type of collaborative work that is essential in textile and dress research (see, for example papers in Tellenbach *et al.* 2013; Grömer 2013; Alfaro, Costa and Wild (eds) 2004; Alfaro and Karali (eds) 2008; Alfaro *et al.* 2011; Carroll and Wild 2012).

[114] Brøns 2014.

[115] See papers in Fluck and Larsson Lovén forthcoming.

have draped and wrapped their clothing to suit their figures, to highlight their perceived good points or used any combination of colour, fine quality textiles, jewellery and cosmetics to create their desired image.[116] For the modern reader these subtleties are hard to identify, let alone interpret. As with all the other questions asked here, we need to have a wide range of understanding to interpret the evidence and to put it into context.

Talking about fashion also produces mixed reactions among academics studying the ancient world, many (including ourselves) take it for granted that ideas of fashion existed but others are more sceptical arguing that the concept can only be applied from the early modern era and period of industrial revolution which revolutionized cloth and clothing production and set the cyclic production and consumption schedule which today frames the constant changes in fashion. However, even in antiquity when the basic shapes of clothing did not change much over time, there are changes of style, ways of draping and alterations of dress and in choices of material and colours. Much of the information about such nuances comes from literary material and particularly from moralizing treatises in which descriptions of dress express far more than simply descriptions. Individuals who chose to dress differently (or, we might say, 'fashionably' in modern terms) are often defamed or vilified for choosing to look outrageous in the author's eyes – but if we look behind the literary gloss we might argue that here are the introductions of new trends and choices. Archaeological finds can also show the development of these trends – purple was always a popular colour in antiquity and different -shades of it more fashionable at some times than others. The introduction of lighter weight and sheerer materials, particularly for female clothing is also commented on by moralizing and satirical authors but sculptures from the 2nd century BC seem to delight in showing layers of lighter weight materials, and where colour has been detected on such sculptures this seems to go hand in hand with more pastel shades.[117] The sculptures may show off the artistic ability, of both the sculptors and the painters but they may equally represent dress as worn, or at least aspired to. Experimental research on dyes shows that shades are not difficult to attain and were not necessarily expensive and that many alternatives to the expensive murex purple were available.

Winding up

All of these questions are linked to each other and are best answered by open ended and multi-layered interpretations. To create a history of textiles and dress that engages with the cross-disciplinary dynamic it is essential to take an interdisciplinary approach. Collaborative working has produced some of the most interesting and provocative research on dress in antiquity, and even in single authored works the influence of diverse approaches is clear. To understand iconography one needs to identify garments, in so doing we can ask questions about production, origin and material – and then ask how a certain textile might drape or gather, how much it might weigh, or cost, or how it might enable or restrict movement. Reading about textile production and clothing in poetry or in papyri is greatly enhanced if we really understand the processes the authors are describing – we might better understand the nuances of the poetic uses of say, colour, the use of wool/silk, descriptions of spinning, Penelope at her loom and the like if we have a fuller understanding of the processes of production.

[116] Cf. Ovid *Ars Amatoria*, 3. 263–74 and Harlow 2012.
[117] Dillon 2010; Østergaard 2010b.

To really advance textile and dress studies in the classical period we need to focus on potential future perspectives as well as to engage fully with interdisciplinary approaches. We need to integrate textile research into other histories: of agriculture, of gender, of politics, of economy and consumption, of technology and mentalities. To highlight the tactile and sensory aspects of textiles and dress and be able to ask: how did it feel to wear a new garment, how did the sound of garments put across the idea of quality, how did clothing operate as it got worn, and eventually worn out. How did new wool smell, how did freshly washed or dyed clothes smell, and what was the scent of true purple or woad? All these questions require interdisciplinary approaches. The evidence dictates the questions as much as the questions guide what sources to use. Some sources are more relevant than others to answer certain questions; some sources are simply not able to answer some questions but may offer enhanced information or may address other tangential issues.

In many respects the novelist Iris Murdoch could have been thinking of textiles with the following statement:

> "There are certain areas of scholarship, early Greek history is one and Roman law is another, where the scantiness of evidence sets a special challenge to the disciplined mind. It is a game with very few pieces, where the skill of the player lies in complicating the rules. The isolated and uneloquent fact must be exhibited within a tissue of hypothesis subtle enough to make it speak."[118]

Acknowledgements

We thank our colleagues Ellen Harlizius-Klück, Peder Flemestad, Miguel-Angel Andrés-Toledo, Berit Hildebrandt, Cherine Munkholt and Giovanni Fanfani for their valuable comments and assistance.

[118] Murdoch 1968, 165.

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2. Embellishment Techniques of Classical Greek Textiles

Stella Spantidaki

Several consecutive textile discoveries in recent years have contributed to the formation of a corpus of 26 Greek textile remains dated to the 5th and 4th centuries BC.[1] All were discovered in funerary contexts and most have been preserved in a mineralised state due to contact with metal objects. These textiles present very homogeneous characteristics in terms of raw materials, thread structure, twist and diameter, their weave and thread count.[2] A new investigative methodology, which combines optical and SEM microscopy, has allowed fibre identification and analysis of their structure.[3] Indeed I believe that the best way to study Classical Greek textile manufacture nowadays is an interdisciplinary method, which combines information from written sources, iconography, textile production tools and textile remains.

From written sources we know that during the Classical period Athens had a flourishing textile industry and that textile manufacture and trade were among the most profitable economic activities.[4] Cloth manufacture was strongly connected to women, but only in the context of the *oikos*, the home. All women of the household, whether free or slaves, were responsible for the production of the family's cloth and clothing. Outside the home, however, male professionals managed workshops in the Athenian Agora that were probably also selling places. A very large number of skilled men and women, very often slaves, but also liberated slaves and freemen worked in small workshops under the supervision of a master weaver (*hyphantēs*),[5] dyer (*bapheus*)[6] or fuller (*knapheus*).[7] The texts mention a very large number of professions related to specific stages of the manufacturing process that indicate the existence of an elaborate textile industry.[8]

The most common textile manufacturing tool in Classical Greece was the warp-weighted loom, attested by the discovery of large numbers of loom-weights and by several depictions on classical

[1] I am grateful to M.-L. Nosch for inviting me to participate in this anthology.
[2] Spantidaki and Moulherat 2012, 195.
[3] Moulhérat 2008, 30–34.
[4] Bresson 2008, 199; Vickers 1999, 32.
[5] Pl. *Phdr*. 87.5b, 87c.8, *Cra*. 388c.9, 390b.3, *Plt*. 281a.9, 289c.7, *Grg*. 517e.1, *R*. 369d.8, 370d.3, 370e.2, 374b.7; Arist. *EN* 1097a.8, 1163b.35, *MM* 1.33.10.4, 1.33.11.3, *Pol*. 1256a.9, 1291a.13, 1325b.41.
[6] Pl. *R*. 429d.4; Diph. *Fr*. 73 (72).1 (Austin); Lys. *Ep*. 112.8.
[7] A. *Ch*. 760; Hdt. 4.14.5; Ar. *Vesp*. 1128, *Eccl*. 415; Pl. *Grg*. 491.a.2; Aeschin. *Tim*. 124.6; Antiph. *Fr. title* 121 (123) (Austin); Aeschin. Socr. *Fr*. 41.3 (Dittmar); Thphr. *Lap*. 67.4, *Char*. 18.6.2; Attica Inscriptions *IG* I^3 554, 616, 905.
[8] Spantidaki 2009, 80–83.

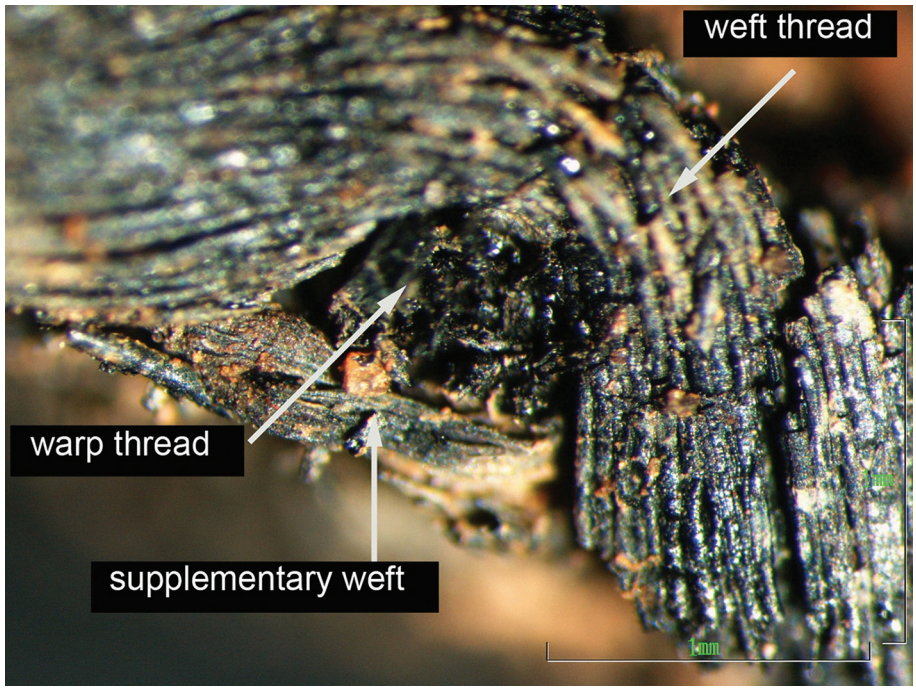

Fig. 2.1 Detail of the band discovered in Chania, showing the use of linen warp, weft in goat hair and supplementary weft in nettle. Spantidaki and Moulherat 2012 Greece. In M. Gleba and U. Mannering (eds) Textiles and Textile Production in Europe. From Prehistory to AD 400, 193, fig. 7.3.

vases. Most of the Greek textile remains studied are tabbies, manufactured on this type of loom. However, the sources and the archaeological remains suggest that other types of loom were also used. Three very narrow bands from Chania (Crete),[9] Mycenae[10] and Lefkandi,[11] although from older periods, indicate the existence of narrow looms, used for the production of small-size textiles (Fig. 2.1). Several hairnets and small weaving frames depicted on Attic vases, as well as mentions of an interlacing technique in the literature (*plekein*),[12] suggest the existence of sprang textiles. The written sources provide us with information about felt, *pilos*,[13] a technique in which no loom is used. The ancient Greeks used felted fabrics for the production of weather-proof textiles. Finally, two techniques suggested by the iconography and for which there is no other evidence are tapestry and tablet weaving. Each technique was used to achieve a different result on the textile's appearance.

[9] Spantidaki and Moulherat 2012, 189.
[10] The study of the band from Mycenae is still unpublished.
[11] Popham *et al.* 1982, 173.
[12] E. *Fr*. 284.1 (Nauck); Theoc. *Id.* 1.52, 11.73 ; Thphr. *HP* 4.8.4.7; Philet. *Fr.* 25.2 (Küchenmüller).
[13] A. *Fr*. 40a.435a.2, 40a.435b.1 (Mette); Hecat. *Fr*. 284bis.2 (Jacoby); Hecat. Abd. *Fr*. 18.2 (Jacoby); Th. 4.34.3.2; Hdt. 3.12.17, 4.23.18, 4.23.19, 4.73.11, 4.74.1, 4.75.2, 7.61.3, 7.62.8, 7.92.5; Pl. *Sps*. 220b.4, *Lg*. 942e.1; Critias. *Fr*. 65.2 (Diels and Kranz); Cratin. *Fr*. 107 (100) (Austin); Lysipp. *Fr*. 3 (3) (Austin); X. *Cyr*. 5.5.7.4; Hp. *Aër.* 18.9; Ctes. *Fr*. 16.39, 20.36, 26.14, 26.38, 26.41; Theoc. *Id.* 21.13; Aen. Tact. *Pol*. 11.12.3, 11.12.4, 25.2.7, 25.3.2, 33.3.3; Arist. *GA* 785a.27; Antiph. *Fr.* 108 (109).2; Ephor. *Fr*. 216.26; Attica Inscriptions *IG* II^2 1672.70–71.

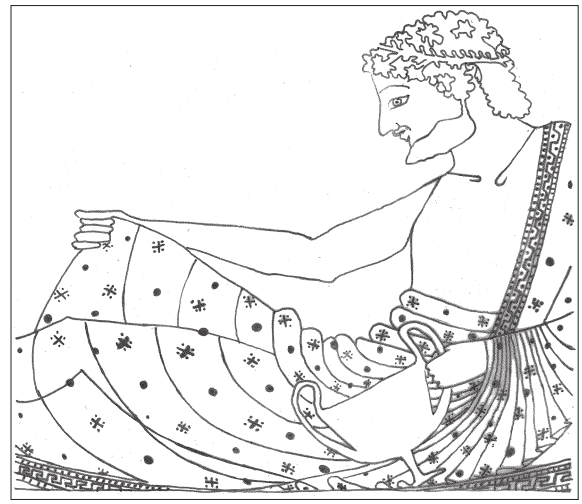

Fig. 2.2 Cloth decorated with small repetitive patterns. Amphora of the Andokides painter, Munich, Museum antiker Kleinkunst, inv. no. 2301. Drawing S. Spantidaki.

Although the general image of fabrics in Classical iconography shows rather plain garments, a detailed study of the textiles depicted on vases and sculptures demonstrates the use of various decorative patterns and colours creating unique results. Unlike North European textiles, in which various weaves, such as tabby and twill are preserved, the surviving Greek textiles manufactured on the warp-weighted loom are all tabbies. The study of the ancient sources indicates that the final appearance of a Greek textile did not depend as much on the weaving technique, as on the large variety of embellishment techniques used. The term embellishment is used to describe all the different procedures undertaken in order to improve a textile's appearance. These techniques can be divided into two categories: the first includes the decorative techniques during and after the weaving, while the second refers to the special treatments of the whole or parts of the cloth before and during spinning and during and after weaving.

Decorative techniques

A large number of garments depicted in Classical iconography present small repetitive decorative patterns, spread all over the cloth's surface (Fig. 2.2). This kind of decoration can be achieved using different techniques. One hypothesis suggests the techniques of supplementary weft. The first basic weft-patterned technique is the continuous weft, where the additional weft floats on the back of the cloth, only coming forward where it needs to be visible in order to create the decorative patterns. Thus, a single bobbin can be used to create multiple horizontal designs and the floats produced on the back can be left in place, or cut away. The second technique is the discontinuous weft (brocade), where the additional weft is no longer used horizontally to create all the designs at the same time, but vertically, for just one design; one bobbin is used for every pattern. The advantage of the second technique is that the cloth has significantly fewer floats on the back, allowing fine textiles to retain their transparency. The weft-patterned techniques are considerably time consuming, but offer design freedom; as the additional weft is added by hand, it is possible to create all sorts of polychrome decorative patterns. The Greek term *enhyphainein*,[14] literally "to weave in" could be associated with this technique. Two textile fragments from Koropi, now in the Victoria and Albert Museum, London, conserve tiny fragments of a black thread, woven in the cloth, which originate from a weft-patterned technique (Fig. 2.3).

[14] Men. *Fr*. 561.2 (Austin); Duris *Fr*. 31.12 (Müller); Hdt 1.203.15, 3.47.9; Arist *Mir.* 838a.22; Theoc. *Id*. 15.83; Thphr. *Char*. 5.9.4.

Fig. 2.3 Detail of a black thread weaved in the fabric from Koropi. © C. Moulhérat.

Fig. 2.4 Detail of an embroidered lion from Koropi. © C. Moulhérat.

A second hypothesis proposes embroidery as the technique for this type of decoration. There is a debate about the use of embroidery in Classical Greece;[15] however, the discovery of an embroidered cloth in Koropi, near Athens, unless it is imported, attests to the use of this technique in Classical times. The fragment is decorated with a diaper pattern, each lozenge containing an embroidered lion. A few traces of the silver gilded threads of the embroidery have been preserved. The pattern can be identified from the holes left by the needle (Fig. 2.4).[16] Furthermore, the Greek term *katastiktos*[17] seems to refer to embroidered clothes. The two different techniques can achieve very similar results, so an association of a precise pattern to a specific technique remains difficult for now.

Many garments depicted in the iconography present borders decorated with, mostly, geometric patterns (Fig. 2.5). The designs used are easily created with the technique of tablet weaving, a type of weaving that uses mostly square tablets perforated at the angles. The narrow bands produced could be used either as hair bands, as borders applied on larger clothes or integrated into the weave as starting or finishing borders. These tablet-woven textiles are warp-faced as their weft is completely covered by the warp. When the tablet-woven border is combined with another cloth, it creates a difference of textures that endows the finished fabric with a special character. To this day, there are no Greek terms associated to this technique, nor has it been identified among the archaeological finds for this period.

More elaborate decorative patterns depict complex animal decorations, human figures and mythological scenes. The information about this kind of ornament in the written sources is vast.[18] Such patterns can be created with different techniques: supplementary weft, tapestry, painting and resist dyeing.[19] Tapestry is a technique for which there are no archaeological traces in Greece until the

[15] E.g. Wace 1948, 51–55. See Droβ Krüpe and Paetz gen. Schieck this volume.
[16] Beckwith 1954, 114.
[17] Megasth. *Fr*. 21.20 (Müller); Men. *Fr*. 1019.1 (Austin); Attica Inscriptions *IG* II² 1514.6, 1514.9, 1514.11, 1514.38, 1514.56, 1514.57, 1514.67, 1514.71, 1518B.54–55, 1518B.68–69, 1524B.177, 1524B.208–209, 1521B.50–51, 1521B.66–67, 1523.11, 1523.13, 1523.20, 1523.25–26, 1523.27, 1528.19–20; Samos Inscriptions *IG* XII.6 133.16.
[18] E.g. E. *Ion* 1141–1145, 1421–1423.
[19] The painting and resist dyeing are embellishment techniques discussed below.

famous 4th century BC cloth from Vergina.[20] Tapestry is used to create elaborate decorative patterns and offers the weaver complete design freedom. All patterns mentioned in Classical literature could have been produced in tapestry. The term *enhyphainein*, already connected to the supplementary weft, could also be associated with tapestry.

However, as tapestry requires extremely well stretched warp threads, Elizabeth Barber believes that the warp-weighted loom used in Greece could not provide the high tension needed and that the elaborate designs were created using weft-patterned techniques.[21] Tapestry, according to Barber, would have been produced on a special loom. Nevertheless, a series of experiments have been tried out the recent years in order to understand whether tapestry weaving is possible on the warp-weighted loom. Ellen Harlizius Klueck's experiment with the weaving of the decorative patterns of the "Peplos Kore" has demonstrated that tapestry weaving on the warp-weighted loom can work well and fast.[22] Ellinor Sydberg has likewise achieved the reconstruction of the famous Överhogdal tapestries on a warp-weighted loom.[23] These experiments confirm nowadays the possibility of tapestry weaving on this type of loom.

Fig. 2.5 Detail of a border with meander decoration. Amphora of the Andokides painter, Munich, Museum antiker Kleinkunst, inv. no. 2301. Drawing S. Spantidaki.

Colour stripes are among the most common decorations in Classical clothes. These are coloured bands easily produced by the insertion of a coloured weft thread during weaving. In iconography, they are very often positioned near the selvedges of the cloth. Three Classical textile remains preserve traces of a coloured stripe near their starting borders: the fragments from Kalyvia, Maroussi and one fragment from Kerameikos (Fig. 2.6). The band of the textile from Kalyvia is formed by seven extremely fine, linen weft threads, almost invisible to the naked eye. This shows the taste of the ancient Greeks for discrete decorations, which, combined with other characteristics of the cloth, create unique results. The written sources contain a large number of terms referring to coloured – more often red or purple stripes, situated in various places of the fabrics (e.g. *platyalourgēs:* with

[20] Drougou 1987, 303–316, tabl. 63–69.
[21] Barber 1992, 109, 111.
[22] Ellen Harlizius–Klueck, experiment of tapestry weaving on a reconstructed warp-weighted loom based on a reconstruction of the painting on the *ependytes* of the «Peplos Kore», done by Vinzenz Brinkmann, 2004. The experiment was done as a research project within the exhibition "Gesponnen und Verwoben. Textiles zu Zeiten von Römern und Germanen", in the Clothiers Museum Bramsche, Germany, from 5 June until 25 October 2009 (unpublished).
[23] Wikman 1996, 18; Oscarsson 2010, 64–73.

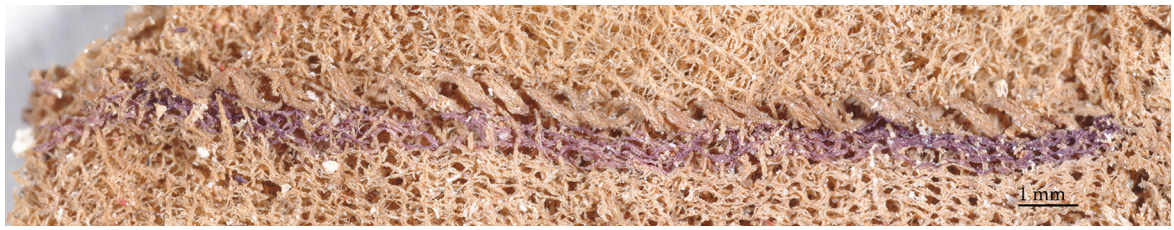

Fig. 2.6 Detail of the starting border from Kalyvia decorated with a purple band. © ARTEX.

a wide red band;[24] *periporphyros*: with a red border;[25] *mesoleukos*: a white decoration in the centre;[26] *periēgētos*: with a coloured border).[27]

Another easy way to produce stripes was to use weft threads that are thicker than in the rest of the fabric. The difference of the thickness creates stripes with a slight relief, more or less visible depending on the angle of the light. Such narrow stripes decorate the fabric from Eleusis, one of the largest textile remains from Classical Greece. Had the weaver used thicker threads in the warp as well as the weft, the result would have been a square pattern, such as on the fragment from Glyphada, Athens, now in the Louvre (Fig. 2.7). As with the stripes, the square pattern is in slight relief, more visible from a distance rather than up close. These decorations introduced variations to the tabby and did not require any special skills.

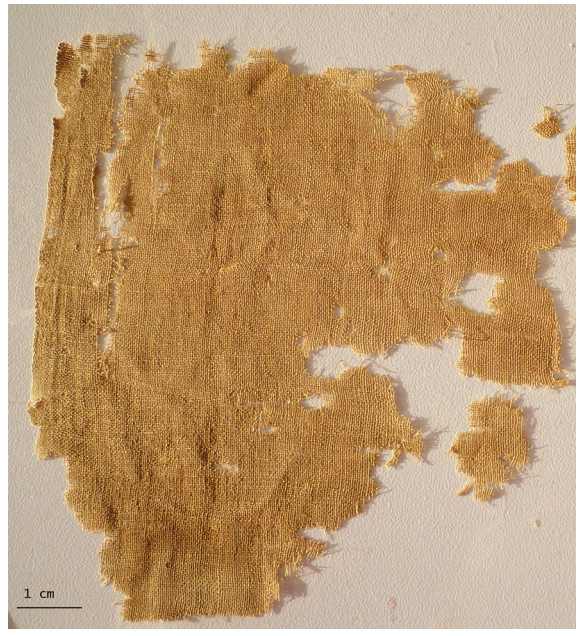

Fig. 2.7 Partial view of a fragment from Glyphada. Notice the square pattern formed by thicker threads. © *C. Moulhérat.*

One element that has always played a significant role in the decoration of textiles is colour. In the texts there is extensive information on shades related to fabrics, sources of natural dyes, but also techniques of resist dyeing and painting on textiles. The ancient Greeks could choose their dyes from a wide range of tinctorial plants and animals, which included simple everyday plants, such as chamomile, onions, grenade, and more specialised plants and animals, such as kermes (*kermes vermilio*),[28] madder

[24] Attica Inscriptions *IG* II² 1514.17–18, 1514.45–46, 1516.47, 1517B.126–127, 1518B.57–58, 1518B.61, 1518B.62–63, 1521B.47–48, 1529.29.
[25] Hippias Erythr. *Fr.* 1.30 (Müller); Crates Com. *Fr.* 35 (31) (Austin); Arist. *Fr.* 8.45.611.346 (Rose).
[26] X. *Cyr.* 8.3.13.3; Ctes. *Fr.* 41.1 (Jacoby).
[27] Attica Inscriptions *IG* II² 1514.18, 1514.21, 1514.43, 1514.52, 1524B.207–208, 1524B.215, 1523.22–23, 1529.12–13; Antiph. *Fr.* 151 (153).2 (Austin).
[28] Thphr. *HP* 3.7.3.9, 3.16.

(*rubia tinctorum*),[29] alkanet (*alkanna tinctoria L.*),[30] orchil lichen (*rocella tinctoria*),[31] oak (*quercus coccifera*),[32] woad (*isatis tinctoria L.*),[33] purple (*Murex brandaris, Stramonita haemastoma, Hexaplex trunculus*)[34] and saffron (*crocus sativus*).[35] Some kind of dyeing certainly occurred at home, but complicated dyes – such as purple – were undertaken by professional dyers. Four Classical textile remains preserve traces of purple dye: the fragments from Kalyvia, one from Maroussi and two from Kerameikos (as seen in Fig. 2.5).[36] According to the dye analysis, the first two fragments were dyed with the true murex purple dye;[37] and purple dyeing has been confirmed at least for one fabric from Kerameikos.[38]

In written sources we find references to the encaustic, or hot wax painting technique, a method whereby the pattern is painted with mineral pigments mixed in wax. This was used for the decoration of statues and the creation of mural paintings, such as in the tombs of Vergina, in northern Greece. As this technique uses painting, it allows the creation of elaborate designs on fabrics. Herodotus mentions that the people of the Caucasus Mountains used to decorate fabrics with elaborate figures with a paint or dye created by mashing the leaves of a certain plant and mixing them with water; the patterns created are described as completely colourfast.[39] According to Barber and Michael Vickers, this method resembles the techniques of resist dyeing.[40] Two resist dyed textiles have been discovered near the Greek colony of Panticipaeum (nowadays Kertch). In Kurgan 4 at Seven Brothers, dated to the mid-5th century BC, a woollen fabric has been found, decorated with resist dyed friezes of the Greek mythology.[41] In Kurgan 6 of the early 4th BC has been discovered a large sarcophagus cover with 11 stripes decorated with animals, plants and mythological figures named in Greek letters, produced by painting the designs on in a two-stage resist-dyeing process called hot batik.[42] Another fabric in tapestry with elaborate polychrome patterns has been found in the sarcophagus. The fact that resist-dyed and tapestry textiles have been discovered together in the same tomb indicates, according to Margarita Perivoliotis, that "the resist dyed cloths were the inexpensive, but elegant, substitute for the time consuming and therefore expensive tapestry clothing".[43]

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[29] Hp *Acut*. 31.2, *Mul. i–iii* 9.17, 224.12; Thphr. *HP* 6.1.4.5, 7.9.3.1, 9.13.6.1, 9.13.4.9; Hdt. 4.189.9.
[30] Thphr. *Fr*. 4.31.9, 4.33.7, *HP* 7.9.3.8 (Wimmer); Bolus *Physica et Mystica* 2.42.3 (Wellmann).
[31] Thphr. *HP* 4.6.5.1.
[32] *Ibid*. 4.6.8.7.
[33] Samos Inscriptions *IG* XII 6.1 133.13.
[34] A. *Pers*. 317, *Ag*. 957, 959; S. *Fr.* 504.1 (Radt); Hdt. 3.22.4; Pl. *Lg*. 847.c.1; Arist. *Col*. 795b.11; Ion *Fr*. 3b, 392 13.17 (Jacoby); Epich. *Fr.* 254.4 (Kaibel); Ctes. *Fr*. 1b.688, 1p.Alpha*.10, 1.q.22, 45.261, 45.357, 45.386, 451*9 (Jacoby); Men. *Fr*. 561.1 (Austin); Zeno Stoic. *Test., Fr.* 1.16 (von Arnim); Clearch. *Fr*. 42.2 (Wehrli); Duris *Fr.* 14.9, 31.11; Theopomp. *Fr*. 117.4 (Jacoby); Thphr. *HP* 4.6.5.5.
[35] Pi. *Nem.* 1.38; Sch. Pi *Nem.* 1.58a1, 1.59.3, *Pyth.* 4.412b.2 (Drachmann); A. *Fr*. 61.138 (Radt); Ar. *Lys*. 51, 645, *Th*. 138, 253, 941, 945, 1220, *Ran*. 46, *Eccl*. 879; Arar. *Fr*. Kai 1.2 (Meineke); Crat. *Fr*. 40 (38).2 (Austin); Duris *Fr*. 29.5 (Müller); Timae. *Fr*. 50.6 (Jacoby); Sch. E. *Hec* 471.3, 471.4 (Schwartz); Sch. Ar. *Nub* 70a.1 (Holwerda), *Lys*. 645.3, 645.20, *Th.* 261.3, 688.4, 941.1, 1044.1, *Eccl.* 332.2, *Ran.* 46.1, 46.3, 47.10, *Th.* 261.3 (Dübner); Attica Inscriptions *IG* II^2 1514.58, 1514.60–61, 1516.52, 1517B.162, 1524B.213–214, 1524B.235, 1522.12, 1522.25, 1522.28–29, 1528.13, 1528.22–23, 1529.8, 1529.17, 1529.18–19. For further information on natural dyes used in Greece see Cardon 2007.
[36] For the first two Spantidaki and Moulherat 2012, 195. The study of the textile remains from Kerameikos is not yet published.
[37] Spantidaki and Moulherat 2012, 195.
[38] Margariti *et al*. 2013, 779.
[39] Hdt. 1.203.12.
[40] Barber 1991, 226; Vickers 1999, 21.
[41] Barber 1991, 206; Gleba and Krupa 2012, 413, fig. 20.14
[42] Gerziger 1975, 51; Barber 1991, 206, 226, fig. 7.11 and 16.15.
[43] Perivoliotis 2006, 6.

Traces of painting have been identified on a textile fragment from Koropi besides the embroidered one. Another diaper pattern, this time painted, contained a painted decoration in its centre. The painting technique is easily identified, because the colour does not penetrate into the fibres, but remains on the surface of the cloth. The nature of the colour has not yet been identified (Fig. 2.8). One can make the assumption that painting may have been used to create elaborate patterns and as a substitute for tapestry, as Perivoliotis suggested.

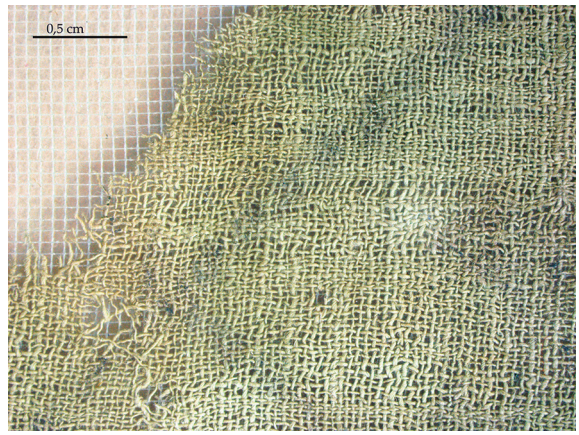

Fig. 2.8 Detail of a painted lozenge from Koropi. © C. Moulhérat.

Special treatments

A commonly depicted embellishment technique is the pleating of garments. The images of pleated clothes that are often seen on vases and sculptures are characteristic of the Classical period (Fig. 2.9). However, not all clothes with folds were permanently pleated. The pleating of textiles was a technique used by fullers to achieve permanent folds, in contrast to many types of clothes, which presented pleats only when folded around the body.[44] The written sources do not offer much information about the technique used and the only mention is of textiles being put in a press called *ipos*,[45] probably with the pleats already formed. One also finds a large number of terms related to various types of pleated garments: pleated textile (*stolidōtos*),[46] with many folds (*polyptychos*),[47] with wide folds (*kataptychēs*)[48] and with equal folds (*isoptychēs*).[49] The study of the iconography suggests the use of two different kinds of pleated garments. The first shows folds that are evenly distributed over the entirety of the surface of the cloth, while in the second we see that the pleats do not cover the whole surface of the textile. The result is a cloth on which a small number of pleats alternate with stretches of smooth surface without pleats (Fig. 2.10). A horizontal line at the bottom of all pleated textiles may indicate some kind of seam. So far there are no traces of pleated textiles preserved in Greece.

Depictions of crimped garments are very frequent in Classical iconography (Fig. 2.11). This "crepe" effect is created by the use of very hard twisted threads with a crimped aspect. Several Classical textile remains preserve these characteristic twisted threads, especially the fragments from Glyphada, Koropi, Marathon and the hemp fragment from Trachones (Fig. 2.12). This technique led to the creation of textiles with a unique appearance simply by raising the twist of the threads during spinning without needing to change the weave of the cloth. It could be combined with other embellishment techniques, such as pleating and colour, in order to achieve more impressive results. No technical term has yet been associated with this technique.

[44] Barber 2004, 20.
[45] Archil. *Fr.* 235.1 (West); Poll. *Onomastikon* 10.135 (Bethe).
[46] X. *Cyr.* 6.4.2.6.
[47] Hp. *Art.* 73.9, 75.3.
[48] Theoc. *Id.* 15.34.
[49] Attica Inscriptions *IG* II^2 1514.63–64, 1514.65, 1514.66, 1522.16, 1524B.228–229, 1524B.235, 1522.4, 1522.9, 1522.12.

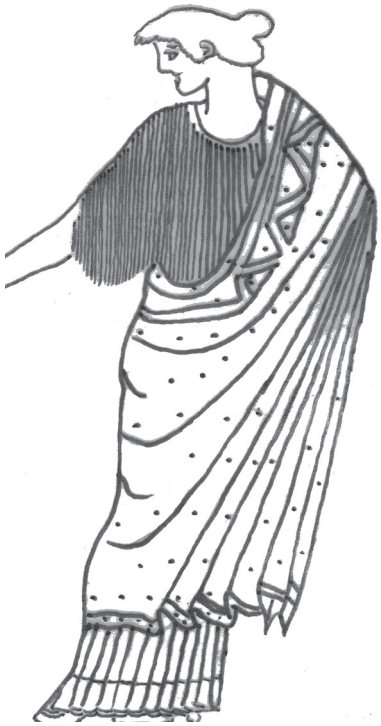

Fig. 2.9 Pleated garment from a crater of the painter of Berlin in Badisches Landesmuseum Karlsruhe inv. no. 68/101. Drawing S. Spantidaki.

Fig. 2.10 The two types of pleated garments. Left: the first type, Badisches Landesmuseum Karlsruhe inv. no 68/101; right: the second type. Cup of Euphronios and Douris in the Metropolitan Museum, inv. no. 1986.322.1. Drawing S. Spantidaki.

Transparent textiles commonly depicted on vases and sculptures were particularly valued in Classical Greece. A large number of terms refer to these kinds of clothes, e.g. transparent (*diaphanēs*),[50] very fine (*pany leptos*),[51] fine and delicate (*tanaüphēs*)[52] (Fig. 2.10). These textiles must have been produced with very fine threads, probably linen, such as the ones identified in the fragments from Kalyvia, Moschato, Kerameikos and Maroussi (Fig. 2.13).

In the Classical texts there is mention of a specific kind of transparent garment called *amorgina*.[53] These fabrics are described as of great value and high quality; according to Aristophanes they were so fine that the person who wore them appeared naked.[54] The relation of the term *amorgina* with the island of *Amorgos* lends plausibility to the hypothesis that it was produced there. The fineness of

[50] Ar. *Lys*. 49; Lycurg. *Fr*. 5.10.4; Men. *Περικειρόμενη* 822 (Sandbach), *Fr*. 471 (653).1 (Austin); Clearch. *Fr*. 48.4 (Wehrli); Arist. *Fr.* 8.45.611.222 (Rose).
[51] Th. 2.49.5.5.
[52] S. *Trach.* 602.
[53] Ar. *Lys*. 150; Pl. *Ep*. 363a.4; Aeschin. *Tim.* 97.8; Antiph. *Fr.* 151 (153).1 (Austin); Clearch. *Fr.* 19.12 (Wehrli); Cratin. 103 (96).1 (Austin); Attica Inscriptions *IG* II^2 1514.2, 1514.10, 1514.22–23, 1414.51, 1514.61, 1514.63–64, 1514.64, 1514.65, 1517B.165, 1517B.172, 1524B.132, 1517B.120–121, 1518B.65, 1518B.65–66, 1518B.69–70, 1518B.70–71, 1524B.211, 1524B.214, 1524B.216, 1524B.217, 1524B.235, 1524B.236–237, 1522.15, 1523.20–21, 1523.21–22, 1528.18–19, 1528.21, 1529.2–3, 1529.7–8, 1529.18, 1530.4; Delos Inscriptions *ID* 104 (26 bis) C.1 8, 10.
[54] Ar. *Lys*. 149–154.

Fig. 2.11 Detail of a crimpy textile. Cup in British Museum inv. no. E44. Drawing S. Spantidaki.

Fig. 2.12 Detail of hard-twisted threads from Marathon. © ARTEX.

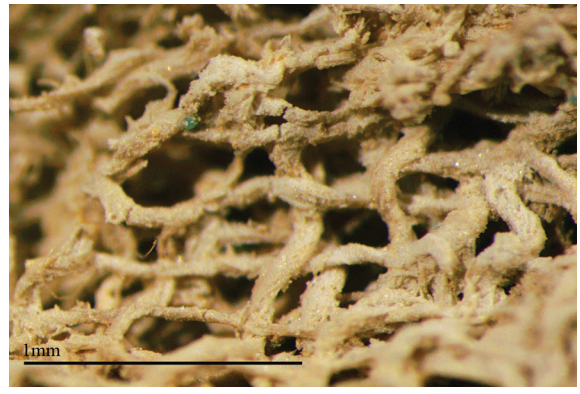

Fig. 2.13 Detail of a very fine textile from Maroussi with multiple layers visible. Spantidaki and Moulherat 2012 Greece. In M. Gleba and U. Mannering (eds), Textiles and Textile Production in Europe. From Prehistory to AD 400, 193, fig. 7.15.

these clothes has led various researchers to the view that they could have been made out of silk, probably wild; the fact that *Amorgos* is very close to *Kos*, the island on which, according to Aristotle, the first wild silk textiles were manufactured, supported this hypothesis.[55] However, more recent authors inform us of the vegetal nature of *amorgis*,[56] the plant providing the raw material. Thus, it appears that the *amorgis* might have been a variety of linen. The etymological connection between the terms *amorgina* and *amorgē*[57] (the watery run-off when olives are pressed), along with the information that in modern Greece certain textiles are treated with olive oil to make them shine, gave rise to another hypothesis regarding their manufacture.[58] The high degree of transparency could have been achieved by combining extremely fine linen threads, treated, at some stage of the manufacturing process, with olive oil. Linen threads are generally very dry and need to be hydrated during spinning and weaving. The oil greases the thread and makes it slippery, thus facilitating the spinning and weaving process. More importantly, it accentuates the transparency and makes the cloth very smooth and shiny.

[55] Richter 1929, 29.
[56] Ar. *Lys*, 735, 737; Poll. *Onomasticon* 7.74.5 (Bethe); Hsch. *Lexicon* A.3756.1 (Latte); Suid. *Lexicon* A.1626.1 (Adler).
[57] Hp. *Ulc.* 12.35, 12.49; Arist. *Col*. 796a.27; Thphr. *CP* 1.19.3.6.
[58] Marinatos 1967, A4.

Table 2.1. Summary of production and embellishment techniques and the information provided from the Classical sources.

Sources ⇒ **Production stages - manufacture and embellishment techniques ⇓**	**Texts**	**Iconography**	**Textile Remains**	**Textile Production Tools**
Colour	Colour terms	Coloured textiles	Traces of purple dye, black threads and painting	
	Dyes from plants and animals			
	Dyed textiles			
	Painted textiles			
	Resist-dyed textiles			
Colour Stripes	Terms for colour stripes	Striped textiles, coloured borders	Purple bands	
Crimpy textiles		Crimpy textiles	Very hard-spun threads	
Embroidery	*katastiktos*	Small decorative patterns	Embroidery from Koropi	Needles
Felt	*pilos*	Hats, mantles		
Float decoration			Patterns of floats in warp and weft	
Pleated Textiles	Terms for pleated textiles	Pleated garments		
Raw Material	Animal, vegetal, metallic fibres	Transparent clothes	Linen, wool, cotton, hemp textiles, traces of metallic thread	
		Thick textiles		
Specialisations	Variety of specialised terms			
Spinning	Spinning tools terms	Spinning scenes	Threads without apparent twist, medium twist, very strong twist	Spindle-whorls of different dimensions, *epinetra*
Sprang	*plekein*	Sprang frames, hairnets		
Supplementary weft	*enhuphainein*	Small repetitive patterns	Traces of supplementary weft (Koropi)	
Tablett-weaving		Bands with geometrical patterns		
Tapestry	*enhuphainein*	Elaborate decorative patterns		
Thickness Stripes			Thickness stripes	
Transparency	Terms for very fine or transparent textiles	Transparent clothes	Extremely fine textiles	Very light and small loom-weights
Weaving on the warp-weighted loom	Technical weaving terms	Visible borders	Starting borders	Loom-weights

The interdisciplinary study of the sources shows that the variety of embellishment techniques gave the ancient Greeks a broad choice from which to select the most suitable method for any desired result. People used these various techniques with freedom and ease to improve the appearance of their tabbies. They also used them interchangeably depending on aesthetic preferences. They could create discreet decorations simply by introducing a thicker thread. By changing the colour of the weft they could create simple stripes or decorative patterns. Once the weaving was completed, they could keep decorating the fabric with embroidered patterns, paint it, or pleat it. They could use just one technique, or combine several to achieve the exact appearance they sought. The same pattern could be created through a variety of different techniques, depending on the value of the fabric and its future use. One could, for example, produce the same purple figure using purple dye and tapestry and another using orchil and resist dyeing. The result would not be exactly the same, for the orchil would never be as bright as the purple. However, it made richly ornamented garments accessible to a significantly larger number of people (Table 2.1)

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3. The Importance of Beginnings: gender and reproduction in mathematics and weaving

Ellen Harlizius-Klück

Towards the end of Plato's dialogue *Cratylus,* Socrates points out the importance of the right beginning to his dialogue partner: if someone erred in the beginning, it is no surprise that by bringing the argument into agreement with such a beginning, many faults occur. "Everyone must therefore give great care and great attention to the beginning of any undertaking, to see whether his foundation is right or not. If that has been considered with proper care, everything else will follow".[1] In the history of mathematics this quotation is one of the main references explored in order to trace axiomatic method and logic back to philosophy, as Socrates states: "It is just so sometimes in geometrical diagrams; the initial error is small and unnoticed, but all the numerous deductions are wrong, though consistent".[2] Within specific constraints this argument is reversible as we can say: if something incorrect follows, there must be something wrong in the beginning. The mathematical method of indirect proof takes advantage of this case, but this only works when the object of scrutiny is organized in contradictory terms.

The first mathematical contradiction of this kind was found in the difference between odd and even numbers. Together with the *tertium non datur* (excluded middle), which is traced back to the pre-Socratic philosopher Parmenides, it represents the beginning of mathematical logic and proof theory.[3] In this way the power of the beginning leads to an order with a binary structure[4] based not only on a difference of numbers but also of gender. In another of Plato's dialogues, *The Statesman*, a young man named Socrates divides the class of beings living in herds into humans and animals – and the dialogue partner, a foreigner from a circle close to Parmenides, points out a mistake: "A better division, more truly classified and more equal, would be made by dividing number into odd and even, and the human race into male and female" (*Statesman* 262e).

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[1] *Crat 436d.* In the *Republic* too, Plato stresses "that the beginning in every task is the chief thing" (*Republic* II, 377a).
[2] *Crat 436d*. The word 'geometrical' is added; Plato's text only has *ton diagrammaton*. In Euclid's *Elements*, not only geometrical figures but also integers are shown as lines. However, it is common to assume that geometry is meant here. For the history of mathematics see Szabó 1960.
[3] See Szabó 1960, 368–371 and Becker 1965, 125–145.
[4] In mathematics bivalent number systems sometimes are called 'dyadic' as in the ancient arithmetic of odd and even or the binary number system of Leibniz. The use of the word 'binary' has been introduced more recently but means the same.

This raises a series of questions: is there a connection between reproduction and dualism? Are we to suppose that dualism as the result of the *tertium non datur* was the right and necessary beginning of science? Was Plato's hint to the gender difference just a popular analogy? Was it perhaps derived from the concept of reproduction in natural history or biology where the binary organisation of male and female is assumed?

When Bettina Mathes recounts the history of the media of reproduction, the binary difference is hidden not in the difference of predecessor and successor or of original and copy, but in the history of alphabetical writing. She writes that the letters A and B at the beginning of the alphabet do not merely conserve two phonemes but also at the same time, gender difference: the A standing for the male, the B for the female – a succession wherein we have also a priority of the first against the second.[5]

This might explain the analogy of number and gender: Greek numbers were written with the letters of the alphabet. The gender of the first letters is passed over to the first numbers: the male One and the female Two. With the Pythagoreans, whose number concept was taken over by Plato,[6] the odd numbers are indeed male and the even ones female, leaving out the number One, which was not understood as a number at all. Euclid defines number as follows: "A *number* is a multitude composed of units" (*Elements*, Book VII, def. 2). The exclusion of One (*monas*) from the definition of numbers is not due to ontological or metaphysical reasons. To practise the method of indirect proof one has to be able to distinguish the odd from the even numbers; that means by using bisection, there must be a unit or the two same numbers as a remainder. The unit itself may not be dissected and there is no way to prove it for odd- or evenness, thus it breaks off the boundaries of dualism.

A binarity of another sort seems to dominate the dualism of odd and even in Euclid's arithmetic: the sameness of the two halves from which the number is composed on the one hand and the remaining unit on the other hand; or, we might say, a dualism of pair and unit. But can we say that Two (as number of twoness or sameness) and with it the 'female' is at the beginning? And can we take the doubling of numbers (which imposes itself as principle of number-production) as female, in opposition to a number-production based on the unit and its successors that is similar to the familiar sequence of father and son?[7]

In choosing a male beginning, the fertility incorporated in the writing system seems to be fixed as 'mentally-male fertility'.[8] As a metaphor of the digital code this mentally-male fertility has strongly influenced genetic research and the technology of reproduction and is perhaps responsible for its success. Christina von Braun once pointed out that phonetic writing produced new structures of thinking and, besides *polis* and history, new forms of cultural memory.[9] She also argues that writing would serve as an instrument in the realisation of a-sexual calculable bodies. According to Nicole Loraux, the written regulations of mourning by Solon, for instance, show that dead warriors were no longer sons of their mothers but sons of the community and therefore should be mourned as such.[10] I will return to this point later.

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[5] See Mathes 2005, 83 and Braun 2001, 59–62 and 105–108.
[6] On Plato as the originator of this idea see Burkert 1962.
[7] See Harlizius-Klück 2004, 202–205.
[8] Mathes 2005, 85.
[9] See Braun 2001, 59.
[10] See Braun 2001, 61 and Loraux 1990.

Ever since Aristotle, counting means to repeatedly add one unit to an original element in the sense of gradually increasing and of the reproduction of characteristics from the father to the son/follower.[11] Does this mean the second place in the system of reproduction (the B behind the A) is then occupied by the son?

Also in Plato's *Statesman*, the dialogue in which the arithmetical difference refers to the male-female difference and in which this competence of differentiation is declared as pure knowledge, the nameless leader of the speech excessively worries about the question of reproducing the community. Nature may not be left to its own devices because it is abandoned by divine reason and does not reproduce correctly or at least not in the desirable direction – as it is following from the myth of Kronos.[12] This is not a new topic. Homer tells us in the Odyssey that Athena disguised as Mentor complains to Telemachos, son of Ulysses: "Few sons indeed are like their fathers; most are worse, few better than their fathers" (*Od* II, 276). Thus if the desirable direction is to have children who are similar to their fathers – then we have a kind of reproduction with a dualism including a difference in age and gender identity.

The mythic figure of Athena hints at the ideal solution, as she herself needs not to be ashamed beside her father Zeus. She was not born from a woman's body but from a man's head.[13] Anxiety over the origin from the female body and the fact that man may not reproduce himself without a woman was widespread in antiquity. Euripides has Hippolytos say:

> "O Zeus, why have you settled women in the light of the sun, women, this bane mankind find counterfeit? If you wished to propagate the human race, it was not from women that you should have given us this. Rather, men should have put down in the temples either bronze or iron or a mass of gold and have bought offspring, each man for a price corresponding to his means, and then dwelt in houses free from the female sex" (Euripides, *Hippolytus* 616–625).

The equation of number classification and gender difference mentioned by Plato in the *Statesman* is connected to the intention to cancel the deviation from the divine order that sneaked its way into reproduction through the female body. Therefore the wise statesman determines marital bounds according to true knowledge. In the era of divine leadership by Kronos, men grew out of the ground and returned thereto after the appropriate time (*panta automata gignesthai tois anthropois*; *Statesman* 271d). This automatic genesis was lost when Kronos left the world alone. In order to create a mortal gender, Athene and Hephaistos had to produce women (by craft): Pandora and her companions. Thus it is described by Plato.[14] In the beginning of the dialogue the difference of knowledge was fixed as such: on one hand there are "arithmetic and certain other kindred arts…" that bring about mere insight, on the other hand there are the crafts that bring about physical "things which previously did not exist". And such were the female bodies.

Thus the statesman has to regulate the reproduction of the community with the aid of arithmetic. A hint on how this is to be done may be found in the *Republic*, where Socrates tells us what the muses would answer if asked in which way his ideal state might begin to disintegrate. And this is what the muses would answer:

> "Hard in truth it is for a state thus constituted to be shaken and disturbed; but since for everything that has come into being destruction is appointed, not even such a fabric as this will abide for all time, but it shall

[11] See Harlizius-Klück 2004, 200–205.
[12] See Harlizius-Klück 2004, 135–165.
[13] See Harlizius-Klück, 2008, 120.
[14] See E. Harlizius-Klück 2004, chap. II: "Der Verlust der zölibatären Maschine", 142–148.

> surely be dissolved, and this is the manner of its dissolution. Not only for plants that grow from the earth but also for animals that live upon it there is a cycle of bearing and barrenness for soul and body as often as the revolutions of their orbs come full circle, in brief courses for the short-lived and oppositely for the opposite; but the laws of prosperous birth or infertility for your race, the men you have bred to be your rulers will not for all their wisdom ascertain by reasoning combined with sensation, but they will escape them, and there will be a time when they will beget children out of season. Now for divine begettings there is a period comprehended by a perfect number, and for mortal by the first in which augmentations dominating and dominated when they have attained to three distances and four limits of the assimilating and the dissimilating, the waxing and the waning, render all things conversable and commensurable with one another, whereof a basal four-thirds wedded to the pempad yields two harmonies at the third augmentation, the one the product of equal factors taken one hundred times, the other of equal length one way but oblong – one dimension of a hundred numbers determined by the rational diameters of the pempad lacking one in each case, or of the irrational lacking two; the other dimension of a hundred cubes of the triad. And this entire geometrical number is determinative of this thing, of better and inferior births. And when your guardians, missing this, bring together brides and bridegrooms unseasonably, the offspring will not be well-born or fortunate" (*Republic* VIII, 546a–d).

This so-called wedding-number is a highly complex issue and one may wonder if not using one of the "certain other kindred arts" would bring more clarity to this subject. But Plato (respectively the nameless foreigner) simply does not tell us what is on his mind.[15]

The young partner in the *Statesman* dialogue to whom the correct proceeding in connecting the citizens should be explained, already fails at the first mathematical topic. So the respondent foreigner chooses a digression: he explains correct statesmanship through the example of weaving. This suggests itself because the most important principle of arithmetic is ordering by dividing into two equal parts, which is called *dihairesis*; and the main part of the *dihairetika* listed in the *Sophistes* dialogue which precedes the *Statesman* are activities of wool-processing.[16] Thus the *dihairesis* is exhaustively presented by the production of woollen cloaks and finally the statesman is found as the one who weaves together the brave and the circumspect just as the weaver does with the strong warp and the softer weft. Thereby it would be possible to control the births within the state and to circumvent the danger of children being unlike their fathers.

Thus the order of weaving replaces the classifications of arithmetic that are not sufficiently mastered by the young man in the dialogue. Are we then allowed to assume that the desired knowledge of the right order, division and connection, may also be explained directly through weaving? If Plato's intention is to use numbers for controlled reproduction, is the topic of weaving meant to disguise this? Is it mere accident to find the efforts to avoid the being-born-from-a-woman and the first formal treatments of pure mathematics dealt with in association? And is it mere accident that the logical classification that is necessary here, namely the *dihairesis*, is introduced by putting wool and fibres into order? Is it possible that dualism was introduced into philosophy and logic from weaving?

Two inventions have been critical for the possibility of a formal construction of mathematical fields such as arithmetic and geometry: the above mentioned method of indirect proof and the discovery of incommensurable quantities – which means that there are proportions that might not be expressed with integers (which we nowadays call irrational). Due to the fact that such integers

[15] We find similarities with Kronios, who says: "10000 and 7500 are in a ratio of the male to the female. The difference between good and worse descendants is based on whether this ratio is harmonious or disharmonious". This would be easier to calculate, if we knew the correct meaning of 'harmonious'. See Gaiser 1974, 55.

[16] See Harlizius-Klück 2004, 94–96. See Plato: *Sophist* 226a.

(for instance the one to describe the ratio of side and diagonal of the unit square) do not exist, we have to prove the fact in an indirect way – and here the dualistic order of numbers by dissection shows off all its power. The point of the proof-strategy is to begin with the assumption that the number exists. If we try to factor it, logical deduction shows that it must be both even and odd – and this is in contradiction to the law of the excluded middle. In this way we have proved that the assumption in the beginning was false and therefore the contrary is right: there is no such number (see Euclid, *Elements*, Book X, § 115a).

Even if we today are immediately convinced of the duality of odd and even – the complementarity of these number properties cannot rely on the complementarity of the words used in Greek (as it is in German: gerade – ungerade, which means: even – uneven). In Greek even and odd are *artios* and *perissos*. Historians of mathematics therefore believe that numbers were discussed as forms of little stones arranged in rows and columns and that the differences were put into writing as definitions (the even amount of stones may be dissected; the uneven one may not). And then a higher level of reflection was reached where the contradiction became clear.[17] Seen this way, the binary logic of odd and even would be a consequence of phonetic writing and unthinkable without it. Therefore, it seems that not only binary logic but also the technical-generating aspect of the number system was due to alphabetical writing and originated in Greek antiquity.

We could stop here and take the mixture of gender dualism, dyadic order of number, and weaving principles as historical or Platonistic accident only superficially touching the dominance of the writing effect.

Reproductive counting

Studies in the history of ancient mathematics take no account of the aspect of male-female number codification, and see it as a rather tedious concomitant of no mathematical interest. We have already seen that this does not coincide seamlessly with the gendered codification of the alphabet. Within the alphabet, this only applies to the beginning while the even-and-odd difference is spread over all numbers. The strong connection of weaving terminology and logical classification in Plato is never discussed – either in the history of philosophy or in the history of mathematics. It is elided as some kind of metaphor.

Perhaps other gendered number systems or such systems that take into account the reproduction process as the linguistic or literal principle of counting are worth consideration. Two such systems are introduced here to demonstrate that this concept of number is not an exceptional case.

Jadran Mimica[18] assumes that the occidental cultural style of doing mathematics is specific to our knowledge and that ethnographic inquiry might provide an alternative ontological ground to question such cultural facts. The focus of his ethnological study is the logic of the numerical series and their fabrication among the Iqwaye in Papua New Guinea. Counting is done with fingers, hands, feet, persons of a group, etc.; and in doing so, counting is no fluent performance at all. It is a task that requires constant reflection because numbers have to be combined reasonably (that means according to correct generic principles) from the only two proper number words for One and Two (*ungwonangi* and *huwlaqu*).[19]

[17] See Lefèvre 1981, who makes no distinction between language and writing. See Harlizius-Klück 2004, 55–60.
[18] Mimica 1988.
[19] See Mimica 1988, 36–37. The amount of numerals means nothing with regard to the counting ability. It only means

To this end, counting follows the division of the body and hands which are thought of as a unit of four subsets each with five elements: the one, the two, the second one (=3), the second two (=4), and another one denoting the generated whole: the hand (=5). In counting further the second hand is added, then the toes and feet and finally the person or yet more persons. For example 300 is named as "two hands and one persons with all their legs and hands". This means: ((2×5)+5)×((2×5)+(2×5)) = (10+5)×20 = 15×20 = 300.

According to Mimica, this style of generating numbers has the same structure as the cosmogonic myth of the Iqwaye. A male divine creator (the Iqwaye are organized in patrilinear groups) generates the entire cosmos from the parts of his body. Thus the possibility of counting is closely interrelated with the image of the cosmos and the principles of its creation.

This counting order assisted by a body scheme is organised as a binary or dualistic structure of relations between the two numbers One and Two and this is done in analogy to a concept of part and whole. Therefore a pair, each with two fingers, together with one finger makes the whole of *one* hand which itself again is part of a body. Mimica refers to the enumeration of Iqwaye as a "process of totalisation".[20] The binarity of part and whole is found in the social organisation too, where "children are partialised wholes replicating their father".[21] The father is thought of as bisexual and each body is bisected symbolically into a male right and a female left side to which the strong and the weak are allocated. Although these bivalences are not based on a concept of oppositions, but on a concept of unification which is repeated permanently in the counting process. The two and only numerals are mapped onto both sexes: "… the ontological meaning of male sex is always oneness, whereas the female is the dyad or twoness".[22]

Regrettably Mimica does not mention whether the Iqwaye have a writing system. Maybe for him, as for most mathematicians, this is a matter of course. Brian Rotman who, similar to Mimica, accuses western mathematics of describing reality in a platonistic manner valid beyond experience, change, and language even insists that mathematics is a language that does not work without a writing-system.[23]

We will return to the question of writing. Let us first examine the number system of the Quechua-speaking people of South America where we also find counting as a process of reproduction.[24] In Quechua, the language of the Bolivian and Peruvian Andes, one starts counting with a One thought of as female.[25] The word 'mama' denotes:

- the origin of number
- the origin of colour
- the (clan) mother
- the master weaver and leader of the weaver workshop
- the queen of the Inca.

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that the representational order is grounded on a certain amount of elements. It appears that the complexity of the controllable order may be even greater when the amount of elements is less and their order simple. From this derives the striking success of the computer which also knows only two numerals: zero and one.

[20] Mimica 1988, 56.

[21] Mimica 1988, 63.

[22] Mimica 1988, 89. And on page 69 Mimica draws the conclusion: "the generation of numbers is to be understood as the symbolic process of sexual reproduction".

[23] Rotman 1993.

[24] For the following, see: Urton 1997.

[25] See Urton 1977, 1.

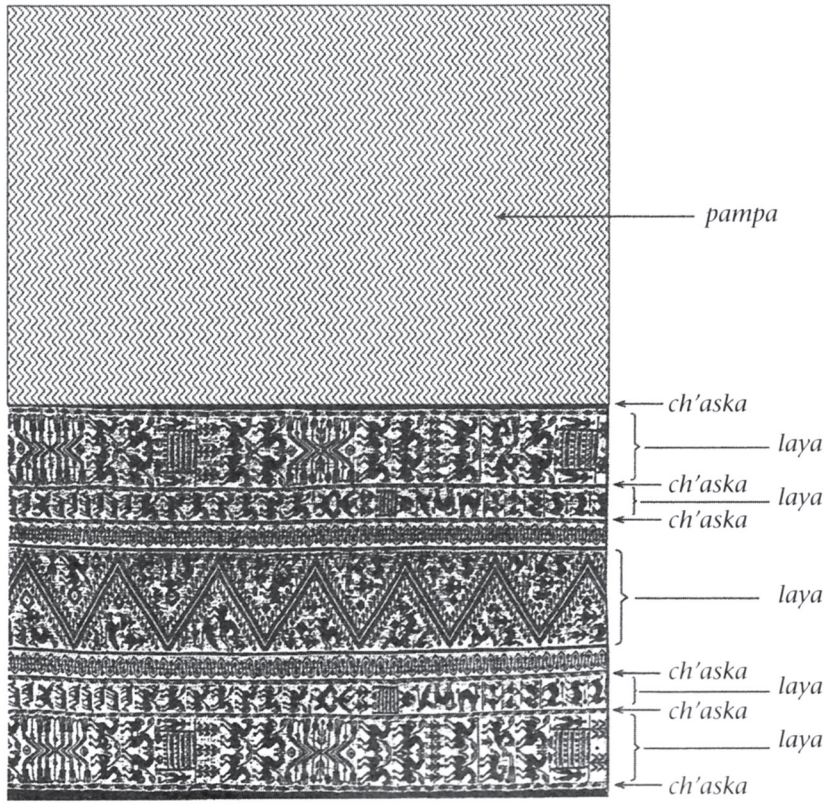

Fig. 3.1 Organization of sections of an axsu *(image reproduced courtesy of Gary Urton; drawing by Julia Meyerson).*

Counting follows the model of the decimal group of a mother and her descendants ordered by age. That means nursing infants are counted last (highest number, smallest finger).[26] In counting, things or numbers are grouped in pairs: each odd number refers to the following even number. The internal relationship of this pair is organised contrarily: odd numbers are negative, problematic, unfortunate; even ones on the other hand are positive, lucky, and fertile. Beside this concept of dualistic organisation, decimal groups loom large for more comprehensive numerical orders.

By coincidence (or not?) the word for One is also the word for the female master weaver. In weaving, the art of counting is at most developed in the Quechua-speaking population.[27] Girls learn to count and calculate very early in weaving. At about four to five years of age they make their first attempts and when they are six to eight they begin to receive more direct instruction for warping and weaving simple bands with geometric patterns: the *ch'askas*. With the onset of adolescence, they weave their first *axsu*: a woman's skirt that is the "most complex fabric woven in the Tarabuco area"[28] (see Fig. 3.1).

[26] See the chapter 'Birth Order and the Origin of Ordination' in Urton 1977, 85–90.
[27] See Urton 1977, 11 and 112–132.
[28] See Urton 1977, 118. The following description follows Urton 1977, 112–137.

It consists of two separately woven fields that are connected at the end: a large plain weave section (*pampa*) and a field of warp patterned panels consisting of two kinds of patterns: the *layas* (group, kind, species) with animals, plants, people, and things and the *ch'askas* (stars, shaggy hair) with only geometrical motifs.

Here again, we find the dualistic principle of counting on which the making of the warp also relies, consisting only of pairs of white and coloured threads. The decimal principle too plays an important role: all *layas* have only multiples of ten as thread amounts, whereas the numbers for the motifs are fixed: horses consist of 45 to 50 pairs of thread, the condor has 30 pairs, cat, duck, dog, ape, and chicken each 25 pairs. Unfortunately, Urton does not go into more complex questions of pattern weaving because his weaving experience does not reach that far and the Quechua-women have number names that are unknown to men and kept secret: "… women have their own number symbols and metaphors and … many of these are of an explicitly sexual nature …".[29]

Mathematically speaking, pattern weaving requires knowledge of the arithmetic of residue classes, the theory of prime numbers, the calculation of the least common multiple, and the greatest common divisor as well as knowledge of geometry and of the possibility of constructing geometric motifs and images of things with ratios. Each pattern has indeed to be dissolved into or composed of discrete and countable single elements (the threads).

According to Urton, the main principles in counting and weaving patterns, dual and decimal, were already part of the organisation of the Pre-Columbian Inca State (i.e. before the knowledge of the Latin alphabet).[30] On one hand there was the dualistic organisation of the principle of gift giving and reciprocity respectively, the commitment understanding of relationships between people of higher and lower rank; and on the other hand, tributes were formed by an order of tens, hundreds, and thousands. Only when each group was complete was there a duty to render tribute. Gary Urton thus describes the principle of counting as follows: generation or reproduction is the category that both brings sequal elements into being and is used for naming the order.[31] The successive order of birth starting with the mother as origin of production is generally the model/pattern of (numeral) order. Kinship and social relations are the basis of thinking with, and about, numbers and every form of good organisation, for instance, the administration of the state.[32]

However, Urton does not take into account that there is no prediction of the arithmetic of residue classes by reproductive order. Neither the opposition of odd and even nor decimal grouping is reducible to kinship relations. With a view to Mimica's example of the Iqwaye it may be assumed that the decimal groups find their model in the order of fingers and toes. In view of the even and odd complementarity, the difference of sexes seems to be likely, but it is not at all used in Quechua even though there is an idea of reproduction (group of Mother and descendants). In my view, Urton's example holds a possible answer: the order of the numbers is an abstraction of the order in the weave that represents the order of life as a whole. The counting order presented by Urton is an arithmetic of residue classes that only counts complete units/groups just as in a patterned cloth where the patterns fit together. In case of the order of the state or community, it is not necessarily the structure of numbers that is transferred, but the structure of weaving patterns – and transferring number order is the best way to do this.

[29] See Urton 1977, 45.
[30] See Urton 1977, chapter 'Numbers and Arithmetic in Pre-Hispanic and Colonial Andean Societies', 173–201.
[31] See Urton 1977, 70–71.
[32] See Urton 1977, 214–219.

This supposition is confirmed by a document that endeavours to explain the Inca culture to the Europeans by pictures. The following ones (see Figs 3.2 and 3.3) are taken from the 1176 page letter of Guaman Poma de Ayala, himself a descendant of the Inca, to King Phillip III of Spain. This letter-book is titled: *Nueva Corónica Buen Gobierno* (New Chronicle and Good Government) and blames the attitude of the Spaniards who act as if they were god-sent good rulers. He confronts the administrative system of the Spaniards with the old, better, and even more 'Christian' Inca traditions.[33]

The figures show the 7th and 8th of ten depicted Inca kings, dressed in a tunic and mantle. The tunic shows a pattern of rows and columns. Within single fields we see the Hindu-Arabic numerals common only to Western-European tradition, which must have been unknown to Inca-kings and master weavers before the arrival of the Spaniards (see Fig. 3.4).

Supposedly we are dealing with a translation of pattern elements into numerals, but the assignment is not clear. Gary Urton assumes that Guaman Poma merely intended to illustrate that the Inca already used numbers as instruments of organisation prior to the arrival of the Spaniards. The knowledge of the administrative competence of numbers was his most important argument against the moral dominance of the Spaniards and their concept of good government.[34] Yet, even in this case it is doubtful if Poma was interested in numbers as an abstract means of order or if he merely transformed pattern elements ruling the order of the Inca-State into numbers that were familiar to the Spaniards. To Poma, it must have been obvious that an administrative order derived from weaving patterns which may only find its way to the Spaniards' mind in this way.[35]

Starting borders and infringements

Why is weaving again used as a model for good order? Is this situation similar to that of Plato? Is pattern weaving the ideal model for a medium that processes reproduction by binary/dualistic principles and in series that may be described mathematically?

Pattern weaving is a medium of reproduction not only because it delivers a picture of things and their order. The process of weaving is often seen as analogous to natural reproduction. This is the case not only with Quechua-speaking people but also in Greek antiquity. In her research on the function of weaves in Homeric societies, Beate Wagner-Hasel pointed out that the weaving women in the Homeric epics (Helen of Troy, Penelope etc.) produce the temporal body of the clan symbolically by the weave and in reality by the exchange or gift of these weaves. The weaving of the *basileas* (aristocratic women with a queenly status) and the circulation of their weaves produces a community through time and was even capable of determining the rank of a person if regulations of legal succession were lacking. Wagner-Hasel calls this generative power materialised in weaves. This power only possessed by the mothers and wives, bridges the discontinuity of experience and memory, and passes ranking positions on to the next generation.[36] In democratic Athens, this power of generation was claimed by men.

Therefore, the restrictions of mourning mentioned at the start of this chapter and which Nicole Loraux cites to prove the change in the role of the mother, consistently concern the lavishly

[33] Today the manuscript is in the collection of the Royal Library of Copenhagen and accessible online at: http://www.kb.dk/permalink/2006/poma/. This is also the source for the images.
[34] See Urton 1977, 201–208.
[35] Even if today we use the word 'pattern' in the context of order, we would not think of woven ones or of weaving models. To say that 'pattern' points to a matter of hidden numerical order would be more convincing.
[36] Wagner-Hasel 2000, 204–205.

Fig. 3.2 Yahuar Huaca Inka, Guaman Poma: Nueva corónica*, fol. 104v, (GKS 2232 quarto, image reproduced courtesy of The Royal Library – Copenhagen).*

Fig. 3.3 Viracocha Inka, Guaman Poma: Nueva corónica*, fol. 106v, (GKS 2232 quarto, image reproduced courtesy of The Royal Library – Copenhagen).*

patterned clothes and shrouds that have been of great importance in the old mourning rituals. As Beate Wagner-Hasel has shown, the mourning restrictions concerned not only the public presentation of female wealth but also the participation in the posthumous reputation of the dead, which fixed the status of the clan through time.[37] Therefore, in the transitional period from the invention of writing to the invention of the community that is codified in writing, the formation of the *polis* is not a question of solid and durable signs of memory: "The relations of the *polis* as common relations reaching further than the household are more visible in female rituals (the mourning of the dead, and the presentation of the shroud), that are directed to the inhabitants of a settlement: to the *demos*".[38]

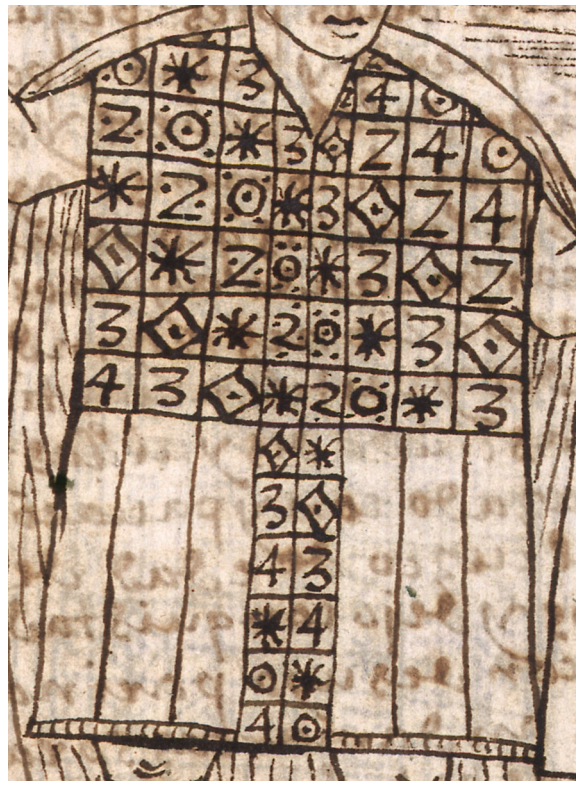

Fig. 3.4 Detail of tunika of Yahuar Huaca Inka, see Fig. 3.2.

One has to examine the technique closely in order to understand where the relationship of weaving and reproductive order is precisely grounded and where specific qualities of numbers are to be taken into account. Pattern weaving in Greek antiquity is complicated as well as simplified by a peculiar feature of the warp-weighted loom used. Before the preparation of the warp on the loom, one has to weave a band as long as the weave should finally be wide. During the weaving of this band, the weft threads are stretched out on one side as long as the weave should be long. This band is then fixed on the upper beam of the standing loom, the long weft threads of the band hanging down and forming the warp by attaching weights.[39] The threads of the band are sometimes grouped during weaving: even ones and odd ones in separate bundles.

The band remains on the weave and might be continued at the sides, so that the completed weave must not be cut, and seam and hem are integrated into the weave from the beginning. In weaving practice, this includes the fact that the weaver has to fit the patterns and their repeats into the length of the pre-woven band. Moreover, during the weaving process of this band, one has to consider the possibilities of patterning which will follow for the whole weave from the amount of threads woven into the patterns of the heading band.

We already know this topic of the ordering power of the beginning. In Antiquity it is not only a question of the logical structure of theories, but also a question of the legacy of texts. Reliability

[37] See Wagner-Hasel 2000, especially chapter IV: 'Ehrgeschenke und Machtstruktur: *time* und *geras*', 166–219.
[38] Wagner-Hasel 2000, 218, translation by Ellen Harlizius-Klück.
[39] See Barber 1991, 269–273; see also Harlizius-Klück 2004, 99–119, with a corrected diagram of the loom.

of the content of the poem of Parmenides depends on the fact that the content is told to the author by a female goddess and the beginning of the poem relates the journey to this goddess. Plato has his wedding number announced by the Muses, and similarly Homer's Iliad begins with calling on the Muses to help him sing his poem. These figures of beginning seem to be transferred from the poet's demand for legitimacy into the early works of philosophy and science. Gregory Nagy demonstrated that behind the authoritative meaning of entrance formulas in poetry and history there is a connection between the process of weaving and the writing of texts.[40] He refers mostly to the heading band or starting border that had a special meaning in the production of ritual weaves such as the *peplos* of the city-goddess Athena. From this sacred character of the weaving of starting bands for the clothes of gods, Gregory Nagy takes the authoritative meaning of the beginning. However, there remains the question of why does the weaving of this border have such a crucial significance at all? Is it possible that the technical fact that this border is the basis and regulating principle for the entire weaving process has been transferred to the production of texts? The ritual meaning of the beginning would then be transferred with reference to textile technical meanings. Even if these weaving techniques as well as text formulas and legitimacy through a female goddess disappear with time – the ordering power of the beginning remains solidly within the new structures of argument.

A woven fabric does not show itself as a hierarchical or binary organisation despite its being produced by the binary principle of warp and weft, of ups and downs, and despite the hierarchy of the heading band over the structure of the weave. In the final analysis it shows less the difference of its elements than their connection. It consists of binary organised continuous elements that have their contrary character only within the process of weaving. Being odd or even, being warp or weft are temporary features of continued threads. In the end the binary differences are solved within the fabric and this in the double sense that they vanish (warp and weft are hard to distinguish if the weave is no longer on the loom) as well as stay visible (if you look attentively the weft is under the warp or vice versa). It is exactly these features that Plato uses in his dialogue to rule the community by the Statesman. Thus, weaving on the one hand is to be counted in the crafts that do not lead to mere knowledge, but on the other hand weaving delivers the model of classification order as such. Within the often cited classification of knowledge (*epistemas*) into "arithmetic and certain other kindred arts" and the crafts that bring about "things which previously did not exist", weaving may be placed in the first category due to its dualistic and therefore dihairetical structure all the more because the number differentiation into odd and even is crucial in weaving and perhaps was even invented there.

Acknowledgment

This contribution was a lecture in 2007 at the Humboldt University in Berlin for the Graduate Research School 'Gender as a category of knowledge'. It was published in German under the title "Zahlverwandtschaften: Versuch über die Reproduktion des Geschlechts der natürlichen Zahl" in *Epistemologie und Differenz. Zur Reproduktion des Wissens in den Wissenschaften*, edited by Bettina Bock von Wülfingen and Ute Frietsch, Bielefeld: transcript, 2010, 27–45. I am grateful to the Gerda Henkel Foundation for giving me the opportunity to investigate and discuss this further at the Danish National Research Foundation's (DNRF) Centre for Textile Reseach in Copenhagen.

[40] Nagy 2002.

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4. Representation and Realities: fibulas and pins in Greek and Near Eastern iconography

Cecilie Brøns

The ancient Greek wardrobe included the *peplos*, sometimes referred to as the Dorian *chiton*, and the *chiton*. The *peplos* was a simple garment consisting of a rectangular cloth pinned at the shoulders and belted at the waist. The *chiton* was sewn together at the side, thus consisting of a tube, which was sewn or "buttoned" at the shoulders and upper arms, creating sleeves. The main difference usually emphasized between the two is the presence or absence of pins or fibulas. However, for example, the *peplos kore* from the Athenian acropolis wears both garments – they were not exclusive. Another common garment was the *himation*, a mantle usually worn over one shoulder. It is assumed that the garments were fastened by special ornaments, such as the fibula – the ancient safety pin – or regular straight pins. These serve to fasten the *apoptygma* of the *peplos* on the right and the left shoulder. A triangular lappet is drawn over the shoulder from the back and clasped on the front part with a pin, point up or down.[1]

The goal of the present article is to achieve a more comprehensive understanding of how, when and if fibulas and pins were used as dress-fasteners in the Greek Mediterranean area, and to what extent iconography represent reality. Are the represented dress-fasteners merely imagined types? Or do they represent real types identifiable in the archaeological record? And what does this mean for our understanding of ancient garments and ways of dressing?

This article will try to answer these questions through the investigation of iconographic sources juxtaposed with literary and archaeological evidence. Emphasis will be on the iconographic material, since previously focus in scholarly research often seems to have been on the literary sources, even though a corpus of informative visual material exists in the form of vase painting, sculpture and minor arts. This material provides evidence for different techniques of fastening garments. However, with regard to chronology, representations from the Bronze Age are too summarily executed to be informative. In early Iron Age depictions, dress-fasteners are basically non-existent, and due to the conventions of Geometric art, the interpretation of dress is a very difficult – or even impossible – task.[2] Focus is therefore primarily on material from the Archaic and Classical periods.

Fibulas appear in the Mediterranean area from *c.* 1200 BC, but their heyday is in the late geometric and early archaic periods from the 8th to the beginning of the 6th centuries BC. They are usually

[1] Jacobsthal 1956, 109.
[2] Lorimer 1950, 336.

made of bronze, and are recovered from different contexts, burials as well as sanctuaries. The sanctuaries of Lindos and Ialyssos on Rhodes and Pherai in Thessaly in particular have revealed exceptionally large numbers.[3] The fibulas come in many different types, which are often typical to a certain geographical area and time span. Thus we speak of for example Thessalian, Cypriot or Phrygian types. The pin is older in Greece than the fibula, and probably more common in most regions.[4] The great majority of preserved pins are of bronze, and are, like the fibulas, recovered from both burials and sanctuaries.[5]

Unfortunately very few (Greek) iconographic representations, such as sculpture and vase painting, illustrating how the fibulas were worn, have survived to today, and even in the few instances where such fasteners are visible, they are often ignored by scholars. Since the depicted evidence for fibulas is quite scant, it usually cannot be determined with certainty exactly which type of garment(s) was used with the fibulas or how the fibulas were placed. Thus, only in cultures where there is extensive written or iconographic sources, or in cases of very good preservation conditions do we know with certainty the actual attire for certain regions and periods. If we are not in possession of such sources the reconstruction of dress is primarily based on the preserved metal ornaments/accessories.[6] For this very reason, fibulas and pins are of crucial importance for our understanding and knowledge of ancient dress cultures and ways of dressing.

Dress fasteners in ancient literature

The ancient Greek terms for dress-fasteners are especially *porpē* (plur. *porpai*), *peronē* (plur. *peronai*) and *peronis*.[7] The word *porpē* derives from the verb *peirō* – to pierce,[8] usually translated as 'brooch' or 'clasp for fastening dresses'[9] and is commonly interpreted as denoting a fibula.[10] It is often semantically confused with the term *peronē*. The term *peronē*,[11] as well as the much rarer *peronis*,[12] are also primary derivatives of the verb *peirō*.[13] It is normally translated as 'pin', 'brooch' or 'buckle', but can also mean 'rivet', 'pivot' or 'a small armbone' (radius).[14] However, it is important to keep in mind that these terms not necessarily were the only ones used to designate these items. There are thus several well-known terms to describe the pins and fibulas, but in written sources, they are rarely discussed in any detail and often mentioned only in passing. Furthermore, we only know the function of these terms, but not exactly what they looked like. This is probably because they would have been familiar to the ancient audience and would not have needed further elucidation. As explained by Llewellyn-Jones, literary evidence tends only to focus on a customary or daily object or activity when it is being misused or abused.[15] This can explain why fibulas

[3] E.g. Kilian 1974, 168–187; Blinkenberg 1931, 71–91.
[4] Lorimer 1950, 338.
[5] Jacobsthal 1956, 87.
[6] Donder 1994, 6.
[7] A pin for fastening clothes can be called *belonē*, which is also the term used for a sewing needle.
[8] *LSJ s.v.* peirō.
[9] *LSJ s.v.* porpē.
[10] Prêtre 2012, 198. The *suda s.v.* porpē: defines it as 'the fibula among the Romans'.
[11] The term occurs already in Homeric texts, where it is used to fasten clothing, *Il*.5.425, *Od*.19.226,256, *Od.*18.293.
[12] *LSJ s.v.* peronis equates the word peronē.
[13] *LSJ s.v.* peirō.
[14] *LSJ s.v.* peronē.
[15] Llewellyn-Jones 2003, 10.

and pins are so rarely mentioned in written sources – they were simply taken for granted. It is also interesting to note that there are only two options for translating these terms: pin or fibula, indicating the perception of scholars of antiquity that these were the only two possible options of dress-fasteners available to ancient Greeks.

Even though rare, there are examples of pins and fibulas in the ancient literary sources. For example, in a passage in Herodotus,[16] and in passages in the *Iliad*[17] and *Odyssey*,[18] a female garment held together by pins at both shoulders is described – usually identified as the Doric *peplos*. Accordingly, graves with two pins at the shoulders have been identified as belonging to female individuals wearing this specific garment.[19]

Homer twice mentions pins where beautiful garments are described. In the *Iliad* (14, 178–180) Hera's *peplos* wrought by Athena Ergane was fastened by two gold pins. Furthermore, in the *Iliad* (5, 422–425) Aphrodite is wounded in battle, as she stroked an Achaian maiden and grazed her hand on the pin. Another example is from the *Odyssey* (18, 292–294) where a *peplos* with two gold pins and six gold fibulas is to be given by Antinoos to Penelope.

Greek tragedians mention female garments both with and without pins. For example, Polyxena, in the *Hecuba* (558–561) by Euripides, grabs her dress at the shoulder and tears it open to the waist, which has been interpreted as implying a sewn garment. But in the same play (1035), Polymestor is blinded by pins or fibulas from the women's garments.[20] There are thus also examples in literature of pins being used for horrible actions: E.g. Oedipus striking his eyes, and Polymestor being blinded by the Trojan women.[21]

Another literary source that mentions pins is Herodotus, according to whom pins were still worn in the 5th century BC. He also writes that Argive and Aeginetan women wore pins longer than those of earlier times.[22] His story of the murderous women of Athens, who use their dress pins to kill the sole survivor of Athens' attack on Aegina, is conventionally used as textual evidence for the changes seen in the iconographic representation of feminine garments in the middle of the 6th century BC.[23] However, it might be appropriate to question whether we sometimes give too much credit to Herodotus views on dress cultures. For example, it should be remembered that both Herodotus and Thucydides refer specifically to Athens, but the changes observable are Pan-Hellenic.[24] Furthermore, the descriptions by Herodotus are often short and very general and should be used with caution in modern interpretations of dress and iconography.[25] The information in the texts is thus very scant and often too general, so for an investigation of the use of pins and fibulas we must rely on further sources.

[16] Herodotus 5, 87–88.
[17] Homer, *Iliad*, 14, 178–180.
[18] Homer, *Odyssey*, 18, 292–294.
[19] Kilian-Dirlmeier 1984, 281.
[20] Johnson 1964, 30.
[21] Sophocles *Oedipus Tyrannus* 1265–70; Euripides, *Hecuba* 1169–71.
[22] Jacobsthal 1956, 90. Herodotus, *Histories* 5.89.
[23] Lee 2005, 55. Herodotus, *Histories* 5.87.
[24] Lee 2005, 57.
[25] Gleba 2008, 16.

Fig. 4.1a (above) The François vase. Atalanta. © Museo Archeologico, Nazionale, Florence.

Fig. 4.1b (right) The François vase. The Moirai. © Museo Archeologico, Nazionale, Florence.

Representations of pins and fibulas in vase-painting

Greek vase-painting constitutes one of the most frequently used sources for the study of ancient clothing,[26] but unfortunately dress-fasteners are often omitted in the depictions. However, by a closer study of the material, a considerable number of exceptions appear, especially in Attic red-figured vase painting.

Pins

Representations of dress-fasteners are rare in black-figure vase painting, and in these instances they primarily consist of pins.[27] The earliest example (and also the most elaborate representation) of pins represented on vases is on the François vase, *c.* 570–560 BC. The decoration is divided into seven friezes and primarily depicts mythological scenes. In the first frieze on side A is the scene of the hunt for the Calydonian Boar, where Atalanta, identified by an inscription, wears a short tunic fastened at her shoulders by pins placed head downwards (Fig. 4.1a). In the 3rd frieze are four Moirai whom all have their *peploi* fastened by pins, placed head down, some of them connected by a chain hanging across the chest (Fig. 4.1b). There are further examples of depictions of pins

[26] Gleba 2008, 14.

[27] Jacobsthal provides a list of examples of pins depicted in black- and red-figured vase-painting, Jacobsthal 1956, 106–109.

Fig. 4.2 Sherd of an Attic black-figured amphora with depiction of a woman clad in peplos fastened by pins. c. *550–530 BC. © Trustees of the British Museum.*

on the François vase. They all belong to women and are worn with *peploi* in pairs, one by each shoulder, all placed head down.[28]

Other black-figured representations of pins are much more summarily executed by means of incisions, as rendered on a sherd depicting a woman clad in a *peplos* fastened by pins (Fig. 4.2). In such instances, it is clearly impossible to tell the type or decoration or whether they were placed head upwards or downwards.

Pins are more commonly represented in red-figure vase painting. In the 5th century BC they appear on a few vases from *c.* 470 BC onwards, but after the middle of the century they become rarer.[29] One explanation could be that on many vases of the last decades of the 5th century BC, the drapery on the shoulders is drawn in wild, sketchy lines, and it is therefore not easy to see whether there is a pin or not.[30]

Often the pins are depicted fastening *peploi* of female figures. Usually the garments are fastened by two pins, one at each shoulder, as is illustrated on a red-figured Attic calyx crater, *c.* 460–450 BC, by the Niobid Painter (Fig. 4.3). One scene depicts a frontal female figure identified as Pandora clad in a long Doric *chiton* with *apoptygma*, fastened on each shoulder by a pin. A similar representation is on the famous Niobid krater, where the goddess Artemis is clad in a *peplos*, open on one side,

[28] Similarly, a fragment of a *lekanis* from *c.* 575–525 BC depicts a woman clad in a *peplos* fastened by a pin placed downwards at each shoulder, Fitzwilliam Museum GR.113.1899.
[29] Jacobsthal 1956, 110.
[30] Jacobsthal 1956, 109.

Fig. 4.3 Red-figured calyx crater with depiction of Pandora. c. *460–450 BC. © Trustees of the British Museum.*

fastened by two pins placed with their heads upwards. However, there are also rare examples of the *peplos* garment having only one pin.[31]

Based on the depictions in vase-painting there appears to be a change in how the pins were worn from head downwards in black-figure representations to upwards in red-figured examples. With regard to position, the pins on early Greek vases are often fastened head down, point up. This position of pins is odd since it makes them heavy at the bottom, liable to slip off, and the pin point may be dangerous sticking up in this way. According to Lorimer, the position of the pins head down and the method of insertion do not render reality, because pins inserted this way could not hold a

[31] E.g. an Attic red-figured *oinochoe* dating to *c.* 460–450 BC depicting a maenad clad in a black-bordered *peplos*, open on one side, fastened by a pin at her right shoulder, Firenze, Museo Archeologico, inv. No. 4007. Another example is the red-figured hydria by the Nausicaä Painter in the Metropolitan Museum of Art, dated to *c.* 460–450 BC, which depicts Heracles' mother Alcmene, dressed in a *peplos* fastened by a pin on the left shoulder, Richter and Hall 1936, 98–100.

Fig. 4.4 Neck-amphora with depiction of Hermes. c. 520 BC. Courtesy of Thorvaldsen's Museum, Copenhagen.

Fig. 4.5 Fragment of a white ground cup with a depiction of Europa in a garment fastened by four pins. Courtesy of Staatliche Antikensammlungen und Glyptothek München. Photo: Renate Kühling.

garment.[32] Though there seems to be no mention in excavation reports of pins found in this position, the vase paintings possibly do render reality. Additionally, if the pin was worn point down, it could prick the wearer. However, a pin can be secured with a thread, wire or chain which passes through a perforation in the shank or head of the pin or through an eyelet attached to the shank.[33] Some figures in vase painting who wear *chiton* and *himation* diagonally draped have the *himation* secured in the same way by a single pin on the right shoulder. The change from point upward to point downward (the latter can be seen on the Pandora vase) illustrated in vase-painting is possibly due to the fact that tradition had been broken and no one remembered how *peplos* pins had really been worn. The point downward position looks perhaps more natural and would be used by a person pinning a *peplos* on a statue.[34] However, it could of course also represent a change in practice.

[32] Lorimer 1950, 399.
[33] Jacobsthal 1956, 115.
[34] Lorimer 1950, 401.

Pins were also used to fasten mantles of both men and women. An example is a neck amphora dating to *c.* 520 BC from Thorvaldsen's Museum, Copenhagen depicting Hermes in a mantle fastened by a horizontally placed double pin or fibula (Fig. 4.4).[35]

Occasionally vase-painting provide us with exceptional examples of how pins were worn, as for example depicted on a fragment of a white ground cup dated to the early classical period.[36] The woman (Europa) wears a garment fastened by four pins, two with point upwards, and two with point downwards (Fig. 4.5). The pins are placed at her shoulders and above her elbows. This way of fastening a garment is unusual for Greek art, where the norm is two pins or fibulas.

Based on the depictions in vase painting we can conclude that women as well as men wore pins. When women wear pins, they use them to fasten the *peplos*, usually one pin placed at each shoulder even though there are exceptions to this, e.g. Europa wearing four pins, or to fasten a mantle at one shoulder only.[37] When men are depicted with pins, they use them to fasten a *himation* at one shoulder only, or in the case of the *chlamys* the pin is usually placed frontally.

Fig. 4.6 Fragment of an Attic dinos signed by Lydos. c. *560–540 BC. Courtesy of the Acropolis Museum, Athens. Photo: Tsiamis.*

Fig. 4.7 Attic red-figured skyphos. c. *440 BC. Courtesy of the National Museum of Denmark.*

Fibulas

Fibulas are very rare in Greek vase-painting. A possible example is a fragment of an Attic *dinos* signed by Lydos (*c.* 560–540 BC) carrying a depiction of Aphrodite wearing a *peplos*. The garment is fastened at the shoulder by an object in the shape of four spirals (Fig. 4.6).

Besides this example, it seems that fibulas are never depicted in the way they actually looked, and no real types are discernible. Instead they are usually depicted as round brooches. There are several examples of the round brooch in black-figured vase-painting, where it is usually depicted as a fastener for men's mantles, but they are much more common in red-figured vase painting, where they fasten different types of garments, but they are especially familiar as fastenings of the *chlamys* and are part of the emblematic uniform of Apollo Citharoedus.[38] Examples include an

[35] See also for example the Attic red-figured volute krater from Ferrara depicting a bearded male wearing a chlamys fastened by a similar double pin, Museo di Spina inv. no. 2739.
[36] Jacobsthal 1956, 108.
[37] Furtwängler and Reichhold 1900–32, pl. 114,1; Jacobsthal 1956, fig. 335.
[38] Lorimer 1950, 403.

Attic red-figured *skyphos*, which depicts two young men, perhaps Orestes and Pylades, who both wear a *petasos* and a *chlamys* fastened by a round brooch (Fig. 4.7). The round brooch was also very common in depictions of Hermes, due to his traditional costume consisting of *petasos* and *chlamys*, usually fastened in front by a round brooch.

The round brooch was generally common in art from the 5th century onwards, and is often depicted in Apulian vase painting. Lorimer identifies it with the *porpē*. According to literary sources it was used by men in certain circumstances, e.g. the traveller to fasten his *chlamys*, by men going out to active service and at a later date by professional soldiers, but also by schoolboys until their admission to a gymnasium.[39] In other instances it was used to secure the female *peplos* or occasionally the Ionic *chiton* in the 5th century, and it also appears on Hellenistic monuments as an adjunct to female dress,[40] but here they are generally smaller than men's brooches.

Representations of pins and fibulas in sculpture and the minor arts

Early Greek sculpture rarely provides any specific evidence for how garments were attached. Firstly, the *kouroi* – Archaic depictions of male figures – were usually rendered naked. Secondly, the female statues – the so-called *korai* – are dressed, but rarely depict any type of dress fasteners. The garments observable on the *korai* are the *peplos*, the *chiton*, the *himation*, the *epiblēma* and the *ependytes*.[41] The *epiblēma* was a kind of shawl thrown over both shoulders covering back and sides, but sometimes worn covering the chest with the ends hanging down the back, while the *ependytes* was a garment, belted or unbelted, worn over the *chiton*.[42] The belted *peplos* was the common dress for the early *korai*, but even though this type of garment was worn with pins or fibulas, these are never depicted on the sculptures, and so far not a single *peplos* statue with pins preserved has come down to us. It has been suggested that this is due to their shoulders (and thus the dress-fasteners) being covered by their hair or a mantle.[43] Alternatively, the fasteners might have been painted on, but so far no evidence confirms this.

During the 6th century BC the *chiton* becomes the most common garment for the *korai*, often worn with a short *himation*. The depictions of these garments also do not include dress-fasteners with the possible exception of a *kore* from Samos who wears a *chiton* and a *himation* fastened by a sort of brooch or disc at her right shoulder (Fig. 4.8).

Sculptures with holes from inserted metal pins or fibulas

Occasionally, details such as horse's harnesses or weapons were added to sculptures or reliefs in stone. This was also the case for dress fasteners such as fibulas or pins, which were inserted into holes drilled in the marble. These metal attachments – primarily made of bronze – have in almost all cases now disappeared, either because they were removed due to the value of the metal, or they have simply disappeared as a result of disintegration. Nevertheless, the drilled holes still remain,

[39] Lorimer 1950, 402.
[40] Lorimer 1950, 339.
[41] Richter 1968, 7.
[42] Richter 1968, 9.
[43] Richter 1968, 12. The same could very well be the case for Classical and Hellenistic female marble sculpture since these are often wearing tightly wrapped mantles covering the under-garment and the area where fibulas or pins might have been placed, perhaps especially with regard to the Herculaneum and *pudicitia* and "arm-sling" format, Dillon 2010, 82–92.

which can give us an idea of the placement and use of the original dress fasteners.

The phenomenon is far from uncommon. Among the most famous examples of attached dress-fasteners are the sculptures from the Parthenon where some of the sculptures in the temple's pediments have holes that testify to the presence of pins or fibulas. For example, the marble statue group of the Parthenon east pediment depicting the birth of Athena, include two female figures, interpreted as Demeter and Persephone or as two *Horae* (seasons) (Fig. 4.9), who both wear a sleeveless *chiton*. The right figure has holes at each shoulder for the insertion of metal fibulas, now disappeared. Another statue from the east pediment has holes for the insertion of fibulas or buttons. The figure depicts a young girl wearing a girdled *peplos* with an over fold. At both shoulders a single hole is drilled, placed at the attachment of the garment (Fig. 4.10). Another example comes from the marble statue group from the west pediment, which illustrates the mythical contest between Athena and Poseidon for the supremacy of Attica. A female torso, which can probably be identified as Amphitrite, is clad in a long sleeveless *chiton*, girdled high with a metal belt (now missing). At her right shoulder are two small holes for a fibula, while she has a garment (mantle?) over her left shoulder which is also provided with a hole, perhaps for the insertion of another dress-fastener (Fig. 4.11).

The temple of Athena Nike is another monument on the Athenian acropolis that carries depictions of dressed figures with drilled holes for the insertion of pins or fibulas.[44] On the parapet (*c.* 420–400 BC) are rendered *nikai* leading sacrificial animals, erecting trophies, or bringing offerings to Athena Nike. The *nikai* wear belted *chitons,* of which some display visible holes at the shoulders for the insertion of dress-fasteners in metal.

Fig. 4.8 Kore from Samos clad in chiton *and* himation*.* c. *560 BC Staatliche Museen zu Berlin, Antikensammlung, Sk 1750. © Staaliche Museum zu Berlin. Photo: Gisesa Geng/Philip Gross, Universität zu Köln.*

[44] Acropolis Museum inv. no. 1014 and 994.

Fig. 4.9 The Parthenon east pediment: Demeter and Persephone. © Trustees of the British Museum.

Furthermore, a marble acroterion, dating to *c.* 480 BC, from the Old Athena temple on the Acropolis, representing a headless torso, probably Nike, has similar holes.[45] The torso is clad in a *peplos* over a *chiton*, and has drilled holes for the insertion of a dress-fastener at the right shoulder.

Another example of this phenomenon is a marble torso of a *kouros* (naked youth) found in the river Ilissos, Athens.[46] The *kouros* can be dated to the early 5th century BC. It wears a *himation* which covers his back and hangs symmetrically open at the front.[47] The edges of the mantle are fastened on the shoulders. On one side are two drilled holes, on the other side only one (Fig. 4.12).[48] Konstantinou has interpreted this as an indication of a two-disc brooch with a chain across the chest.[49] However, this is rather speculative, and other fibula types are also a possibility.

A somewhat similar example is the colossal marble statue of Dionysos dating to *c.* 530/20 BC from Ikarion. The statue is clad in a *chiton* and a *himation* and has small drilled holes on the chest

[45] Acropolis Museum inv. no. 694.
[46] Athens National Museum inv. no. 3687
[47] Dressed *kouroi* were common in the north-east Aegean and east Greece, especially Ionia.
[48] Jacobsthal 1956, 105.
[49] Konstantinou 1931–32, 46.

(two on the left shoulder, two lower down on the left breast, two on the right side of the breast), which according to Romano may be for the attachment of separate locks of hair.[50] However, (some of) the holes might have been for added fibulas or pins in metal.

A final example is the relief plaques from a marble altar from Thasos where two such examples have drilled holes for the insertion of dress-fasteners in metal.[51] The altar belongs to the early classical period, *c.* 480– 465 BC. The reliefs occupied a central position in the *Passage des Théories*, a structure at the northeast corner of the Agora. On the west side Apollo is depicted wearing a long *chiton* and a mantle, originally fastened by a pin or fibula, indicated by a hole at the shoulder. On the east side Hermes is depicted, identified by his characteristic *chlamys*, cap and *Kerykeion*.[52] His mantle is fastened on the right shoulder, where there are four holes placed close together for the insertion of a dress-fastener – probably a fibula.

These examples illustrate that dress-fasteners were used for the fastening of men's (in this case male gods) *himatia*, and for fastening women's (here, goddesses') *chitones* or *peploi* in the late archaic and classical period. However, it is difficult to determine whether these holes were for pins or fibulas (possibly, one hole might indicate a pin, while two holes could indicate a fibula, but this is doubtful and unconfirmed by the evidence), and for now it can only be concluded that dress-fasteners were present on these specific examples.

Fig. 4.10 The Parthenon east pediment: Female figure. © Trustees of the British Museum.

Fig. 4.11 The Parthenon west pediment: Female torso. © Trustees of the British Museum.

[50] Athens National Museum inv. no. 3072–74, 3897. Romano 1982, 400.

[51] Louvre, inv. no. Ma 696.

[52] http://www.perseus.tufts.edu/hopper/artifact;jsessionid=1CF6D3337550682DEC3CA855B918DF67?name=Louvre+Ma+696andobject=Sculpture.

Fig. 4.12 Marble torso of a kouros *found in the river Ilissos, Athens. Courtesy of the National Archaeological Museum, Athens. © Hellenic Ministry of Education and Religions, Culture and Athletics/ Archaeological Receipts Fund.*

Fig. 4.13 Kore from the Athenian Acropolis. c. *480 BC. Courtesy of the Acropolis Museum, Athens. Photo: Nikos Daniilidis.*

Buttons

Buttons are typically considered exclusively related to the *chiton*, which appears during the first half of the 6th century BC, and distinguishable by its light appearance and its sleeves with buttons along the upper arms. Buttons are thus most commonly rendered in the artistic depictions for the sleeves of *chitons*, where, in case of work in stone, they are usually carved (or reproduced in metal, indicated by the presence of drilled holes), or in the case of work in metal, they are cast.[53] Unfortunately, these depictions rarely inform us on the material of these buttons, and they could thus have been made from a variety of materials from metal to wood or textile.

Besides their use for creating sleeves of *chitons*, it seems that buttons were also used singularly to fasten garments. An example is a *kore* from the Athenian Acropolis, who has her *himation* attached by a round object, possibly a button (Fig. 4.13).[54] Figurines also illustrate the use of round dress-fasteners – perhaps identifiable as buttons. Thus, a Greek bronze figurine from 490–480 BC

[53] With regard to vase painting, buttons appear from the early 5th to the 4th century BC. Jacobsthal 1956, 111.
[54] Acropolis Museum inv. no. 686.

Fig. 4.14 Greek bronze figurine. c. *490–480 BC.* *© Trustees of the British Museum.*

Fig. 4.15 Bronze buttons with gorgon heads. c. *500 BC.* *© Trustees of the British Museum.*

of a goddess with a dedicatory inscription wears a long garment with the *apoptygma* fastened at the shoulders by small round fasteners, either brooches or buttons (Fig. 4.14).[55]

Actual buttons in bronze have been recovered from Greece, e.g. the four examples dating to *c.* 500 BC with Gorgon heads preserved in the British Museum (Fig. 4.15).[56] However, buttons are surprisingly few, compared to their frequent appearance in iconography; perhaps due to their confusion with beads etc.[57] In addition they were probably often made in perishable materials such as wood, bone or textile. This would also make them very light, and thus appropriate for thin garments.

Shoulder discs

Another type of shoulder attachment, which probably represent a dress-fastener, are the shoulder discs in different sizes represented in different media over a large part of ancient Greece.

[55] Walters 1899, 16; Lorimer 1950, 402.
[56] British Museum, reg. no. 1959, 0720.1–4.
[57] Haynes 1960/1, 48–49.

The famous marble statue of a winged Nike, discovered beside the Artemision on Delos is a case in point. It wears a *peplos* and *chiton*, leaving the right leg exposed, and it has a disc at each shoulder (Fig. 4.16).[58] At the largest, the discs are 6 cm in diameter and 1.7 cm thick. There is nothing to indicate that something was attached to the edge of the discs or beneath them. According to Rubensohn, it is out of question that the discs have any relation to the wings of the figure. Instead, they were rather related to the garments, functioning as decorative discs attached to the fibulas or pins, which held the *peplos* in place.[59] The discs on the Delian statue are placed far from the sternum, as is often the case in terracottas from the mainland and Magna Graecia. The discs were most probably decorated with rosettes, but no traces, neither plastic nor painted, are preserved.[60] A parallel for such decoration can be found in the Boeotian plate fibulas with incised decoration often in the form of rosettes.

Fig. 4.16 Marble statue of a winged Nike from the Artemision on Delos. Courtesy of the National Archaeological Museum, Athens. © Hellenic Ministry of Education and Religions, Culture and Athletics /Archaeological Receipts Fund.

The same type of disc is depicted on a 6th century terracotta copy of the above described statue.[61] It was recovered from the Delion at Paros beneath the small Artemis temple in the sanctuary.[62] A tongue-shaped petal is preserved on the right disc, which indicates that they were originally decorated with rosettes of a type known in more stylised form, for example on early archaic ivory disc fibulas.[63]

These decorative discs are especially very common in archaic terracotta imagery from the Greek mainland, particularly in the Peloponnese and Boeotia, but also in the Greek west.[64] For instance there are several examples of such shoulder discs among the large group of terracotta figurines from the 6th century BC, commonly called *pappades* because of their flaring polos.[65] On

[58] Jacobsthal 1956, 105; Rubensohn 1948. Athens NM 21.
[59] Rubensohn 1948, 22–23.
[60] Rubensohn 1948, 28, 29. This is based on the fact that a terracotta copy of the statue has such rosettes (see below).
[61] Jacobsthal 1956, 105.
[62] Rubensohn 1948, 23, 24.
[63] Unfortunately, no colours are preserved. Rubensohn 1948, 28, 29. A bronze disc with a similar rosette in gold has been recovered from Delphi.
[64] Rubensohn 1948, 27.
[65] Szabo 1994, 64.

the canonical *pappades* the garment is usually decorated according to a set scheme: neck ornament of one or more horizontal rows of decoration, a belt with pendant ribbons and lower border ornament. The female figurines often wear breast bands or neck ornaments (*hormos*) attached at the shoulders with circular discs – probably disc fibulas or pins with large circular head (Fig. 4.17).[66] In some examples the shoulder ornaments have been interpreted as floral decoration, or wreaths of flowers, but should rather be interpreted as an elaboration of the discs.[67] Several regions have revealed such female figurines wearing chest ornaments attached by what appears to be large disc fibulas. They are often associated with Boeotia, where a large number seem to have been produced. However, many have also been recovered in for example Attica, Corinth, Argos, Arcadia and Laconia.[68] These figurines often functioned as grave offerings, but they also occur in conspicuously great numbers in the sanctuaries of goddesses, e.g. Athena on the Acropolis of Athens, the Athenian nymphs, Brauronian Artemis, Demeter of Eleusis, Argive Hera, Argive Aphrodite, Tegean Athena, Artemis of Lusoi, Spartan Artemis Orthia, and Spartan Athena Chalkoikos.[69] It has been suggested that the figurines represent heroised dead, but this interpretation has been refuted, and it has instead been proposed that the types in question are divinities – perhaps the goddess Hera,[70] and the figurines might even represent a coroplastic imitation of ancient wooden statues.[71]

A terracotta figurine from the early 5th century BC recovered at Gela, plausibly confirms the identification of the discs of the

Fig. 4.17 Female terracotta figurine from Thebes. Courtesy of the National Archaeological Museum, Athens. © Hellenic Ministry of Education and Religions, Culture and Athletics/Archaeological Receipts Fund.

[66] Szabo 1994, 65, 88.
[67] Barfoed 2013, 98.
[68] Szabo 1994, 111.
[69] Szabo 1994, 117.
[70] Paul 1958–59, 204; Barfoed 2013, 97.
[71] Szabo 1994, 114, 121.

above figurines as fibulas.[72] The figurine in question is seated on a throne, and according to C. Blinkenberg, it represents the goddess Athana Lindia, venerated at Lindos, Rhodes.[73] The goddess is clad in a *chiton*, and at the shoulders are placed two large fibulas in the shape of double palmettos attached to each other by three chains with ornaments covering the chest (Fig. 4.18), quite similar to the so-called *pappades*. It thus seems likely that both types of figurines represent actual fibulas.

Fig. 4.18 Terracotta figurine from Gela (Athena Lindia?). © Trustees of the British Museum.

In some instances terracotta figurines display very large examples of shoulder discs. This is for example the case for a group of female figurines, dating to the 7th to 6th centuries BC, recovered from sanctuaries in the area of the Greek city Metapontum in southern Italy. Some of them have wings, and are rendered standing, while others are seated, but without the wings. They have tentatively been identified as divinities – possibly Artemis. The discs are placed on the shoulders of the figurines, usually one by each shoulder, but occasionally further discs are placed underneath, thus giving a total of four discs, always arranged symmetrically. Unlike the *pappades* and the figurine from Gela, these discs are not attached by chains, but unattached like the discs on the Nikai from Delos and Paros described above.

There are similar representations of large shoulder discs in Attic red-figured vase-painting, for example in the depictions of the cult statue of Dionysos Lenaios.[74] These examples depict the god frontally in loose garments, usually a *himation*, but occasionally also in *chiton* and/or *ependytes* with large discs placed at the shoulders. Yet these discs are very large and placed quite high in comparison to the examples described above, perhaps indicating a different use or material.

These examples show that the discs connected by chains and ornaments were worn by female figures, and probably represent actual dress-fasteners, while the very large shoulder discs were worn without connecting chains by male and female figures, and with different types of garments. Their exact use is still unclear since we do not know whether they were strictly ornaments, perhaps symbolising something specific, or if they (also) functioned as dress fasteners. However, they appear to be reserved for divinities such as Artemis and Nike, and not depicted in representations of human beings.

[72] Higgins 1969, 303, cat. No. 1109.
[73] Blinkenberg 1917, 31.
[74] See for example Frickenhaus 1912. In the case of Dionysos Lenaios, the discs might be offering cakes, Dillon 2002, 149.

Pins

Some Greek figurines illustrate males wearing mantles fastened by pins, for example a small bronze figurine dating to the 6th century BC, depicting a male in a cloak fastened by a large pin placed almost horizontally on the chest (Fig. 4.19). An inscription on the base reads: "Phauleas dedicated (it) to Pan".[75] The figurine belongs to a well-known class of bronze figures, consisting mostly of shepherds and peasants. They evidently served as offerings in local sanctuaries, and are chiefly found in Arcadia. The figures wear the same practical outfit (either entire or in part) consisting of a round, pointed hat, a short tunic, a heavy cloak sometimes fastened in front with a large pin, and boots.[76]

Fig. 4.19 Bronze shepherd from Arcadia. 6th century BC. © The Metropolitan Museum of Art.

Quatrefoil clasps

A group of bronzes from *c.* 600–430 BC known as caryatid mirrors include depictions of dress-fasteners. The handles of these mirrors consist of a figure of a female dressed in either *peplos* or *chiton* and *himation*, occasionally fastened by a large clasp or fibula placed flat on the shoulder, some of which possibly depict actual fibula types. Hence, a mirror of unknown provenance dating to *c.* 495–480 BC depicts a woman dressed in *chiton* and a *himation* fastened at the right shoulder with a large quatrefoil clasp (Fig. 4.20).[77] Other examples renders dress fasteners of a more elongated shape, but still of a quatrefoil type, either used to fasten a *himation* on the right shoulder or to fasten (or just decorate) a *chiton* at both shoulders. A mirror from *c.* 550–530 BC is particularly interesting, since it renders a woman clad in garments fastened by both buttons and a large quatrefoil clasp. She wears a *chiton* with sleeves created by large buttons over which she wears a *himation* fastened at the right shoulder by the clasp (Fig. 4.21).[78]

[75] http://www.metmuseum.org/Collections/search-the-collections/130008553?rpp=20&pg=1&ft=&ritsena&pos=1
[76] Richter 1946, 249.
[77] Congdon 1981, 146, cat. No. 27. The Hermitage Museum inv. no. B 815.
[78] Congdon 1981, cat. No. 12. Museum Narodowe w Warzawie Inv. no. 198308 MN.

Fig. 4.20 Bronze mirror stand. c. *495–480 BC. Courtesy of the State Hermitage Museum, St. Petersburg.*

Fig. 4.21 Bronze mirror stand. c. *550–530 BC. Courtesy of the National Museum of Warzaw. Photo: Piotr Ligier/ Muzeum Narodowe w Warszawie.*

Representations of fibulas from Anatolia and the Near East

There are several examples of representations of fibulas from Anatolia and the Near East, primarily in the form of stone reliefs. All the known representations of fibulas from this area show women as well as men wearing fibulas, and they all represent high status such as royalty or deities.[79] Thus, usually nothing is known about the dress of ordinary people, because the iconography concentrates on the elite classes.[80]

During the neo-Assyrian empire, the basic garment worn in ceremonial, religious and court scenes is an ankle-length T-shaped tunic with short sleeves, usually embroidered and fringed round the edges. Over this was worn a voluminous shawl or shawls also with fringed borders. When hunting

[79] Giesen 2001, 362.
[80] Harlow and Llewellyn-Jones 2010, 24.

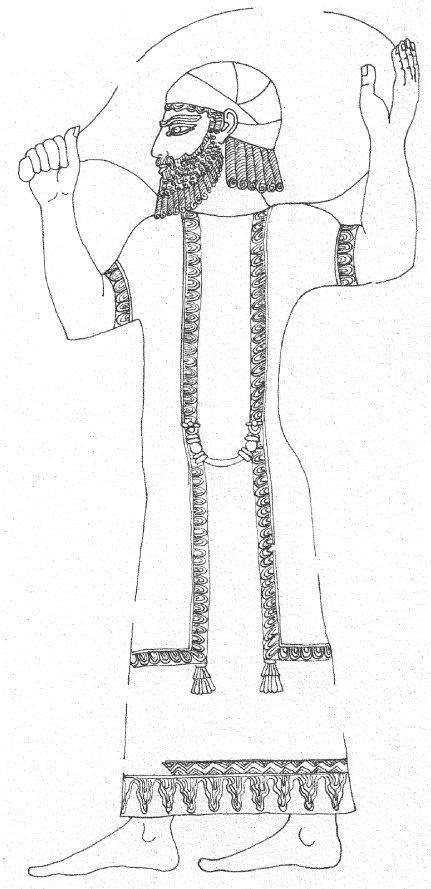

Fig. 4.22 Neo-Assyrian relief from Khorsabad, Iraq, depicting a male tribute bearer. After Madhloom 1970, pl. XLIII, 5.

Fig. 4.23 The rock relief at Ivriz. Detail with the Anatolian king Warpalawas.

or at war they wore simpler outfits consisting of knee-length, short-sleeved tunics and boots.[81] Soldiers are generally dressed in short tunics, held by belts.[82] With regard to religious dress, priests and apotropaic figures wear short fringed tunics, held by a broad girdle. Over this different types of shawls are worn.[83] These garments are never depicted being fastened by fibulas, pins or other dress-fasteners. The female garment appears to have been simple, consisting of a long tunic.[84] Foreigners, such as tributaries, captives and enemy forces, are widely depicted on the Neo-Assyrian reliefs, but their dresses were shown in less detail. They are depicted on reliefs from the 9th century BC, but it was not until the time of Tiglath-Pileser III (744–727 BC) that the artists started to characterise different types of foreign people. In addition, from this period onwards the name of the conquered

[81] Harlow and Llewellyn-Jones 2010, 24.
[82] Madhloom 1970, 68.
[83] Madhloom 1970, 70.
[84] Madhloom 1970, 73.

city was often given immediately above it. Among the foreigners depicted are people from Karchemish, Syrians, Semites and Lydians.[85] The depictions of the Lydians are particularly interesting in this respect. Thus, a neo-Assyrian relief from Khorsabad, Iraq, depicts a male tribute bearer wearing a long under garment (tunic) over which he wears a short-sleeved coat-like mantle, closed at the waist by a large, semi-circular fibula (Fig. 4.22). This is the only depiction of a fibula in neo-Assyrian art, which might indicate that the Assyrians did not wear garments fastened by metal objects, such as fibulas or pins.

The large rock relief at Ivriz, 12 km south of Ereğli at the southern edge of Turkey's central plateau is carved in a wall of living rock. It shows a large figure wearing a multi-horned crown and holding in his hands a sheaf of wheat and bunches of grapes, receiving a smaller figure that approaches him from the right with both hands raised in adoration (Fig. 4.23). Accompanying inscriptions in Hittite hieroglyphs identify the larger figure as the weather and vegetation god Tarhun and the adorant as the Anatolian king Warpalawas, king of Tuwanuwa.[86] The relief can be dated to the second half of the 8th century BC. King Warpalawas is also depicted on the so-called Bor stele. In both representations the Anatolian king wears a long tunic, over which he wears a shawl. Tunic, shawl and belt have fine geometric decoration.[87] On the relief from Ivriz, his garment is held together by a fibula of a distinctively Phrygian type.[88] Unfortunately, the Bor-relief is missing the part from the shoulder to waist, so it is not possible to tell whether this garment was also fastened by a fibula.

Fig. 4.24 Grave stele from Zincirli, South-eastern Turkey with a depiction of a deceased queen. © Staatliche Museen zu Berlin – Vorderasiatisches Museum. Photo: Olaf M. Teßmer.

A grave stele, dating to *c.* 750 BC, from Zincirli (ancient Sam'al) in South-eastern Turkey has a depiction of a deceased queen wearing a long tunic with short close-fitting sleeves fastened at the breast by a ribbed semi-circular bow fibula (Fig. 4.24).[89] According to Luschan, the type of fibula is typical for Zincirli, where they are relatively common, and Assyria, and there are similar finds from Nimrud.[90]

A late Hittite basalt grave stele dating to the end of the 8th–beginning of the 7th century BC from Marash depicts a deceased couple. The woman holds a mirror in her hand and wears a long tunic

[85] Madhloom 1970, 72–73.
[86] Bier 1976, 115.
[87] Bittel 1976, 286, 292.
[88] Dalley 1991, 126.
[89] Luschan 1893, 325. Vorderasiatisches Museum zu Berlin, inv. no. VA 2995; Lorimer 1950, 354. Meyer 1965, 39.
[90] Luschan 1893, 326.

and a mantle. The tip of the mantle is inserted into a belt and fastened at the left side of her waist by a semi-circular fibula of Phrygian type (Fig. 4.25).[91]

A fragmented basalt relief of an enthroned god holding a torch-like sceptre was recovered at the inner town of Carchemish, Syria. A fragment, probably from the same relief, represents drapery held by two fibulas placed next to each other (Fig. 4.26).

Finally, Persepolis, the great Achaemenid centre built in the reign of king Darius (522–486 BC), is an important source to the use and function of fibulas.[92] The Achaemenids essentially had two basic types of garment: a court gown, known as the Persian robe, and a two-piece tunic and trouser suit conventionally called Median dress, which more appropriately should be termed a riding ensemble.[93] The Persian robe consists of a pleated skirt and a cape, and a high cylindrical hat, while the Median outfit consists of a close-fitting knee-length tunic (*ependytes*) belted at the waist, leather trousers (*anaxyrides*) and a high rounded hat, and often also a long sleeved coat (*kandys*) slung on their shoulders.[94] Dress-fasteners are however never depicted, perhaps because the Near Eastern garment usually was draped.[95] Foreigners are also depicted at Persepolis, e.g. on the Apadana, an immense square hypostyle hall. Two pairs of monumental stairways carry sculptured reliefs, which probably depict a real annual ritual in which representatives from different parts of the empire offered the king gifts symbolising their sub-mission. The delegates are depicted wearing their characteristic dress from all over the empire.[96] Each of the stairways shows

Fig. 4.25 A late Hittite grave stele from Marash depicting a deceased couple. After Muscarella 1967, fig. 8.

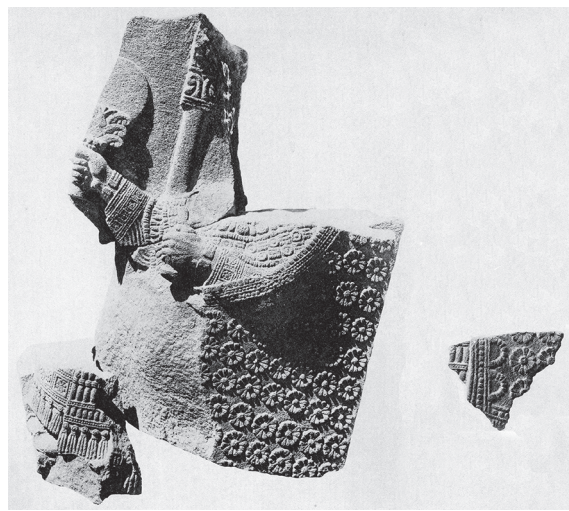

Fig. 4.26 Relief from Carchemish, Syria. A fragment represents drapery held by two fibulas. After Woolley 1952, pl. 64, b, c.

[91] Muscarella 1967, 84; Akurgal 1961, 102.
[92] Gleba 2008, 17.
[93] Harlow and Llewellyn-Jones 2010.
[94] Thompson 1965, 121; Harlow and Llewellyn-Jones 2010, 25.
[95] Giesen 2001, 362.
[96] Vogelsang 2010, 351.

essentially the same scenes: a procession of 23 tribute-bearing delegations of various nations and lines of guards, chariots, attendants etc.[97] Delegation no. 9 is of special interest. It presumably depicts the Cappadocians (central Anatolia). The delegation consists of a delegation leader and four attendants dressed alike: three-knobbed headdress (*bashlyk*), belted coat, trousers and ankle straps of Median type, and a mantle fastened at the shoulder by a fibula (Fig. 4.27).[98]

The "throne hall" is another large building at Persepolis which provides us with evidence for the depiction of fibulas. Here, the southern doorways of the building are decorated with reliefs depicting the enthroned king. The king's throne stands on a large dais, which is supported in each case (relief) by the representatives of 14 nations of the empire. Thus 28 nations are represented, identifiable by inscriptions.[99] Throne-bearer no. W5 (9) is one of the figures of special interest since he wears a short cape with the two curved edges thrown forward over the shoulders and fastened by a fibula (Fig. 4.28a). He can possibly be identified as Cappadocian.[100] Another is throne-bearer no. W12 (23). He is identified as Scythian and wears a belted coat with short sleeves and a short cape (identical with that of the Cappadocian) with two ends thrown forward over the shoulders and fastened by a fibula (Fig. 4.28b). Finally, throne-bearer no. W14 (27), identified as Ethiopian, wears a long skirt and has a bare upper body except for a sash which extends from the waist along both sides with the ends thrown forward over the shoulders to the chest, where they are either knotted or joined by a sort of clasp.[101]

As shown, there are several examples of fibulas in Near Eastern iconography, but interestingly, no pins are depicted. The depictions show both men and women wearing garments fastened by fibulas. In the few female examples the fibulas are used to fasten a mantle either at the chest or at waist level. With regard to the males, the use is varied, which of course can be explained by the different ethnicity of the figures depicted. However, the fibula is primarily used to fasten a sort of mantle at chest level with the remarkable exception of the man from Khorsabad, who has his coat closed by a fibula at waist level.[102]

Archaeological parallels to pins and fibulas depicted in iconography

A question that arises is whether the dress-fasteners depicted represent actual fibula types or if they are just imagined or stylised depictions, which can be solved by simple comparison with the actual fibula types recovered in the Mediterranean. However, when carrying out a comparison of fibula types and iconography, it should be taken into account that the aim of most fibula studies primarily has been to provide detailed stylistic typologies for use in the Aegean/Mediterranean chronology, without any regard to use.

With regard to the depictions of pins, many examples are stylized, but sometimes, especially in red-figure vase painting, real pins seem to be represented, and according to Johnson, most representations on vases seem to depict the characteristic type of pin found in tombs.[103] However, a pin is not 'just a pin': They come in different materials such as gold, silver, bronze, amber and bone, and in different sizes ranging from a few cm to very long specimens. Furthermore, they

[97] Schmidt 1953, 82.
[98] Schmidt 1953, 87, pl. 35.
[99] Schmidt 1953, 134, 84.
[100] Schmidt 1953, 135, pl. 108–109.
[101] Schmidt 1953, 136.
[102] Giesen 2001, 362.
[103] Johnson 1964, 30.

Fig. 4.27 Persepolis, eastern staircase of Apadana. Detail of the leader of the Cappadocian group. Courtesy of the Oriental Institute of the University of Chicago.

a

b

Fig. 4.28: a, Persepolis, the "throne-hall". Throne-bearer no. W5; b, Persepolis, the "throne-hall". Throne-bearer no. W12. Courtesy of the Oriental Institute of the University of Chicago.

exhibit great variety in the decoration of the head, some in the shape of figures such as animals, poppies or pomegranates; others are very ornamented with discs and pearls, while others are very simple.[104] Regrettably, this variety is not reflected in the iconographic depictions where the pins more or less all appear to be of the same size, and often without decoration, but occasionally the pins are ornamented and seem to reflect real types occurring in the archaeological record. For example, some of the pins represented on the François vase, appear to reflect actual contemporary pin types,[105] and the four pins depicted on the late classical white-ground sherd, could be representations of pins with heads in the shape of pomegranate or poppy heads. Furthermore, the double pins occasionally depicted as fasteners of men's mantles (e.g. Fig. 4.4), have direct parallels in the archaeological record. Thus, double pins forming two parallel shafts of wire in bronze, silver or gold have been recovered e.g. in northern Greece. They primarily date to the late classical period, and are often associated with male dress, due to their occurrence in male burials.[106] Yet, they also appear in female burials, also in northern Greece.[107]

[104] For more on the different types of pins, see e.g. Jacobsthal 1956 or Kilian-Dirlmeier 1984.
[105] See Kilian-Dirlmeier 1984, 208–281.
[106] Vokotopoulou 1994, 209; Kypraiou 1997, 102.
[107] E.g. in the tomb of the so-called 'Lady of Aigai' from the early 5th century BC, Kottaridi 2012, 418.

There is also archaeological evidence for the attachments depicted on the François vase (Fig. 4.1), the Boeotian terracotta figurines and the figurine from Gela. Thus, we occasionally encounter pairs of pins or fibulas attached by chains in gold or silver, even though examples of this from Greece are somewhat rare.[108]

Fig. 4.29 Gold disc fibula. c. *330–300 BC. © Trustees of the British Museum.*

As shown, round brooches are often represented in red-figured vase painting. When studying the archaeological material, there is one possible parallel for these among the fibulas: the type is usually termed disc fibulas due to their round shape. Examples are recovered on Crete and Rhodes, where for example five disc fibulas were recovered in the Athena sanctuary in Ialyssos.[109] On the Greek mainland the type has been found in e.g. Olympia and Sparta, and in Italy in Sala Consilina, Torre Mordillo and Francavilla Marittima.[110] Apart from a golden specimen from the Artemis temple at Ephesus, the 31 disc fibulas from Anatolia listed by Caner adhere from the surroundings of Izmir.[111] According to Caner, these disc fibulas were made regionally, e.g. on the Greek islands, since the disc fibulas from Anatolia all resemble the specimens from Lindos and Ialyssos.[112] In comparison, only one specimen has been recovered in Romania.[113] According to Stubbings, this type is relatively rare compared to other fibula types.[114] Blinkenberg dates the type to the geometric-archaic periods,[115] but the example from Romania is dated to the mid-5th century BC.[116] But even though these disc fibulas look like the objects depicted, and the dating is almost contemporary with the iconographic material, their occurrence in archaeological contexts seems very scarce in comparison with their frequent depiction in vase painting in particular. This unbalanced relation speaks against the identification of the depictions as this type of disc fibula. Furthermore, the diameter of the disc fibulas is rather small in comparison to especially depictions in sculpture and minor arts. However, it should be kept in mind that these publications are primarily centered on bronze specimens, not on fibulas in precious metals such as silver or gold,[117] in this way possibly skewing the picture of the presence and distribution of

[108] Baumbach 2004, 47, 71.
[109] Sapouna-Sakellarakis 1978, 110.
[110] Kilian 1975, 150.
[111] Caner 1983, 47.
[112] Caner 1983, 47.
[113] Bader 1983, 105.
[114] Stubbings 1962, 437.
[115] Blinkenberg 1926, 263.
[116] Bader 1983, 105.
[117] Thus, the fibula typologies by e.g. Sapouna-Sakellarakis, Kilian, Caner and others are published in the series

Fig. 4.30 Gold foil rosettes and gold plaques originally worn across the chest and attached at the shoulders. From a burial at Kamiros. c. *660–620 BC. © Trustees of the British Museum.*

certain fibula types. For instance, there are several examples of round gold disc fibulas belonging to the Hellenistic period (Fig. 4.29).[118]

With regard to the large round shoulder discs on terracotta figurines, Lenaia vases etc. there are no clear archaeological parallels. No fibulas seem to be likely candidates, and even pins with large disc-shaped heads appear unlikely, since they should have been placed exactly horizontally balancing on the shoulder, to have illustrated such large roundels. However, the discs could possibly represent rosettes of gold foil. Such rosettes, even though of a smaller size, have been recovered in Greek burials, where they are placed as a pair at the shoulders, sometimes attached by a metal chain or a cord adorned with plaques or pendants (Fig. 4.30),[119] but also in relation to statuary, as for example the 6th century BC chryselephantine representation of a deity (Apollo) from Delphi. Alternatively, we should think of these large round discs as something different, perhaps they were solely symbolic, like the wings of the figurines of Artemis and Nike, and thus not representing something 'real' or perhaps these roundels were made from perishable materials such as textile.

A possible identification of an existing archaeological fibula type is the black-figure sherd by the Lydos painter (Fig. 4.6). The ornament consisting of four spirals could possibly be a so-called four-spiral fibula (Fig. 4.31). This kind of fibula is formed from two spectacle fibulas in thin metal wire. In the middle there is usually an undecorated disc to cover the joint.[120] Spectacle fibulas were widespread, and occur from the Baltic to the Mediterranean and from Switzerland to Poland.[121] They are found at many sites in Greece, and were common on the mainland, particularly at Sparta and Perachora, where there is good evidence for local production, on the islands, in East Greece,

Prähistorische Bronzefunde.

[118] E.g. a gold disc brooch dating to *c.* 330–300 BC in the British Museum inv. no. GR 1872.0604.742. diameter 3.4 cm.

[119] In the tomb of the so-called Lady of Archontiko from northern Greece, *c.* 540–530 BC, a gold foil rosette was placed at each shoulder of the deceased and one was placed lower, centrally on the abdomen. Further gold rosettes were recovered around the abdomen, on the thighs and near the feet, Chrysostomou and Chrysostomou 2012, 370, 368 fig. 1 and 2.

[120] Sapouna-Sakellarakis 1978, 113.

[121] Alexander 1965, 7.

Fig. 4.31 Bronze four-spiral fibula from Boeotia. Courtesy of the National Museum of Denmark.

Fig. 4.32 Spectacle fibulas in ivory from the sanctuary of Lindos, Rhodes. Courtesy of the National Museum of Denmark

and in South Italy and Sicily – in fact, throughout the archaic Greek world.[122] However, the four-spiral fibula is less common than spectacle fibulas. With regard to Anatolia, Caner mentions no specimens, and Blinkenberg lists none from the Levant or Cyprus.[123] The spectacle as well as the four-spiral fibulas can generally be dated to the first half of the 1st millennium BC.[124] Benton thus dates the bronze spectacle fibulas from the sanctuary of Artemis Orthia to 900–700 BC, and the ivory examples to the 9th–6th century BC.[125] Among the island fibulas treated by Sapouna-Sakellarakis, the majority should generally be assigned to the end of the geometric period or to the archaic period.[126] The depiction on the sherd is thus contemporary with the occurrence of the fibula type, a fact that speaks in favour of the identification of a real fibula type.

The archaic bronze mirror from the Hermitage Museum is another example of a depiction of a four-spiral fibula. The clasp is in the shape of a quatrefoil, and could very well represent such a fibula type, occurring contemporarily with the execution of the mirror. Other archaic bronze mirrors also have depictions of quatrefoil clasps. However, these might instead represent spectacle fibulas – either in bronze or ivory – with ornamentation in the shape of a figure 8 loop where the two spirals are joined together (Fig. 4.32).

The terracotta figurine from Gela perhaps illustrates hinge fibulas. The main features of this type are the unusual shape of the head and foot. The head is connected to the needle with a sort of rivet,

[122] Benton 1950, 17; Warden 1990, 33; Stubbings 1962, pl. 185, A194, an unfinished ivory spectacle fibula.
[123] Caner 1983; Blinkenberg 1926, 284–285.
[124] Alexander 1965, 7.
[125] Benton 1950, 17.
[126] Sapouna-Sakellarakis 1978, 110.

Fig. 4.33 Silver hinge fibulas from northern Greece. 5th century BC. Courtesy of the National Museum of Denmark.

which often takes the form of a palmetto, while the footplate is constructed of several elements and often reminds one of a stylized snake head (Fig. 4.33).[127] The type is distributed from Central Greece to the north-western Balkans and the lower Danube,[128] but it does not seem to have been in use on the Greek islands or in Anatolia.[129] They have been excavated at Halieis in the Argolid, in Serbia, and at Bukovizi in Thrace,[130] and Blinkenberg listed examples from Epirus, Thessaly, Elis and Bosnia.[131] According to Jacobsthal only one was recovered from the Peloponnesus, from Lousoi, while none were found at Sparta, Argos, Olympia, Perachora or Aegina.[132] The hinge fibulas are

[127] Vasic 1999, 102.
[128] Kilian 1975, 155.
[129] Jacobsthal 1956, 205. The type is not included in the studies by Caner or Sapouna-Sakellarakis.
[130] Muscarella 1967, 28.
[131] Blinkenberg 1926, 229.
[132] Jacobsthal 1956, 206.

Fig. 4.34 Phrygian fibula from the sanctuary of Lindos, Rhodes. Courtesy of the National Museum of Denmark.

comparatively younger than the Phrygian fibulas,[133] and were primarily widespread in the central Balkans in the 5th and 4th centuries BC.[134] With regard to the dating of the fibulas from Thessaly, Kilian lists two examples from Pherai, of which one can be dated to the second half of the 6th century BC, while the other belongs to the 5th century BC.[135] Jacobsthal, on the other hand, dates four silver hinge fibulas from Tempe to the late 4th century BC.[136] With regard to chronological occurrence, the fasteners depicted could possibly be a hinge fibula. However, the type is quite rare in Greece, which could speak against their identification on the figurine in question.

In sum, there are generally very few depictions of actual recognisable fibula types in Greek art even though many different types – and an even larger number of sub-types – of fibulas existed in the 1st millennium BC. The situation is somewhat different for the representations from Anatolia and the Near East. Here, the fibulas are often illustrated in detail, and real fibula types can often be discerned. The types depicted are usually bow fibulas and especially Phrygian types can be identified (e.g. at the relief at Ivriz and the Khorsabad relief). The Phrygian fibulas share certain distinct characteristics that enable them to be distinguished from other groups. Their symmetrical arcs are generally semi-circular or occasionally horseshoe or crescent-shaped. Most have decorative mouldings at the end of the arcs, while others have additional mouldings on the arc proper (Fig. 4.34).[137] The

[133] Kilian 1975, 155.
[134] Vasic 1999, 102.
[135] Kilian 1975, 156.
[136] Jacobsthal 1956, 207.
[137] Muscarella 1988, 425.

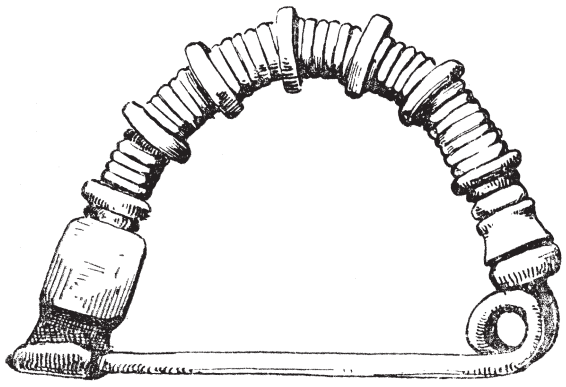

Fig. 4.35 Near eastern bronze fibula. After Blinkenberg 1926, 237, fig. 273.

catch that holds the pin in place is one of the distinctive and easily recognized characteristics of Phrygian fibulas and exists on all examples from Anatolia. The catch flares out at its base, has a vertical spine separating two grooves or channels thus dividing it into three sections, and a pair of horizontal spurs/horns project from the top. These horns may vary in size, shape and thickness, and are one of the most distinctive features.[138] According to Muscarella, fibulas with Phrygian features recovered outside Anatolia will omit these spurs, which is a sign that they are local copies rather than imports.[139]

The Phrygian fibulas derive primarily from one geographical culturally defined area, central Anatolia. Phrygian fibulas have been excavated at every known Phrygian site in Central Anatolia, the great majority coming from Gordion, where about 700 specimens have been recovered, and from Boğazköy where 170 specimens have been found. Except for one example from Al Mina in North Syria, none have been recovered south of Anatolia or in other areas of the Near East, where a different type prevailed. Both imports and local imitations have been found at Greek sites on the mainland and on the islands as well as in Asia Minor, while one has been recovered in Italy. The earliest examples do not predate the second half of the 8th century BC, probably not earlier than 750/740 BC.[140]

The reliefs from Zincirli and Marash depict semi-circular fibulas with ribbed arc, which are found in the Near East including Iran.[141] The fibulas depicted seem to be of a specific type (Stronach type I 5), which can roughly be dated to the 8th–7th centuries BC (Fig. 4.35).[142] Large numbers of fibulas have been found all over the Near East, where they have an extremely wide distribution, which by the 7th century roughly coincided with the limits of the Assyrian empire.[143] To the north the dividing line between the Near Eastern and the Phrygian fibula types seems to have run more or less along the boundary between Phrygia and the Assyrian buffer states in North Syria. The Near Eastern semi-circular fibulas were furthermore widely diffused in Greece and the Aegean islands from the sub-Mycenaean period onwards, but seem seldom to have penetrated further south. They have also been recovered on both Cyprus and Rhodes, but relatively few seem to have penetrated much further west to Greece itself.[144]

One of the fibula types on the Apadana reliefs from Persepolis has a ribbed arc and a hand catch while another has a plain arc. Both fibula types have been recovered from Western Iran and Southern Caucasus.[145] The hand catch is a distinctive trait for the Near Eastern fibulas, and are

[138] Muscarella 1967, 13.
[139] Muscarella 1988, 425.
[140] Muscarella 1988, 425; Kilian 1975, 151–154.
[141] Muscarella 1967, 84.
[142] Sapouna-Sakellarakis 1978, 130.
[143] Stronach 1959, 181.
[144] Stronach 1959, 181.
[145] Muscarella 1967, 83.

observed in several of Stronach's types. It is common in the triangular fibulas (Stronach type III and IV), but these are not represented in Persepolis. It is difficult to determine the exact fibula types on the Apadana reliefs, but they are quite likely to belong to Stronach's type I or II described above.

Conclusion

Often, the Greek iconographic evidence does not match the archaeological material regarding fibulas. As shown, there are exceptions, but these are very rare, and the most reliable examples are not from Greece, but from Anatolia and the Near East. A contributing factor to this is of course that the Greek depictions of the Classical period are later than the most widespread occurrence of the pins and fibulas in the archaeological record, while the Anatolian and Near Eastern examples are more or less contemporary with the heyday of the fibulas.

Another important factor, especially in the case of vase painting is that, many of the described examples are Attic. This creates a certain bias, since the situation with regard to the occurrence of pins and fibulas differs from site to site. For example, in some sanctuaries pins are very common, e.g. in the Hera sanctuary at Argos, the Athena Alea sanctuary at Tegea and the sanctuary of Artemis Orthia at Sparta,[146] while fibulas are rare. The opposite situation is the case at other sanctuaries, e.g. at Pherai, Thessaly and the Athena sanctuaries at Lindos and Ialyssos on Rhodes. This difference cannot be explained by chronology, but is a clear indication of differences in votive dedications, perhaps caused by differences in local fashions, tastes, and traditions.

The survey of iconographic evidence for the use of dress-fasteners shows that they were not gender-specific or related to specific garments. In fact, fibulas and pins appear to have been used with a wide range of garments such as the *peplos*, *chiton*, *himation*, and the *chlamys* in the Greek sphere, as well as in the Near East, where fibulas were used with different garments, but primarily used to fasten a sort of mantle.

In the early periods, fibulas (but no pins) are only depicted in Near Eastern art. The omission in early Greek art is however due to the character of the artistic depictions, and not an indication of fibulas not being present in this area or at this time. But even in the archaic period, where we know that fibulas were widely used, they are not depicted realistically in art.

But what is the explanation to the lack of reality in the archaic Greek depictions? One possible reason is that it simply wasn't that important. Or perhaps it was too difficult to render pins and fibulas, which is probably the case for e.g. black-figure vase painting and possibly in the case of some of the figurines. Or perhaps, as is the case for the literary sources, the dress-fasteners were taken for granted by the ancient audience, and it was thus not necessary to depict them. A modern day example is the omission of for example the zipper from depictions of trousers, jackets etc.

A somewhat similar situation in iconography can be found during the Roman Empire. Here, jewellery was absent as adornment on female statues in public settings, and there are hardly any statues of Imperial or private women intended for public display that boast plastically indicated jewellery until Late Antiquity, although a few have pierced ears.[147] Thus, the statuary representation of women in public differed from the self-representation of real women. This is because decent women did not wear jewellery in public since it was considered immoral and associated with

[146] Baumbach 2004, 36.
[147] From the second half of the 3rd century, plastically indicated jewellery became common, Fejfer 2008, 350.

adultery.[148] This absence of jewellery from sculpture is in stark contrast to the actual situation, since immense finds of earrings, necklaces etc. have been recovered across the Roman Empire, and thus seem to have been popular among Roman women. Furthermore, in other and more private media, women are often portrayed wearing jewellery.[149] There was thus a form of "censorship" present in iconography. However, we do not have any solid evidence of this phenomenon in Greek art with regard to the pins and fibulas.

Another example is the presence/absence of the veil. According to Llewellyn-Jones, women of varying social strata of the ancient Greek world were habitually veiled, especially in public or before unrelated men.[150] But in most painted scenes in Greek art the veil is entirely absent. This is not surprising in domestic scenes, but it certainly is in outdoor scenes where women are also shown unveiled.[151] According to Llewellyn-Jones the veil actually appeared in daily life far more often than it is ever found depicted in art. Thus, what one sees in artworks does not always correspond to what one would have seen on the ancient streets of Athens.[152]

This leads to the relevant question, which is to what extent iconography reflects the appearance of real men and women of the time. There is often an underlying assumption that the garments represented in iconography accurately reflect the dress actually worn, but, in fact, there is no solid reason that this should be the case, since the depictions are based not simply on historical reality, but also on artistic canons or conventions and it is difficult, if not impossible, to differentiate between the two.[153] Thus, depictions are not necessarily "windows to the past", and the social reality is probably more nuanced than the representations suggest. Vase painting is often used arbitrarily by scholars to illustrate aspects of "daily life", and the images are often used as faithful, almost photographic depictions, but as stressed by Llewellyn-Jones this is a mistake. Vase-painting cannot be used to fill the gaps in classical literature since it is a different medium, and with a different agenda.[154] So although representations e.g. on vases are frequently used as documents of the time in which they were painted, the approach is sound only when the information gained from them can be checked against external evidence.[155] However, Greek art does provide valuable glimpses of reality even though the depictions of dress not necessarily give a fully authentic picture of "real life", but instead meet certain artistic and social mandates centring on especially idealistic constructs.[156] For example, iconography illustrates differences in how the dress-fasteners were used and worn – e.g. if they were placed head up or head down – and provides us with exceptional cases such as the sherd with the depiction of Europa wearing a garment fastened with four pins.

Another issue is that the figurative art primarily represents mythological and heroic figures,[157] and the question of whether for example vase painting reflects everyday life or represents mythological scenes is still unresolved.[158] Thus, a very high proportion of the figure scenes on Greek vases (but

148 Fejfer 2008, 345–347.
149 Fejfer 2008, 348.
150 Llewellyn-Jones 2003, 3.
151 Llewellyn-Jones 2003, 88.
152 Llewellyn-Jones 2003, 10.
153 Gleba 2008, 17.
154 Llewellyn-Jones 2003, 85.
155 Gleba 2008, 17.
156 Llewellyn-Jones 2003, 86, 87.
157 Lee 2005, 58.
158 Gleba 2008, 17.

also sculpture and architectural decoration) deal with subjects of myth. Those that depict daily life, increasingly in the late archaic and classical periods, often also have a heroic flavour.[159] The *peplos* is thus the regular dress of divine, mythological and heroic figures, which are the common theme in archaic black-figure vase painting. However, this may be traditional clothing reflecting old fashioned garments with pins/fibulas rather than reflecting contemporary fashion.[160]

But what does this omission mean? Were the fibulas and pins only used until the end of the early classical period, where they seem to almost disappear from the depictions? And are these rare exceptions actually usable indications of the use of fibulas and pins in this period? Possibly, the depictions are indications of an archaising perception of the garment fastened by pins and fibulas which was now worn by deities etc., but not necessarily by ordinary people in late classical Athens.

An alternative, and probably more likely explanation, especially with regard to for example red-figure vase painting, and possibly also in the case of sculpture, is that the garments depicted were not worn in this way any longer. As already put forward by Lee, the iconography of dress in the early Classical period does not reflect contemporary dress practices.[161] It is thus possible that by the Classical period the *peplos* had become a ceremonial garment used for ritual purposes. It was no longer worn in daily life, but now represented a historical garment from earlier times.[162] This is supported by Dillon, who states that the *peplos* may have had special sacred or ritual connotations, and should possibly be considered more a costume in the late Classical and Hellenistic periods.[163] It has also been suggested that images that wear both tunic/*chiton* and *peplos* are perhaps to be interpreted as human figures, while those that wear only the *peplos* are more likely to be heroic or divine.[164]

According to Lee, the *chiton* appears in Greek art around the middle of the 6th century BC, and essentially supplants the *peplos* until the Early Classical period *c.* 480–450 BC when the *peplos* again becomes the predominant female garment depicted.[165] But from *c.* 400 BC onwards fibulas are no longer depicted and straight pins become rare.[166] Furthermore, fibulas seem to be absent from Attic burials in the 6th and 5th century BC.[167] The re-appearance of the *peplos* in "real life" as suggested by Lee is thus not supported by the archaeological evidence – at least with regard to the fibulas. It seems that it is only in iconography – especially Attic – that the *peplos* re-appears. Whether this means that it was worn again in Athens still remains to be answered.

[159] Boardman 2001, 168.
[160] Lorimer 1950, 396.
[161] Lee 2005, 59.
[162] Lee 2005, 59.
[163] Dillon 2010, 81.
[164] Dillon 2010, 79.
[165] Lee 2005, 56.
[166] Thiersch 1906.
[167] Johnson 1964, 30. However, there are several examples of burials with pins and fibulas from e.g. northern Greece from the 6th and 5th centuries BC, e.g. the so-called Lady of Aigai, buried in the early 5th century BC with a pair of gold pins, a pair of gold fibulas and a gold double pin.

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5. Dressing the Citharode: a chapter in Greek musical and cultic imagery

Marco Ercoles

Apollo's dress: from Rome to Crete

Phoebe, faue: nouus ingreditur tua templa sacerdos:
huc age cum cithara carminibusque ueni.
nunc te uocales impellere pollice chordas,
nunc precor ad laudes flectere uerba mea.
ipse triumphali deuinctus tempora lauro,
dum cumulant aras, ad tua sacra ueni.
sed nitidus pulcherque ueni: nunc indue uestem
sepositam, longas nunc bene pecte comas,
qualem te memorant Saturno rege fugato
uictori laudes concinuisse Ioui.

Bless, o Phoebus, the new priest entering your temple; / make haste and hither come with psalm and cithara. / Pluck now, I pray you, with your thumb the singing strings / and tune my utterance to hymns of praise. / Bind your brow with bays triumphant: come among us, / while they heap the altar, for your sacrifice. / In brightness and in beauty come, putting on today / the robe of state and combing your luxuriant hair, / as on that legendary day when Saturnus fled his kingdom / and you sang the glory of victorious Jove.[1]

With these solemn lines in hymnic style Tibullus opens his elegy (II 5) celebrating the induction of Messalla's son Messalinus into the college of *Quindecimuiri Sacris Faciundis* during a religious ceremony at Apollo's temple on the Palatine. The elegy is one of the more ambitious and complex within Tibullan production, as it has been recognized (Murgatroyd 1994, 167), and it is not surprising that it is placed under the sign of Phoebus, invoked by the poet *qua citharoedus*.

Citharody, that is cithara-singing, was one of the most prominent and appreciated forms of Greek *mousike*; it maintained its prestige even in the Roman environment, particularly from the Augustan period onward, when citharodic contests in Greek fashion began to be regularly held.[2] Even before this, citharody was known and appreciated in Rome (especially by the philhellenic aristocracy): Apollo *citharoedus* appeared on Republican coinage as early as the 2nd century BC, and was the subject of many statues placed by wealthy Romans in their villas and, later, by Augustus to embellish the Palatine.[3] The most famous among these statues, which has been attributed to Scopas,

[1] Transl. by G. Lee. For a commentary on the text see Murgatroyd 1994, 163–174.
[2] Cf. Power 2010, 93–103, 153–157; Scoditti 2010/2011.
[3] Cf. Roccos 1989; Fullerton 1990, 163–165; Castaldo 2008, 114–115

adorned the cella of Phoebus' temple on the hill, and hosted in its basement the *libri Sibyllini*, only accessible to the *Quindecimuiri*. It is likely that Tibullus had in mind this very *simulacrum* in his description of the god, as is the case with Prop. II.31.15–16: *inter matrem deus ipse interque sororem*/*Pythius in longa carmine ueste sonat*. Quite similar is the description by Ovid in *Met.* XI 165–171, credited as another possible allusion to the Palatine Apollo:[4]

> *ille (i.e. Phoebus) caput flavum lauro Parnaside vinctus* 165
> *verrit humum Tyrio saturata murice palla*
> *instructamque fidem gemmis et dentibus Indis*
> *sustinet a laeva, tenuit manus altera plectrum;*
> *artificis status ipse fuit. tum stamina docto*
> *pollice sollicitat, quorum dulcedine captus* 170
> *Pana iubet Tmolus citharae submittere cannas.*
>
> He, his fair head bound with laurel from Parnassus, / swept his cloak, dyed with Tyrian murex, across the ground, / and in his left hand he was supporting a lyre embellished with gems / and Indian ivory, and his other hand held the plectrum; / he was the very image of an artist. Then he plucked the strings / with his learned thumb, and Tmolus, captivated / by their sweetness, ordered Pan to lower his pipes to the lyre.[5]

As in Tibullus and Propertius, the god is represented wearing a long, flowing robe, whose fabric is of high quality; his instrument has a richly embellished design (v. 167). Tibullus also describes his hair as long and flowing (II 5,18). Moreover, the god is portrayed while striking cithara's strings with the thumb of the left hand and bearing a plectrum in his right hand. This iconography, which could possibly derive from the visual impact of the above cited statue, is not a creation of Augustan age; indeed, it ultimately goes back to late-archaic and classical Greece,[6] when paintings representing Apollo in this manner appeared on Attic black figure vases, and is probably connected with the institution of citharodic contests at the Panathenaia around 566 BC.[7]

To be sure, in the first instances of the iconography (second half of 6th century BC) it is really difficult to distinguish with any certainty between the god and human performers participating in the Panathenaic Games (consider, e.g., the Panathenaic-shaped amphora, from 550–540 BC; London, British Museum B 139: see Fig. 5.1).[8] This ambiguity depends mainly upon the fact that Apollo was generally considered to be the archetype of human citharodes as well as their inspirer: ἐκ γάρ τοι Μουσέων καὶ ἑκηβόλου Ἀπόλλωνος / ἄνδρες ἀοιδοὶ ἔασιν ἐπὶ χθόνα καὶ κιθαρισταί, "from the Muses and far-shooting Apollo men are singers and cithara-players on earth" (Hes. *Th.* 94–95 = *H. Hom.* XXV 2–3, where ἀοιδοὶ … καὶ κιθαρισταί should be intended as a periphrasis for κιθαρωδοί).[9] In Pindar, *P.* 4,176, the same expression is applied to the first human citharode: ἐξ Ἀπόλλωνος δὲ φορμιγκτὰς ἀοιδᾶν πατήρ / ἔμολεν, εὐαίνητος Ὀρφεύς, "from Apollo came the cithara-player, father of songs, / the widely praised Orpheus".[10] The logic *pendant* of citharodes'

[4] For Tibullus see Murgatroyd 1994, 165–170. For Ovid see Power 2010, 29 n. 58. For another reference to the statue see Plin. *NH* XXXVI 25.
[5] Transl. by D. E. Hill.
[6] Cf. Shapiro 1989, 54–58 and pl. 27; Sarti 1992.
[7] Cf. Davison 1958, 37; Shapiro 1992, 65–66; Power 2010, 425. On the institution of the citharodic contest within the reorganization of the Panathenaia in 566 BC see Herington 1985, 84–87 and Shapiro 1992, 57–58, with further bibliography.
[8] Cf. Maas and Snyder 1989, 33–34, 58; Shapiro 1992, 65–66; Castaldo 2000, 28–29; Bundrick 2005, 162; Power 2010, 425ff. Things change in the 4th century BC, after the full development of the professional character of citharody: cf. Sarti 1992.
[9] Transl. by M. L. West. Cf. West 1966, 187; Cassola 1975, 580.
[10] Whether the Theban poet implies a real or just a metaphorical affiliation is not clear (cf. part. Braswell 1988, 255–256;

Apollinean descent is the *aition*-story related by Proclus in his *Chrestomathia* (*ap.* Phot. *Bibl.* 320 a 33–b 4):[11]

> Νόμιμος δὲ ἐκλήθη (*scil.* ὁ Ἀπόλλων) ὅτι τῶν ἀρχαίων χοροὺς ἱστάντων καὶ πρὸς αὐλὸν ἢ λύραν ᾀδόντων τὸν νόμον, Χρυσόθεμις ὁ Κρὴς πρῶτος στολῇ χρησάμενος ἐκπρεπεῖ καὶ κιθάραν ἀναλαβὼν εἰς μίμησιν τοῦ Ἀπόλλωνος μόνος ᾖσε νόμον, εὐδοκιμήσαντος δὲ αὐτοῦ διαμένει ὁ τρόπος τοῦ ἀγωνίσματος.
>
> Apollo was called *Nomimos* because, while the ancients set up choruses and sang the *nomos*[12] to the *aulos* or to the lyre, Chrysothemis the Cretan was the first man to sing by himself a *nomos*, wearing magnificent raiment and taking up the cithara in imitation of Apollo; and since he won acclaim, this style of competitive performance persists to this day.

The origin of the traditional monodic performance of the citharodes is attributed here to a legendary Cretan musician, credited elsewhere as the first winner of the Pythian citharodic competition.[13] Chrysothemis would have introduced the song to the stringed instrument and the proper distinguished clothing "in imitation of Apollo": his invention is nothing else than the reenactment of the divine performance. One can remember the arrival of the god to Delphi as it is vividly described in the core of the third Homeric Hymn (vv. 182–185: beginning of the Delphian section):

Fig. 5.1 Panathenaic-shaped amphora (550–540 BC), London, British Museum B 139 (© Trustees of the British Museum).

> εἶσι δὲ φορμίζων Λητοῦς ἐρικυδέος υἱὸς
> φόρμιγγι γλαφυρῇ πρὸς Πυθὼ πετρήεσσαν,
> ἄμβροτα εἵματ' ἔχων τεθυωμένα· τοῖο δὲ φόρμιγξ
> χρυσέου ὑπὸ πλήκτρου καναχὴν ἔχει ἱμερόεσσαν.
>
> Playing on his scooped-out lyre glorious Leto's son goes also to rocky Pytho, his divine garments scented, while his lyre under the golden plectrum makes a delightful clangor.[14]

Giannini in Gentili *et al.* 2000, 475), but this does not affect the issue at stake here.

[11] It is uncertain whether the anthology should be ascribed to the famous Neoplatonic philosopher who lived in the 5th century AD or to a homonymous grammarian of the 2nd century AD; cf. Ferrante 1957, 9–13.

[12] On citharodic *nomos*, a specific kind of musical composition, see in particular Barker 1984, 249–255; West 1992, 215–217.

[13] Cf. Paus. X 7,2, relying on an ancient Delphian tradition; see also *hyp.* Pind. *P.* 4,10 (2 Dr.).

[14] Transl. by M. L. West.

In the same rhapsodic hymn, which in its final form is likely to go back to 6th century BC,[15] Apollo chooses as ministers of his Pythian sanctuary Cretan men (vv. 390ff.), probably for their renowned cultic and musical tradition (see vv. 516–519; cf. *Il.* XVIII 590–592).[16] It should not be merely by chance that Chrysothemis, the first human citharode, came from Crete: if all the clues provided by Proclus, Pausanias and the Homeric Hymn are considered together, there are good grounds for arguing the existence of a Delphian tradition that linked the Pythian cult and the relative citharodic contest with one the most ancient civilizations with which the Greeks came into contact, one particularly versed in cultic and musical practices;[17] it is worth remembering here that the cultual song in honour of Apollo, the *paiaon*/*paian*, came from Crete and, according to a Greek tradition,[18] was brought to Sparta by the 7th century BC musician Thaletas from Gortyn.[19] The reason for linking the Pythian festival to ancient Crete could be that detected by Power,[20] who sees in the Proclus passage cited above, as well as in Ps.-Plut. *Mus.* 5, 1133b (Philammon the Delphian composed some of the *nomoi* later employed by the Lesbian Terpander), the traces of an attempt made by the Delphians to "contest the Panhellenically mainstream Lesbian claim to the invention of agonistic Kitharoidia and to position it instead as their own legacy by rooting the history of its competition pieces in the legendary past of the Pythian contests".[21]

All in all, this backward journey over the centuries shows that one of the distinguishing traits of the iconographic theme of the so-called Apollo Citharoedus, going back to archaic Greece, is the fine, richly embellished costume which, especially in Greek vase-pantings,[22] was usually composed of the following elements: an ankle-length flowing robe (*chitōn*), pleated and often elaborately patterned; a decorated mantle falling over it, usually long (*himation*), but sometimes short (*chlamys*); a golden wreath on the god's head. Integral parts of the iconographic scheme are the great concert cithara, square-based and characterized by curving arms with inlaid works of precious material, such as gold (cf. Pind. *P.* 1,1–2); an embroidered cloth hanging from the base of the instrument; a plectrum with its cord. All this *skeue* was imitated by the first musician-poet who introduced citharody among men, according to the Delphian tradition cited above. This means clearly that the costume is an important and distinctive trait of the citharode, since it denotes his own status, his being an *imago Apollinis*.

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[15] Cf. Burkert 1979; Janko 1982, 112–113; Aloni 1989.

[16] Cf. Cassola 1975, 514 *ad l.*, with bibliography.

[17] Pausanias speaks explicitly of a Delphian oral source (X 7,2). In the case of the Homeric Hymn, it can not be disregarded that the quoted lines come from the Delphian section. As for Proclus, things are more complicated: the author does not cite his sources, nor are they otherwise detectable with any certainty; an interesting attempt has been made by Rutherford (1995), who thinks of a 4th–3th century BC source, perhaps a Peripatetic scholar, such as Heracleides of Pontus (originally a Platonist, he passed over to the Peripatos), interested in history of ancient Greek music and well known to the learned writers of the Imperial age (e.g. Ps.-Plutarch and Atenaeus). He could be the medium (or one of the media) through which Proclus knew the story of Chrysothemis.

[18] Cf. Ps.-Plut. *Mus.* 1134b–d.

[19] Cf. Burkert 1985, 145–146. The scholar argues in favour of a Minoan origin for the close relationship between god and song in the Greek religion: such a conception would be expressed by the common denomination *Paiaon*: "the epiphany of the god in dance and song agrees well with what may be surmised from the Minoan iconography" (1985, 44).

[20] Power 2010, 377–378.

[21] P. 377.

[22] See e.g. the Attic red-figured *oinochoe* (Boston, Museum of Fine Arts 97.370) representing Apollo and Artemis at an altar (for a reproduction cf. Maas and Snyder 1989, 71 fig. 1).

Divine imitation, as students of history of religions have shown, was a characteristic cultic practice;[23] "at least in certain cults, priests and priestesses seem to have acted out the roles of the deities themselves".[24] This is the case of the rites in honour of Apollo *Ismenios* at Thebes, of Artemis at Ephesos, of Athena at Pellene, of Demeter at Andania, where cult agents can exhibit the costume of the divinity. Textual evidence on the issue is relatively late, but very telling; it attests cult attedants dressed in divine costume playing parts in processions, dramas and banquets. The most interesting case is that of Andania, in the southern Peloponnese: an epigraphic decree dating to 92 BC (*LSCG* 65)[25] advises partecipants to the local Mysteries of Demeter on every ritual aspect and makes explicit reference to a group of female people who "must be dressed in the manner of the goddesses" (ll. 23–24), probably Demeter and Kore.[26] In the light of this evidence, the much debated question of "offering gods" painted on Greek vases seems to find a reasonable explanation: they could be interpreted as priests/priestesses dressed up like gods.[27]

A similar logic could apply to citharodes competing in musical contests on the occasion of religious festivals, and therefore in a sacred context; as noted above, vase paintings portray them dressed like Apollo, and in the more ancient iconographic examples it is rather difficult to distinguish human citharodes from the god. Yet, agonistic performances should be distinguished from cultic action in the strict sense.[28] A diachronic approach to the problem seems to be the best route to follow, as it focuses on the meaning of divine imitation by citharodes and its (reconstructable) evolution.

Dressing the citharode: from Crete to Athens, through Lesbos[29]

Let us start with a document which can help to locate the role of the citharodes in a sacred context. A decree from Eretria in Euboea (*IG* XII 9,189), dating to 341/340 BC, shows how the musical performances at the local Artemisia were organized; particularly interesting is what is prescribed at ll. 13–15:

> τοὺς δὲ τὴν μουσικὴν ἀγωνιζομένους πάντα[ς] ἀγωνίζεσθαι προσόδιον τεῖ θυσίει ἐν τεῖ αὐλεῖ ἔ[χο]ντας τὴν σκευὴν ἥμπερ ἐν τοῖ ἀγῶνι ἔχουρ[ι].[30]
>
> All those participating in the musical contests are to take part in the processional song for the sacrifice in the courtyard (i.e. of the temple) with the outfit (*skeue*) they have in the contest.

Musicians (among which are citharodes)[31] are requested to take part into the ritual procession (πομπή) introducing the sacrifice (θυσίη) and to wear, on this occasion too, the same elaborate

[23] Cf. Burkert 1985, 97–98; Connelly 2007, 104–115.
[24] Connelly 2007, 104.
[25] New edition with commentary by Gawlinski 2012.
[26] Cf. Gawlinski 2012, 131–132.
[27] This was firstly argued by Nilsson (1957, 99–106) and finds now support in the iconographic evidence collected and discussed by Connelly (2007, 108–115), particularly in the images with inscribed theonyms in the genitive case (e.g. ΔΕΜΕΤΡΟΣ on the Attic red-figure cup from Capua, now in Brussels, Bibliothèque Royale 12), which seems to indicate that the painted figures belong to the god.
[28] Cf. Herington 1985, 5 and n. 3, with bibliography; Barker 1990, 46–47. For a definition of cult as a narrower category than ritual see Christensen 2009, 16–18.
[29] This section is much indebted to Power's (2010) treatment of the citharode's outfit.
[30] For the meaning of the verb ἀγωνίζεσθαι in the context see Rotstein 2012, 107–108. On the decree and its relevance as document concerning citharodic performance, see Power 2010, 20–24; Rotstein 2012, 106–110 (both with further bibl.).
[31] The inscription lists the following performers: rhapsodes, boy aulodes, citharists, parody-singers, citharodes.

σκευή they would wear in the contest following the rite, that is the traditional outfit they usually have in musical competitions. In this way, as the decree explicitly states (ll. 38–40), the procession will be as magnificent as possible (συμπομπευόντων δὲ καὶ οἱ τῆς μουσικῆς ἀγωνισταὶ πάντες, ὅπως ἂν ὡς καλλίστη ἡ πομπὴ καὶ ἡ θυσίη γένηται).

This situation was perhaps not restricted to Eretria's Artemisia, as 6th century BC iconographic evidence for an Athenian festival in honour of Athena (most likely the Great Panathenaia) seems to suggest: e.g. a black-figured Attic amphora (Berlin, Staatliche Museen F 1686; *c.* 540 BC: see Fig. 5.2) offers the image of a sacrificial procession for the goddess with two auletes and two cithara-players providing musical accompaniment.[32] The musicians wear distinguished clothes; the cithara-players' outfit, in particular, is the same of agonistic citharodes': an ankle-length, pleated *chiton*; over this a long *himation* with intricate decorative patterns; a wreath on the head.[33] They could be contestant musicians, as in Eretria' case, but, given the importance of the Panathenaic procession in the Athenian *demos*,[34] it is not unlikely that they were members of the Euneidai, an Athenian clan deeply involved in the polis' religious life (particularly in the cult

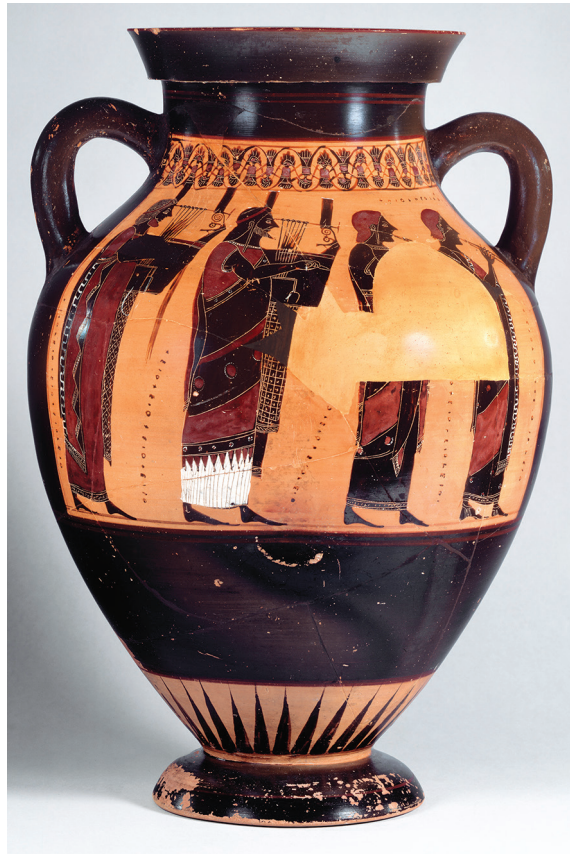

*Fig. 5.2 Black-figured Attic amphora by the Berlin Painter (*c. *540 BC), Berlin, Staatliche Museen F 1686; photo: Johannes Laurentius (Staatliche Museen zu Berlin, Antikensammlung).*

[32] Cf. Shapiro 1992, 54f., where other Athenian vase paintings (dating to 560–540 BC) with sacrificial procession in honour of Athena are taken into consideration. Although there is no certainty that these paintings refer to the Panathenaia, their chronological proximity to the date of the reorganization of the festivals into the main civic cultic moment make the hypothesis highly probable. One can also compare the processional scene with the four auletes and the four cithara-players on the north side of the Parthenon frieze (around 440 BC), where most scholars recognize the representation of the Great Panathenaia's πομπή (cf. Bundrick 2005, 150ff.; Power 2010, 23–24, with further bibliography). The identity of the cithara-players represented on the frieze is discussed: usually taken as contestant musicians (cf. e.g. Hurwitt 1999, 223), they have been also interpreted as members of the Euneidai (cf. Simon 1983, 63; Burkert 1994, 46–48), known to provide lyric music to festival processions (see Poll. VIII 103), or – which seems less likely – as citizen amateurs (cf. Bundrick 2005, 152).

[33] Plato, the 4th century BC comic poet, calls the citharode's mantle ἐπιπόρπαμα (fr. 10 K-.A., transmitted by Poll. X 190), evidently after the clasp used for fastening the garment on the shoulders. For portraits of agonistic citharodes see e.g. the Panathenaic-shaped amphora attributed to the Berlin Painter (formerly in the Hunt Collection; *c.* 490–480 BC) and the *pelike* by the Pan Painter (New York, Solow Art and Architecture Foundation; *c.* 480–470 BC): see, respectively, Shapiro 1992, 58 fig. 37 and Bundrick 2005, 167 fig. 98.

[34] Cf. Kavoulaki 1999, 299–306: "the body which forms the procession is no other than the civic body, the civic community" (p. 300).

of Dionysos *Melpomenos*)[35] and known to provide citharodic music for ritual occasions,[36] especially for festival processions.[37]

All these elements point to the involvement of the citharodes (together with other musicians, especially auletes) not only in the agonistic moment of the festival, but also in the cultic one. In the former context, the σκευή indicates "the ritualized assumption of *a* larger-than-life persona in the moment of performance, symbolically mediating the transformation of the performer's identity from ordinary musician to extraordinary *kitharôidos*" (Power 2010, 25). The legendary Chrysothemis (but the same is true for Orpheus), *imago Apollinis*, stands at the beginning of the tradition in which the citharode, by wearing his garments, inscribes himself. In the second moment, the outfit is charged also with a cultic significance, the citharode being inscribed within a local tradition of ritual religious acts – a tradition prescribing, among other things, the use of well defined musical lines called νόμοι, "(musical) costumes", thus called because "deviation from the form of pitching established for each type was not permitted" ([Plut.] *Mus.* 6, 1133c).[38] In this case, the clothing can somehow be compared to the colourfully decorated costume of string-players represented by Late Minoan-Mycenaean frescoes and paintings from Crete, which Power considers as distant ancestors of the citharodes' costume: "the processional lyre players depicted on paintings from Hagia Triada, Crete, who wear ankle-length, vertically banded robes, very closely resemble Archaic/Classical citharodes". The iconographic similarity can be supported by other evidence: the legendary Delphic tradition discussed above attests a recognised link between Cretan cultic practices and the Pythian festival, with its citharodic contest.[39] The outfit of the citharode could thus be the heir of the sacral dress of the Bronze Age lyre-players,[40] provided that, as archaeological evidence shows, some cultural continuity existed from the Late Minoan III (*c.* 1400–1100 BC) onward.[41] An important difference should be stressed: in all the extant paintings, the Bronze Age lyre-players are involved in cultic occasions,[42] while the citharodes of Archaic (at least from the 7th century BC)[43] and Classical age are primarily agonistic performers and (at least until the end of the 6th century BC) sympotic entertainers.[44]

A closer antecedent can perhaps be identified in the famous lyre-player portrayed in the palace *megaron* at Pylos: he holds a swan-necked stringed instrument and wears a long robe, horizontally striped from midthigh downward, quite similar to the ceremonial clothes found in Crete.[45] The bard, exceptionally tall, seats on a rocky outcrop and looks at a bird rising up nearby: both his stature

[35] Cf. *IG* II/III 5056: the priest of Dionysos Melpomenos was a member of the Euneidai.
[36] See Harpocr. 141,1–3 Dind. (ε 161 Keaney).
[37] Cf. Poll. VIII 103 οἱ δὲ περὶ τὰς πομπὰς, ἐκ τοῦ Εὐνειδῶν γένους. See also above n. 32.
[38] The Greek name for ritual religious acts is τὰ νομιζόμενα, implying traditionally codified gestures: cf. Bremmer 1994, 38–39; see also Christensen 2009, 16–18. For 'nomic' music cf. West 1992, 216, observing that νόμος, "in ordinary usage […], referred to a specific, nameable melody, or a composition in its melodic aspect, sung or played in a formal setting in which it was conventionally appropriate: a sacrifice, a funeral, a festival competition, or a professional display".
[39] Power 2010, 25 n. 49. Cf. Franklin 2006, 59–60; Power 2010, 373 n. 164 (both focusing on *H. Hom. Ap.* 516–519).
[40] The first to define "sacral dress" for the costume of the musician on Cretan frescoes was Nilsson (1950, 159); he observed: "this dress is certainly not one for everyday life but is reserved for deities and officiants of the cult".
[41] This is particularly true of North-Western Peloponnese and the Ionian Islands: cf. d'Agostino 1979; Burkert 1985, 47–53; Murray 1993, 14–15.
[42] Cf. Maas and Snyder 1989, 3; Anderson 1994, 7–9; Younger 1998, 48–49.
[43] Consider Terpander, known as the founder and first winner of the citharodic competition at the Karneia festival in Sparta; cf. Gostoli 1990, XIV, 71–72; Power 2010, 319.
[44] Cf. Rossi 1983; Vetta 1983, L–LIV.
[45] Cf. Anderson 1994, 12 with n. 14.

and the bird near to him, a common form of divine epiphany in Minoan-Mycenean religion,[46] suggest that the figure is a musician-god, or alternatively a divinely inspired human musician.[47] The relationship between the bard and the pairs of men below him is unclear: the two are represented while seated at tables and drinking in an institutionalized context, which resembles a symposion; several reconstructions of the fresco programme in the room have been proposed, positing a more or less close connection between the one and the others. Yet, the relation between singer and banqueting men on the same wall is undeniable.[48] Clearly evident is the sacral status the *aoidos*, which distinguishes him from the other characters in the fresco.

Commenting on the painting, Vetta observed that *aoidos* singing to banqueting men in the *megaron* are described many times in the *Odyssey*, thus representing a situation which reflects palatial models still alive through the Dark and Archaic Ages.[49] Indeed, the "divine *aoidos*"[50] described in the poem seems reminiscent of the bard of Pylos, not only because of his connection to a royal court, but also for his sacral aura: he is inspired and protected by the gods (the Muses and Apollo), he sings for both men for gods and he sings the gods' deeds[51]. For this reason, Aegisthus does not kill the singer appointed by the departing Agamemnon as guardian of Clytemestra and the household (*Od.* III 267–272),[52] nor does Odysseus murder Phemius (*Od.* XXII 330–354: see part. vv. 345–348).[53] Unfortunately, the *Odyssey* does not offer any description of the *aoidos*' costume; we can just imagine it to be similar to that of the singer of Pylos. Some light is cast on the stringed instrument, the *phorminx*, which was integral part of the performer's outfit, described as "exceedingly beautiful" (περικαλλής: *Od.* I 153), "hollow" (γλαφυρή: *Od.* VIII 257, XVII 262, XXIII 144), perhaps with reference to the rounded base of the soundbox, and characterized by a clear tone (λίγεια: *Od.* XXIII 133).[54]

Feasting in the *megaron* is not the only context of the performance of the *aoidos*: Demodocus is shown while accompanying acrobatic dancing in the public *agora*, where he delivers a song on the love between Ares and Aphrodite. This coexistence of (semi-)private and public contexts reminds of the musical activity of the first and more prominent citharode of the Archaic age, Terpander from Lesbos, who sang at both the citharodic contests annexed to the Spartan Carneia and the common banquets of the Spartiates, the *andreia*.[55] In his century (7th BC), the art of singing to the

[46] Cf. Carter 1995.

[47] Anderson (1994, 12–13) thinks of Apollo (this god is not attested in Mycenaean religion: cf. e.g. Larson 2007, 86; we should think of Paiaon, if it is true that the Greek Apollo inherited from him the close relationship with the hymnic song called *paian*: cf. Burkert 1985, 145–146). Power (2010, 25 and n. 49) suggests identifying the singer of Pylos with a semi-divine musical hero, such as Orpheus.

[48] Cf. Lang 1969, 79–80, 194–195; Scully 1981, 78 n. 23, with bibliography; Immerwahr 1990, 196–200; Bennet 1997, 528; Younger 1998, 47–48, 69 nr. 31; Vetta 2001, 23 ("è questa la più antica figurazione che mette nello stesso campo l'aedo e i banchettanti").

[49] "La situazione più volte descritta nell'*Odissea* ripete modelli palaziali che l'età oscura aveva continuato in ambienti disadorni e che l'arcaismo riproporrà nelle eleganti dimensioni degli androns nobiliari" (Vetta, *l.c.*). See also Bennet 1997, 528–529, with bibl.

[50] Cf. *Od.* I 336, IV 17, VIII 43, 47, 87, 539, XIII 27, XVI 252, XVII 359, XXIII 133, 143, XXIV 439; see also XVII 385 (θέσπιν ἀοιδόν).

[51] Evidence for such a singer in a palatial context comes also from a Linear B tablet found in Thebes (Av 106,7), where two lyre-players are attested: *ru-ra-ta-e*. Cf. Godart 2001, 1573–1574. Let me thank the editors and R. Pierini for this reference.

[52] On this bard and his important social role cf. Page 1972; Scully 1981; Svenbro 1984, 34–48; Vetta 2001, 23–24.

[53] Cf. Pagliaro 1952, 14–15; Scully 1981, 82–83; Vetta 2001, 47 n. 20.

[54] Cf. Maas and Snyder 1989, 6–7.

[55] On the *andreia* (later called *syssitia*) see now Quattrocelli 2002.

stringed instrument regains visibility and magnificence after centuries – the so called Dark Age – in which it was perhaps less vivacious (unless the portrayal of Dark Age music offered by the scanty iconographic evidence is inaccurate, a possibility which must be taken into account).[56] Now, the musicians/singers no longer appear naked on vase paintings, as was the case in Geometric art,[57] but long robed, as in Minoan and Mycenaean representations, while the stringed instruments no longer present with three, four or five strings, but with seven, as in Bronze Age paintings. One interesting piece of evidence is a vase fragment (first half of the 7th century BC) from Old Smyrna, not far from Terpander's Lesbos, depicting a seven-stringed lyre with a round base and with a bird just above it, which seems reminiscent of the association of lyres and birds (theriomorphic divine epiphany) in Minoan-Mycenaean art.[58] From the second half of the 7th century BC representations of seven-stringed instruments increase in number, and the round-based model (*phorminx*) gradually leaves room to the flat-based one (*kithara*), that will become the instrument *par excellence* of the citharodes. Both instruments often appear in the hands of Apollo, portrayed with an outfit clearly alluding to the iconographic scheme of Apollo Citharoedus, well established by the third quarter of the 6th century BC mainly in Attic vase paintings;[59] sometimes they appear in the hand of human musicians dressed in an ankle-length chiton and a long himation (see e.g. the black-figured vase now in Athens, Acropolis Museum 2203: see Fig. 5.3).[60] In other cases, as noted above, it is hard to distinguish between the god and human performers.

All in all, the citharode's outfit seems to assume its standard form between 7th and 6th centuries BC, in connection with the foundation, or reorganization, of musical contests held at the major Greek festivals (particularly in Sparta, Delphi and Athens).[61] At this time, the *skeue* appears to have a 'sacral aura' (the sign of a privileged relationship Apollo-citharode) which can be traced back to the divinely connotated clothing of the *aoidos* of Pylos, whose link with the gods is clearly indicated by the bird near to him (indeed, the same singer could be a god: see above n. 47). In turn, this clothing is reminiscent of the sacral dress of Minoan lyre-players, worn on liturgical occasions, although the Mycenaean *aoidos* does not primarily perform a cultic role, as far as we can see from the *Odyssey*.[62] This is – I think – an important stage in the long prehistory of the citharodic outfit.

In the light of this background the importance accorded to the citharodic *skeue* in the famous story of Arion from Methymna referred by Herodotus (I 23–24), based on Corithian and Lesbian oral traditions, is more understandable.

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[56] Cf. Maas and Snyder 1989, 28, who consider the rendition of the lyre on Geometric vases, where the instrument has less than the seven strings usually represented on Minoan and Mycenaean paintings.

[57] Cf. e.g. the proto-Attic hydria now in Berlin (Antikenmuseum 31573) or the kantharos from Boeotia preserved in Dresden (1699); cf. Maas and Snyder 1989, 12, 22 figs 10–11.

[58] Cf. Maas and Snyder 1989, 42 fig. 10. The fragment of dinos was originally published by Akurgal 1950 (see also 1961, 15 fig. 3) and Cook 1951, 248 fig. 8.

[59] Cf. Lambrinudakis 1984, 314–316; Maas and Snyder 1989, 32–33.

[60] Cf. Maas and Snyder 1989, 33, 47 fig. 10.

[61] Cf. Herington 1985, 5–10, 161–166 (all the main archaic festivals); Shapiro 1992 (Great Panathenaia); Davies 2007 (Pythia).

[62] The only ceremonial occasion in which professional *aoidoi* are involved in the *Odyssey* is the wedding feast (IV 18; XXIII 133). In the *Iliad*, while prominent *aoidoi*, such as Demodocus or Phemius, are absent, there are anonymous *aoidoi* involved in a funeral threnody (XXIV 721). In neither of the poems do professional singers perform at sacrificial processions or in other cultic occasions.

Fig. 5.3 Black-figured vase (550–525 BC), Athens, National Archaeological Museum, Acr. 2203; photo: Ourania Theofilopoulou (© Hellenic Ministry of Education and Religious Affairs, Culture and Sports/ Archaeological Receipts Fund).

τῷ [*scil*. Περιάνδρῳ] δὴ λέγουσι Κορίνθιοι (ὁμολογέουσι δέ σφι Λέσβιοι) ἐν τῷ βίῳ θῶμα μέγιστον παραστῆναι, Ἀρίονα τὸν Μηθυμναῖον ἐπὶ δελφῖνος ἐξενειχθέντα ἐπὶ Ταίναρον, ἐόντα κιθαρῳδὸν τῶν τότε ἐόντων οὐδενὸς δεύτερον, καὶ διθύραμβον πρῶτον ἀνθρώπων τῶν ἡμεῖς ἴδμεν ποιήσαντά τε καὶ ὀνομάσαντα καὶ διδάξαντα ἐν Κορίνθῳ. τοῦτον τὸν Ἀρίονα λέγουσι τὸν πολλὸν τοῦ χρόνου διατρίβοντα παρὰ Περιάνδρῳ ἐπιθυμῆσαι πλῶσαι ἐς Ἰταλίην τε καὶ Σικελίην, ἐργασάμενον δὲ χρήματα μεγάλα θελῆσαι ὀπίσω ἐς Κόρινθον ἀπικέσθαι. ὁρμᾶσθαι μέν νυν ἐκ Τάραντος, πιστεύοντα δὲ οὐδαμοῖσι μᾶλλον ἢ Κορινθίοισι μισθώσασθαι πλοῖον ἀνδρῶν Κορινθίων· τοὺς δὲ ἐν τῷ πελάγει ἐπιβουλεύειν τὸν Ἀρίονα ἐκβαλόντας ἔχειν τὰ χρήματα· τὸν δὲ συνέντα τοῦτο λίσσεσθαι, χρήματα μέν σφι προϊέντα, ψυχὴν δὲ παραιτεόμενον. οὐκ ὦν δὴ πείθειν αὐτὸν τούτοισι, ἀλλὰ κελεύειν τοὺς πορθμέας ἢ αὐτὸν διαχρᾶσθαί μιν, ὡς ἂν ταφῆς ἐν γῇ τύχῃ, ἢ ἐκπηδᾶν ἐς τὴν θάλασσαν τὴν ταχίστην. ἀπειληθέντα δὲ τὸν Ἀρίονα ἐς ἀπορίην παραιτήσασθαι, ἐπειδή σφι οὕτω δοκέοι, περιιδεῖν αὐτὸν ἐν τῇ σκευῇ πάσῃ στάντα ἐν τοῖσι ἑδωλίοισι ἀεῖσαι· ἀείσας δὲ ὑπεδέκετο ἑωυτὸν κατεργάσεσθαι. καὶ τοῖσι ἐσελθεῖν γὰρ ἡδονὴν εἰ μέλλοιεν ἀκούσεσθαι τοῦ ἀρίστου ἀνθρώπων ἀοιδοῦ, ἀναχωρῆσαι ἐκ τῆς πρύμνης ἐς μέσην νέα. τὸν δὲ ἐνδύντα τε πᾶσαν τὴν σκευὴν καὶ λαβόντα τὴν κιθάρην, στάντα ἐν τοῖσι ἑδωλίοισι διεξελθεῖν νόμον τὸν ὄρθιον, τελευτῶντα δὲ τοῦ νόμου ῥῖψαί μιν ἐς τὴν θάλασσαν ἑωυτὸν ὡς εἶχε σὺν τῇ σκευῇ πάσῃ. καὶ τοὺς μὲν ἀποπλέειν ἐς Κόρινθον, τὸν δὲ δελφῖνα λέγουσι ὑπολαβόντα ἐξενεῖκαι ἐπὶ Ταίναρον. ἀποβάντα δὲ αὐτὸν χωρέειν ἐς Κόρινθον σὺν τῇ σκευῇ καὶ ἀπικόμενον ἀπηγέεσθαι πᾶν τὸ γεγονός.

The Corinthians say (and the Lesbians agree) that the most marvellous thing that happened to Periander in his life was the landing on Taenarus of Arion of Methymna, brought there by a dolphin. This Arion was a cithara-player second to none in that age; he was the first man whom we know to compose and name the

> dithyramb which he afterwards taught at Corinth. They say that this Arion, who spent most of his time with Periander, wished to sail to Italy and Sicily, and that after he had made a lot of money there he wanted to come back to Corinth. Trusting none more than the Corinthians, he hired a Corinthian vessel to carry him from Tarentum. But when they were out at sea, the crew plotted to take Arion's money and cast him overboard. Discovering this, he earnestly entreated them, asking for his life and offering them his money. But the crew would not listen to him, and told him either to kill himself and so receive burial on land or else to jump into the sea at once. Abandoned to this extremity, Arion asked that, since they had made up their minds, they would let him stand on the half-deck in all his regalia and sing; and he promised that after he had sung he would do himself in. The men, pleased at the thought of hearing the best singer in the world, drew away toward the waist of the vessel from the stern. Arion, putting on all his regalia and taking his cithara, stood up on the half-deck and sang the "Stirring Song" (*Orthios nomos*) and when the song was finished he threw himself into the sea, as he was with all his regalia. So the crew sailed away to Corinth; but a dolphin (so the story goes) took Arion on his back and bore him to Taenarus. Landing there, he went to Corinth in his regalia, and when he arrived, he related all that had happened (transl. by A. D. Godley, with some adjustments).

The way in which Arion avoids death is assuming the identity of the citharode, that is becoming a man protected by Apollo; his complete outfit is the sign of this 'sacral' identity and is therefore stressed in the story (the nexus πάση σκευή occurs four times). Notwithstanding many fictional motives in the legend, the sacral character of the *skeue* probably reflects a genuine common idea in the Archaic and early Classical ages, destined to be weakened through time, and to fade away – a process possibly caused by the emerging agonistic and virtuosistic character of citharody, especially in the second half of the 5th century BC.

Arion, as Terpander before him, came from Lesbos: both were exponents of a long-established, prestigious musical tradition which was in contact with the Near Eastern musical culture through the Mermnad Lydia.[63] At Lydian banquets, according to Pindar (fr. 125 M.), Terpander invented the barbitos, a kind of lyre with particularly long arms and a deeper pitch than the common lyre.[64] It is possible that this cultural environment played some role in the definition of the citharode's elaborate outfit, as it is seemingly suggested in the story about the 7th century BC poet and musician Magnes from Smyrna (whence the most ancient Greek painting of a seven-stringed lyre, contemporary with Magnes, comes from: see above n. 58). The story is reported by Nicolaus of Damascus (*FGrHist* 90 F 62), perhaps dependent on Xanthus of Lydia:[65]

> Μάγνης ἦν ἀνὴρ Σμυρναῖος, καλὸς τὴν ἰδέαν εἴ τις καὶ ἄλλος, ποιήσει τε καὶ μουσικῇ δόκιμος· ἤσκητο δὲ καὶ τὸ σῶμα διαπρεπεῖ κόσμῳ, ἁλουργῆ ἀμπεχόμενος καὶ κόμην τρέφων χρυσῷ στρόφῳ κεκορυμβωμένην· περιήει τε τὰς πόλεις ἐπιδεικνύμενος τὴν ποίησιν. τούτου δὲ καὶ ἄλλοι μὲν πολλοὶ ἤρων, Γύγης δὲ καὶ μᾶλλόν τι ἐφλέγετο καὶ αὐτὸν εἶχε παιδικά. γυναῖκάς γε μὴν πάσας ἐξέμηνεν, ἔνθα ἐγένετο ὁ Μάγνης, μάλιστα δὲ τὰς Μαγνητῶν, καὶ συνῆν αὐταῖς. οἱ δὲ τούτων συγγενεῖς ἀχθόμενοι ἐπὶ τῇ αἰσχύνῃ, πρόφασιν ποιησάμενοι, ὅτι ἐν τοῖς ἔπεσιν ἦσεν ὁ Μάγνης Λυδῶν ἀριστείαν ἐν ἱππομαχίᾳ πρὸς Ἀμαζόνας, αὐτῶν δὲ οὐδὲν ἐμνήσθη, ἐπάξαντες περικατέρρηξαν τε τὴν ἐσθῆτα καὶ τὰς κόμας ἐξέκειραν καὶ πᾶσαν λώβην προσέθεσαν. ἐφ' οἷς ἤλγησε μάλιστα Γύγης καὶ πολλάκις μὲν εἰς τὴν Μαγνητῶν γῆν ἐνέβαλε, τέλος δὲ καὶ χειροῦται τὴν πόλιν· ἐπανελθὼν δὲ ἐς Σάρδεις πανηγύρεις ἐποιήσατο μεγαλοπρεπεῖς.

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[63] On this issue see Franklin 2002 and 2007. The scholar's position can be summarized as follows: "with the accession (coup?) of Gyges and his revamping of the Royal Court in the early 7th century, we may detect a sudden spike of Mesopotamian influence on the culture of the Lydian elite, due to the Mermnads' emulation of Assyrian court life. Sardis was thus able to make a unique contribution to Archaic Greek orientalism through a continuous, focused infusion of classical Mesopotamian art and learning into the Greco-Lydian, and thence wider Greek, world" (2007, 193).

[64] On this *testimonium* see Ercoles 2012, 4–6, with further bibliography.

[65] On Magnes see Talamo 1979, 151–154; Franklin 2007, 195, with bibliography.

> Magnes, a man from Smyrna, beautiful in appearance – none more so – and expert in both poetry and music; he also kept his body appropriately adorned, clothed in purple and wearing his hair piled-up in a gold band; and he used to go around the cities displaying his poetry. Many others were enamoured of him, but Gyges in particular was on fire for him and kept him as a boy-friend. But it drove all the women wild, where Magnes was, especially those of the Magnesians, and he was intimate with them. Their relatives were vexed at the shame, and making a pretence that in his poems Magnes had sung of the bravery of Lydians in a cavalry-battle against Amazons, while saying nothing of *them*, they grasped and tore off his clothing and loosened his hair and applied every [possible] humiliation. Gyges was very angry about this: he made frequent invasions into the Magnesians' territory, and in the end took their city; and on returning to Sardis he created magnificent festivals.[66]

As in Arion's case, the anecdote is no pure fiction: behind the hostility of the Magnesians toward Magnes it is possible to hear an echo of the contrast, amongs Greeks from Asia Minor, between philo-Lydian aristocratic groups (the so-called Λυδίζοντες) and anti-Lydian aristocracy: the disfigurement of the rich, refined clothing of Magnes can be read as opposition to his adoption of an oriental life-style and to his relationship with the Mermnad dynasty (Gyges).[67] The story is therefore characterized by strong political implications; yet, it can tell us something about the garments of a musician-poet – perhaps one among many – working in the Greco-Lydian world in the period of Terpander's activity. Even if the style seems to be more refined than that of Archaic and early Classical Greek citharodes, who did not wear their hair piled-up in a gold band (as far as we can see from iconographic evidence), the magnificent clothing of such musician-poets could have inspired Greek citharodes and led them to assume a more distnguished apparel than that which was in use before the Orientalizing period. It is now worth remembering that the same seven-stringed instrument, whose invention the ancient tradition (cf. 47–54 Gostoli) ascribes to Terpander, is called in some *testimonia* Ἀσιάς (κιθάρα), Asiatic (cithara);[68] according to Duris of Samos (*FGrHist* 76 F 81) and to Ps.-Plutarch (*Mus.* 5, 1133c, depending perhaps on Heraclides Ponticus),[69] the name of the instrument derived from its being used by Lesbian citharodes, whose homeland faced Asia (ἐκλήθη Ἀσιὰς ἀπὸ τῶν χρωμένων Λεσβίων, οἵτινες οἰκοῦσι πρὸς τῇ Ἀσίᾳ), while for others it derived from its being invented in Lydia (cf. *schol.* Ap. Rh. II 777 W. and St. Byz. α 474 B.).[70] As Franklin observed (2002, 442), "it is very attractive to connect *this instrument* with the heptatony of the Near East, since it is exactly at this time that 'Asian' culture was saturating Greece".

Some conclusions

If this historical sketch is in any way reliable, the citharodes' outfit is the distant heir of the Minoan-Mycenaean robes worn by lyre-players and palatial *aoidoi*, 'up-dated' and enriched by oriental influences in the early 7th century BC. By adopting it, the performer becomes part of a long-lasting musical tradition going back to very ancient times,[71] ultimately referable to Apollo: divine imitation

[66] On the passage see Ercoles 2012, 1–3, with bibliography.
[67] Cf. Talamo 1979, 151–154; 1983, 23.
[68] Cf. [Plut.] *Mus.* 6, 1133c and *Syn.*^{b} a 2225 Cunningham (= testt. 51a–b Gostoli), with the commentary by Gostoli 1990, 116–118.
[69] Cf. Weil and Reinach 1900, 29; Jacoby *ad FGrHist* 76 F 81.
[70] On the 'Asiatic cithara' as expression of the influence of Near Eastern music on Greece see Cassio 2000, 105–108; Franklin 2002 (see above n. 63).
[71] See e.g. Heraclides Ponticus' history of Greek citharody (fr. 157 Wehrli), starting with Amphion of Thebes, instructed in music by his father Zeus, and including legendary figures such as Philammon, Thamyris and the 'Homeric' Phemius

involves here the reenactement of the god's performance and makes the citharode a protégé of the god. The ritual function of the citharode's exhibition (song and music, and visual display) whitin the context of public festivals is to delight men and, above all, the celebrated god:[72] this is made quite clear by *H. Hom. Ap.* 146–150, where the gymnic and musical contests of the Ionians "with trailling robes" (ἑλκεχίτωνες) at the Delian festival are described as a way of delighting Apollo (149–150 οἳ δέ σε πυγμαχίῃ τε καὶ ὀρχηθμῷ καὶ ἀοιδῇ / μνησάμενοι τέρπουσιν ὅταν στήσωνται ἀγῶνα), but also by the explicit craving for divine favour contained in rhapsodic *prooimia* (cf. e.g. *H. Hom.* XIX 48, XXI 5, XXIII 4), by which citharodic ones should not differ too much.[73] It is in such agonistic context that the divinely inspired art of citharody mainly developed into a virtuoso and secularized performative genre.[74]

When, on the other side, the citharode is asked to take part into the sacrificial procession, and eventually to join in a cultic song (as in the above cited case of Eretrian Artemisia), he is requested to concur with the rest of the 'cultic community' (sometimes representing the whole civic community, as in the case of the Panathenaia) in interrupting the routine of everyday life and asking for divine attention and protection:[75] by means of beauty and magnificence, his distinguished dress – like the rest of the processional apparatus – marks the sacredness of the moment and contributes to transform the participants' action into a collective offering to the god.[76] In this context, the citharode's figure and role are reshaped: as iconographic and epigraphic evidence makes clear, he is no more, or at least no more prominently, the skilled performer who delights, but rather an intermediary between the cult agents and the other participants, "a boundary marking the space where the ritual takes place" (Nordquist 1992, 167).[77] In vase-paintings with processional scenes, non-playing participants do not generally appear to react to music; rather, "the music functions together with the participants and directly in the cultic action" (*ibid.*). In other words, here the citharode weaves with his instrument's strings a very complex web connecting all the participants – while leaving the various, differently coloured woofs still recognizable – and making them dialogue with the divine.[78]

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and Demodocus. For a different reconstruction, tracing back citharody to Orpheus, see Glaucus of Rhegion's *On ancient poets and musician* (fr. 1 Lanata). Such historical sketches are a clear sign of Greeks' awareness of the antiquity of their citharodic tradition.

[72] The performance was equivalent to an ἄγαλμα, designed as it was to generate *charis*: see Pulleyn 1997, 49; Graf 1993, 119.

[73] See [Plut.] Mus. 6, 1133c and see Gostoli 1990, XXIX–XXXIII (p. XXIX: "doveva trattarsi di composizioni del tutto analoghe agli *Inni omerici*"); Power 2010, 187–200 (p. 188: "rhapsodic and citharodic *prooimia* were more morphologically and phraseologically alike than different").

[74] Such development appears to have been completed by the second half of the 5th century BC, the period of the so called New Music. Iconographic evidence shows that things began to change in the first half of the same century: see Sarti 1992, 99–101, focusing on the development of the iconographic scheme of Apollo Citharoedus (as the cithara gradually becomes the typical instrument of professional, virtuoso performers, it appears less and less frequently as the god's attribute).

[75] For religious festival as an interruption of everyday life see Burkert 1985, 99; Bremmer 1994, 38; on holiday dresses cf. Burkert 1985, 99–100; Gawlinski 2012, 134–135, with bibliography. On sacrificial procession and its meaning within civic festivals see particularly Graf 1993; Kavoulaki 1999, both with further bibliography.

[76] On this topic see particularly Kavoulaki 1999, 298–303, 319–320, with bibliography.

[77] For iconographic evidence see Nordquist 1992; for epigraphic evidence, see the sacred law of Andania (cited above: see n. 25), where the musicians are appointed to walk in procession after the cult functionaries: cf. Gawlinski 2012, 139.

[78] For the image of weaving as a metaphor for playing the cithara cf. Alcm. *PMGF* 140, Alcae. 303 A,5 V., Pind. *N.* 4,44, Telest. *PMG* 810,4–5, *APl* XVI 307,5; cf. Restani 1995, 98–100.

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6. Alchemical Textiles: colourful garments, recipes and dyeing techniques in Graeco-Roman Egypt

Matteo Martelli

Recipes for purple dyeing in the alchemical collections: an overview of the earliest authors and sources (1st–4th century AD)

Among the Greek alchemical writings composed during the first centuries AD, it is possible to find several recipes or passages dealing with various methods for dyeing fabrics (in particular wool) purple. These texts usually focus on dyeing techniques that employed substitutes for the expensive Tyrian purple produced by sea molluscs belonging to the family of *Muricidae*.[1] According to the information provided by later alchemists, the most ancient author who wrote about this topic is the so-called ps.-Democritus (1st century AD), who is said to have composed four books on dyeing, namely *On Gold* (or *On the Making of Gold*), *On Silver* (or *On the Making of Silver*), *On* (*Precious*) *Stones* and *On Purple*. The most explicit account on his production is reported by the alchemist Synesius (4th century AD):

> ἐγένετο δὲ ὁ ἀνὴρ λογιώτατος, ὃς ἐλθὼν ἐν Αἰγύπτῳ ἐμυσταγωγήθη ὑπὸ τοῦ μεγάλου Ὀστάνου ἐν τῷ ἱερῷ τῆς Μέμφεως σὺν καὶ πᾶσι τοῖς ἱερεῦσι Αἰγύπτου. Ἐκ τούτου λαβὼν ἀφορμάς, συνεγράψατο βίβλους τέσσαρας βαφικάς, περὶ χρυσοῦ καὶ ἀργύρου καὶ λίθων καὶ πορφύρας.
>
> He (*i.e.* Democritus) became a very wise man when he went to Egypt and he was initiated in the temple of Memphis along with all the Egyptian priests by the great Ostanes. He took his basic principles from him and composed four books on dyeing, on gold, silver, (precious) stones and purple. (Syn. Alch. § 1, ll. 9–13 Martelli).[2]

Although only an epitomized version of this work has been handed down in the Byzantine manuscripts,[3] a short section on purple has been preserved along with what is still extant of the two books *On Gold* (*Περὶ χρυσοῦ*) and *On Silver* (*Περὶ ἀργύρου*). This section is composed of two different parts: (a) a recipe[4] describing a complex process for dyeing wool purple by means of

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[1] On the zoology of these molluscs, such as the *Murex trunculus* or the *Murex brandaris*, see *e.g.* Oddone Longo 1998, 79–90.

[2] Martelli 2011, 224 (= Berthelot and Ruelle 1887, vol. 2, 57).

[3] The three most important and ancient manuscripts are: *Marcianus graecus* 299 (10th–11th century); *Parisini graeci* 2325 (13th century) and 2327 (1478); see Berthelot and Ruelle 1887, vol. 1, 173–219; Mertens 1995, XXII–XXXVIII; Martelli 2011, 3–43.

[4] Ps.-Dem. Alch. *PM* § 1 in Martelli 2011, 180–183 (= Berthelot and Ruelle 1887, vol. 2, 41, l. 3 – 42, l. 8).

three ingredients, namely a kind of seaweed (βρύον θαλάσσιον),[5] *lakcha* (λακχά)[6] and monk's rhubarb (λάπαθον); (b) a catalogue of dyeing ingredients, which are divided into two classes: (1) the dyestuffs that, although esteemed by the ancients, do not produce a lasting dye, and (2) the dyestuffs that, on the contrary, are effective but not considered valuable by the contemporaries of the author. The catalogue lists 17 different ingredients, nine of which are included in the first class[7] and eight in the second.[8]

The original version of this book *On Purple* was in all likelihood more extended and elaborated, as is possible to infer from the analysis of the Oriental tradition, which preserves some sections that did not enter into the Byzantine epitomized version. The Syriac translations in particular still incorporate some recipes which are lost in the original Greek version: the translation handed down by the Cambridge manuscript Mm. 6.29 (fol. 97v–98r),[9] in fact, includes the description of three techniques for dyeing wool, two of which are based on the use of a specific ingredient called *phykos* (φῦκος, identified either with the orchil lichen or with a dyeing alga);[10] in addition, the two alchemical manuscripts kept in the British Library (*Egerton* 709 and *Oriental* 1593)[11] preserve a clear reference to the fourth book of ps.-Democritus in a section devoted to the preparation of a secret mixture which also includes dragon's blood:[12]

ܗܡܚܠܘܢ ܕܡܢܐ ܕܒܗܕܐ ܟܕ. ܐܘ ܐܢ ܠܝܬ ܕܡܢ ܕܡܐ ܕܬܢܝܢ ܕܟܬ. ܘ ܐܢ ܠܝܬ ܕܡ ܗܡܚܠܘܢ. ܐܘܡܐ ܟܕ.

Dragon's blood[13] (diluted) in urine of infants in the same way as *lakcha* (*λακχά*), as is said in the book on purples: "and if there is not dragon's blood add *lakcha*"

As already pointed out by Berthelot-Duval, the above quoted 'book on purples' should be probably identified with ps.-Democritus' book *On Purple* (*Περὶ πορφύρας*), from which the quotation on dragon's blood and *lakcha* could have been taken. The interest of the author towards such ingredients and techniques is also confirmed by the Byzantine tradition, which preserves an anonymous recipe-book on the making of precious stones[14] in which Democritus is quoted in relation to purple dyeing. In fact, after a long discussion on the various solutions to be used during the different steps of

[5] Perhaps the expression βρύον θαλάσσιον corresponds with φῦκος: see Pfister 1935, 11; Halleux 1981, 233; it might refer to a kind of dyeing alga, such as *Plocamium coccineum* or *Rytiphlaea tinctoria*; see Martelli 2011, 260, n. 4.

[6] The identification of this ingredient is uncertain; the term could refer either to alkanet (or *Alkanna tinctoria* L.; see Pfister, 1935*,* 22, n. 92) or to the so-called lac-dye (a dye extracted from the scale insect called *Kerria Lacca*); see Martelli 2011, 262, n. 7.

[7] Namely: (1) φῦκος (orchil lichen or dyeing alga), (2) κόκκος (kermes), (3) ἄνθος θαλάσσιον (unidentified), (4) ἄγχουσα Λαοδικηνή (alkanet), (5) κρημνός (unidentified), (6) ἐρυθρόδανον τὸ Ἰταλικόν (Italian madder), (7) φυλάνθιον (unidentified), (8) σκώληξ ὁ πορφύριος (probably a dyeing cochineal), (9) ῥόδιον τὸ Ἰταλικόν (lit. 'small Italian rose').

[8] Namely: (1) ὁ τῆς Γαλατίας σκώληξ (probably a dyeing cochineal), (2) τὸ τῆς Ἀχαίας ἄνθος called λακχά (a dyeing cochineal or alkanet; see n. 6), (3) τὸ τῆς Συρίας ἄνθος called ῥίζιον (madder), (4) κογχύλιον (dyeing mollusc purple), (5) κοχλιοκογχύλιον (dyeing mollusc purple), (6) ὁ Αἰγύπτιος κόγχος called πίννα (dyeing mollusc purple), (7) ἰσάτις (woad), (8) τὸ τῆς ἀνωτέρας Συρίας (*scil.* ἄνθος) called κόγχος (dyeing mollusc purple).

[9] French translation in Berthelot and Duval 1893, 274.

[10] See e.g. Cardon 2007, 500–501; Pfister 1935, 7–12; Halleux 1981, 233.

[11] See Berthelot and Duval 1893, XLVI–XLVIII.

[12] See Berthelot and Duval 1893, 50, ll. 6–7.

[13] The term *samatrīn* probably refers to the red resin produced by the *Dracaena cinnabari* (see Sokoloff 2009, 1016). According to Bar Bahlul (see Duval 1898, vol. 2, col. 1337), it corresponds to the third species of the plant called σιδηρίτης (see Diosc. IV 33s.; Plin. *NH* XXV 43).

[14] Edited by Berthelot and Ruelle 1887, vol. 2, 350–364; the 'book' is composed by 33 sections (some of which are recipes) usually introduced by specific titles.

the dyeing process,[15] the (anonymous) author draws a clear comparison between the methods for dyeing stones and for dyeing fabrics:[16]

> Τινὲς μὲν οὖν διὰ τριῶν ζωμῶν εἰργάσαντο […]· ἄλλοι δὲ δι' ἑνὸς μόνου τὸ πᾶν ἀπειργάσαντο ἀραιοῦντες, καὶ ἀναστύφοντες, καὶ βάψαντες· […] Δημόκριτος καὶ Μαρία καὶ Ζώσιμος τὴν δι' ἑνὸς ἀπάρτισιν τοῦ παντὸς ἔχουσιν· ὃν τρόπον καὶ ἐπὶ τῆς ψυχροβαφῆς ἐδικαίωσε πορφύρας.
>
> Some people used to work by means of three solutions […]; other people, on the contrary, completed all the process by means of only one solution, by which they used to make (*scil.* stones) porous, to mordant, and to dye. […] Democritus, Maria and Zosimus accomplish the whole process by means of only one (*scil.* solution): he (i.e. Democritus) thought this was the right method also for the cold dyeing in purple.

While three different authors – namely Democritus, the ancient Jewish alchemist Maria (1st–2nd century AD)[17] and the Egyptian alchemist Zosimus (3th–4th century AD) – are mentioned in relation to the dyeing of stones, only one author seems to be considered with regard to the cold technique for purple dyeing. This process, well attested by the so-called 'alchemical' papyri,[18] was probably explained in the book *On Purple* ascribed to Democritus, who seems to be the subject implied in the last sentence. However, we cannot rule out that other ancient alchemists also dealt with this topic, even though they perhaps did not devote an entire book to it. Hermes, for instance, is said to have somehow discussed purple dyes in connection to an unidentified ingredient called *kōmaris* (κωμάρις),[19] which was employed for dyeing both stones and wool. In addition, similar information is also preserved in reference to the Persian Ostanes, who is presented by the alchemical literature as the teacher of Democritus. A short summary of the topics treated by the magus is preserved in a Syriac alchemical text ascribed to the Egyptian alchemist Pebichius. He is presented, in fact, as the translator of Ostanes' books, whose contents are summarized as follows (Mm. 6.29, fol. 131^{r}15–131^{v}3):

> ܐܦܬܚ ܠܗ ܠܣܦܪ ܘܐܫܟܚ ܟܠ ܡܕܥ ܕܐܝܬ ܒܗ ܐܝܟ ܕܐܣܛܪܘܠܘܓܝܐ ܘܚܟܡܬ ܐܠܗܝܬ ܘܐܣܛܪܘܢܘܡܝܐ ܘܦܝܠܘܣܘܦܝܐ ܘܣܝܡܝܐ ܘܩܘܪܒܢ ܕܐܠܗ̈ܐ ܘܗܕܐ ܕܐܝܬ ܒܗ ܐܝܟ ܕܐܣܛܪܘܠܘܓܝܐ ܘܚܟܡܬ ܐܠܗܝܬ ܘܐܣܛܪܘܢܘܡܝܐ ܘܦܝܠܘܣܘܦܝܐ ܘܣܝܡܝܐ ܘܩܘܪܒܢ ܕܐܠܗ̈ܐ ܘܗܕܐ [...] ܘ ܟܠ ܗܘ ܕܣܦܪ ܗܘ ܕܐܠ ܒܝܬ ܐܝܟ ܕܐܣܛܪܘܠܘܓܝܐ ܘܚܟܡܬ ܐܠܗܝܬ ܘܐܣܛܪܘܢܘܡܝܐ ܘܦܝܠܘܣܘܦܝܐ ܘܣܝܡܝܐ ܘܩܘܪܒܢ ܕܐܠܗ̈ܐ ܘܗܕܐ

On the other hand, next to this scattered information on the fragmentary alchemical sources dealing with purple, several papyri preserve detailed descriptions of different processes used for giving wool various purple shades. First of all, the two famous (al)chemica papyri, namely the Leiden and the Stockholm papyri (3th–4th century AD), preserve a selection of recipes devoted to the same four technical fields covered by ps.-Democritus' books (gold, silver, precious stones and purple). After several recipes dealing with various treatments of metals,[21] the Leiden papyrus concludes with 11 recipes (*P.Leid.X.* 89–99) describing different aspects of the methods for dyeing wool purple: how to dilute or fix specific dyestuffs (for instance 'alkanet,' ἄγχουσα),[22] which kind of astringent elements had to be employed[23] and how to guarantee a shining and lasting purple colour. Moreover, more recipes on similar topics are included in the Stockholm papyrus: after the description of various methods for making silver (*P.Holm.* 1–9) and precious stones (*P.Holm.* 10–88), the second part of the papyrus is all devoted to purple dyeing. In fact, 70 recipes (*P.Holm.* 89–159) deal with numerous aspects of this topic: how to prepare or dilute various dyestuffs,[24] how to perform the different steps of the process (in particular washing,[25] mordanting[26] and proper dyeing[27]), and how to prepare several kinds of dyeing solutions. The recipes focus especially on the variety of dyestuffs that were employed and of shades that could be reached rather than on the material to be dyed, which is always indicated by the general term *to erion* (τὸ ἔριον, 'wool', without further specifications).[28] In addition, one recipe (*P.Holm.* 125) composed just by a list of dyeing substances sounds similar to the catalogue preserved by ps.-Democritus' section on purple. The text reads:

> Δοκιμασίαι φαρμάκων βαφικῶν. Ἰσάτις ἡ βαρεῖα καὶ κυανῆ καλή, ἡ δὲ ἔκλευ/κος καὶ κούφη οὐκ ἐσθλή. Κόκκου Συρίου / δοκιμασία· θραῦε τὸν εὐανθέστατον καὶ κο/υφότατον αἰρῶν. Ὁ δὲ μέ/λας ἢ διάλευκος πονηρός. Νίτρῳ δὲ διαμασησ/άμενος διάκρινε τὸν εὐανθῆ. Ἐρυθρόδανον / εὐανθέστατον συντρίβων εἰς δοκιμασίαν / ἄγε. Φῦκος τὸ πορφυρόχροον καὶ εὐπαγὲς ὅ/πως ὄστρεον. Τὸ δὲ διάλευκον καὶ μέλανον / ὂν οὐκ ἐσθλόν. Διαμασώμενος οὖν φύλασ/σε εἰς τὴν χεῖρα εὐανθέστερον αἰρ[ῶν]. Στυ/πτερία δὲ ὑγρὰ καὶ λευκὴν λίαν. Ἡ δὲ ἅλμη/ν ἔχουσα ἀχρεία ἐστίν. Χαλκοῦ ἄνθος τὸ κυανόχρου[ν] καὶ χλω/ρόν λίαν πρασῶδες καὶ εὐανθέστατον.
>
> Examination of Dyeing drugs.
> Heavy and dark blue woad is good, but the pure white and light (kind) is not good.
> The examination of Syrian kermes. Take and crush that which is the lightest and the most finely coloured.

[21] Along with recipes which explicitly refer to various methods for whitening or yellowing base metals (such as copper, tin, lead) we find recipes explaining how to purify and harden metals, how to prepare golden and silver paints, how to test metals for purity, etc. See Caley 1926, 1150; Halleux 1981, 11.

[22] See, in particular, *P.Leid.X.* 89 and 91 (how to fix ἄγχουσα); *P.Leid.X.* 90 (how to dilute ἄγχουσα).

[23] A list of astringent ingredients (or mordants) is given by *P.Leid.X.* 92.

[24] See e.g. *P.Holm.* 109 (how to collect ἴσατις); *P.Holm.* 111 (how to cook ἄνθραξ); *P.Holm.* 93, 94, 96, 138, 146 (how to dilute ἄγχουσα); *P.Holm.* 97, 149 and 150 (how to dilute κόμαρι); *P.Holm.* 137 (how to dilute φῦκος); *P.Holm.* 158 (how to dilute θεῖον).

[25] See e.g. *P.Holm.* 90, Στρουθισμός. Τὸ δὲ στρουθίσαι ἐστὶν τοῦτο κτλ., "Cleaning with Soap Weed. Cleaning with soap weed is done in the following way" etc. (transl. by Caley 1927, 991). See also *P.Holm.* 124 and 151.

[26] See e.g. *P.Holm.* 92 Στῦψις. Χάλκανθον καὶ σκορπίουρον ζέσας / χρῶ πρὸς ὃ ἂν βούλει βάμμα. Στύφει δὲ κ(αὶ) / λίθους καὶ δέρματα παντοῖα, "Mordating. Boil chalcanthum and skorpiurus and employ for any desired colour. These substances, however, also mordant all kinds of stones and skins" (transl. by Caley 1927, 991). See also *P.Holm.* 100, 143, 144, 148 and 152.

[27] Most recipes describe how to dye wool purple (different nuances are however considered). Particular attention is devoted to the so-called cold dyeing (ψυχροβαφή): see *P.Holm.* 106, 121, 123, 135, 142, 145, 155.

[28] See e.g. *P.Holm.* 120 (tit. Διαφόρων χρωμάτων βαφαί), where it is explained how to dye wool in three different colours: see l. 1 Φοινικόχροα ποιῆσαι ("Make Phoenician dye"); ll. 4–5 Ἐὰν δὲ θέλῃς κέδρινον βάψαι ("If you want to dye cedar colour"), l. 6 Ἐὰν δὲ κεράσινον ("If you want to dye cherry-red"). See also *P.Holm.* 89 and 145.

> The black or white-spotted is, however, poor. Chew it into pieces with soda and set the finely coloured apart. Pulverize the finest coloured madder and thus make the test.
> Purple-coloured and fast *phykos* is as if snail-coloured, but the white-spotted and black is – take notice – not good. Now chew it into pieces, hold it in the hand and choose the most finely coloured one.
> Alum should be moist and very white. That which contains saltiness is, however, unsuitable.
> Concerning flowers of copper, that is suitable which shows a dark blue colour, a very green leek colour or, in general, a very fine colour.[29]

The recipe displays a clear intent to classify various dyestuffs and to explain some empirical criteria to distinguish several substitutes for the real purple. Similar ingredients are employed not only in the recipes handed down by the two (al)chemical papyri, but also in other more fragmentary recipes preserved by shorter pieces of papyri which belong today to the following collections:

1. *P.Iand.* 85 (1st–2nd century AD);[30] fragments of two recipes (15 defective lines) that seem to describe two dyeing processes based on different ingredients: *sērikon* (σηρικόν)[31] and *phykos* are employed in the first recipe; cinnabar (κιννάβαρι), hematite (αἱματίτης), and safflower (κνῆκος) in the second one.
2. *P.Gen.* III 122 (inv. 197; 2nd century AD); fragments of various recipes. It is possible to identify a recipe for dyeing wool and perhaps linen (ll. 11–16?; the dyestuff is not readable); a second better preserved recipe deals with the treatment of silver (ll. 26–31).[32]
3. *PSI* inv. 20011 (undated); the central column hands down a few recipes on the dyeing of different substances; a dye bath composed by several ingredients seems to be used for dyeing both wood (in order to imitate ebony) and leather.[33]

These fragments confirm that during the first centuries AD various recipe-books dealing with the dyeing of different materials were circulating in the Graeco-Roman Egypt.

Professional dyers, domestic dyeing procedures and alchemy throughout the reading of the Egyptian papyri

The dyeing techniques described and collected in the above-mentioned recipe-books seem to be somehow connected with the practical experiences of professional dyers. Dyeing procedures, in fact, required a professional specialization: anyone interested in such processes had to handle a wide set of dyeing substances which were processed according to specific chemical treatments in order to react with wool. In addition, such operations had to be carried out in proper workspaces, which required quite a substantial investment in order to be properly equipped. Especially in the manufacture of clothing, the process needed to be split up between different specialized craftsmen who took care of the various phases of the production, from the wool spinning to its dyeing.[34] Jones[35] for instance distinctly claimed that "the finishing processes of fulling and dyeing were performed

[29] Transl. by Caley 1927, 995–996 (slightly modified).
[30] Halleux 1981, 158–160.
[31] The term σηρικόν (l. 2, written <σ>ειρ-) is conjectural; it could refer to a red pigment; see Halleux 1981, 160, n. 1.
[32] See Fausti 1996, 31–41.
[33] Halleux 1981, 160–163.
[34] See Wipszycka 1965, 127–128; Van Minnen 1987, 31–88 (in part. p. 45); Gibbs 2012, 38–55, who wrote (p. 45): "Textile production had several specializations that moved through the entire production process, from raw materials to finished goods: notable examples include the *eriokartes*, who was involved in both carding wool and shearing sheep (*P Mil. Vogl.* IV 212r v (109 CE)); the *bapheis*, who dyed textiles (*P Tebt.* II 287 (161–9 CE)); the specialist trouser makers, the *brakarioi* (e.g. *P Oxy.* X 1341 (4th century CE); the *gnapheis*, who fulled finished garments and washed old clothes (*P Lond.* II 286 (66–9 CE); *P Phil.* 1 (103–24 CE), etc.".
[35] Jones 1960, 190.

by workers who were quite distinct from one another and from the weavers. *Fullones* (γναφεῖς) and *coloratores* (βαφεῖς) formed separated trades, and were grouped in their own guilds".[36]

Along with several receipts of payment, Egyptian papyri have preserved more specific documents that allow us to look more closely at some aspects of the activity and organization of these experts.[37] On the one hand, dyers used to work in specific workshops, which could be either independent buildings (equipped with all the facilities) or part of the house,[38] as it is possible to infer from some contracts for leasing or selling *ergastēria* (ἐργαστήρια, 'workshops, workspaces'). For instance, a sale contract of a dye-shop equipped with a leaden pot and an earthenware cask is preserved by *P.Oxy.* XIV 1648 (2nd century AD; see ll. 61–63 βαφικὰ ἐργαστήρια ἐν τῷ ἀποδεδ(ειγμένῳ) βαφείῳ, / καὶ ὃ ἔχουσιν ἐν τούτῳ χαλκεῖον μολυβοῦν καὶ / πίθον ὀστράκ(ινον), "and dyeing-workshops in the aforesaid dyeing-place, and the leaden pot and earthenware cask which they possess there");[39] moreover, one century later, *P.Oslo.* III 138 (323 AD) hands down a contract for the lease of house property in the Oxyrhynchus' Cretar quarter, which also included a dyer's workshop described as "a space (a room) on the ground floor with all its utensils and furniture" (ll. 8f. ἐκ ἐαυ̣τ̣[οῦ] βαφ<ε>ίου τόπον ἕνα ἐπίπεδο[ν] / σὺν χρηστηρ̣ίο̣ις πᾶσι).[40] These papyrological data seem to match archaeological finds, at least according to Flinders Petrie's investigations in Anthribis, where the Egyptologist discovered a fully equipped workshop of a dyer with a big cistern and sixteen vats.[41]

On the other hand, papyri often refer to specific guilds of dyers, or 'professional associations', which are mentioned with regard to various circumstances. *P.Tebt.* II 287 (161–9 AD), for instance, preserves an official record of "an appeal made by the fullers and the dyers of the Arsinoite nome against the exaction by a minor official of what they held to be an undue amount for the tax upon their respective trades".[42] In addition, fullers and dyers are again mentioned together in the list (probably a tax list) handed down by *P.Carlsberg* 53; the bottom of the papyrus, although not strictly connected to the *bapheis* (βαφεῖς, 'dyers'), deserves particular attention: after the mention of the later dyer, called Τύραννος Κρονίωνος, the list goes on (ll. 12–3) by giving the name of Ὀρσενοῦφις Ἥρωνος ἡγούμ(ενος) γερδ(ίων) Τεβτ[ύνεως / ὑπ(ὲρ) διακρίσεως μαθητῶ(ν), "Orsenouphis, son of Heron, supervisor (leader) of the weavers in Tebtunis, for the screening of apprentices". As already pointed out by Van Minnen,[43] Orsenouphis was probably heading up a guild of weavers, which

[36] Jones' conclusions are based on the assumption that a similar situation was more or less common in all the Roman provinces. It is difficult, however, to sketch a uniform and complete picture that can fit each part of the Roman Empire. See Vicari 2001, 13–15; Droß-Krüpe 2013, 46–114 and 233–253.

[37] Droß-Krüpe 2013, 31–35 and 51–57.

[38] Husson 1983, *s.v.* ἐργαστήριον.

[39] See also *P.Lond.* II 371 (1st century AD): probably the receipt for the lease of a property with "a tower that accommodated a dyer's workshop along with its utensils and furniture" (ll. 3–4 πύργου ἐν ᾧ βαφεῖον καὶ ἕτερα χρη/στήρια); *P.Oslo.* III 139 (2nd century AD): a veteran is asked to rent his βαφεῖον ('dyer's workshop'); *CPR* XIV 10 (6th century AD): an ἐργαστήριον βαφευτικόν ('dyeing workshop') is rented to two brothers.

[40] In a similar way, *P. Cornell. inv.* 43 (4th century AD) hands down the contract for the lease of part of an house in Hermopolis, which included also an unspecified workshop (ἐργαστήριον); see Rabinowitz 2001, 51–62. *P.Neph.* 48 (4th century AD) records the sale of another house that included a small line working space. Finally, *P.Laur.* III 73 + *P.Giss.* 119 (to be joined together; see Gonis 2002, 169–172) hands down the contract for the lease of part of a house that belonged to the purple dyer (κογχιστής) Aurelius Victor: however there is no mention of any workshop accommodated into the house.

[41] See Petrie 1908, 11 and pl. XXXIV.

[42] Grenfell and Hunt and Goodspeed 1907, 47–48.

[43] Van Minnen 1987, 70–71. See also Bülow-Jacobsen 1989, 125–131.

was somehow involved into the training of new apprentices (μαθητοί). As far as I know, a similar function is not attested by any source with reference to a guild of dyers:[44] it is likely that each dyer was responsible for the training of his own apprentices, especially in a society where specialized trades were usually learned within the family and passed on from father to son.[45]

Unfortunately the identification between these professional dyers and the authors of the above mentioned recipe-books is far from evident. The wide range of techniques considered by ps.-Democritus or by the compiler(s) of the Leiden and Stockholm papyri show a general interest towards a broad umbrella of competences, which were proper to different categories of experts (metallurgists, makers of fake precious stones, glassmakers, etc.).[46] Each of these craftsmen had to develop a high degree of specialization and probably never committed himself to learning and practicing different kinds of *technai* (τέχναι, 'arts'). Obviously we cannot exclude that more specific recipe-books (or selective collections of recipes), devoted for instance solely to purple dyeing, were somehow circulating among specialized craftsmen. For instance, the above mentioned *P.Iand.* 85 preserves two recipes focused on purple only and Pliny the Elder informs us of *commentarii* devoted to the making of precious stones.[47] In addition, the Leiden and Stockholm papyri preserve few references to their sources; in particular *P.Leid.X.* 89 reads: "How to fix Alkanet. Urine of sheep, or *comaris*, or henbane as in the recipe 55".[48] Perhaps we find here a reference to *P.Holm.* 147, where the same instructions for fixing alkanet (ἄγχουσα) are reported: the text is currently the 58th recipe of the section on purple and the reference of *P.Leid.X.* 89 could reflect the order of an earlier and shorter recipe-book – maybe devoted just to purple dyeing – which was one of the sources of the (al)chemical papyrus.[49]

However, even within the specific field of purple dyeing, a certain distinction between the author of the (al)chemical texts and professional dyers seems to be drawn by the recipes themselves: in particular *P.Holm.* 106 explicitly refers to the dyers (βαφεῖς), from whom some specific dyestuffs, namely 'scum of woad' (τὸ ἀφρὸν τῆς ἰσάτεως) and an unspecified 'flower' (ἄνθος, a kind of dyestuff), had to be taken. The dyer seems not to be the person who was performing the technique explained by the recipe: the 'author' of the recipe referred to him as a kind of expert who could provide the required dyeing material.

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[44] The inscription *Alt. v. Hierapolis* 227 must be mentioned at this point, since the text records a certain M. Aurelius Diodorus Corescus who left an amount of 3000 *denarii* to the guild of purple dyers (perhaps his colleagues), whose leader was required to burn poppies on his tomb every year. But if they neglected to do so, the money had instead to go to the ἐργασία θρεμματική, a term that has been interpreted by some scholars as a '*collegium alumnorum*' or an association of slaves' children (see already Humann 1898, 143); this interpretation was already criticized by Van Minnen 1981, 71, n. 142; more recently the expression has been read as referring to an association of shepherds: see Ritti 1992, 47.

[45] See Wipszycka 1965, 146; Fikhman 1994, 25–27. Justinian' *Digest* XXXII 91,2 (from the jurist Papinian) mentions a workshop willed from father to son; see also *CPR* X 124, ll. 4–6 (6th century AD), where two βαφεῖς ('dyers'), father and son, are mentioned.

[46] See Martelli 2011 (2), 280–281.

[47] Plin. *NH* XXXVII 197. See also *P.Holm.* 53, where we find an interesting reference to unspecified writings (presumably on the making of precious stones): Λίθων στῦψις καὶ ἀραίωσις. Στυπτηρίαν τρίψας τῆξον ὄξει ἐπι/μελῶς καὶ βάλε τοὺς λίθους καὶ δὸς βρ/άσμα ἓν καὶ ἄφες νυκτερεῦσαι. Τῇ / δὲ αὔριον ἀποκλύσας βάπτε, ὡς θέλεις, / χρώμενος ταῖς γραφαῖς, "Corroding and Opening Up of Stones. Grind alum and melt it carefully in vinegar. Put the stoner therein, boil it up, and leave them over night. Rinse them off, on the following day and colour them as you wish by use of the recipes for colouring (*i.e.* by use of the writings, in which these techniques were probably explained)" (transl. by Caley 1927, 987).

[48] The Greek text reads: Κάτοχος ἀγχούσης. Οὖρον προβάτειον ἢ κόμ/μαρι ἢ ὑοσκυάμους ὁμοίως καὶ τόπῳ νε΄.

[49] See Halleux 1981, 105, n. 3.

A few private letters preserved in Egyptian papyri seem to hint at a similar function of the *bapheis*, who are often mentioned in regard to the purchase of dyeing ingredients. Some instructive examples are offered by the archive of Apollonios,[50] a *strategos* (113/4 to *c.* 120 AD) of the Apollonites *Heptakomia* (Upper Egypt) who also had to perform military service in the north of Egypt (e.g. near Memphis) during the Jewish revolt (115–117 AD).[51] Apollonios' family belonged to the upper stratum of Egyptian Greeks and administered a quite large weaving enterprise – at least compared with the standards of that time[52] – which involved many workers employed as spinners and weavers. Several papyri of the archive,[53] allow us to build a detailed picture of the activities carried out under the supervision of Apollonios himself, and especially that of his wife Aline and his mother Eudaimonis.[54] In a letter dating to the beginning of 117 AD, Eudaimonis first asked Aline – who was in *Heptakomia* with her husband – about her pregnancy and afterwards explained the troubles she had in finding girls to work with her in the weaving enterprise:

> *P.Brem*. 63 (ll. 1–14) Εὐδ[αι]μονὶς Ἀλίνηι τῆι / θυγατρὶ χαίρειν. / Εὔχομαί σε πρὸ πάντων εὐ/καίρως ἀποθέσθαι τὸ βάρος / καὶ λαβεῖν φάσιν ἐπὶ ἄρρε/ν[ο]ς. τῆι κθ / ἀνέπλ[ε]υσας καὶ / τ[ῆι] ἑξῆς κατέσπακα. μόγις / ἔλαβον ἀπὸ τοῦ βαφέος (*lege* βαφέως) τ[ῆι] / ι τοῦ Ἐπείφ. Συνεργάζομαι / δὲ ταῖς παιδίσκαις σου κατὰ / τὸ δυνατόν. Οὐχ εὑρίσκω /τὰς δυναμένας συνεργάζεσ/θαι ἡμῖν, ἅπ[α(?)] σ[α(?)]ι γὰρ ταῖς ἰδί/αις κυρίαις ἐργάζονται.
>
> Eudaimonis to her daughter Aline, greetings. Above all, I pray that you may give birth in good time, and that I shall receive news of a baby boy. You sailed away on the 29th and on the next day I finished drawing down (? the wool). I at last got the material from the dyer on the 10th of Epeiph. I am working with your slave girls[55] as far as possible. I cannot find girls who can work with me, for they are all working for their own mistresses etc.[56]

A *bapheus*, presumably a professional dyer, is mentioned by Eudaimonis in regard to the delivery of an unspecified dyestuff. Unfortunately the letter does not provide us with any information about how this dyestuff was used and where or by whom the dyeing process was carried out. Dyeing processes are mentioned also by Aline, wife of Apollonios, in another letter dating to 118 AD, straight after the end of the Jewish revolt. Aline was already back in Hermoupolis when she wrote to her husband about some building works on his estates, which suffered both because of Apollonios' absence[57] and Jewish attacks:

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[50] Apollonios' archive is composed by about 150 papyri ; see Montevecchi 1998, 253 and 575; Kortus 1999.
[51] See Fuks 1953, 132–151 (= Fuks 1984, 323–342).
[52] See Wipszycka 1965, 81–87; Droß-Krüpe 2013, 154–159.
[53] See, in particular, *P.Giss.* 12, 20, 21, 68 and 78 and *P.Brem.* 45 and 63.
[54] See Kortus 1999, 192–193; Wipszycka 1965, 81–84.
[55] On the meaning of the term αἱ παιδίσκαι, 'slave-girls' or 'free employers' (attracted by higher wages), see Van Minnen 1967, 63, n. 111.
[56] Transl. by Bagnal and Cribiore 2006, 143; see also Potter and Mattingly 1999, 55; Wipszycka 1965, 81.
[57] We know that in 117 AD Apollonios applied to the prefect Q. Ramnius Martialis for 60 days' leave in order to take care of his private affairs. *P.Giss.* 41 preserves a letter where Apollonios reminded the prefect of his earlier (not taken into account) application for leave (see ll. 1–9), which is copied down again in the second part of the papyrus (*P.Giss.* 41, col. 1,11 – col. 2,1–13): "[To Rammius Martialis, the] mightiest prefect, from Apollonios the strategos of Apo] llonopolis-He[ptakomias,] greetings [....] (col. 2) [...] use. For not only because of my long absence do my things begin to be completely in disorder, but [also] because of the unholy Jews' attack just about everything [which] I have [in the] villages of [Hermoupo]lis and in the metropolis needs repair from me. If you agree with this request of mine, with the ordering of my things as far as possible I will be able in a more composed manner to turn to the attentions of the strategia" (transl. by Sherk 1988, 172).

P.Giss. I 20 (ll. 1–18) Ἀλινὴ Ἀπο[λλωνίῳ τῷ̣] / ἀδελφῷ̣[.... χαίρειν]. / Εὐχαριστοῦμεν πᾶ̣[σι τοῖς θεοῖς περὶ τῆς ὑγείας] / σ̣ου ὅτι σε καὶ ἀπ̣ο̣[....?] / ἡ ἐπιστολή σου τὴν [....?] / που ἀπέσ̣ρεψεν [....] / μ̣ῶν. Ἡ δὲ προελ̣ε̣[....] / ὥστε μηδὲν θεωρεῖσθ̣α̣[ι...?] / ἀηδῶς ἔχειν διὰ τὸ διᾳ̣σ̣τ̣[....?] / γενόμενον μετὰ κισσ̣ον [..... ἔγρα]/ψας περὶ τῆς ὑγίας σ̣ο̣[υ...] κ[....?] / νοι εἰσίν. οἰκοδομ[εῖς...]ῳ̣σ̣[....?] / οἰκοδόμοις καὶ τέκτο[σι..]χο [....?] / γιον. Ἐργά[ζο]μαι τὰ ἔρι̣ᾳ̣ [καθὰ] ᾔ̣γρα[ψάς μοι ὁποῖ]/ον δέ σοι χρῷ̣[μ]α ἀρέσ̣κ̣ε̣ι̣, [δήλω]σον δ̣ι̣᾽ ἐ̣π̣ι̣[σ]τ̣ο̣λῆς / ἢ μεικρὸν ἔρ[γο]ν αὐτοῦ π[έμψο]ν. Εἰ θέλεις ἀνα/βληθῆναι σ̣[ου τ]ὴν ἰσχνὴν̣ [λε]υ̣κ̣ὴν στολήν, φρόν/τισον τῆς πο̣[ρ]φύρας.

Aline to Apollonios her brother, greetings. We give thanks to all the gods because of your safety… [long lacuna. You wrote about your health... You are building... builders and carpenters... I am working at the wool as you wrote... tell me by letter which colour pleases you or send me a small sample of it [or a little bit of wool]. If you want your light, white garment to fall down, give heed to the purple etc.[58]

Among the different workers (οἰκοδόμοι, 'builders, architects'; τέκτονες, 'carpenters') involved in the building or renewing of Apollonius's house,[59] Aline seems personally to take care of the wool working, with particular attention to the dyestuff, which is mentioned twice in the papyrus by the term πορφύρα (lit. 'purple').[60] Aline, as well as her mother Eudaimonis, was probably responsible for such expensive products and had to supervise both their purchase and their use in the dyeing procedures. However, it is not clear whether the dyeing of fabrics was carried out within the weaving enterprise: perhaps dyestuffs were just bought by Apollonios' family and afterwards delivered to the workshops of specific craftsmen, who took charge of the dyeing procedures.[61] A similar case is attested by *P.Oxy.* XVII 2149 (2nd–3th century AD), where Kerdon offers to supply the dyer with the dyestuff (πορφυρίον) for dyeing a tunic (κιθών). Otherwise, we cannot exclude that some professional dyers were temporary hired by Apollonios and worked in the workshops (even if not proper βαφικὰ ἐργαστήρια) of his enterprise. Ancient dyers, in fact, especially if they did not have their own workshops or could not rent a workspace, used both to work for private individuals[62] in order to accomplish some *ad hoc* dyeing procedures, and to operate in association with other experts in textile manufacture. An example (although quite later) of the second case is offered by *P.Grenf.* II 87 (602 AD), which mentions two dyers who brought their own equipment to the workshop (ἐργαστήριον) of a *stippoyrgos* (στιππουργός, lit. 'worker in tow'; see LSJ[9] 1646), where they dyed a specific amount of raw textile material.[63]

[58] Transl. by Bagnal and Cribiore 2006, 152.

[59] According to *P.Brem.* 15, the building included some small shrines (ἱερά, see also *P.Giss.* 20, where a shrine dedicated to Dioscuri is distinctly mentioned), a guest room (ξενία), a Symposium room (συμπόσιον), a bedroom (κοιτών), and a courtyard (αἴθριον). See Kortus 1999, 132.

[60] In the Egyptian documentary papyri the terms πορφύρα and πορφύριον can refer either to the dyestuff or to the dyed fabric; see Worp 1997.

[61] Wipszycka 1965, 86 wrote: "Dans l'établissement appartenant à Apollonios, on n'exécutait pas certaines manipulations rattachées au finissage des tissus: on les confiait à des artisans indépendants. Ainsi P. Brem. 63 dit qu'Eudaimonis faisait teindre la laine par des teinturiers, en fournissant elle-même les colorants" (however, we have seen how the letter is not so clear in this respect).

[62] We have only Byzantine papyri regarding dyers hired by private individuals: *P. Herm.* 30 (6th century AD) preserves a contract according to which a certain Aurelius Menas is hired for two years by (l. 20) Andreas and Peter, working in the business of Egytian purple (πραγματευταὶ Αἰγυπ̣τίας π̣ορφύρας): however the reading is unclear and Andreas' and Peter's business remains uncertain. *P.Grenf.* I 68 (6th/7th century AD) hands down a receipt for the salary given to a dyer by the deacon George. Similar examples related to fullers are discussed by Wipszycka 1965, 14 (see also Flohr 2013, 72–74). Both activities, in fact, required technical skills and specific equipment, so that some scholars supposed that fullers and dyers could sometimes have worked together or shared the same working spaces, especially with reference to Pompeii's and Ostia's *fullonicae* (see Forbes 1964, 141; Pietrogrande 1953, 86): *contra* see the remarks already made by Wipszycka 1965, 134, and more recently by Crawford 1990, 16. For an up-to-date discussion of this issue (also related to the possible ties between fullers and the other experts involved in the textile production), see Flohr 2013, 80–84.

[63] Wipszycka 1965, 149.

As far as dyeing activities are concerned, another papyrus of Apollonios' archive, *P.Brem.* 59, is noteworthy, since a woman wrote back to Apollonius who apparently had asked her to buy the purple for dyeing a cover for his head:

> *P.Brem.* 59 (ll. 5–15) περὶ ἧς μοι ἔγραψας πορφύρας π̣[ρὸς] / τὴν σὴν κεφαλὴν ἐ[ξ]ήτη<σα> παν... ο̣ὐ̣/χ εὗρον τοιαύτην πρὸς ἣν ἔχει[ς] / ὀξεῖαν, ἀλλὰ καὶ σαπρὰ εὗρον.../ τιμῆς. Ἐχάρην οὖν μὴ εὑροῦσα, σα/πρὰ γάρ ἐστιν καὶ τὰ σύνεργα. Ἀσ/πάζου τὴν κ[υ]ρίαν μου [Κα]μίλλαν / καὶ τὴν σύνβιόν σου καὶ [π]άντας / τοὺς σούς. Ἀσπάζεταί σ[ε] καὶ ὁ υἱός / μου ποιητὴς α̣ὐτόλυρ̣ος. / Ἔρρ[ῶσ]θαί σε εὔχομ[αι].
>
> You wrote to me about the purple of your head and I looked thoroughly, but I could not find purple as shiny as you have. I found some of cheap quality and... of price. Then I was glad I did not find it, since the equipment is also of bad quality. Salute Camilla, my lady, your wife, and all your relatives. My son, 'the poet with his own lyre' says hello. I pray that you are well.[64]

Regrettably, the papyrus is mutilated at the beginning, and we do not know the name or status of the woman who probably wrote the letter herself.[65] The playful reference to the poetic achievements of her son might reveal the upper class status of the writer, who, as well as Eudaimonis and Aline, was responsible for the purchase of a first rate dyestuff. In this regard, the woman was required to distinguish[66] between different kinds of 'purple' (πορφύρα), by considering both their brightness and, of course, their price. Moreover, the woman mentions some tools (σύνεργα), probably to be identified with the dyeing equipment,[67] even though she did not specify where these tools were located or whom they belonged to. In some cases, we cannot exclude that women were somehow involved in domestic procedures for dyeing textiles:[68] as we have seen, Egyptian papyri sometimes refer to workshops located in a part of the house, and a few letters seem to display upper class women performing dyeing processes. In particular, as already pointed out by Bagnall-Cribiore,[69] in *SB* V 7737 (1st–2nd century AD), Senpikos said to her son Melas: "Once your brother leaves, I (will) dye the wool and take it" (ll. 12f. ἐὰν ἐγδημήσῃ (*lege* ἐκδημήσῃ) ὁ ἀδελφός σου, βάπτω τὰ ἔρια καὶ φέρω).

In conclusion, as pointed out by Bagnall, "the existence of a textile and clothing industry of considerable proportions, ranging from individual craftsmen to larger establishments, is well documented in the papyri. But the letters show also a lively private commerce in the materials of making clothing, from tow and raw wool to finished cloth to dyestuffs".[70] Private men and women, often belonging to the upper and well cultivated class, were actively involved in the choice of the right dyeing ingredients and in their purchase; moreover they had direct relations with professional dyers and could, in some cases, even try to use dyestuffs for performing domestic dyeing procedures. People moved by a theoretical or antiquarian interest towards such a set of techniques fit well into this dynamic picture, where we can imagine that a certain kind of practical knowledge was circulating and could be transferred from the 'experts' to private individuals. Unfortunately the alchemical literature preserves very few passages that show alchemists at work and point out to

[64] Transl. by Cribiore 2001, 237.
[65] See Cribiore 2002, 157–158.
[66] This aspect reminds us of the criteria for recognizing effective dyestuffs which are listed by *P.Holm.* 125.
[67] The use of σύνεργα in dyeing techniques involving purple seems to be attested by *P.Kell.* I 79 (4th century AD; see l. 14), a private letter that deals with the delivery of some dyestuff for the dyeing of woman's frocks. On the contrary, Bagnall and Cribiore 2006, 79, interpreted the term σύνεργα in *P.Brem.* 59 as referring to 'weaving implements'.
[68] Bagnall and Cribiore 2006, 78; Wipszycka 1965, 150 and 154–155.
[69] Bagnall and Cribiore 2006, 323.
[70] Bagnall 1993, 34.

the space where they used to perform their 'experiments'. However, we know that the alchemist Zosimus used to frequent the house of his pupil Theosebeia: according to *Mém. Auth.* VIII 1–30,[71] in order to solve an alchemical problem, the alchemist first looked at the equipment used by Paxamos, the *stroyktōr* (στρούκτωρ, a kind of chef)[72] of the house, and afterwards checked one of the ancient alchemical books kept in Theosebeia's library. Such a domestic dimension could hint at some alchemical experiments performed at home, where we cannot exclude that some dyeing procedures were also put into practice.

Dyed garments as an 'adulterated' status symbol: sea purple versus its substitutes

Theosebeia very probably belonged to one of the rich and noble Roman families living in Egypt: Zosimus addressed her as 'purple-robed lady' (πορφυρόστολε γύναι)[73] by hinting at the 'patrician, if not imperial status'[74] of the woman. It is indeed well known that purple was an important symbol of royalty: as pointed out by Reinhold,[75] "the growing tendency from the end of the second century to associate it with the imperial garb, now, under the absolutist monarchy, developed in the fourth through the sixth centuries, from Constantine to Justinian, into the standardization of the use of purple in the imperial insignia". However, in the first centuries AD, the use of purple was not restricted to official purposes: next to the official use of purple garments Egyptian papyri show a more open access to these kinds of precious and luxury goods, which were ostentatiously displayed by private persons as signs of their affluence.[76] Recent scientific analyses of purple textiles found in rubbish heaps of the Roman *praesidia* of Didymoi (Eastern desert of Egypt) have identified a few examples of garments decorated with 'true purple' (that is the purple extracted from Muricid molluscs), which were probably worn "by low-rank officers, possibly also soldiers, and some of their civilian companions".[77] Moreover, purple and purple cloths are often mentioned in the Egyptian documentary papyri, which hand down lists of expensive items belonging to rich and well off families. For instance, in a letter dating to the 3th–2nd century BC a certain Thetos asked her father to buy a considerable amount of cloth, cosmetics and containers for jewellery; her letter reads:

> *BGU* VI 1300, (ll. 5–26) καλῶς / ποιήσεις ὡς ἂν ἀναπλῆς ἀνε/νέγκῃς...[..]..... καὶ κερκίδας β / πυξίδας μέσ[α]ς β καὶ ἐλάσσους γ / γλωσσοκομῖα (*lege* -κομεῖα) β ἀλαβαστροθήκην / καλαμίσκου<ς> β μῆλα β ἐξά/λιπτρον ἔχον βάσιν δακτύλιον / καὶ κονδύλιον Σικυώνιον / ζμυρναστατῆρας ε ὀλκὴν νάρδου γ / μύρον σμυρνεον (*lege* -ναῖον) ἔλαιον / τῆι μικρᾶι εἰς τὴν κεφαλὴν .ρβ[..] / ὀστρίνην καὶ δακτυλίους β / ο[....?]υπτρουθήκην χρυ[σῆν...] / πορφυρᾶ μεσόλευκα σινδόνα κτλ. (ll. 22–26) ἀνένεγ/κον δ[ὲ] καὶ κτένας β κροκυφάν/τους β κόκκινα β ἐνπλόκεια β / κροτάλια τῆι μικρᾶι π[ο] ρφύρας / θαλασσίας στατῆρα.

[71] Mertens 1995, 26–27. In the passage Zosimus refers to the house by the expression ἐν ὑμετέροις οἴκοις: according to Mertens' interpretation, the plural could be explained by the fact that Theosebeia was part of a group of alchemists; Zosimus himself mentions the names of other members of this group, such as the Egyptian priest Neilos and Taphnoutia (see Mertens 1995, 197, n. 1; Hallum 2008, 302–303).
[72] The term στρούκτωρ (from the latin *structor*) is translated by Mertens (1995, 26, n. 2) as 'maître queux'.
[73] Berthelot and Ruelle 1897, vol. 2, 246, l. 22.
[74] Hallum 2008, 302.
[75] Reinhold 1970, 62 (see also pp. 59–61).
[76] Reinhold 1970, 53–55.
[77] See Cardon *et al.* 2011, 204–205.

> When you sail upriver, please bring… and 2 shuttles, 2 medium-sized boxes and 3 small ones, 2 caskets, a case for alabaster ornaments, 2 tubes, 2 probes, an unguent box with a ring base and a Sikyonian goblet, 5 staters' weight of myrrh, 3 of nard oil, myrrh oil, oil for girl for the head, … of purple and 2 rings, a golden mirrorbox, medium-white linen cloths with purple […] And bring up also 2 combs, 2 hairnets, 2 scarlet ones, 2 hair clasps, earrings (?) for the girl, a stater of sea-purple dye.[78]

Moreover, according to the later *P.Oxy* I 114[79] (dating to 2nd–3th century AD; the papyrus is mutilated at the beginning) a certain Eunoia addressed a letter to an unknown correspondent (for redeeming several valuables which had been pawned at two pawnshops (with a very high rate of interest, the 48 per cent). Among other luxury objects, such as metal vessels (e.g. a cup, a large tin flask) and jewellery (e.g. armlets, necklaces, bracelets), also "a tunic and a white hooded cape with true purple border" (χιτὼν καὶ μαφόρτιν λευκὸν ἀληθινοπόρφυρον) and "a garment of purple linen" (λινούδιον ἐμπόρφυρον) are included.

Both papyri do not only enumerate several purple clothes, but in two points the writers lay stress on the pureness and high quality of the dyestuff. Eunoia specifies that her tunic and cape were dyed with 'true purple' (ἀληθινοπόρφυρος) and Thetos also includes in her list a stater of 'sea purple' (πορφύρα θαλασσία), namely the dyestuff extracted by Muricid molluscs such as *Murex trunculus* or *Murex brandaris*.[80] Such a concern about the kind of purple employed for dyeing garments must be understood in the light of the big diffusion of purple articles which were manufactured not only with 'true purple' (ἀληθινή πορφύρα), but also (and in most of the cases) with dyes of lower quality and with substitutes for the sea purple.[81] After the first studies carried out by Pfister on some garments found in Antinoe,[82] the use of these kinds of dyestuffs has been confirmed by the analyses of other Roman textiles found in Egypt. Moreover, while Pfister's investigations focused especially on Coptic garments from the 3th century on,[83] more recent researches have taken into account samples of earlier Roman textiles dating back to the 1st–2nd century. Among the several studies focusing on different collections or new finds, it is worth mentioning the data that have been recently published in regard to the hundreds of textile fragments recovered from the archaeological sites of Maximianon, Krokodilō and Dydimoi (Roman *praesidia* in the Eastern Egyptian desert).[84] Various ingredients mentioned in the above-discussed alchemical texts were in fact detected;[85] the most important are listed below:

1. Plant dyes: (1a) Dyer's madder or *Rubia tinctorum* L., "an herbaceous plant [...] with a perennial root system of long branching roots in which are concentrated the numerous red colorants"[86] (first of all

[78] Transl. by Bagnall and Cribiore 2006, 106.
[79] Transl. by Bagnall and Cribiore 206, 295.
[80] See also *P.Stras.* IV 222 (2nd century AD; l. 13 [ἀλ]ηθινοπόρφυρον, 'of genuine purple'); *SB* XII 11075 (5th century AD; l. 8 [ἀλ]ηθινῆς μικτῆς πορφύρας, 'genuine mixed purple' and l. 11 ἀληθινοπόρφυρον, 'of genuine purple'); *P.Hamb.* I 10 (2nd century AD), which mentions (l. 23) Τυριανθίνη πορφύρα ('Tyrian purple').
[81] Documentary papyri explicitly refer also to ψευδοπόρφυρος, 'of fake purple' (*P.Oxy.* VII 1051, l. 15; see Worp 1997, 57; see also *P.Oxy*. XLII 3080, 2nd century AD, l. 5 πορφύρας παρατύπου, 'of counterfeit purple'). However, note that some recipes of the Stockholm papyrus explain how to dye in 'true purple' by means of various substitutes for the genuine dyestuff extracted from sea molluscs; see *P.Holm.* 100 and 139.
[82] See, in particular, Pfister 1935, 36–42.
[83] See also Halleux 1981, 43–44.
[84] For an overview on the textiles found in these sites (along with the finds of other sites, namely the quarries of Mons Claudianus and Mons Porphyrites, and the ports of Berenike and Myos Hormos), see Bender Jorgensen 2004, 87–99.
[85] See, in particular, Cardon *et al.* 2004, 101–111; *idem* 2004 (2), 145–154; Wouters *et al.* 2008, 1–16.
[86] Cardon 2007, 108.

alizarin). The plant is often mentioned in the alchemical recipes, both in ps.-Democritus and in the Leiden and Stockholm papyri, which refer to it with the names of *erythrodanon* (ἐρυθρόδανον or ἐρευθέδανον)[87] or *rhiza* (ῥίζα, lit. 'root').[88] According to the different ratio between alizarin and purpurin detected in the textiles, scholars supposed that ancient dyers used two kinds of madder:[89] the proper dyer's madder and a second variety, perhaps to be identified with the so called wild madder (*Rubia peregrina* L.).[90] (1b) 'Woad' or *Isatis tinctoria* L., a biennial herb whose leaves, after being crushed and macerated, give a juice that reacts on exposure to oxygen and produces indigotin,[91] the dark blue colorant often detected in the ancient textiles (also in combination with madder). The plant is mentioned by both ps.-Democritus[92] and the Stockholm papyrus[93] with the name of ἴσατις. (1c) 'Henna' or *Lawsonia inermis* L., a plant whose leaves can release the red-orange dye called lawsone. Pfister[94] proposed to identify the *krimnos* (κριμνός), mentioned both by ps.-Democritus[95] and by the Stockholm papyrus,[96] with this plant. (1d) Weld or dyer's rocket (*Reseda luteola* L.), a plant used for producing yellow dyes, which does not seems to be mentioned in the alchemical texts.[97] However, as pointed out by Cardon, "it is not excluded that another plant, rich like weld in luteolin (a flavanoid or yellow crystalline compound), may have been used. A systematic investigation of the possible sources of luteolin available to the dyers of the East Mediterranean countries in antiquity still has to be conducted".[98]

2. Animal dyes: Dyer's kermes or *Kermes vermilio* Planchon, a scale insect of the oak (*Quercus coccifera* L.); the females produce a dye called kermes (detected also in combination with the 'true purple' extracted from sea molluscs). This insect is usually called *kokkos* (κόκκος) in the alchemical texts.[99]

Alongside these investigations, which confirm that several ingredients mentioned in the ancient recipes were actually used in Egypt for dyeing various types of garments, a few documentary papyri allow us to look more closely at the dyeing substances that were present in the workshops of ancient *bapheis* in Roman Egypt. A list of three different dyestuffs bought by a dyer is recorded in *P.Cairo. Zen.* III 59326bis (3th century AD), which mentions:

[87] See Ps.-Dem. Alch. *PM* § 2, l. 25 Martelli; *P.Holm.* 125 (vide *supra*); *P. Holm.* 133 Ἄλλη. Ἄγχουσα, ἐρυθρόδανον, φῦκος, αἷμα μόσχιον πορφύραν βάπτει, "Other (recipe): Alkanet, madder, *phykos* and blood of a veal dye in purple".

[88] The identification between the two ingredients is based on *P.Holm.* 159, l. 1114 ῥίζαν, τοῦτ'ἔστιν ἐρευθέδανον πεφρυγμένην, κεκομμένην καὶ σεσησμένην, "the root, i.e. roasted, pulverized and sifted madder (*ereythedanon*) (see also Hsch. ε 6078 *s.v.* ἐρυθαίνει, [...] ἡ ῥίζα ἡ λεγομένη ἐρυθρόδανον, "the root called madder"). See also Ps.-Dem. Alch. *PM* § 2, l. 30 (ῥίζιον) and *P.Holm.* 112.

[89] See Cardon *et al.* 2004, 104–106; *idem* 2004 (2), 152–153.

[90] Other identifications are not to be excluded; on the various species of *Rubinaceae* with red colorants, see Cardon 2007, 122–129.

[91] On this chemical process, see Cardon 2007, 335–354. Note that the Stockholm papyrus – although only in the section about stones (*P.Holm.* 47, 63, 64, 84) – also mentions a dye called ἰνδικόν, which was perhaps extracted from the *Indigofera tinctoria* L., one of the most important indigo-producing plants (see Halleux 1981, 214).

[92] Ps.-Dem. Alch. *PM* § 2, ll. 32 and 34 Martelli.

[93] *P.Holm.* 106 (in combination with alkanet and kermes); *P.Holm.* 109–111 describe how to treat the plant for producing a dye called ἄνθραξ (see Halleux 1981, 200, n. 6); *P.Holm.* 122 (in combination with kermes); *P.Holm.* 121 (see *supra*).

[94] Pfister 1935, 14–15.

[95] Ps.-Dem. Alch. *PM* § 2, l. 25 Martelli (where the spelling κρημνός is attested); see Martelli 2011, 272, n. 17.

[96] *P.Holm.* 89 (dyeing βαφή prepared with κριμνός and alum); *P.Holm.* 738 (as a substitute of the kermes in combination with woad and alkanet); *P.Holm.* 116 (in combination with *phykos*); *P.Holm.* 117 (in combination with copper flower); *P.Holm.* 120 (process involving different dyeing βαφαί); *P.Holm.* 127 (in combination with acacia); *P.Holm.* 140.

[97] In regard to yellow dyeing, the papyri mention in particular: (1) κνῆκος, 'safflower' (*Carthamus Tinctorius* L.); see *P.Holm.* 123, where the plant is used for producing a colour called χρυσανθής (in *P.Leid.X.* 61 it is recorded among the ingredients used for making a gold ink); *P.Holm.* 94 (in combination with alkanet); *P.Holm.* 145, where it is used for dyeing wool green (πράσινος); (2) ἐλύδριον, 'celandine'; see, in particular, *P.Holm.* 145. See also Renna 1998, 145.

[98] Cardon *et al.* 2004 (2), 152.

[99] The use of other dyeing cochineals, in particular of the so-called Armenian cochineal (*Porphyrophora hamelii*), has been confirmed especially by the analyses of Coptic textiles: see, for instance, the analyses applied on the textiles of Late Roman Egyptian origin kept at the *Deutsches Textilmuseum Krefeld*, which have been summarized by Schieck and Fuchs 2011.

(1) madder (ἐρυθρόδανον);
(2) Young Fustic (*Rhus cotinus* L.; θάψος),[100] a rounded shrub whose heartwood produces a yellow colorant.[101] Although not present in the alchemical texts, it is mentioned by Nicander and Theocritus,[102] and it was used for dyeing both wool and hair: a recipe for dyeing hair with alum, orpiment, saffron and *thapsos* (θάψος, "the same used by the dyers" is specified in the text) is preserved by the physician Paul of Aegina (III 2,6) under the title of 'golden dye' (βαφὴ χρυσοειδής).
(3) Alum (στυπτηρία),[103] an important mordant mentioned in several dyeing techniques explained by the Leiden and Stockholm papyri.[104]

In addition, other dyestuffs are listed in two declarations of prices, which date to third decade of 4th century AD and were addressed to the *logistes* of Oxyrhynchus by two different guilds of dyers (or by the same guild in two different moments). The two documents, namely *P.Oxy.* LIV 3765 (*c.* 326 AD) and *P.Harr.* 73 (*c.* 329–331 AD),[105] include the prices of more or less the same substances, although the list of the second one (which seems more complete) is introduced by a few lines addressed to the *logistes* Flavius Julianus. The dyeing substances are as follows:

P.Oxy. LIV 3765, col. iii, ll. 16–23			**P.Harr. 73, col. ii, ll. 40–45**		
(16) Νικαϊνῆ[c] λί(τρας) α τάλ(αντα) π					
(17) ῥιζείν[η]c λί(τρας) α τάλ(αντα) γ					
(18) πορφύρα[c ἐν]τοπ(ίου) λί(τρας) α τάλ(αντα) β			(40) π̣[ο]ρφύρας ἐντοπίου λί(τρας) α τάλ(αντα) η		
(19) κοκκίνου α (*i.e.* προτείου) λί(τρας) α τάλ(αντα) η			(41) κ̣[ο]κ̣κίνου α (*i.e.* προτείου) λ[ί(τρας)] α̣ τάλ(αντα) ι		
(20) β (*i.e.* δευτερίου) κοκκίνου λί(τρας) α τάλ(αντα) β			(42) β (*i.e.* δευτερίου) κ̣ο̣κ̣κίνου λί(τρας) α τάλ(αντα) ε		
(21) σ̣α̣ν̣δ̣υ̣κ̣ίνο̣υ̣ κ̣α̣ὶ̣ χ̣λ̣ωροῦ καὶ (22) καλλαΐνου καὶ τ̣ῷ̣[ν.]..[.]…. λ̣ί̣(τρας) α τάλ(αντον) α (δηνάρια).			(43) [σανδυ]κίνου[1] καὶ χλωροῦ καὶ (44) σ̣υ̣γ̣χ̣ρ̣ώ̣ω̣ν̣ λί(τρας) α τάλ(αντα) ε		
(23) [ῥ]ο̣δ̣ί̣νου λ̣ί̣(τρας) α τ̣ά̣λ̣(αντον) α			(45) ῥοδί[νο]υ λί(τρας) α τάλ(αντα) ζ		
Nicaen (purple)	1 lb.	80 talents			
Root (purple)	1 lb.	3 tal.			
Local purple	1 lb.	2 tal.	Local purple	1 lb.	8 talents
Scarlet, first grade	1 lb.	8 tal.	Scarlet, first grade	1 lb.	10 tal.
Second grade scarlet	1 lb.	2 tal.	Second grade scarlet	1 lb.	5 tal.
Bright red and yellow-green and / blue-green and…	1 lb.	2 tal.	Bright red and yellow-green [...]	1 lb.	5 tal.
Pink	1 lb.	1 tal.	Pink	1 lb.	7 tal.

1 The integration was proposed by Coles in his edition of P.Oxy. LIV 3765 (p. 186).

[100] See Cardon 2007, 191–195.
[101] See, for instance, Hsch. Θ 155 *s.v.* <θάψινον>· τὸ ξανθόν, ἀπὸ τοῦ ξύλου τῆς θάψου, [ὃ βάπτει] ᾧ ξανθίζουσι τὰ ἔρια καὶ τὰς κεφαλάς, "*thapsinon*: the yellow (dye) from the wood of young fustic, by means of which wool and hairs are dyed yellow".
[102] Nic. *Al.* 570 and *Th.* 529; Theoc. II 88. According to Schol. in Theoc. II 88a (ll. 4–6), the ingredient was considered by Asclepiades as a cosmetic for the eyes; it was expected to produce a colour that is said κροκοειδῆ ('saffron-coloured').
[103] For all the occurrences of the term in both literary and documentary papyri, see Casanova 2000, 120–124.
[104] See Halleux 1981, 230 and 44, n. 4.
[105] Both the papyri were edited and commented by Revel A. Coles, the first in the LIV volume of the series *The Oxyrhynchus Papyri* (1987) and the second in Coles 1980.

Three kinds of 'purple' open *P.Oxy.* (just the last one is recorded also by *P.Herr.*): while the first one in all likelihood refers to the dye extracted from sea molluscs, the others are to be understood as cheaper products or substitutes for the real purple. The expression 'root purple' (ῥιζείνη πορφύρα)[106] is attested in the title of *P.Holm.* 159, 'Root purple dye' (πορφύρας ῥιζίνης βαφή), which explains how to mordant wool and dye it with madder: the identification with the dye extracted from the plant seems quite likely. On the contrary, the last kind of purple (called πορφύρα ἐντόπιος, 'local purple') perhaps an Egyptian dyestuff, has been not identified.[107] The geographical origin of several ingredients is often specified by the alchemical text. For instance, ps.-Democritus[108] mentions "the Egyptian shell from the coast, which is called *pinna*" (ὁ Αἰγυπτίος κόγχος ὁ τῆς παραλίου, ὃς καλεῖται πίννα); although the expression seems to point to a kind of shellfish, the text does not provide us with a solid base for proposing any identification.

The second part of the list includes several terms that usually refer to the colours of various textiles rather than to the dyestuffs used for producing such colours.[109] The adj. *kokkinos* (κόκκινος, 'scarlet')[110] is probably to be connected with the term *kokkos* (κόκκος, 'kermes'), which has been already discussed: the two kinds listed in the papyrus could hint at different scale insects used during the dyeing process.[111] On the contrary, it is more difficult to precisely identify the dyestuffs behind the colours listed at the end of the two papyri. The adj. *sandykinos* (σανδύκινος)[112] probably refers to 'a bright red colour' (σάνδυξ) [113] obtained both from minerals[114] and from plants.[115] On the other hand, a green-yellow colour (χλωρός) could be produced by using various dyeing substances; for instance, two different shades of green, namely *prasinos* (πράσινος) and *mēlinos* (μήλινος), which are often recurring in Egyptian papyri in relation to various textiles,[116] are explained by *P.Holm.* 89 as follows:

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[106] See also *P.Oxy.* VII 1051 (3th century AD; l. 13 πορφύρας ῥιζίου); *P.Strasb.* III 131 (4th century AD; ll. 6 and 8 ἀπὸ ῥιζίνης πορφύρας).

[107] The expression 'local purple' (πορφύρα ἐντόπιος) recurs also in *P.Oxy.* VIII 1153 (2nd century AD; l. 26 ἐντοπίᾳ πορφύρᾳ *sic*).

[108] Ps.-Dem. Alch. *PM* § 2, ll. 31f. Martelli; see Martelli 2011, 277, n. 25.

[109] *P.Lond.* III 928 (2th century AD) preserves a list of colours where we find similar adjectives referring to the term χρῶμα (see ll. 12f. λίρινον, ναρκίσσινον, ῥόδινον, [φ]οινίκινον, δάφνινον); similar cases, although the term χρῶμα is missing, are attested by *P.Oxy.* XIV 1739 (2nd–3th century AD; σαπφείριον, μαρῖνον, καλλάϊνον, τυρινόν, φλόγεινον, σμυρναίαν?) and by *O.Ashm. Shelt.* 197 (= *SB* I 2251; 4th century AD; σαπφείριον, χλωρόν, λευκόν, γάλβινος, μέλαν, κόκκινον, πορφυροῦν, ῥόδινον, λαμπρόν). See Passoni Dell'Acqua 1998, 111–112.

[110] The term often recurs in the papyri for qualifying different kinds of dyed textiles: see, for instance, *BGU* VI 1300 (see *supra*); *BGU* VII 1666 (1st century AD; l. 10 κοκκ[ί]νη στολή); *P.Mich.* V 343 (1st century AD; l. 6 κοκ<κ>ίνη *scil.* στολή); *P.Mil. Vogl.* IV 222 (2nd century AD; l. 11 κόκκινον *scil.* ἱμάτιον) *P.Cair. Zen.* IV 59696 (3th century AD; l. 4 κοκκίνη *scil.* ταινία); *P.Fam. Tebt.* 49 (3th century AD; fr. B, l. 1 φαιλόνη κοκκίνη).

[111] On the identification of the different kinds of κόκκοι that are often mentioned by ancient sources (see *e.g.* Diosc. IV 48), see Martelli 2011, 270, n. 14.

[112] In the Egyptian documentary papyri various kinds of textiles are said σανδύκινοι: see, for instance, *BGU* IV 1207 (1st century BC; l. 6 περιστρώματα σανδύκινα); *P.Oxy.* VIII 1153 (1st century AD; l. 14 σανδύκινον *scil.* καρποδέσμιον); *SPP* IV pp. 115 – 116 (2nd century AD; l. 12 χιτὼ[ν] σανδύκ[ινος]). The term is never attested in the alchemical texts, which mention an ingredient called *sandykion* (σανδύκιον) in just one recipe dealing with mercury (Berthelot and Ruelle 1887, vol. 2, 301, l. 1).

[113] See, for instance, Phot. σ 499, l. 13: σάνδυξ· χρῶμα κόκκινον, "*sandux*: scarlet colour" (= Suid. σ 91).

[114] See, in particular, Diosc. V 88,5–6, where *sandux* (σάνδυξ) is said to be produced by heating ceruse (ψιμύθιον, 'white lead'; see also Plin. *NH* XXXV 40).

[115] According to Hsch. σ 165, the grammarian Sosibius wrote (fr. 21b Müller): σάνδυξ, δένδρον θαμνῶδες, οὗ τὸ ἄνθος χροιὰν κόκκῳ ἐμφερῆ ἔχει, "*sandux*, shrubby tree, whose flower has a scarlet colour".

[116] See, for instance, *Stud. Pal.* XX 67 (= *SPP* XX 67 R; 2nd–2th century AD; l. 29 κεβρικάριᾳ πράσινα); *P.Tebt.* II 405 (3th century AD; l. 1 χιτὼν πράσινος); *P.Lond.* VII 2180 (3th century AD) attest the two terms (context broken).

> Βάμμα χρωμάτων γ΄. / Βάμμα, ἐξ οὗ τρία βάμματα γίνεται. Κριμνοῦ / μέρος β΄ καὶ στυπτηρίας βαφικῆς μέρο<ς> α΄ κόψ/ον καὶ φύρασον μεθ' ὕδατος καὶ χάλα τὰ ἔρια / καὶ γίν<ε>ται κόκκινα. Ἐὰν πράσινα, θεῖον με/θ' ὕδατος τρίψας ἐπίβαλε. Ἐὰ(ν) δὲ μήλινα, νίτρ/ον ἄκρατον μεθ' ὕδατος ἐπίβαλε.
>
> A dye bath for 3 colours. A dye bath from which three dye baths can come. Bruise and mix with water 2/3 of a part of *krimnos* and 1 part of dyer's alum. Put the wool in and it becomes scarlet red. If it is to be leek green add ground sulphur with water. If, however, it is to be quince yellow then add unadulterated natron along with water.[117]

Finally, while the adj. *kallainon* (καλλάϊνον, 'blue-green') is never attested by the alchemical texts in relations to the dyeing of textiles, the nuance pointed out by the adj. *rhodinos* (ῥόδινος, 'pink, made of rose')[118] may correspond to the 'rose-coloured dye' (ῥόδοβαφοῦς βαφή) mentioned by *P.Holm.* 112, a recipe that describes how to dye wool (after a preliminary mordanting process) with madder.[119]

Conclusions

The majority of alchemical recipes, archaeological finds, and documentary papyri that have been so far discussed come from the same geographical area (i.e. Graeco-Roman Egypt) and belong to the same historical period (*c.* 1st–4th century AD). Such a chronological and geographical consistency facilitates a close and meaningful comparison between the data preserved by these sources, which may somehow clarify each other.

As far as dyestuffs are concerned, some of the alchemical recipes prescribe using the same ingredients that have been detected in various kinds of textiles discovered and analysed by archaeologists. Moreover, the same substances – in particular madder and kermes – are listed in receipts and declarations of price produced by ancient *bapheis*, who clearly made use of a similar set of dyestuffs. Therefore, a certain link may be established between the activities of ancient dyers, the results they achieved (at least according to those textiles that have been more or less accidentally discovered), and the dyeing procedures described by alchemical texts. Regrettably, as already pointed out by Halleux,[120] archaeological textiles confirm the use of a small number of substances compared with the quantity of ingredients listed by the recipes. Moreover, a similar result is obtained by contrasting alchemical texts with documentary papyri, which also attest the employ of some dyestuffs – such as young fustic (*P.Cairo Zen.* III 59326bis)[121] – that are not mentioned in the alchemical recipes.

Hopefully, such a gap will be reduced by collecting and investigating new archaeological and papyrological data, which could shed new light on ancient dyeing techniques and materials. In this direction, as we have seen, the more recent analyses of Roman textiles found in Egypt have already broaden our picture and seem to give a taste of what to expect from this promising research area. In any case, this discrepancy does not invalidate the so far achieved results and should not lead us

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[117] Transl. by Caley 1927, 991 (slightly modified); see also *P.Holm.* 145.

[118] In the Egyptian documentary papyri, the adjective often refers to different kinds of dyed textiles: see, for instance, *P.Bodl.* I 61d (2nd century AD; l. 3 [ῥο]δίνην *scil.* χιτῶνα); *P.Hamb.* I 10 (2nd century AD; l. 18 ῥοδί[νην] and l. 28 ἱμάτιον ῥ[όδ]ινον).

[119] On the different nuances produced by madder (often mixed with other dyes), see Cardon *et al.* 2004, 104.

[120] See Halleux 1981, 45–46.

[121] See *supra*, p. 119.

to dismiss the chemical value of ancient recipes, by considering them as non-sense texts lacking any kind of technical accuracy. On the contrary, a possible way to improve our understanding of these writings could consist in an experimental approach aimed to recreate some of the described processes. In this way we could better evaluate the results attainable by using substances that might have produced unstable dyes, which did not survived in the textiles found during archaeological excavations.

On the other hand, a vivid picture of the variety of colours and dyes which were typical of Graeco-Roman Egypt is displayed by documentary papyri, which – even when they list concrete dyestuffs, such as the above mentioned *P.Oxy.* LIV 3765 and *P.Harr.* 73 – show a specific attention to the different shades, tones and nuances achievable by the people who were able to handle a wide set of chemical products: hundreds of colourful textiles, in fact, are mentioned and described by the papyri,[122] which confirm how *à la mode* these products were during the first centuries AD. The circulation of such luxury goods, which quickly became a sort of status symbol, explains the interest shown by the members of well-off families, who were not only keen on possessing similar items, but also revealed a kind of expertise in recognizing and purchasing the most valuable dyestuffs, and sometimes were even involved in practical dyeing procedures. We can well believe that cultivated people (even if 'not experts') started being more and more interested in the dyeing techniques, which were behind the polychromies of the textiles they were seeking for. In fact, a similar attitude, along with an erudite and antiquarian interest, must be presupposed for the 'authors' who collected technical texts. As we have seen, ps.-Democritus or the anonymous 'author(s)' of the Leiden and Stockholm papyri tried to classify the dyeing substances according to different criteria (such as their dyeing properties, the stability of the dye, the geographical provenance of the ingredients) and described several processes based on the combination of many dyestuffs. In such a picture, the above discussed presence of different ingredients revealed by the comparison between alchemical texts and documentary papyri emphasize the variety of dyeing techniques and substances available in Graeco-Roman Egypt and arise the question of the relationship between ancient *bapheis* and alchemical authors. Did alchemical authors just rely on ancient craftsmen's practical experience? Did they collect (and maybe selected) recipes circulating among the experts or did they introduce new processes and materials? Perhaps, only a wider and deeper comparative and multidisciplinary investigation will allow us to give a proper answer to these questions. However, it remains clear that the authors of alchemical texts shared the same attention to various colours and shades attested by documentary papyri. They took into account a wide range of chromatic gradations, where the ideal purple colour was practically defined into various tones and nuances that could be produced by following the instructions given by the recipes. As already pointed out by Halleux,[123] "le lecteur de *Leid.* et de *Holm.* ne peut pas échapper à l'impression que le compilateur «fait des gammes», qu'il combine de toutes les manières possibles tous les succédanés possibles, pour fixer une sorte de couleur idéale qui apparaît quelquefois, mais s'évanouit toujours".

[122] A great amount of dyed textiles is mentioned in the marriage contracts of the Roman Egypt; see Montevecchi 1936, 44–47; Passoni Dell'Acqua 1998, 109–115.
[123] Halleux 1981, 46.

Acknowledgments

I would like to sincerely thank Prof. Philip Van der Eijk and the Alexander von Humboldt Foundation for their generous support to my current research.

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7. The Conservation of a 5th-Century BC Excavated Textile Find from the Kerameikos Cemetery at Athens

Christina Margariti and Maria Kinti

This chapter presents the conservation of an excavated textile find from the Kerameikos cemetery in Athens, Greece. The conservation of excavated textiles has a double nature: the preservation of the material integrity of the find and the preservation of the information it contains. The Kerameikos textile find dates from the 5th century BC and has been preserved in association with copper, which is the most common type of preservation in Greece. Past microscopic and amino acid analyses had indicated the presence of silk fibres, of both the *Bombyx mori* silkworm and a wild silk species *Pachypasa otus*. The use of silk in textile production was not common in Classical Greece. In the present study, several instrumental analytical techniques were applied, namely E/SEM, EDX, CL, FTIR, and Raman spectroscopies, for the purpose of characterisation of the condition and material identification. Technological analysis identified four different textiles and a net present, and evidence of decoration in one of the textiles with the use of a purple coloured dye. None of the techniques applied confirmed the presence of silk. However, cellulosic bast and possibly cotton fibres were identified. The presence of cotton is an equally rare phenomenon for the Classical period in Greece. ESEM and CL analysis indicated the dye present was purple dye from molluscs.

Moreover, ESEM analyses showed evidence of deterioration by micro-organisms. Scanning electron micrograph images of the morphology of the fungus present and PCR gene analysis executed directly on samples from the find, identified sequences of the cellulolytic fungus *Aspergillus terreus,* potentially active. Subsequently, cotton, linen and silk swatches were inoculated with the fungus in order to study its effects on the morphology of the fibres. SEM analysis showed that the morphology of the fibres was affected, especially in the case of the cellulosic ones, which can be explained by the fact that *A. terreus* is a cellulolytic fungus. In general, fungal growth seemed to be quite different between cellulose and silk fibres. Scanning electron images of the effects of the fungi action on the morphology of the cotton swatches fibres showed many similarities with the SEM images of the excavated fibres indicated as cotton, thus, further enhancing fibre identification. In addition, identification of the micro-organism present informed the decision making in the conservation process.

Textile conservators, scientists and archaeologists collaborated for the application and evaluation of the analysis results. Therefore, this case study showed that interdisciplinary collaboration is of outmost importance to the interpretation and preservation of excavated textiles.

Introduction

There are certain characteristic properties that define an archaeological textile.[1] The fact that the textile has been buried or entombed at some point in its history accounts for an inherent fragility and incompleteness. These explain the acceptance of evidence of deterioration as potential sources of contextual information. Hence, more non-interventive conservation treatments are generally chosen in the case of archaeological textiles. Unburied objects, even of similar date to buried ones, are characterised as historical, or anthropological and ethnographical.[2] For easier reference, in this study, the terms 'excavated' and 'non-excavated' are used to differentiate these two major groups of textiles.

Conservation is the comprehensively documented action taken by adequately qualified professionals, to diagnose the condition of cultural property in order to retard or prevent deterioration or damage, and to retain its significance as primary evidence. This can be achieved by control of the environment, whether in store, display or transport, and/or by treatment of the structure, and/or by research that conforms to established legal, ethical and academic practices. The final aim is to maintain the object as nearly as possible in an unchanging state, accessible to present and future generations.[3]

Textiles are generally made of organic material (such as plant and/or animal fibres, although metal threads could also be incorporated), which is sensitive to the aggressive process of burial. In addition, the action of excavation brings about radical changes to the established situation, hence a considerable acceleration of deterioration.[4] The conservation of excavated textiles differs mainly from that of non-excavated textiles, in that the original physical and chemical properties of the fibres have probably changed more dramatically and are not known. Therefore, retainment and interpretation of the evidence contained within excavated textiles may be challenging, but nevertheless a priority.[5] Instrumental analytical methods seem to have a critical role to play in the preservation of excavated textiles.[6]

This study presents the conservation of an excavated textile find through the application of technological and instrumental analyses. The find is from the 5th century BC, and it was retrieved from a grave at the Kerameikos cemetery in Athens, Greece. It was excavated at the first half of the 20th century and it was analysed twice in the following years. The results of past analyses had indicated the presence of silk, a point which has been used as evidence for the use of silk in textile production in Classical Greece.[7] It was considered necessary to undertake the present research mainly for two reasons:

1. The reliability of the previous analyses had been disputed,[8] and
2. The condition of the find and its current storage had never been assessed. Therefore, it was decided to analyse the find further for the purpose of technological analysis, material identification and characterisation of its condition. The project was based on the collaboration of professionals from different fields such as textile conservators, scientists and archaeologists.

[1] Brooks *et al*., 1996, 16.
[2] Brooks *et al*., 1996, 16; Jaeschke, 1996, 86.
[3] ECCO, 2008; IIC, 2008; ICOM, 1984.
[4] Pye, 2001, 23.
[5] Brooks *et al*., 1996, 16; Jaeshke, 1996, 86; Boccia-Paterakis, 1996. 147; Glover, 1990, 53; Wild, 1990, 8.
[6] Ambers and Freestone, 2005, 3; Howell, 2005, 304; Vandenabeele and Edwards, 2005, 169; Kouznetsov *et al*., 1996, 23; Jakes *et al*., 1994, 648; Biek, 1965, 70, 79, 115.
[7] E.g. Barber, 1991, 31–32; Tzahili, 1997, 36.
[8] Spantidaki, 2004, 68.

The excavation

The find was excavated in 1936, during a systematic excavation conducted by the German Archaeological Institute at Athens, at the Kerameikos cemetery. Amongst certain graves located in the area below an old church (dedicated to Agia Triada) was found the grave 35 HTR73.[9] The burial area within which this grave was found, belonged to the Alcmaeonidae family, a prominent family of Classical Athens. The specific grave belonged to Hipparete, the grand-daughter of Alcibiades. Alcibiades (*c.* 450–404 BC) was an Athenian general who became a controversial figure during the Peloponnesian War (431–404 BC). Underneath the grave of Hipparete a sarcophagus made of fossil stone was found, which contained a copper *lebes*. The *lebes* was wrapped in straw and bound with wide, purple coloured ribbons.[10] The wrapped *lebes* was probably originally placed in a wooden chest since wooden remains were found at the bottom of the sarcophagus. The *lebes* contained the incinerated remains of a thin fabric, which was decorated around its four corners with purple dye. The shape and decoration of the copper *lebes* and the stratigraphy of the grave indicated that the findings are dated in the last third of the 5th century BC (approximately 430–400 BC). Not enough evidence has survived to ascertain the identity of the deceased but they most probably belonged to the Alcmaeonidae family.

Past analyses

In the late 1960s samples were collected and analysed by a German scientist by the application of microscopy and staining tests.[11] Five different textiles were identified: a plain-weave fabric; a loosely woven silk fabric in plain weave; a close silk *rep*[12] with selvedge and purple stripe; a fine silk veil and; a fine silk fabric with remains of embroidery. Remains of a silk yarn were also recorded. The silk identified was reported to belong to the cultivated *Bombyx mori* species. In the same publication, the analysis of other textile finds from Hochmichele, contemporary to the Kerameikos, were also included. These were also reported to be made of *Bombyx mori* silk fibres.

In the 1990s, samples were removed again from the Kerameikos textiles, to determine whether the silk fibres were from a wild silk species locally produced on the Aegean island of Kos.[13] Wild silk was detected in the Kerameikos (and Hochmichele) textiles by the application of microscopic and aminoacid analysis.[14] However, all these previous results have been refuted in the case of the Hochmichele textiles, and disputed in the case of the Kerameikos textiles.[15]

Present analyses

It was decided, therefore, to further investigate the Kerameikos textiles for technological analysis, material identification, and characterisation of the condition, by the application of non-destructive methods of investigation, namely: stereomicroscopy, Environmental/Scanning Electron Microscopy

[9] Knigge, 1988, 108; Kübler, 1976, 83–84; Kunze-Goette *et al.*, 1999, 74.
[10] Kübler, 1976, 77.
[11] Hundt, 1969, 66.
[12] term used by Hundt, meaning a fabric with closely spaced narrow ribs running in the direction of the weft.
[13] Aristotle *HA* V 19.6; Panagiotakopulu, 1997, 421.
[14] Good, 2010, 36–40; and 1995, 966.
[15] Spantidaki, 2004, 68.

(E/SEM), Energy Dispersive X-ray spectroscopy (EDX), Fourier Transform Infra-red (FTIR) and Raman spectroscopies, and Cathodoluminescence (CL). The fact that the techniques chosen were non-destructive meant that the sample(s) would remain unaltered for the same and/or different kind of analysis in the future. As far as excavated finds are concerned the preference for a non-destructive over a destructive technique offering the same results is enforced by a directive of the Hellenic Ministry of Culture,[16] and in any case was considered essential from an ethical point of view.

Methodology

Stereomicroscopy

For stereomicroscopy, an OLYMPUS SZ61 stereomicroscope (magnification range with a 10x eyepiece 6.7 to 45 times) with an OLYMPUS SP-500UZ digital camera was used.[17] Samples were illuminated by a standard stereomicroscope light source, with two light beams falling on the sample at 45º each. Examination of the find revealed four different textiles and a net present. These were given the numbers Y1, Y2, Y3, Y4 and Y5, according to differentiations in the weave (the letter Y standing for the starting letter of the word textile in Greek – *Ύφασμα*).

Environmental Scanning Electron Microscopy

A PHILIPS XL30 Environmental Scanning Electron Microscope (magnification up to 50,000) was used. The instrument uses water vapour as the chamber gas. 2 × 2 mm samples from the find were secured to aluminium stubs with double-sided adhesive tape and placed in the sample chamber. Secondary electron images were generated. All specimens were imaged with a 15keV beam and at a nominal magnification of 400 times. The optimum accelerating voltage was 15kV, where the characteristic morphology of the fibres was clearly seen, and charging of the specimens was minimal. No sampling preparation was necessary. This method affords high magnification images of the sample and the morphology of the fibres, which enables characterisation of the condition and fibre identification.[18]

Fourier Transform Infrared microspectroscopy

FTIR spectroscopy was applied as an aid to fibre identification, to check whether the characteristic peaks for the major organic polymers were present in the spectra of the specimens, using the spectra of fresh fibres as references.[19] The full spectral range of the technique stretches in wavenumbers (cm^{-1}) from 700 to 4000 cm^{-1}.[20]

An FTIR microscope in reflectance mode was used for this analysis. Samples were studied using a Perkin-Elmer FTIR Spectrum One instrument attached to an optical microscope; 32 scans were accumulated with a resolution of 4 cm^{-1}. The whole specimen was placed on a small gold mirror inserted into the central hole of the microscope slide. In each case the microscope apperture was adjusted so that an area of 70 × 100 mm was analysed at the centre of a fibre. Grams AI v8ª software was used to process the spectra.

[16] ΥΠΠΟ/ΓΔΑΠΚ/ΑΡΧ/Α2/Φ30/22268/778/05.03.2004.
[17] Coho, 1996, 73; Haerinck, 2002, 248–252; Nowick *et al*., 2005, 837–842.
[18] Asderaki *et al*., 2004, 3–5; Bertrand *et al*., 2003, 388; Coho, 1996, 73–76; Garside and Wyeth, 2006, 90; Jakes and Sibley, 1989, 239; Joosten *et al*., 2006, 170; Moulhérat *et al*., 2002, 1395; Müller *et al*., 2003, 178–179.
[19] Bertrand *et al*., 2003, 391; Chen *et al*., 1996, 222; Edwards and Wyeth, 2005, 310; Gillard *et al*., 1994, 187; Jakes and Sibley, 1989, 240; Margariti *et al*., 2010, 162.
[20] Skoog *et al*., 1998, 404.

In the context of excavated textiles and bearing in mind the 'non-destructive' prerequisite for textiles excavated in Greece, this is the only non-destructive method. It does not apply any pressure to the sample during analysis, and does not require pressing for sample preparation. However, the drawbacks when using the FTIR microscope in reflectance mode are that the infrared beam might be scattered due to the cylindrical shape of the fibres, and that it does not penetrate the specimen in depth to perform bulk rather than surface analysis. The former might diminish the quality of the spectra, while the latter might reduce the reproducibility of the results, especially in specimens partially coated by deposits. Nevertheless, relevant experiments have shown that the quality and reproducibility of the FTIR microscope spectra was satisfactory for this study.[21]

Cathodoluminescence

Cathodoluminescence (CL) was applied for the identification of the purple dye present.[22] CL was measured in the SEM by Gatan CL3+ system. Both modes, spectroscopy and sample imaging at the particular wavelength, were employed.[23] The CL spectra were measured at 20 keV and a 4.5 nA electron beam current, at room temperature with the monochromator slits set at 3 mm. To avoid surface charging the VP mode was used. The SEM used was a Zeiss Supra 40VP (Variable Pressure) Field Emission Gun (FEG). Utilisation of low, at around 1 keV, electron landing energy and VP mode allowed the investigation of samples without any additional (conductive) coatings. This approach makes the technique non-destructive, since the sample is not altered.[24] In addition, frame integration method of image building was used to further eradicate unwanted charge accumulation. Elemental analysis was done by EDX Sapphire Si(Li) detector and quantified by standardless ZAF algorithm.

Raman spectroscopy

Raman spectroscopy was also applied for dye analysis as it has been found effective in dye analysis of excavated textiles.[25] The Raman spectra were measured by Renishaw InVia micro Raman microscope with Ar laser excitation at 514.3 nm and maximum laser power around 9 mW on the sample. The data were acquired from 2 μm diameter spots with neutral filters limiting laser power on the sample to 0.6 mW/μm^2. Low power excitation guaranteed that the analysis spot was not modified by laser light. To overcome fluorescence, the background was fitted by a polynomial procedure in Wire™ software from Renishaw Ltd and then subtracted.

For comparison purposes, a reference textile sample was used which was dyed with purple dye from the mollusc *Murex brandaris* collected from Hermione in Argolida, Greece.[26]

Results and discussion

Stereomicroscopy clearly showed the method of construction of the fabric and the yarns.[27] Textile Y1 is a weft-faced plain weave fabric with single-ply Z-twist warps, twist angle approx. 55º, it is not clear whether the wefts are very lightly Z-twisted or whether the fibres have not been twisted to

[21] Margariti 2009, 127–128.
[22] Margariti *et al.*, 2012.
[23] Barker, 1986.
[24] Derrick *et al*., 1994, 156.
[25] Tímár-Balázsy and Eastop, 1998, 394; Vandenabeele and Edwards 2005, 169; Withnall *et al*. 2005, 154.
[26] Protopapas and Gatsos 2003.
[27] Emery 1994.

make the yarns; weave count 20 warps × 60 wefts/cm^2; and yarn diameter 0.17 ± 0.02 mm warps and 0.14 ± 0.02 mm wefts (Fig. 7.1).

Textile Y2 is also a weft-faced plain weave fabric with single-ply Z-twist warps, twist angle approx. 35º, it is not clear whether the wefts are very lightly Z-twisted or whether the fibres have not been twisted to make the yarns; weave count 30 warps × 100 wefts/cm^2; and yarn diameter 0.11 ± 0.02 mm warps and 0.07 ± 0.02 mm wefts (Fig. 7.2).

Textile Y3 is a plain weave fabric with single-ply Z-twist warps and wefts; twist angle approx. 45º; weave count 30 warps × 30 wefts/cm^2; and yarn diameter 0.15 ± 0.02 mm (Fig. 7.3).

Textile Y4 is an open plain weave fabric, with single-ply Z-twist warps and wefts; twist angle approx. 30º; weave count 35 warps × 35 wefts/cm^2 approx. (the poor condition of this textile in combination with the open structure of the weave did not allow for a precise weave count); and yarn diameter 0.05 ± 0.02 mm (Fig. 7.4).

Starting edges, have been identified at textile Y2, where two threads are coiled around each other in Z direction (Fig. 7.5). Selvedges of all the textiles have also been identified, where additional warps have been used to strengthen the side edges of the fabric on the loom (e.g. Figs 7.4, 7.6).

A fifth fabric was also identified, which is a net with Z-twist; twist angle approx. 35º; and yarn diameter 0.05 ± 0.02 mm (Fig. 7.7).

In textile Y2 stripes of purple colour, where the wefts only have been dyed purple, have been used as decoration (Fig. 7.8). The results are presented in tabular form below (Table 7.1).

ESEM analysis was performed on the four textiles (Y1, Y2, Y3, and Y4) but not to the net, since only two minute fragments (2 mm × 2 mm approx.) have been isolated. The warp fibres of textile Y1, and both warp and weft fibres of textiles Y3 and Y4 have smooth surfaces, cylindrical shape and exhibit nodular thickening across their length, all of which are characteristics of cellulosic bast fibres, such as flax (Fig. 7.9).

The wefts of textile Y1, and both warps and wefts of textile Y2 seem to have a distinctively different appearance, which is flatter, rather than cylindrical, with occasional convolutions along the longitudinal axis of the fibres, characteristics indicative of cotton fibres (Fig. 7.10). ESEM analysis also allowed for measurements of the fibres. The diameters of the cellulosic bast fibres

Table 7.1 Weave and yarn analysis results of the Kerameikos textiles.

Textile		Weave type	Weave count/cm^2	Twist	Twist angle (approx.)	Yarn diameter
Y1	warp	Plain, weft-faced	20	Single-ply, Z	55º	0.17 ± 0.02 mm
	weft		60	Z(?)	?	0.14 ± 0.02 mm
Y2	warp	Plain, weft-faced	30	Single-ply, Z	35º	0.11 ± 0.02 mm
	weft		100	Z(?)	?	0.07 ± 0.02 mm
Y3	warp	Plain, balanced	30	Single-ply, Z	45º	0.15 ± 0.02 mm
	weft					
Y4	warp	Plain, open	35(?)	Single-ply, Z	30º	0.05 ± 0.02 mm
	weft					
Y5	-	Net	-	Single-ply, Z	35º	0.05 ± 0.02 mm

Fig. 7.1 Textile Y1. Scale bar 1 mm.

Fig. 7.2 Textile Y2. Scale bar 0.2 mm.

Fig. 7.3 Textile Y3. Scale bar 1 mm.

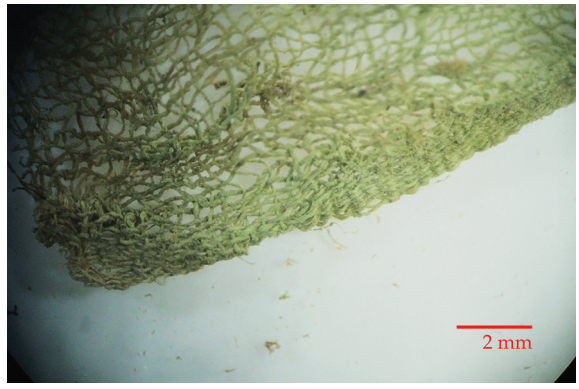

Fig. 7.4 Textile Y4. Scale bar 2 mm.

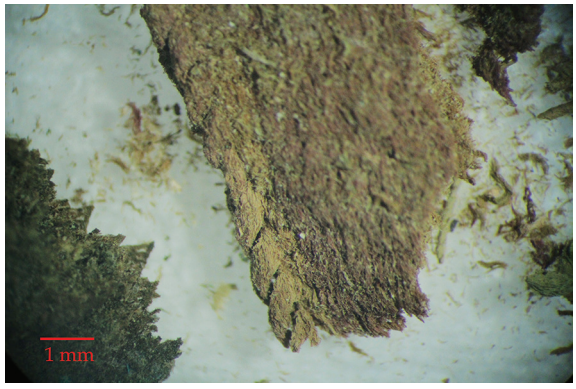

Fig. 7.5 An example of a starting edge. Scale bar 1 mm.

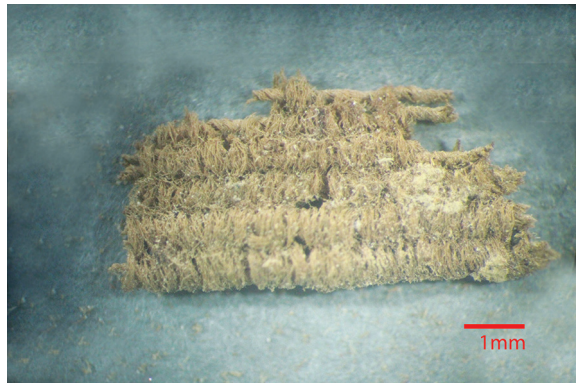

Fig. 7.6 An example of a selvedge. Scale bar 1 mm.

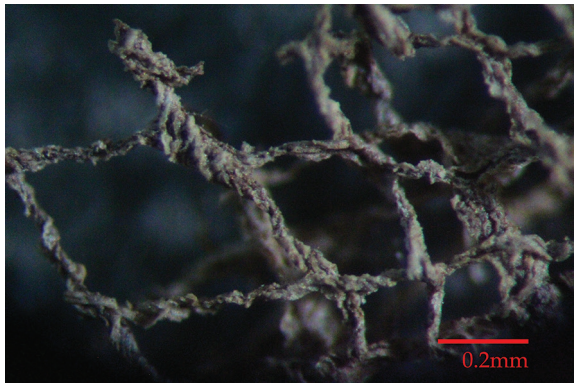

Fig. 7.7 The net, Y5. Scale bar 0.2 mm.

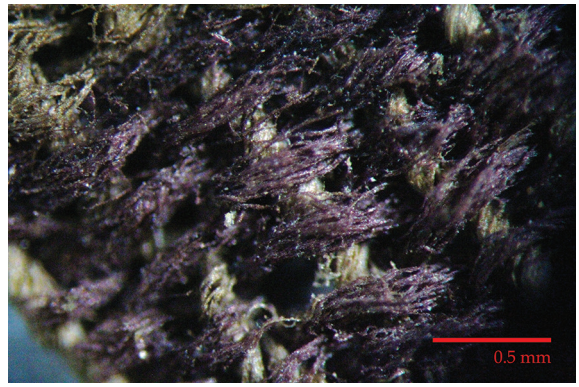

Fig. 7.8 Detail of the purple coloured decoration. Scale bar 0.5 mm.

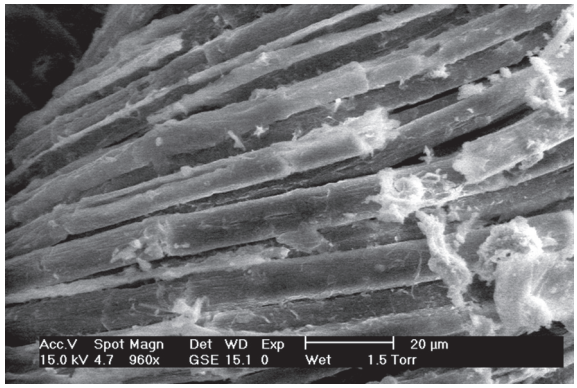

Fig. 7.9 Scanning electron micrograph of fibres, which are cylindrical and exhibit nodular thickening.

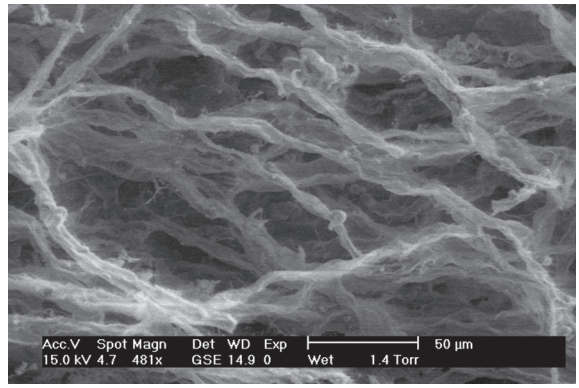

Fig. 7.10 Scanning electron micrograph of fibres, which are flat and exhibit occasional convolutions.

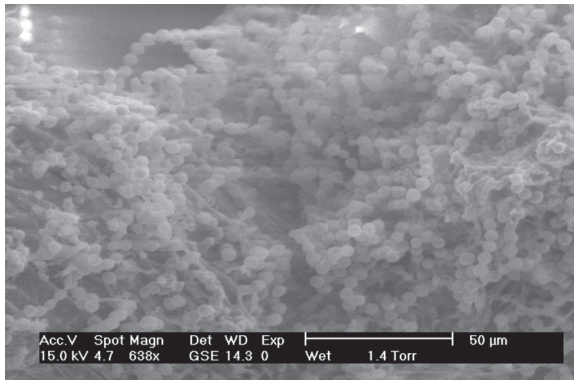

Fig. 7.11 Certain areas of the fibres were heavily masked by spherical shaped growths, indicative of the presence of fungi.

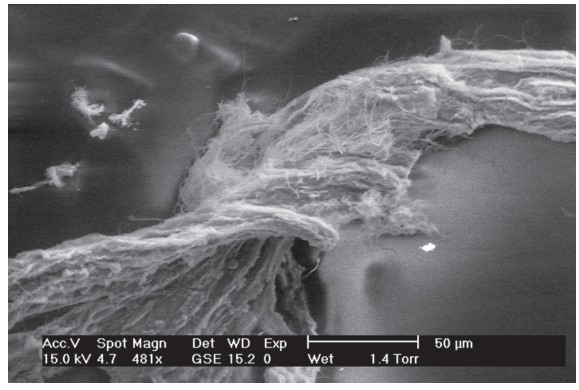

Fig. 7.12 Certain areas of the fibres were masked by hyphae, indicative of the presence of fungi.

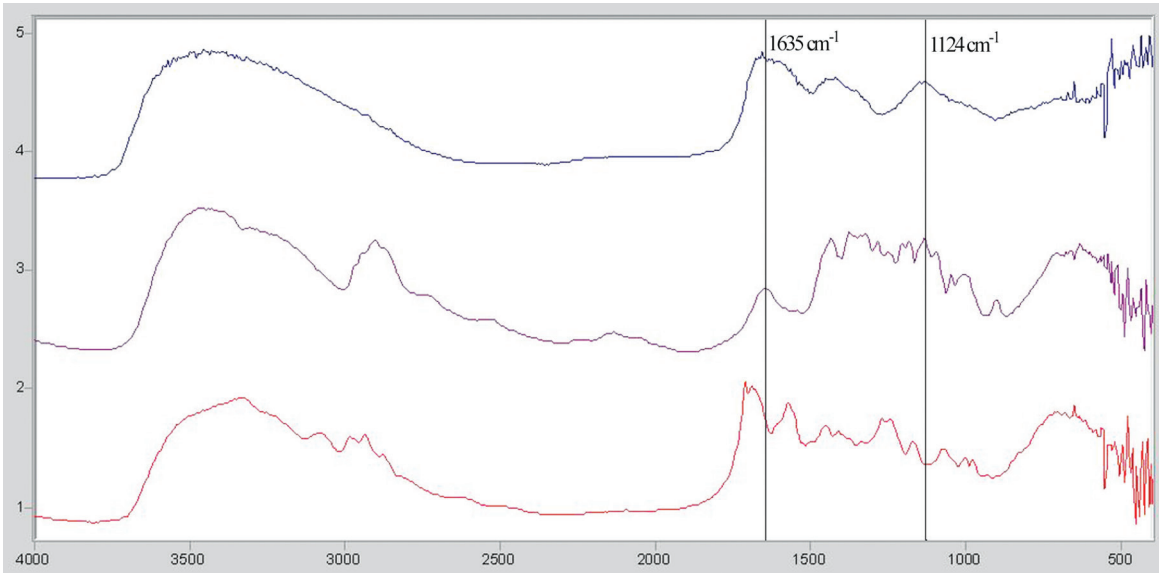

Fig. 7.13 The FTIR spectrum of excavated fibres (top) showed two of the characteristic peaks of cellulosic fibres (middle), but none of proteins (bottom).

range from 10 to 15 mm and nodular thickening occurs every 35 mm approximately. The width of what seem to be cotton fibres range from 5 (narrower areas) to 10 mm (wider areas). Average diameters of modern flax fibres range from 15 to 20 mm.[28] Average width of modern cotton fibres range from 10 (narrower areas) to 20 mm (wider areas).[29] These measurements are almost double the ones taken of the Kerameikos textiles. However, average diameters of excavated flax fibres may range from 10 to 15 mm.[30] In addition, average width range of excavated cotton fibres has been reported to be from 6 to 31mm.[31] The latter measurements are in accordance with those taken at the Kerameikos textiles.

ESEM analysis also enabled characterisation of the condition of the fibres. It showed that they had been attacked by micro-organisms sometime in the past. In certain areas the fibres where masked by profuse 1.5–2 micrometers sub-globose dehydrated fungal conidia-like structures (Fig. 7.11) or hyphae (Fig. 7.12), which are also indicative of the presence of fungi.

FTIR analysis indicated that the fibres of the Kerameikos textiles are cellulosic. Ten different areas of each sample were analysed (five for the warps and five for the wefts). Since these spectra were consistent they were synthesised to give an average one. The warps and wefts of all four textiles gave similar spectra, which showed two of the signature peaks of cellulose (1635 cm^{-1} and 1124 cm^{-1}) but none of proteins, indicating both their warps and wefts were made of cellulosic fibres (Fig. 7.13).

The CL spectra of the excavated and reference samples did not show any significant differences. Both materials produce the luminescence with the same position of the maximum and even have

[28] Margariti 2009; Ohio State University 2009.
[29] Margariti 2009; Ohio State University 2009.
[30] Spantidaki and Moulhérat 2004, 9.
[31] Moulhérat *et al*., 2002 1400.

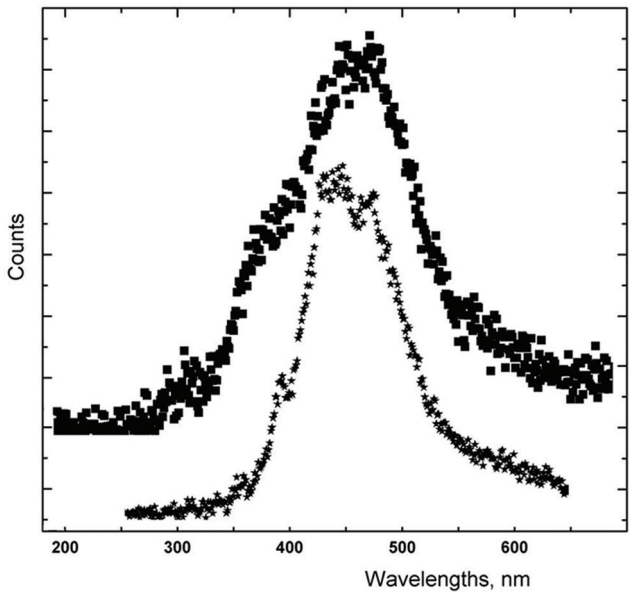

Fig. 7.14 Spectra of Cathodoluminescence exited by 20 keV electrons taken in VP mode.

similar shoulders at around 380 nm and low intensity tails above 520 nm. The pick of CL, at 472 nm, indicates that the dye is almost evenly distributed within the fibres (Fig. 7.14).

The EDX spectrum of the sample showed the presence of bromium (Br), which is also an indication of the presence of purple dye from molluscs, since the purple compounds from molluscs may include: 6.6'-dibromoidigotin, 6- and 6'-bromoindigotin; 6.6'-dibromoindirubin, 6- and 6'-bromoindirubins.[32]

The Raman spectra of the excavated and reference samples show peaks at the same wave-numbers indicative of the presence of purple dye from molluscs (such as, 270. 6 cm^{-1}, 306.8 cm^{-1}, 1254.1 cm^{-1}, 1305.7 cm^{-1}, 1579.9 cm^{-1}, 1627.5 cm^{-1}, and 1702.5 cm^{-1}) (Fig. 7.15). The small differences detected could be attributed to the presence of foreign matter on the excavated sample.

Purple dye from molluscs is one of the earliest dyestuffs used around the Mediterranean basin. It is referred to under several names, such as porphyra, Tyrian purple (from the Pheonician city of Tyre, which was one of the most important centres of purple dye production), Imperial and Royal purple (since purple coloured garments were worn by emperors and royalty). An early reference to the purple dye from molluscs, under the name *porphyra*, is found in ancient Greek mythology, and also in Homer's epics.[33] It was a luxurious commodity of high cost, indicating that the wearer of purple dyed cloth was a member of the highest ranks of society,[34] and according to Aeschylus its worth in weight was equal to that of silver.[35] The main species of shells used in the Mediterannean were *Murex trunculus* shells, which produce a purple-blue colour, and *Murex brandaris,* shells, which produced a purple-red colour. Although the latter was less common in the Aegean region, it was also found in Hermione, near Athens, in the remains of an ancient dye workshop.[36] Aristotle has also reported these two main variations, distinguishing between the reddish hue of Tyrian purple and the Greek '*αλουργής*' (alourgis), which had a violet hue similar to the colour of amethyst.[37] Evidence of the use of purple dye from molluscs has also been found on the Atlantic coasts of Europe, in South and Central America since pre-Colombian times and it is still used in Mexico, China and Japan.[38]

[32] Cardon 2007, 556; Cooksey 2001, 50.
[33] Reinhold 1970.
[34] Cardon 2007, 553.
[35] Aeschylus, cf. *Agamemnon* 940.
[36] Aristotle *HA* V. 19.6.
[37] Aristotle *HA* V 19.6.
[38] Cardon 2007, 353.

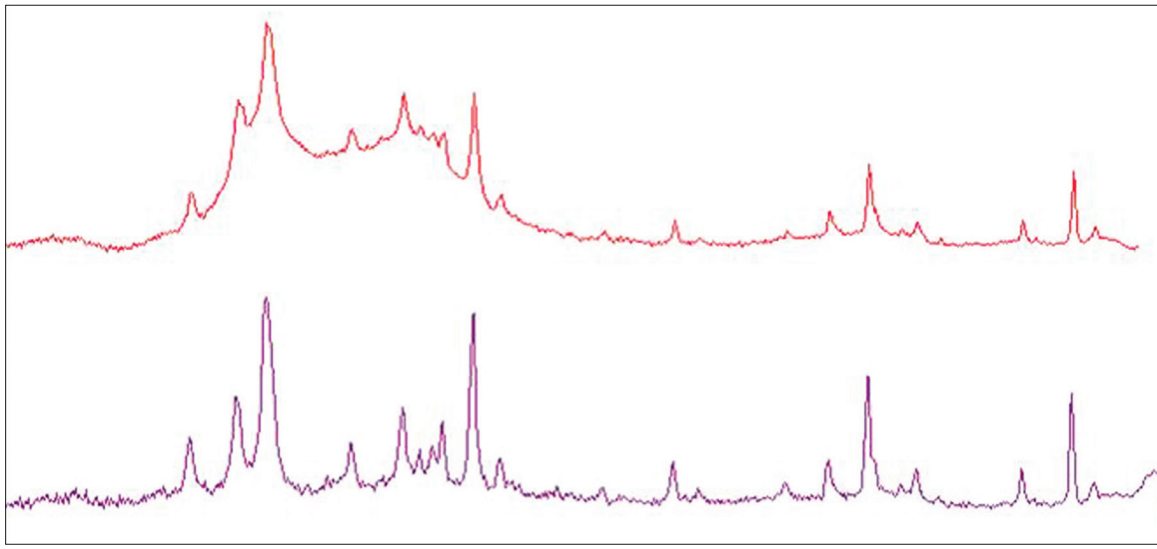

Fig. 7.15 Raman spectra of the excavated purple fibres (top) and reference purple dyed fibres (bottom).

Micro-organism identification

Identification of the micro-organism is considered to be very important not only for the treatment and preservation of the find but also for fibre identification, since different micro-organisms seem to attack cellulosic and proteinaceous fibres. In addition, the identification of the specific micro-organism would afford information on the way it attacks fibres and on its metabolism, hence the deterioration mechanism to which the fibres had been subjected could be better defined and the most efficient method for de-activating the micro-organism could be selected.[39]

Cultures and analytical techniques where applied for verifying the presence of both bacteria and fungi. Cultures of the former did not yield positive results, while ITS-based standard automated forensic PCR applied directly on samples from the find, identified sequences of the cellulolytic fungus *Aspergillus terreus,* potentially active.

Subsequently, cotton, linen and silk swatches were inoculated with *A. terreus* recovered from the excavated sample (strain UOA/HCPFEnv49; Genbank accession ITS no. JF509458; tubulin JF509463; calmodulin JF927640). They were then incubated at 25°C for a week and dried, in order to study the effects of the fungus on the morphology of the fibres by SEM analysis.

An SEM JEOL JSM-5310 was used for the analysis. The inoculated swatches were coated with a gold-palladium alloy (Quorum Technologies, Polaron Range Sputter Coater) in order to examine the growth formations of the fungus and the way it might have affected the fibres' morphology.

SEM analysis showed that the fungus affected the morphology of the fibres. The effects were more intense on the cellulosic rather than the silk fibres. This can be explained by the fact that certain enzymes produced by *A. terreus* are cellulolytic. In general, the pattern of fungal growth seemed to be quite different on cellulose and silk fibres. In the case of the former the fungus grew from the lumen outwards (Fig. 7.16), whereas in the latter the fungus grew on the surface of the silk fibres

[39] Szostak-Kotowa 2004, 167, 169.

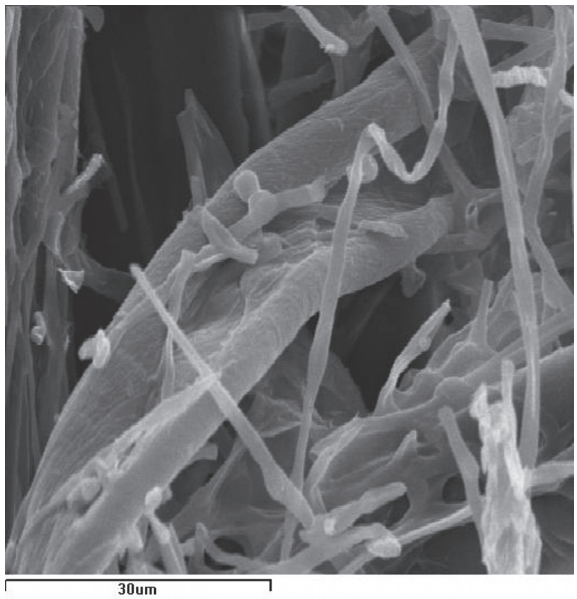

Fig. 7.16 The fungus grows from the lumen outwards on cellulosic fibres.

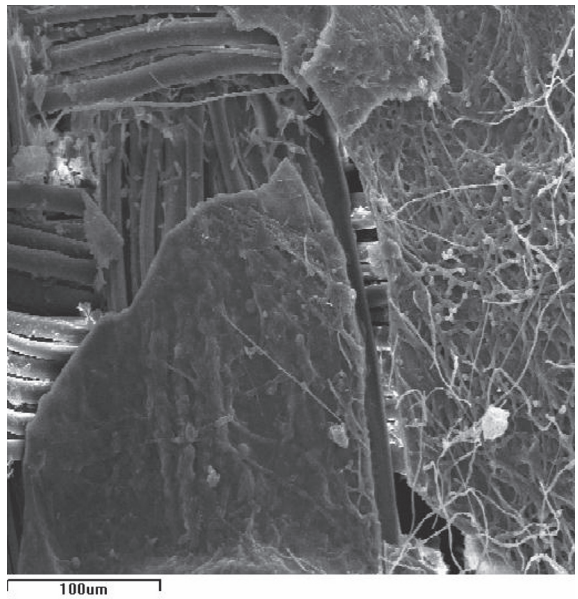

Fig. 7.17 The fungus grows on the surface of silk fibres.

(Fig. 7.17). SEM analysis gave very interesting results, since the images produced of the effects of the fungi action on the morphology of the cotton swatches' fibres showed many similarities with the SEM images of the excavated fibres indicated as cotton. The fungus grows from the lumen outwards destroying the inner section of the fibre first, while leaving the edges more intact (Figs 7.18, 7.10). Therefore, characterisation of the condition analysis results enhanced fibre identification.

Treatment for biodeterioration

Since *Aspergillus terreus* is an aerobic fungus a low oxygen environment was created in order to control its growth and and prevent further biological damage of the fibres. The find was enclosed in a heavy weight transparent barrier film (ESCAL™) with resistance to oxygen permeation. The outer layer of this film is polypropylene. The inner barrier layer is a

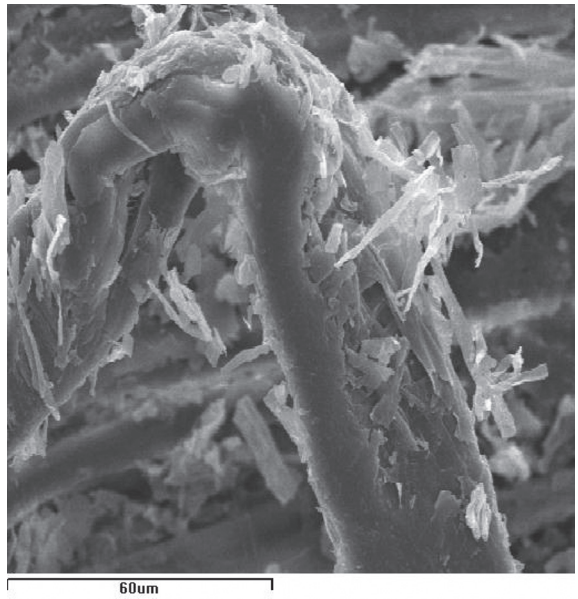

Fig. 7.18 The effects of fungal growth on the morphology of cotton swatches fibres is very similar to that of the excavated fibres identified as cotton.

vacuum-deposited ceramic on a PVA substrate. The inner layer is polyethylene. The film was heat-sealed to create an airtight package. Oxygen absorbers RP System™ type A and K were placed inside the package, to absorb the remaining oxygen (Fig. 7.19).[40]

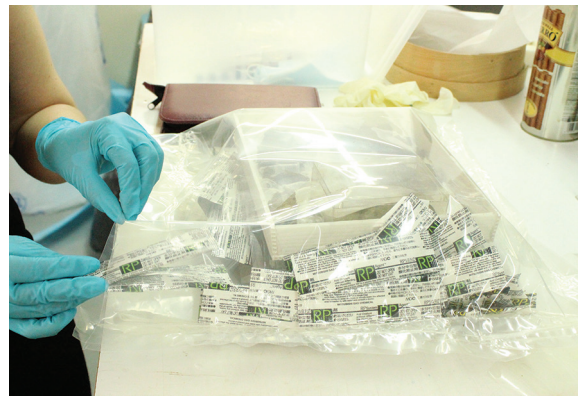

Fig. 7.19 The find treated in anoxic conditions.

An oxygen indicator Ageless Eye®, was also added to check the percentage of remaining oxygen levels achieved. The percentage achieved within the package ranged between 0.2–0.4%. The minimum oxygen percentage for *A. terreus* to grow is around 2–5%,[41] hence further growth of the fungus on the find was prevented.

Finally, a custom-made storage method was developed, which further protects the find but also makes it accessible for future study. The find was stored in three custom-made trays made of corrugated plastic board (Correx®), antistatic polyester film (Polymex®) and self-adhesive polyethylene tape (Tyvek®). A grey coloured archival paper was placed at the bottom of the trays, underneath the Polymex® to aid future examination, study, photography and documentation (Fig. 7.20). The trays were stacked in airtight polyethylene container (Araven®). In order to control the Relative Humidity (RH) levels within the container a dessicant medium (PROSorb®) was added at the bottom, calibrated at RH 50%. The specific medium has the capacity to retain RH levels more stable within the range 40–60%, compared to other widely used mediums (such as, Silica Gel E®, Silica Gel M®, PROSorb®, ART SORB®).[42] Most fungi do not grow at RH levels lower than 60–65%.[43] As far as temperature is concerned, *A. terreus* shows the lowest growth rate between 11–13°C (normal growth rate between 35–40°C and highest growth rate between 45–48°C).[44]

Collaboration

Conservation is a multifaceted activity, hence it usually involves professionals from different fields working together towards the same goal.[45] In this case textile conservators, archaeologists and scientists needed to collaborate. The success of the analyses and the welfare of the object, both depended on the good collaboration of the aforementioned professionals. Their knowledge and expertise was necessary to form the questions to be answered by analysis and to interpret the analytical results in order to retrieve the information within the object and to inform the conservation decision-making process. Moreover, one technique answered more than one question (for example ESEM analysis provided material identification and characterisation of the condition data), so saving the object from repeated sampling and analysis, as would be the case if these professionals were working separately.

[40] Mathias *et al.* 2004, 34.
[41] Hall and Denning 1994, 313–314.
[42] Waller 2009.
[43] Bachmann 1992, 88.
[44] Montegut *et al.* 1991, 217; CRCC 2011.
[45] Muñoz Viñas 2005, 9.

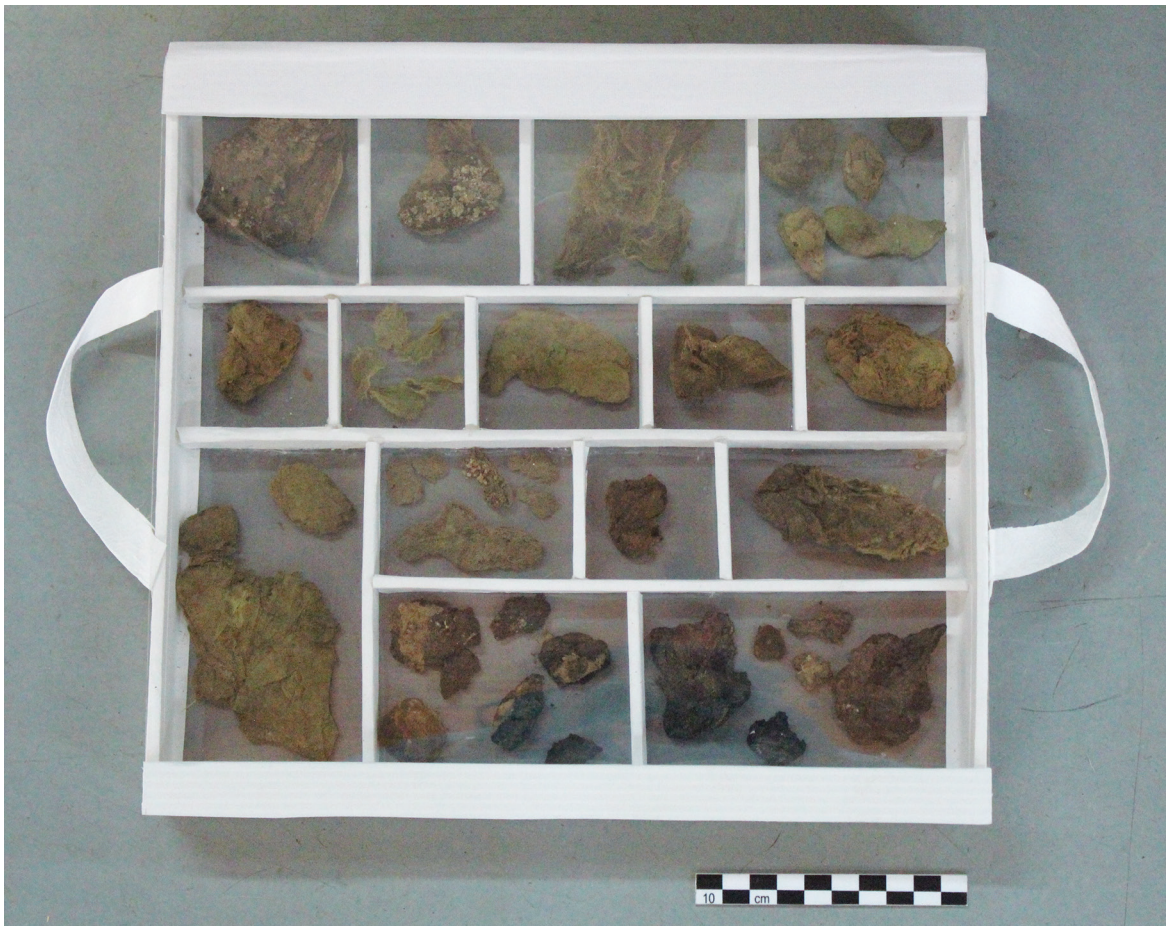

Fig. 7.20 An example of one of the trays, where the find is now stored.

In this collaboration, the textile conservators were able to handle the object safely and preserve it. They were also able to identify and collect the appropriate samples to be used for analyses. Textile conservators are trained to look at objects and distinguish patterns and signs of degradation and areas that carry evidence of characteristic construction features. In order to be able to do that, they needed unlimited access to the whole of the find, which was given by the archaeologists. They were able to decide on the appropriate conservation strategy plan and storage method. To inform the decision-making process it was necessary to know the identity of the constituent materials present, and to be able to estimate the condition of the find, here the help of the scientists was invaluable.

The scientists were able to select the most appropriate amongst the numerous instrumental analytical techniques available, since each one gives a different kind of information and each has its own advantages and limitations. Selection of the most appropriate technique(s), was based on the formation of specific questions asked, on the kind of analysis is wanted and allowed (for example

qualitative and non-destructive), and on the awareness of the advantages and limitations of the available techniques. The scientists were also able to interpret the data produced by the analyses.

The archaeologists provided information on the excavation of the object. Good collaboration with the archaeologists ensured unlimited access to the find, which was of crucial importance to its comprehensive study and proper sampling. Moreover, the archaeologists' knowledge on the history, technological advances and customs of the find's original place and time period was invaluable to the correct interpretation of the analysis results.

Apparently good collaboration between textile conservators, scientists and archaeologists is of crucial importance to the welfare, long-term preservation and understanding of excavated textile finds.[46] There are four ways to aid a successful collaboration between representatives of the three aforementioned professions: the use of a common 'language' and terminology, which would enable better understanding between them; joint publications in journals of interest to their professions, which would promote the fact that they are all partners sharing the common goal of preserving material culture and its evidence for future generations; close contact, which would enable the appreciation of each profession's contribution and restrictions; and continuous dialogue, which would secure the transfer of information between them.[47]

Conclusion

Stereomicroscopy identified four different textiles and a net present in the find. It provided information on construction and decoration. The four textiles are executed in variations of plain weave (weft-faced, balanced and open), while the fifth fabric is a net, and all are made with single-ply, Z-twisted threads. Selvedges and starting edges were located in the four textiles, which means they were woven, possibly, on an upright loom. One of the textiles is decorated with purple coloured stripes near its starting edges, where the wefts only are dyed, hence the dyeing took place before the weaving.

The ESEM afforded high magnification images of the morphological characteristics of the fibres of the four textiles, which gave information on fibre identification. Scanning electron micrographs of the fibres indicated the presence of cellulosic bast fibres, possibly flax, in three of the four textiles and the presence of possibly cotton fibres in two of the four textiles. ESEM analysis also provided information on the condition of the textiles, since it clearly showed that the fibres had been attacked by micro-organisms. It was also shown that the use of a 15keV electron beam provided high enough energy to provide good quality images and at the same time, low enough to prevent destruction of the sample due to the effect of localised heating.

FTIR analysis also indicated the presence of cellulosic rather than proteinaceous fibres. Moreover, it showed that organic matter is still preserved within the fibres, which was important in determining the appropriate storage conditions for the find. The application of FTIR microspectroscopy for fibre identification was affected by the condition of the samples. The requirement for non-destructive application determined the acquisition of spectra in the reflectance mode. Such spectra were shown to be sufficiently characteristic and reproducible to distinguish the fibre categories. In addition, the FTIR microscope results were consistent when different areas of the fibres were tested, which

[46] Brooks *et al.* 1996, 17.
[47] Cruickshank *et al*. 2002, 44, 52; Rotroff 2001, 144; Boccia-Paterakis 1996, 147; Wild 1990, 4.

is very important in the case of excavated fibres, where a minute sample from a whole object is tested. Excavated textile fibres are usually masked and/or impregnated by foreign matter. Therefore, it is important to know that the analysis is not limited to any foreign particles/substance that may be present on the surface of the fibres.

CL analysis detected bromium (Br) in the purple dye, which is indicative for the identification of the dye as purple dye from molluscs. Raman analysis on the excavated sample and a reference one dye with purple dye from molluscs, further confirmed dye analysis results. As expected, the combination of more than one technique increased the reliability of the results. It was also shown that combination of contemporary non-destructive techniques, where the sample is not destroyed and/or altered, could and should be used for repetitive and/or future analysis of excavated textiles.

Cultivation of the fungus present on the find, showed that it was still active and it was identified as the fungus *Aspergillus terreus*. Cultivation and identification enhanced fibre identification, since this fungus is cellulolytic, hence it would preferentially grow on cellulosic rather than proteinaceous fibres and because inoculation of swatches with the specific fungus and examination by SEM showed that the effects of fungal growth on fibres' morphology was similar between the cellulosic swatches' fibres and the excavated ones. Cultivation and identification also informed conservation the conservation decision-making in selecting the appropriate method (anoxic conditions) that de-activated the specific micro-organism.

As far as fibre identification is concerned, the present results are in contrast with those of past analyses, since no proteinaceous fibres, such as silk (either of a cultivated or wild species) were identified in the Kerameikos textile fragments analysed. This is not an unprecedented phenomenon, since there are other cases where past results of the identification of excavated textile fibres as silk have been re-assessed. As already mentioned above, excavated textile finds from Hochmichele, Germany, that had been identified as *Bombyx mori* silk by Hundt, were proved not to be silk.[48] In addition, textile finds from Eberdingen-Hochdorf, also in Germany, previously identified as silk, have also been proven not to be silk.[49] However, in order for the present analyses to be more comprehensive, amino acid sequence analysis by the application of High Performance Liquid Chromatography (HPLC) should be performed both on inoculated reference samples and on excavation samples, to determine whether the amino acids detected on the find in past analyses could derive from the micro-organisms present rather than the fibres. In addition, further research into the introduction of silk fibres in textile production in ancient Greece should be conducted.

Moreover, the presence of cotton fibres in 5th century BC textiles excavated in Greece is an equally rare phenomenon.[50] There are two other cases reported where textile fibres have been identified as cotton. The first is a 5th century BC find of funerary textiles from Attica,[51] and the second is a 4th century BC funerary pyre textile from Royal Tomb II in Vergina.[52] Therefore, it is also necessary to further investigate the introduction and use of cotton textile fibres in ancient Greece.

[48] Spantidaki 2004, 68.
[49] Banck-Burgess 1999.
[50] Margariti 2009, 17–30.
[51] Zissis 1954.
[52] Moraitou 2007.

Further research in the introduction of silk and cotton fibres (either of cultivated or locally grown species) in textile production in ancient Greece, should include: bibliographical research in ancient written texts; palaeobotanical research; and repeat analyses of old case studies.

What became apparent during this project is that the analysis and resulting interpretation of excavated textiles, should be meticulous. In addition, repetition of earlier analyses will most probably be necessary, and possibly confirmation of the results with more than one technique. Textile finds are rare and usually very small quantities survive. Therefore the application of non-destructive methods of investigation, and the dissemination of the results, is imperative for the longevity of such finds. The most important outcome of this research is that good collaboration of textile conservators, scientists and archaeologists was the only way to ensure that technological and material identification information was retrieved, that characterisation of the condition was enabled and that appropriate actions and measures for the long-term preservation of the material integrity of the find were taken.

Acknowledgments

The authors are very grateful to: Dr Stavros Protopapas, Head of Applied Science Department, Directorate of Conservation of Ancient and Modern Monuments, Hellenic Ministry of Culture and Tourism; Dr Vassilis Gatsos, Chemist and author, Hermione, Greece, for the dye analysis and for obtaining the molluscs, preparing the reference samples and kindly providing them; Dr Vladimir Vishnyakov, Senior Research Fellow and Dr Norman Allen, Professor, Dalton Research Institute, Manchester Metropolitan University, for the dye analysis; Professor Aristea Velegraki, Department of Medicine, National and Kapodistrian University of Athens and Professor Athina Mavridou, Department of Medical Laboratories, Technological and Educational Institute of Athens, for the identification of the micro-organism; Ms Vassiliki Orfanou, Archaeologist (now retired), and Mr Leonidas Bournias, Archaeologist, Γ' (3rd) Ephorate of Prehistoric and Classical Antiquities, Hellenic Ministry of Culture and Tourism, for permitting access and study of the find and for providing information on the excavation; Mr Nikolaos Minos, Director, Directorate of Conservation of Ancient and Modern Monuments, and Ms Helene Banou, Director, Γ' (3rd) Ephorate of Prehistoric and Classical Antiquities, Hellenic Ministry of Culture and Tourism, for allowing us to publish this research.

Abbreviations

AIC American Institute for Conservation
CRCC Centre de Recherche sur la Conservation des Collections
ECCO European Confederation of Conservator-restorers' Organisations
ICOM International Council of Museums
IIC International Institute for Conservation of Historic and Artistic Works
JAIC Journal of the American Institute for Conservation
UKIC United Kingdom Institute for Conservation
USGS United States Geological Survey

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8. Transport Amphoras and Loomweights: integrating elements of ancient Greek economies?

Mark L. Lawall

Introduction: Bridging separate spheres

Studies that combine amphoras and loomweights are few and far between, though somewhat accelerating. In 1872, Albert Dumont published the stamps and other inscriptions from 50 loomweights, and the same volume figures prominently in the history of amphora research in the 19th century. His interest, however, was simply to present artifacts carrying texts, so he did not join the two classes of artifact in any broader analysis. Over a century later, publication of an amphora production site on Corcyra in 1992 mentioned the appearance of loomweights at the site.[1] Loomweights and amphoras are briefly united in Chryseis Tsouvara-Souli's publication (1996) of a loomweight stamp from Kassope showing Athena Promachos, who, she notes, also appears on a Samian amphora stamp.[2] More substantively in 2005, Nancy de Grummond argued for a connection between, on the one hand, amphora and lamp stamps attributed to the Sestius family of Cosa and a pair of weights found at Cetamura, one with the letter S and the other with a 9-rayed asterisk, and on the other hand loomweights at Cosa carrying the abbreviation M·L or M·LV and an amphora stamp at Cetamura with the name M·LVRI.[3] Angelos Chaniotis has treated loomweights and amphoras together as both falling under the category of 'inscribed *instrumenta domestica*' to compare Hellenistic and Roman Cretan economies.[4] Gloria Merker's publication (2006) of the Corinth Tile Works included loomweights among the products of the workshop and amphoras as local goods but not made at the Tile Works.[5] Martha Baldwin Bowsky and Eirini Gavrilaki (2010) provided an extended discussion of the *instrumenta domestica* (including discussion of uninscribed material, too, in the case of loomweights, but not in the case of amphoras) from Lappa, Crete.[6] And most recently, Gérald Finkielsztejn briefly advances a theory that, much like an amphora stamp and a jar's quality and capacity, loomweight stamps served to guarantee the weights and general form

[1] Preka-Alexandri 1992, 50.
[2] Tsouvara-Souli 1996, 499, pl. 100, fig. 5; for the amphora stamp, see Grace 1971, 64, cat. nos. 54–56; other loomweights with Athena Promachos, see Akurgal 1983, pl.122; Deonna 1938, pl. 58, no. 484.
[3] de Grummond 2005.
[4] Chaniotis 2005.
[5] Merker 2006, 57–72; publication of the Potters' Quarter at Corinth also includes loomweights but not amphoras, see Stillwell 1952.
[6] Baldwin Bowsky and Gavrilaki 2010.

("*l'encombrement*") of the loomweights for their use on the loom; but in contrast to amphoras, he suggests this purpose was unlikely related to state control.[7] Such juxtapositions of loomweights and amphoras remain exceptional.[8] At the same time the increasing pace of such publications bodes well for a more holistic approach to loomweights and economics into the future.

Many scholarly traditions in Classical Archaeology likely created the current tendency to study such artifact classes in isolation from one another. Dumont happened to join the two classes together as they both fit into the sphere of 'epigraphy', but since then increasing specialization has tended to split these ceramic objects off from traditional stone epigraphy.[9] A similar split among researchers is easily seen in the arrangement of site reports with pottery tending to appear in one section (with or without transport amphoras) and loomweights to appear as 'other' or 'minor' objects or 'small finds'.[10] And yet, in terms of efforts to understand ancient economies this division may be more of an impediment to progress rather than an efficiency wrought by specialization.

The argument begins with a point on which there is broad agreement: The remains of textiles, the artifacts related to textile production, and literary and visual representations of textile work all provide a significant avenue for research on women's roles in ancient economies. In this sense, textile research in Classical Archaeology has significant contributions to offer multi-disciplinary, cross-cultural questions of gender and textiles.[11] One such issue of particular focus here and elsewhere in this volume is to evaluate the impact 'housework' can have on the broader, formal, largely 'masculine' economy.[12] Such a question, however, depends – perhaps ironically – on there being attention to both 'male' and 'female' sides of the economic systems in question. And yet, Classical Archaeology often follows the paradigm of associating textile work with women and isolating women's work from the economic and social world of men. What created such 'separate spheres' and how ancient societies used that ideology remain important questions for scholarship,[13] but the intersection between women's work and men's work is also important and has received more attention in recent decades. To some extent, however, the introduction of men into the research questions led right back to the ideology of separate spheres: women's textile production was intended for the household while men engaged in weaving for the market.[14] This model has not gone unchallenged, and the results have greatly enriched our understanding of Greco-Roman textile production and economies.[15]

A key element to such developments in the field is the recognition that textile production does not occur as a phenomenon isolated from broader socio-economic change. This reality is perhaps

[7] Finkielsztejn 2012, 83 and table 1, promising an extended discussion in the future.

[8] Textile production and pottery production more generally, see Poblome 2004; on loomweights, pottery and ethnicity, see Lehmann 2011; Rahmstorf 2011.

[9] *SEG* still records both amphora stamps and stamped loomweights; and on *instrumenta domestica* in Roman archaeology, see Harris ed. 1993.

[10] E.g., Davidson 1952 (Corinth) and Davidson and Thompson 1943 (Athens), but also "Other finds in stone, clay and Faience" (Sackett and Cocking 1992); and "The Small Finds" (Overbeek 1996). I am only objecting here to the 'other', 'minor', or 'small' labels: 'loomweights', or 'tools for textile production' would be both descriptive and appropriate.

[11] For overviews, see Michelman and Kaiser 2000; Good 2001. On more specific issues, see Boserup 1970 (cf. Benería and Sen 1981); Brown 1970; Ember 1983; Leacock and Safa 1986; Zarinebaf-Shahr 2001; Messick 1987; Saunders and Mehenna 1986.

[12] Bossen 1981; 1984; Ehlers 1990; Krishnaraj 1992; Neetha 2002; Shimray 2004; Rotman 2006.

[13] E.g., Bundrick 2008; Vidale 2002, 325–489 and see d'Ambra 1991; 1993; Lovén 1998 for the Roman Empire.

[14] Thompson 1982; Barber 1991; cf. Reuthner 2006, 234–267; cf. Overå 2007 on the influx of men into 'female' roles in the economy of modern Ghana.

[15] Loftus 1998–2000; 2000; cf. Droß-Krüpe 2011, 58, noting that women weavers become very scarce in the papyrus sources after the 3rd c. AD.

most clearly visible in studies of textile production in Mediterranean and Near Eastern 'palace economies' where the abundant, relevant administrative texts firmly place textile production in the broader economic structure.[16] But even in more recent periods, scholarship is increasingly interested in the intersections between broader social structure and textile production.[17] And yet this progress has yet to be picked up on by the mainstream field of research in ancient economies, so the tendency towards segregation remains.[18] This delay in integration is perhaps not surprising (indeed, the same can be said of other archaeological research areas and mainstream economic history). One impediment to integration is the immense range of activity that could be embraced by the heading of the 'broader economy'. This paper narrows the focus to two elements: loomweights to represent textile production and transport amphoras for the broader economy.

Each of these two classes of artifact represents only a segment of their respective sectors of the economy. Transport amphoras represent the packaging, distribution and storage of certain agricultural goods (mostly, though not only, wine and oil[19]) but even for these economic functions other artifacts are undeniably relevant. Some such other functions are preserved in the archaeological record (e.g., the farmhouses and wine/oil presses,[20] stoas and other shops,[21] shipwrecked cargoes,[22] papyrus records of production, distribution and sales[23]) but many not (e.g., the original and later goods contained in the amphoras,[24] wineskins,[25] documents of consignment, loan and sale outside the papyrological record,[26] records of account for customs purposes,[27] perishable labels on containers[28]). In the amphora record, however, more so than in other artifacts, it is possible to trace changes through time and variation over space in many variables related to economic behavior: the standardization of appearance and size of the containers (or lack thereof), the changing use of permanent markings on the jars, the changing patterns of amphora exports, and the artistic representation of amphora use.

Loomweights are accompanied by similar limitations on their use as proxies for the broader sector of textile production. Most significantly, loomweights only attest to the use of the warp-weighted loom. Since other loom types were in use in other areas of the broader Greek world,

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[16] E.g., Carington-Smith 1975; Nosch 2011; 2009; Burke 2010; Killen 1984; 2007; and Nosch and Laffineur (eds) 2012.
[17] Gleba 2007; 2008; 2009; Lipkin 2012.
[18] Exceptionally, Tsakirgis 2011 and Kron 2011. The *Cambridge Economic History of the Greco-Roman World* (Scheidel *et al.* (eds) 2007), pp. 111–112 notes the general lack of technological progress and economic growth in textile production (without mention of the changing technology of the industry at least in some areas, see Ciszuk and Hammarlund 2008), pp. 338, 348, 366 observe that women wove and that many freed slaves are called *talasiourgoi* (cf. Rosivach 1989; Labarre 1998; Cohen 2003; Wrenhaven 2009). The sections on Archaic and Hellenistic Greece are silent on textile production.
[19] Lawall 2011a with references to earlier scholarship.
[20] Jones *et al.* 1962; Jones *et al.* 1973; Lohmann 1993; Amouretti and Brun (eds) 1993; Carington-Smith and Wall 1994; Brun 2004; Aydinoğlu and Şenol (eds) 2010.
[21] Lawall 2000; Milbank 2002; Kelly-Blazeby 2006; Rotroff 2009; Karvonis 2008; 2010; and Holleran 2012 for Roman shops.
[22] E.g., Gibbins 2001; Carlson 2003; Greene *et al.* 2008.
[23] Kruit 1992a; 1992b; Mayerson 1997; 1999; 2000; Kruit and Worp 2000; Dzierzbicka 2005; Gallimore 2010.
[24] Shipwrecks can provide exceptions, e.g., Carlson 2003; on analyses of trace remains of past contents, see among many others Rothschild-Boros 1981; Heron *et al.* 1991; Reber and Evershed 2003; Bonifay 2007; Evershed 2008; Hansson and Foley 2008; Romanus *et al.* 2009; Pecci *et al.* 2012.
[25] Immerwahr 1992; Daniel 1994 (mostly about use of skins for water).
[26] On the past existence of such documents, see Harris 2006 (for the Roman period) and Pébarthe 2000 (Classical period).
[27] The Elephantine customs scroll is the exception, see Yardeni 1994; Briant and Descat 1998.
[28] For rare lead 'tags' from the Roman period, see Lequément 1975, and added lead stamps on dry-goods containers, see Lang and Crosby 1964, DM66.

the possibility must remain open that other loom technology was also used in Greece.[29] And yet, if we keep the study parameters limited to that of cloth produced using the warp-weighted loom, while keeping in mind this possibility of other technology, then loomweights do still provide an important archaeological proxy for cloth production. Indeed, they allow for consideration of similar topics as those just listed for amphoras: standardization, permanent markings, patterns of distribution, and representations of use. Just as amphoras were more important for their contents than for themselves as works of ceramic art, so, too, loomweights were primarily important for the cloth they helped produce.[30]

A Theoretical Framework: Socio-economic organization and material culture

Of course, despite these general areas of overlap, loomweights and amphoras do represent very different sorts of activity. For amphoras, the most obvious area for research is the quantitative study of shipping patterns, but trade is not an issue often considered relevant for loomweights. Thus, in order to begin the process of a more integrated analysis, it is necessary to start by specifying which areas of economic practice or which issues in economic history can be addressed via these artifacts. Artifact distribution will not be ignored altogether, but a broader economic question is more suited to the nature of the evidence for these artifacts: what can artifacts reveal about the changing and diverse organization of ancient economic behavior?

If we accept the concept that economic behavior is simply that subset of social behavior concerned with the allocation of goods and services (whether scarce or unlimited, whether voluntary or coerced),[31] then the problem of how economic behavior is organized can be recast as a matter of social organization in more general terms. The potentially important roles for artifacts in the development and maintenance of social structure and social practice have been long recognized. Early work on artifact style as clarifying and creating social identities and boundaries can be considered as the forerunner of more recent work debating the active agency of artifacts in social networks.[32] Such a theoretical approach allows us to use traditional elements of amphora and loomweight research, namely typologies and added markings (stamps, pre-firing and post-firing graffiti, dipinti), to move into issues of economic organization.

Networks of form – artifact typologies over regions

Typological work on both amphoras and loomweights has always been challenging. For amphoras, difficulties arise as soon as one moves away from the best-known and most explicitly stamped amphoras, those of Thasos, Rhodes, and Knidos. Once the wider range of amphoras without stamps, rarely stamped, or carrying only poorly specific stamps is taken into account, neat typologies based

[29] Barber 1992, 113–114.

[30] Mårtensson *et al.* 2009; Ciszuk and Hamarlund 2008; earlier discussion of loomweight mechanics, see Barber 1991; Carroll 1983; McLauchlin 1981. On weights as valued objects *per se*, i.e., as votives in sanctuaries, see among many others Paris 1892, 282; Davidson and Thompson 1943, 87, no. 85; Simon 1986, 263–270; Wallrodt 2002[2003]; Chaniotis 2005, 95; Sofroniew 2011; Lipkin 2012, 98–99. Cf. Goldman 1940; Zancani-Montuoro 1965–66; and Kleibrink *et al.* 2004 for loomweights more likely stemming from sacred production within the sanctuary. For the loomweights in the 'Temple house' at Lato both for use, scattered in the rooms, and for dedication, stuffed in a pot: Gaignerot-Driessen 2012.

[31] This definition owes much to Polanyi's objections (1971) to the standard definition of economics as the optimizing or maximizing allocation of scarce resources.

[32] E.g., Hodder 1977; Stark ed. 1998; Knappett 2011.

on the concept that each city should have a distinctive amphora type (an early form of advertising that city's wine) must be abandoned. What has emerged to take their place is a complex system of regional styles whose boundaries might change over time, sometimes – but rarely – narrowing to a single polis, and sometimes broadening to encompass disparate areas. Loomweights, too, have often proved difficult to classify either in time or space. James Whitley expresses the common belief in unchanging diversity: "Pyramidal, biconical, and disc loomweights appear in Crete in late Archaic times, and thereafter change little."[33] Gladys Davidson's Corinthian loomweight typology has proven incompatible with more detailed evidence emerging in recent years,[34] and multiple forms can appear at any given site thereby making it difficult to speak of a particular loomweight type for a particular city and period. The difficulty, as will be shown below, is not insurmountable.

Trends in shape development, however, are not simply matters for classification of artifacts and assignments of dates. Sharing manufacturing practices (resulting in shared styles), seeing and 'reading' shape as an indication of place or region of origin and acting on that knowledge, and even rejecting a known shape as the model for production in favour of another, are all activities that result from people interacting in social – often economic – transactions. Artifacts both help to shape and structure such human interaction and the artifact types themselves may be affected by the results. So, the first very basic assumption for the theoretical framework of this paper is that the appearance of economic artifacts is, to some extent, shaped by economic transactions.

Adding layers of organization

Depending on the nature of those transactions, the role of the artifact may be more or less critical. In a now rather old, but still valuable, article H. Martin Wobst noted that highly visible hats worn in Serbia to identify clan affiliation played a key role in avoiding being shot at in times of inter-clan violence.[35] The hat delivered a critical message repeatedly, visibly, and immediately.

At about the same time as Wobst's article, Gregory Johnson's studies of social complexity drew a link between the addition of layers of organizational structure and certain thresholds of scale of the society.[36] Johnson was interested in political organization, but a similar concept holds true for economic transactions: When matters are small and simple, when all desired information for carrying out an acceptable transaction is known to all parties, then no further organization is needed. When transactions become more complex, additional organizational levels are likely to appear. The addition of text or other symbols, in a permanent fashion, to an economic artifact can be considered from this perspective. The object alone, or the object along with any impermanent additional notations (e.g., a paper tag that might fall off, or a verbal description that is spoken, heard and then ceases to exist), no longer suffices for the functioning of that artifact in transactions. Thus, the second assumption for the theoretical framework is that the addition of markings responds to a problem in carrying out transactions and interactions between people.[37]

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[33] Whitley 2011, 19, note 16.
[34] Davidson 1952, fig. 23; accepted by Biers 1992; challenged by Merker 2006, 58–59.
[35] Wobst 1977.
[36] Johnson 1978; 1982.
[37] While Johnson's work was the initial inspiration for my views on this matter (see Lawall 1995 for my use of this model in regards amphora markings), there are obvious connections and influences, too, from the work of Douglass North (1990; and others working within the paradigm of the New Institutional Economics) and Mark Granovetter (1973; 1985; and others, on the importance of social ties in facilitating exchange). Even so, I agree with Francesco Baldizzoni (2011) that we should not assume either that all institutions arise *in order to* minimize transaction costs or that they have this effect.

One caveat is necessary. Once an innovation in practice occurs in one place its appearance elsewhere might not be a response to the *same* problem. Instead, the innovation could be imitated for different reasons and with different end results.[38] The best example of this is a series of imitations of Rhodian amphoras with stamped handles at indigenous sites in Romania and Bulgaria; the imitative amphoras simply use geometric designs in place of the Greek magistrate's name, month, and maker's name.[39]

From artifacts to economic behavior

Artifacts can serve as proxy evidence for economic behavior to the extent that

1. artifacts shape, and are shaped by, the interactions in which they are involved, and
2. additional information is added to artifacts in an effort to solve some problem of social interaction.

These two points provide a general background for how we might interpret changes in the appearance of amphoras and loomweights. Further evidence for the settings or contexts of these changes comes from the distribution of these artifacts in the archaeological record. For amphoras, distribution patterns are commonly used to indicate 'trade links', but given evidence for re-use and indirect trade, the evidence of distribution is best considered in terms of general zones of circulation or local networks as a backdrop for long distance voyages. The amphora distribution patterns – even when precise quantification is rendered problematic by the vagaries of archaeological method, past and present – can be studied in terms of how such zones change and to what extent long distance trade typifies the distribution of a given amphora type. Within a given site, the distribution of amphora finds can shed light on the relative access to and/or need for amphoras and their contents in individual households as well as the locations of amphora-related commerce. In all of these instances of interaction, significantly, the amphoras themselves are moved between hands.

For loomweights, actual instances of exported weights are rare (though noteworthy, see below). Instead, much more attention is paid to distributions within a given site. While the general ubiquity of finds over many sites causes some researchers to avoid any further interpretation, others have noted and carefully interpreted clusterings within houses, whether as indicating the actual location of weaving or, more conservatively, indicating a likely place for storage of equipment related to weaving and other household tasks. Such evidence can be used to consider whether textile production was intensified either within or beyond the household. Distributions of weights outside houses, especially in sanctuaries and graves, can be used to consider the degree to which the task of textile production held cultic or other status-related importance. On the basis of such evidence for the distribution of amphoras and loomweights, it is possible to consider correlations between patterns of use and the appearances of the artifacts. The amphora record and the loomweight record, in terms of social interactions, differ substantially in that amphoras are often discussed in terms of movements between hands, whereas loomweights are more often conceived as static – hence more difficult (though not impossible) to discuss in terms of social interaction.

It seems best, then, to start with the patterns of interaction that might be reconstructed from the amphora record. These amphora-based patterns then serve as a backdrop for the evidence from the loomweights.

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[38] See Gort and Klepper 1982; Klepper 1996; Styles 2000; Sonobe *et al.* 2003; for an application of this concept to amphoras, see Lawall 2011b.

[39] Varbanov 2011.

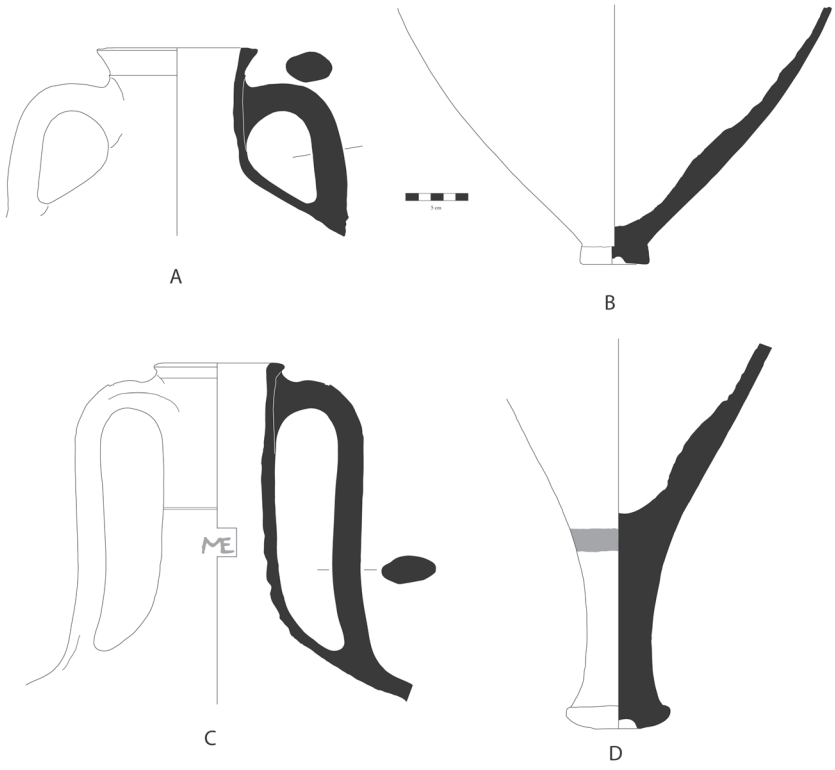

Fig. 8.1 Northern Greek amphora fragments: A – Athenian Agora deposit J2:4, c. *480 BC (Lawall 2011, cat. no. A19, drawing by M. Lawall); B – Athenian Agora deposit J2:4 (Lawall 2011, cat. no. A25, drawing by M. Lawall); C – Olbia Lower City 4th century BC (Drawing by M. Lawall); D Olbia Lower City 4th century BC (Lawall* et al. *2010, cat. no. L40, drawing by M. Lawall).*

Amphoras

Amphora shapes: regional and city-specific styles

Various scholars have pointed out that it would make most sense for amphoras to have both a standard appearance for each city, to advertise at a glance the source of the wine or oil, and a standardized capacity to facilitate calculations of the specific value of a shipment or smaller batch.[40] As it turns out, neither expectation is met with consistency.

There is increasing recognition that the region rather than the city is the defining unit for differentiating the appearances of amphora types.[41] Hence, for much of the late 6th through 4th centuries, northern Aegean amphoras share a narrow wedge-like rim, thumbprints at the base of each handle, and small ring base developing to a tall solid stem (Fig. 8.1);[42] the southern Aegean

[40] E.g., Empereur and Hesnard 1987, 10; Gras 1987 on the link betweenemt shape and city; cf. Hesnard 1986. On standardization, see Grace 1947; 1949; and Wallace 2004.
[41] Lawall 2011b.
[42] Lawall 1997.

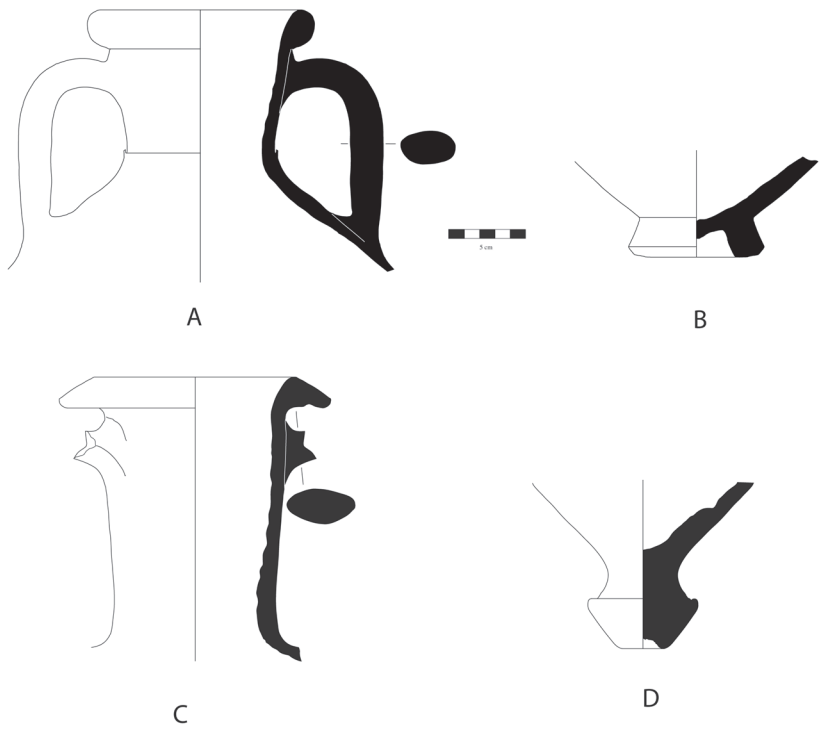

Fig. 8.2 Southeastern Aegean amphora fragments: A – Athenian Agora deposit R12:4, c. *490 BC; B – Athenian Agora deposit G11:8,* c. *500 BC; C – Athenian Agora deposit B12:5,* c. *350 BC; D – Athenian Agora deposit R18:2,* c. *325 BC (All drawings by M. Lawall).*

jars share a rounded and, by the late 5th century, a mushroom shaped rim, rarely using thumbprints on the handles, and using a knob-like toe instead of a thick flaring stem (Fig. 8.2).[43] An example of a somewhat narrower, and short-lived regional style is provided by Lesbos and the adjacent mainland of Aeolis.[44] Archaic jars from this region show wide variation in fabric but relatively less diversity of form; but after *c.* 500 BC, the varieties of fabric disappear in that standard form and it can be assumed that only a much restricted area (some portion of the island itself) carried on the style until the early 3rd century BC.[45] In certain cases, however, specific types pertain to narrower regions or even specific polis-territories. Chios, particularly in the period *c.* 525 to 440, provides one example, as its distinctive bulging neck sets the class apart from its neighbours (Fig. 8.3).[46] Rhodes, through the Hellenistic period, engaged first in a period of some diversity of forms (*c.* 300–*c.*220 BC) before settling on a form nearly unique to that island and its mainland territory for the remainder of the Hellenistic period (Fig. 8.4).[47] Indeed, there is a general shift late in the 4th century towards narrower

[43] Lawall 2002[2003].
[44] Dupont 1998; Dupont 2011; Lungu 2011.
[45] Clinkenbeard 1982; Монахов 2003, 47, pl. 29.
[46] Lawall 1995; Монахов 2003.
[47] Монахов 2005.

regional styles. In many areas, it became easier to identify Aegean amphoras by shape through the Hellenistic period.

Amphora Patterns: Permanent markings

Various kinds of permanent markings appear on amphoras. Amphora stamps and other marks incised or painted before firing responded to some need for documentation and communication at the production end of the jar's life.[48] Other post-firing dipinti and graffiti respond to needs at the distribution and re-use end (Figs 8.5–8.6).[49] The specific need or needs being responded to by the stamps are hotly debated with certification of capacity and state control of some fiscal purpose being the main contending theories. Despite the lack of evidence to the contrary, there is surprisingly little willingness to imagine a diversity of purposes for stamps (e.g., some for public purposes, others for private; some for re-assurance as to capacity, others for noting the receipt of necessary tax funds).[50]

Stamped markings are rare in the Archaic and early Classical periods. There are occasional stamps with single letters or abbreviations while stamps simply bearing images are more common.[51] Within the mid-5th century stamps appear with more or less specific reference to the producing cities (coin images from Chios and Mende are perhaps the most famous examples). Mid- to late-5th century Mendean amphoras often carry precisely painted pairs of letters.[52]

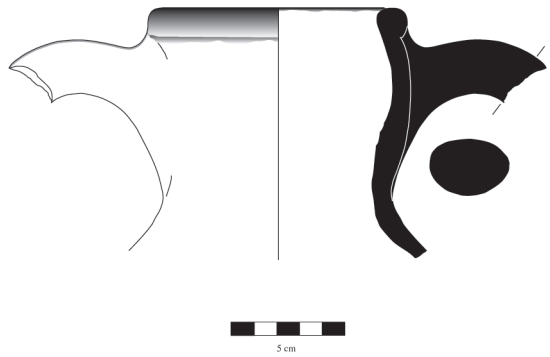

Fig. 8.3 Chian amphora neck: Athenian Agora deposit J2:4, c. *480 BC (Lawall 2011, cat. no. A4, drawing by M. Lawall).*

Fig. 8.4 Rhodian amphora: Athenian Agora (SS7583, eponym Aristonidas c. *206 BC, fabricant Ellanikos) (photo M. Lawall).*

[48] A good overview of research and related issues for amphora stamps is provided by Empereur and Garlan (eds) 1986; Garlan (ed.) 1999; Garlan 2000; Eiring and Lund (eds) 2004; [Кац] 2007.

[49] For amphora markings other than stamps, see Lawall 1995; 2000; Johnston 2004.

[50] Grace 1949, 178; Garlan 2000; 2006; Finkielsztejn 2006; 2012; Badoud 2010.

[51] The single largest series of Archaic stamps comes from the area of Thasos, the so-called *proto-timbres* (see Garlan 1999); otherwise examples are scattered, e.g., Johnston 1990.

[52] Lawall 1995 on the range of markings found on 5th-century amphoras.

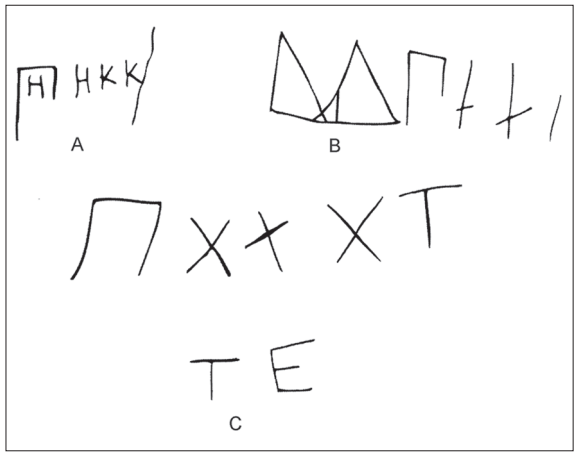

Fig. 8.5 Graffiti on late 5th-century amphoras from the Athenian Agora: A – Lawall 2000, cat. no. 65; B – Lawall 2000, cat. no. 69; C – Lawall 2000, cat. no. 96 (all drawings by M. Lawall).

Fig. 8.6 Dipinti on 4th-century Thasian (?) amphora: Gordion I 157 (Photo M. Lawall).

Only at the very end of the 5th century do names of producers, ethnic labels, and names of magistrates begin to appear. Herakleia Pontica and Thasos provide the best examples of this new phenomenon.[53] There is a proliferation of stamping, usually moving from abbreviations or monograms to fully spelled names, from the late 4th century and especially through the 3rd century. The most complex of the Hellenistic stamps are those of Rhodes, which, after *c.* 235, include the month along with the eponymous magistrate and the maker's name.[54] Knidian amphora stamps of the 2nd century also can include a wide range of information: various different annual (?) officials including *damiourgos*, *phrouarchos*, and *andres* (the Greek version of the Latin *duoviri*); the 'fabricant' name, generally viewed as the workshop owner, but this is debated; and often a further image of uncertain meaning.[55] An extremely important point in terms of social interaction and amphora stamping is that many stamps were impressed incompletely, sometimes even obscuring relevant information entirely.[56] Furthermore, one must wonder how meaningful the name of the priest of Halios on Rhodes might have been to a buyer in Cyprus a few years later.

Amphoras: Patterns of distribution and other aspects of use

Amphora exports may be traced in part by the distribution of different types as found at sites across the Mediterranean and beyond.

In the Archaic period, Aegean amphoras are found widely distributed as far west as Spain, northeast throughout the Pontic colonies, and southeast throughout the Levant. Eastern Aegean

[53] Thasian chronology, see Garlan 1999; Herakleian chronology, see Балабанов 1985; Pavličenko 1999; Kac 2003; Garlan 2008.
[54] Finkielsztejn 2001; Badoud 2007; Lund 2011.
[55] Grace and Petropoulakou 1970; Grace 1985; Jefremow 1995.
[56] Garlan 2000.

amphoras, especially from Ionia, comprise much of these exports especially in the Eastern Mediterranean and the Black Sea. Attic and especially Corinthian (and the region of the broader Corinthian diaspora) amphoras appear often alongside Ionian amphoras in the westerly direction. In striking contrast, regional distribution within the Aegean basin was much more limited with only a few centres, including Athens, showing much diversity in their amphora imports. Even the major exporting producers hardly import any amphoras from beyond their immediate vicinity. In the 5th century, long distance exports towards the west and southeast decline noticeably; exports to the Black Sea continue but are now dominated by northern Aegean producers; and the regionalism of Aegean circulation begins to break down, again with northern producers coming to play a bigger role in south-eastern Aegean assemblages. This latter trend continues in the 4th century, but at that same time the rise of local Pontic amphora (agricultural) production supplemented that region's dependence on imported amphora-borne products. In the Hellenistic period, there again seems to be a prevalence of local circulation within the Aegean, while a few, especially active, exporters dominate long-distance shipping across the Mediterranean.

A further aspect of the archaeology of amphora use is the extent to which the jars were standardized for ease of use in bulk and piece-by-piece transactions. Indeed, scholars long assumed that the jars, much like coins, should be standardized to fit local standards of measure, and, again like coins, the amphoras might be sized to facilitate trade with particular partners or groups.[57] Study of this assumption is difficult. The basic problem lies in accurately measuring the capacity of the jars (often with cracks and always large and cumbersome to manipulate). Calculations from drawings or linear measurements are considered insufficiently precise by some researchers,[58] but the overall dataset of amphora capacities is a mixture of direct measurements, linear measurements, and volumetric reconstructions from drawings. As it turns out, narrowly standardized jars are not especially common: Hellenistic Rhodes provides evidence of the most precise potting; many earlier types can be adduced as poorly standardized – at least to modern sensibilities, the same modern sensibilities that created the assumed need for standardization in the first place.[59] If the focus is shifted to accepting very rough, minimal capacities and heeding a general ancient Greek interest in numbers of containers rather than specific capacity,[60] the more common seeming lack of standardization makes more sense. In addition, the precision of standardization is a variable that is tied to how markets and other modes of transaction function. The basic assumption of a need for *precise* standardization should be set aside.

Amphoras: Pulling together the threads

The production and distribution of amphoras over the Archaic through Hellenistic periods is obviously a massive and complex topic. The patterns and tendencies noted above are only those most applicable to the cross-sector study that is being undertaken here. The connections between evidence for interactions (i.e., moving amphoras from seller to buyer in any number of stages) and changing

[57] Most explicitly working with amphora capacities along the same lines as coin standards, see Mattingly 1981 and Wallace 1984; 1986.
[58] Wallace Matheson and Wallace 1982.
[59] Some of the larger datasets of measured jars come from shipwreck cargoes, see Koehler and Wallace 1987; Carlson 2004; Mantzouka 2004; Greene *et al.* 2008; from the Pontic region most data come from complete jars from tumuli, see Монахов 2003; 2005.
[60] Johnstone 2011.

appearances of the jars (whether in terms of shape, markings, or attention to standardization) provide the most useful comparanda for the evidence that can be assembled for loomweights. The following connections seem most important. Periods of intensive regional circulation of goods tend to coincide with the development of shared regional styles in amphora production. Those producers that are most successful individually in long distance shipping tend to have or develop more distinctive amphora shapes, hence breaking away from established regional styles. On the other hand, those types that are involved in longer-distance shipping, but do so thanks at least in part to their membership in a regional identity, do not make the same break. Thus, Chios and Rhodes both break from pre-existing regional styles, but Thasos does not – at least not in terms of shape, but stamps are added as a distinctive feature in this case. And such a use of stamping or other marks does seem to be a feature of especially successful, and intensively exported amphora types. Whether the success precedes and perhaps even is a catalyst for the stamping or stamping breeds success is generally difficult to determine since the distribution of the 'pre-stamping' amphoras is rarely so well-documented. In the 5th century, however, success in distribution does seem to precede the appearance of stamps or other markings. Improved standardization also appears with some of the more successfully exported types, but comparative evidence in this area is especially problematic, as discussed above.

The foregoing review of the amphora-based evidence is deliberately general; there is a vast specialist literature, anchored by periodic major conference collections and synthetic works, which can fill in the details.[61] Turning next to the evidence for loomweights, such syntheses and collections of the material are quite scarce. Therefore, the level of detail presented here is considerably increased compared with the foregoing discussion of the amphoras.

Loomweights

Loomweight shapes and regional styles

With few exceptions there has been little emphasis on changes in loomweight appearance through time and space in the same way as is common for other ceramic products. The main exception is the Corinth loomweight typology developed partly on sequences of archaeological contexts, and partly on assumptions of stylistic development.[62] Studies from the Pnyx fill in Athens and from the houses at Olynthos remain among the more extended typological considerations.[63] Nevertheless, publications of loomweights are reasonably plentiful. Attempts to discuss broad patterning in shapes through time and across regions remain rare. A noteworthy exception is Bjorn Forsén's discussion of the finds from the Asea survey. Forsén notes the liminal status of Arcadia between Corinth (conical weights) and Laconia (large pyramidal weights), and observes an early Hellenistic transition from a Laconian to a Corinthian focus for the region.[64] Elisabeth Trinkl has observed a general tendency at Ephesos to use small lentoid weights in the Hellenistic period, replaced by much

[61] See note 48 above, to which may be added Lawall 1995; Dupont 1998; Монахов 2003.
[62] Davidson 1952
[63] Davidson and Thompson 1943 (Athens); Wilson 1930 (Olynthos).
[64] Forsén 2003. Forsén here (p. 237 with many references to parallels in note 23) also draws attention to the 'triangular weights', flat triangular slabs of clay with a hole in each corner. This class of 'weight' is not tracked in what follows. It seems possible that these slabs would have been used in tablet weaving with spools (see Gleba 2008, 139–153; Lipkin 2012, fig. 20); for a context at Messene with 'triangular weights' and conical loomweights found together, see Gkika 2012, 74, fig. 7.

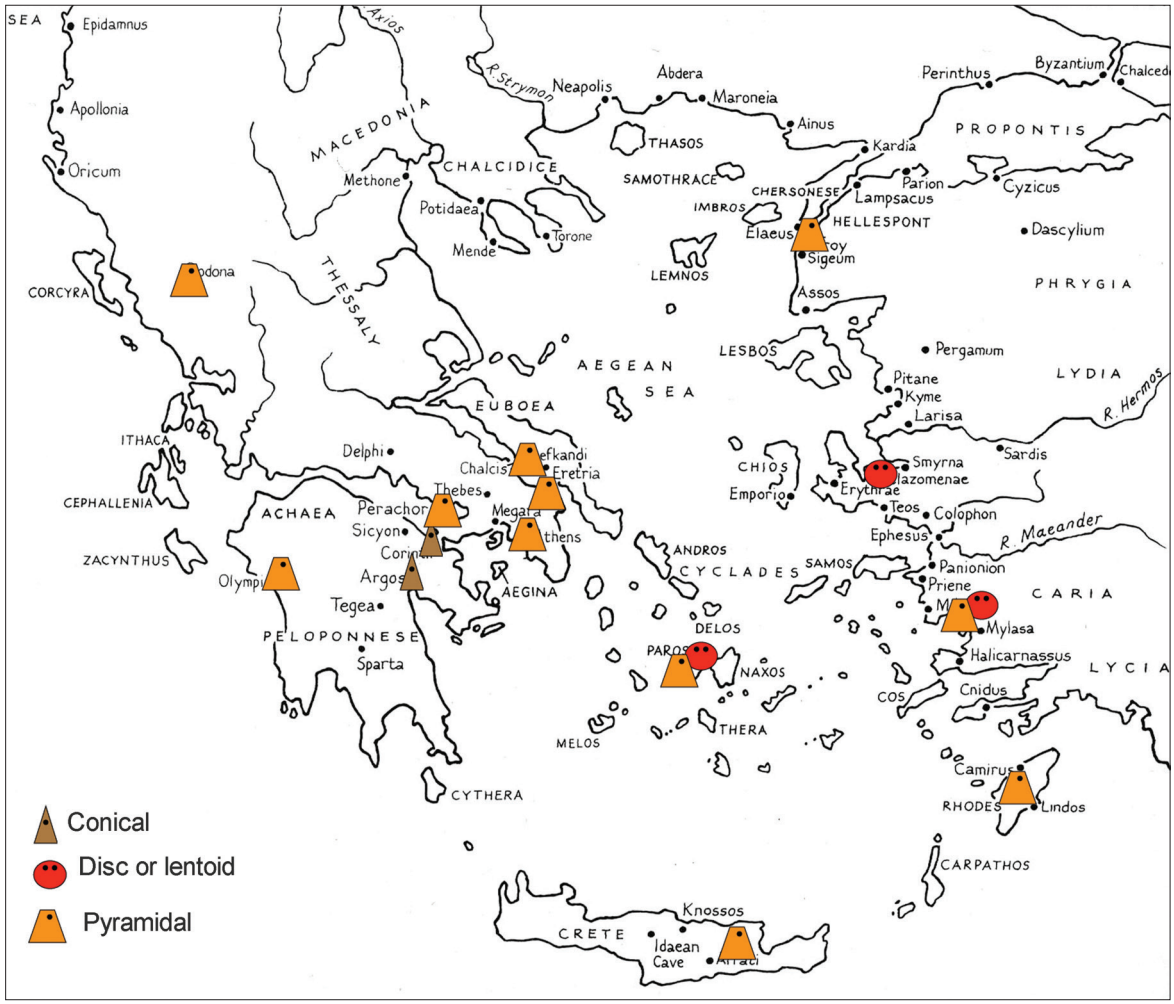

Fig. 8.7 Distribution of loomweight shapes in the Geometric and Archaic periods. (Map based on Boardman 1988, 22).

larger pyramidal weights in the early Roman period.[65] Donald Haggis and colleagues in eastern Crete have noted the general shift from rare, heavy weights in the Geometric period to lighter and much more commonly found pyramidal weights in the late 7th century.[66] Such advances have been made through close attention to whatever chronological evidence is at hand and to the likelihood that there may well be 'old' forms lingering in use (even very old, unbroken weights still in use).

The record is quite sparse for the Geometric and Archaic periods (Fig. 8.7), the mainland can be divided between those who use predominantly conical weights (Corinth,[67] and possibly Argos[68])

[65] Trinkl 2003; 2007.
[66] Haggis *et al.* 2004, 371–372.
[67] Davidson 1952; Pfaff 1988; from post Bronze Age contexts at Prosymna Blegen (1939, 53) notes one conical weight among a group of spools.
[68] From the Argive Heraion, Waldstein (1905, 43–44, figs 89 and 90) publishes a predominance of conical weights, but

and those who use pyramidal weights (Perachora,[69] Athens,[70] perhaps Olympia[71] and Dodonna,[72]). Some of the earliest examples of pyramidal weights on the mainland might be those from Lefkandi-Xeropolis associated with Late Geometric pottery,[73] but similarly early material is now also published from Skala Oropos.[74] From Paros there is a mix of discs, spheres, and pyramids.[75] Archaic levels at Ilion include very few loomweights, but those present are pyramidal or trapezoidal, in the latter case quite large.[76] At Clazomenae, there are somewhat more discs than other forms (pyramidal and truncated conical in order of relative numbers). A large block-like weight is published from Assesos in southern Ionia,[77] but there are more disc-shaped weights at that site.[78] A pyramidal weight is also published from Vigla, Rhodes, where other finds are mostly late Geometric and early Archaic.[79] On Crete, late Geometric and early Archaic weights are also rare, but those that appear are pyramidal (and relatively large), and these are replaced by smaller pyramidal weights during the Archaic period.[80]

In the Classical period (Fig. 8.8), the use of conical weights continues at Corinth and spreads to Perachora.[81] At Classical Lerna, however, pyramidal weights predominate along with the fewer conical forms.[82] The houses at Halieis, too, show a mix of pyramidal (more common) and conical weights.[83] Elsewhere in the Peloponnese – in Laconia,[84] Messenia,[85] Arcadia,[86] Elis,[87] and Vouteni (near Patras)[88] – the pyramidal form is most common. Attica still uses pyramidal weights (generally smaller than those in the Peloponnese),[89] and these are also seen in Lokris (at Halae).[90] Classical Euboea uses a wider range of weight-forms including pyramids (predominant) and discs.[91] This same mix of types is well-published from Olynthos, and the two shapes are generally considered earlier than those much more plentiful conical forms associated with the final period of the city. Thus, Olynthos seems to show a shift to conical weights already before the sack of the city in 348

pyramidal weights are also present. The dates of these pieces, however, are uncertain.
[69] Dunbabin 1962, no. 3480.
[70] Davidson and Thompson 1943, 73; Lynch 2011, 156–157, 291.
[71] Furtwängler 1890, 206 notes the predominance of pyramidal weights and the rarity of conical, but the chronology of this material is not clear.
[72] Carapanos 1878, 112, pl. 61, no. 15, though the date is never given for this piece in particular.
[73] Popham *et al.* 1979, 82–83, pl. 64, nos. 43–46.
[74] Μαζαράκη Αινιάνος 2008, pl. 15γ, 18β.
[75] Σχιλάρντι 1985, pl. 46b from a building of *c.* 700 BC nearby the Temple of Athena.
[76] B. Rose, pers. comm.
[77] Kalaitzoglou 2008, pl. 167, no. 802.BST 07.
[78] Kalaitzoglou 2008, pls. 161–162.
[79] Sørenson and Pentz 1992, 50, no. 106.
[80] Haggis *et al.* 2004, 371–372.
[81] Dunbabin 1962, nos. 3481–3483.
[82] B. Erickson pers. comm.
[83] Ault 2005.
[84] Cavanaugh *et al.* 2005; Overbeek 1996.
[85] Καλτσάς 1983, pl. 80a from the mid 5th century or earlier.
[86] Forsén 2003, with reference to many sites in the region.
[87] Coleman and Abramovitz 1986, nos. D96–D102; then D103–104 are conical weights. This site, in fact, is richest in spool-like weights, but this shape is not being tracked for this paper (see note 64 above).
[88] M. Stavropoulou-Gatsi, *ArchDelt* 53 B΄ Chron. 1998, 264–266, pl. 103.
[89] Davidson and Thompson 1943, 73–76.
[90] Goldman 1940.
[91] Καλλιγάς 1983, pl. 42.

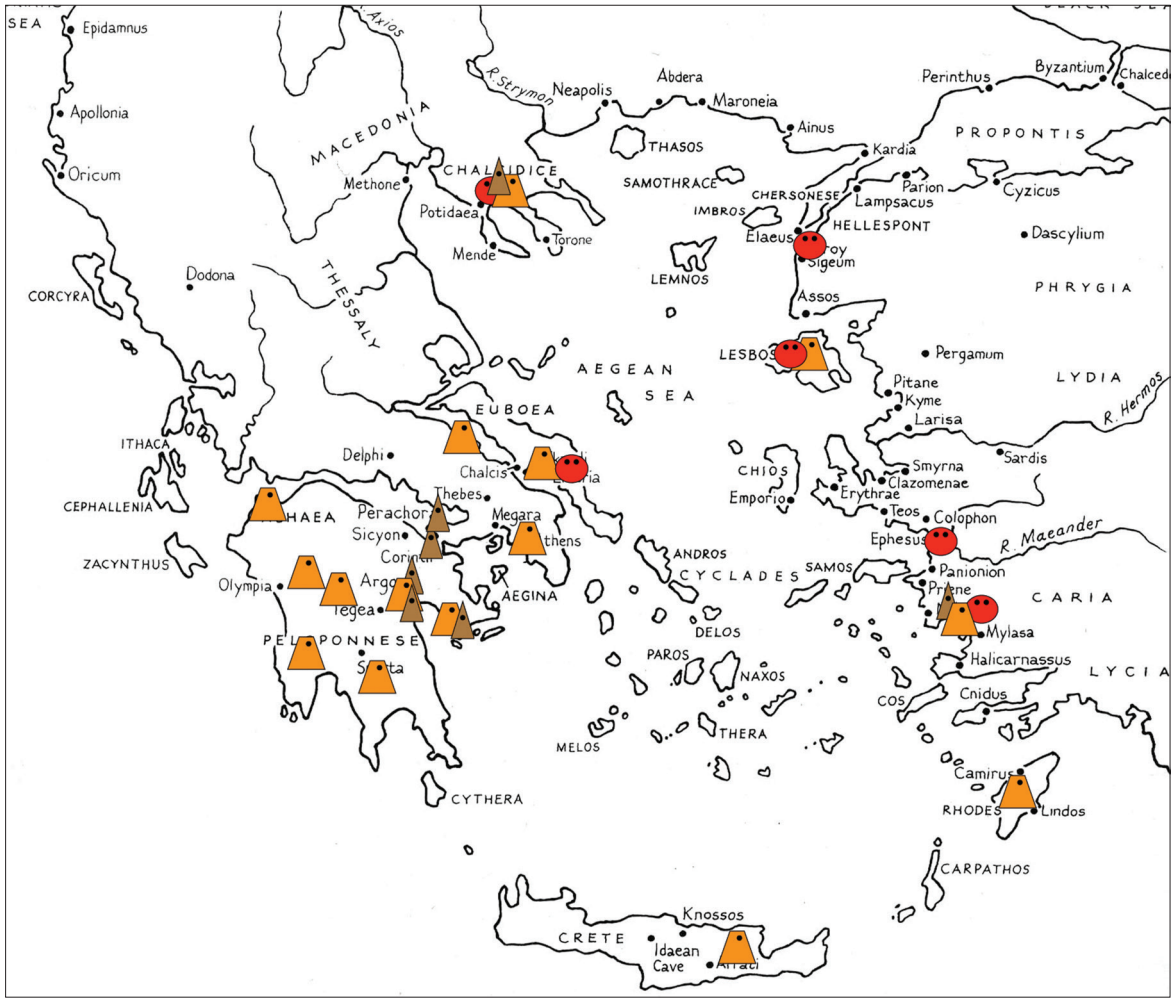

Fig. 8.8 Distribution of loomweight shapes in the Classical period. (Map based on Boardman 1988, 22).

BC, and this general chronology is supported at other sites in the region.[92] Classical Ilion, already in the 4th century BC, uses primarily lentoid weights though there are rare pyramidal examples (also handmade, as are the lentoid weights).[93] Pyramidal weights seem to linger longer at Mytilene as they are still the dominant form in two late Classical/early Hellenistic trenches from the Acropolis there; however, some lentoid weights do appear.[94] Lentoid weights also appear in late Classical contexts at Ephesos.[95] Classical contexts at Miletos tend to include pyramidal weights though a few

[92] That pyramidal weights are still the norm earlier in the 4th century is supported by two examples from Nea Kallikrateia from a house of the second quarter of the 4th century (Μπίλουκα and Γραίκος 2003, figs 5.8–9), but then the shift to conical weights is attested by sets of conical weights from a late 4th century earthquake destruction level at Aphytis (Μισαηλίδου-Δεσποτίδου 2004[2006], fig. 6.7).

[93] Wallrodt 2002(2003).

[94] Dhoga-Toli 2006.

[95] Ireen Kowalleck pers. comm.

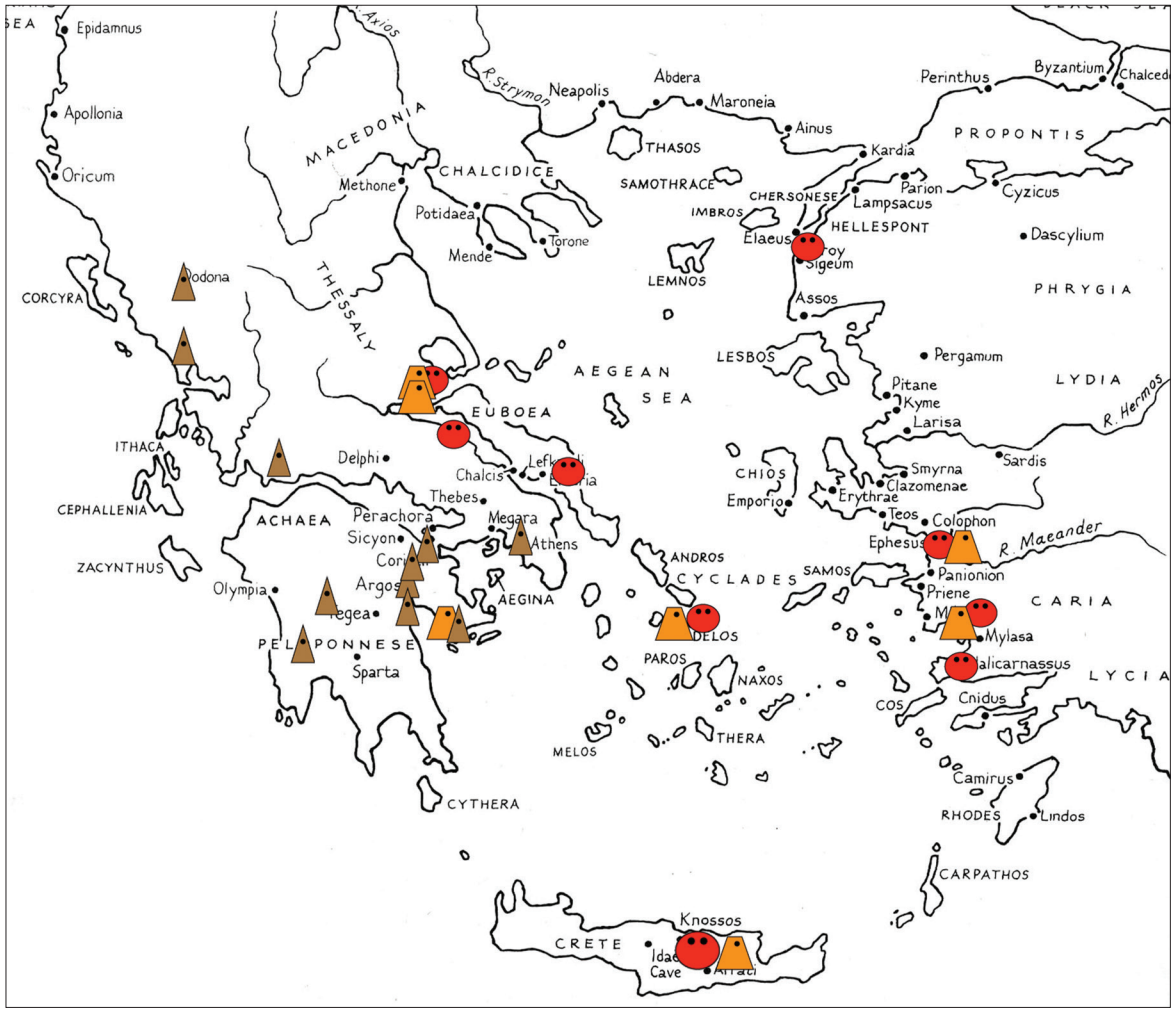

Fig. 8.9 Distribution of loomweight shapes in the Hellenistic period. (Map based on Boardman 1988, 22).

conical and disc shaped weights also appear; and the largest of the published lentoid weights from Miletos are also from Classical contexts.[96] Crete continues to use pyramidal weights primarily, but these tend to be smaller than those in the early Archaic period.

In the Hellenistic period (Fig. 8.9), the conical form is more widespread on the mainland, now including Epirus (Dodonna and Kassope),[97] Messenia,[98] Arcadia,[99] the Argolid,[100] and Attica. In Athens,

[96] Voigtländer 1982, figs 56–58 and 60.

[97] Tsouvara-Soufli 1996; 1999 for Kassope; 1983 for Dodonna.

[98] Kalogeroudi and Möller 2010, K. 163–165, with pyramidal weight K166; the specific dates of the material are not indicated but the pottery includes plenty of Hellenistic material. Also from Messene, Gkika 2012 reports a predominance of conical weights though the material is not sorted by chronological phases at the site.

[99] Forsén 2003.

[100] For Argos, Deshayes 1966, 230, pls. 34 and 44; from Hellenistic Mycenae, see Μυλωνά and Ιακωβίδη 1987, 46, pl. 17β; Halieis: nearby a mid 5th century grave is a pyramidal weight (ADelt 1976, grave 10) but by a mid 4th century grave

the shift to the conical form, really the adoption of the Corinthian form, takes place late in the 4th or early in the 3rd century.[101] Late Hellenistic contexts at Kalydon in Aetolia also show a predominance of the conical form replacing an earlier diversity of forms.[102] Sites in Boeotia also tend to produce conical forms with Hellenistic parallels from Corinth.[103] For Lokris, at Halae, the Classical use of pyramidal forms may give way to disc-shaped weights already by the end of the 4th century.[104] At Halos, along the south end of the Thessalian coast, there is a mix of pyramidal (most common) and disc-shaped weights.[105] Pyramidal weights appear at Goritsa, south of Halos.[106] Disc weights are also found in Hellenistic Eretria.[107] Pyramids and then discs are also far more common in the Aegean islands as is seen at Delos.[108] At Ilion, Ephesos, Miletos, and Halikarnassos the Hellenistic weights are lentoid, with heavy pyramidal weights starting to appear in the 2nd century, apparently becoming more common in the 1st century BC and continuing into the 1st century AD.[109] On Crete pyramidal weights continue to be most common through the 3rd century, but over the 2nd and early 1st centuries BC heavier, disc weights become more dominant. Early Hellenistic Trypitos, Panormon, Kolonna, Praisos and Knossos show mostly pyramidal weights;[110] Eleutherna shows a majority of disc shaped weights though still with many pyramidal weights;[111] late Hellenistic finds from Knossos, Phaistos, Lappa,[112] and Gortyn show primarily disc shaped weights.[113] One of the latest contexts attesting to the production of loomweights into the 1st or even 2nd centuries AD comes from Chalcis where a workshop produced lentoid and disc weights, the latter made using moulds (also found).[114]

Amphoras and loomweights: Shapes

Unfortunately, those areas for which we have the best understanding of amphora production do not often coincide with areas where loomweights are widely published. For example, the patterns of loomweight shapes are increasingly clear for large parts of the Peloponnese and Crete, and at least some information is available from many sites elsewhere on the Greek mainland. On the other

(no. 7) is a conical weight; though Ault 2005 reports both conical and pyramidal weights in the abandoned houses of *c.* 300 BC. Conical weights dominate the finds from the Berbati survey, see Penttinen 1996; 2005. An increased presence of conical weights in the Hellenistic period is also seen at Lerna, Erickson pers. comm.

[101] Davidson and Thompson 1943, 76–79 placed the shift sometime after *c.* 325; but the stratigraphic sequence at Bau Z in the Kerameikos shows 'Corinthian style' weights only appearing in great numbers in building phase 3 of the first half of the 3rd century (Knigge 2005).

[102] Dietz and Stavropoulou-Gatsi 2011, figs 254–255, with earlier examples, fig. 253; similarly, see Dyggve 1934, 134

[103] Examples are in the sherd collection of the American School of Classical Studies.

[104] Goldman 1940, 479 and 510–511.

[105] Burnier and Hijmans 2003; Reinder Reinders 1988; for the dominance of pyramidal weights at other sites in the vicinity, see Wieberdink 1986, figs 15 and 22.

[106] Bakhuizen 1992, 254, fig. 90 and pl. 136.

[107] Καλλιγάς 1983, 112–113, pl. 42.

[108] Deonna 1938.

[109] Trinkl 2003; 2007; Mitsopoulos-Leon 2007; Ladstätter 2010; Voigtländer 1982 for Miletos; Nørskov 2002, G187–188 for Halikarnassos; for Ilion, Rose pers. comm.

[110] Trypitos, see Sophianou 2011; Panormon near Rethymnon, *c.* 300 BC, see Tzachili 2008; Praisos, see Whitley 2011; Whitley *et al.* 1999; Kolonna in the Lasithi plain, see Watrous 1980, 278–281; Knossos, see Coldstream 1999, 328, nos. 14 and 15; Catling *et al.* 1979, 66, fig. 46.

[111] Τσιγονάκη 1994.

[112] Baldwin Bowsky and Gavrilaki 2011, fig. 2.

[113] Knossos, see Catling *et al.* 1981, 102, fig. 12; Phaistos, see Levi 1965–66; Gortyn, see Rendini 1988; Papadopoulos 1999; Rendini 2004.

[114] Σάμψων 1987.

hand, the Peloponnese (apart from Corinth) is still very poorly represented in the amphora record. Likewise, Cretan amphoras earlier than the late Hellenistic period have received little attention.[115]

Some points of similarity can be noted, however. The Classical (especially 4th century) and Hellenistic lentoid weight zone including Miletos and Ephesos maps well onto a region that retained use of the mushroom rim amphora into the Hellenistic period. And yet, Ilion's participation in the same loomweight style stands in contrast to its use of quite different local amphora forms. The lingering use of pyramidal weights to some extent in Attica but especially from Euboea and Boiotia northwards into Thessaly, Macedon and Thrace could be seen as coinciding with two amphora-regions which are closely related in the Classical period but diverge in the Hellenistic: the one in Macedon and Thrace, the other from roughly Euboea through Thessaly.

The case of the expanding use of conical weights over the Peloponnese, into Attica and into western Greece is difficult to coordinate with a particular pattern of amphora production. There are two amphora classes that are closely linked with the Peloponnese: Corinthian Types A and B.[116] The Type A jars show some diversity of fabric but are largely attributed to the Corinthia (though no workshop sites are known).[117] The Type B amphoras are known to have been produced on Kerkyra; fabric analyses have not ruled out Corinth; but other sites across the northern Peloponnese and reaching northward into the Adriatic region may have produced these amphoras.[118] Perhaps significantly for the question of amphoras and conical loomweights, the 5th century saw the appearance of at least one more substantial series within the Corinthian Type A class (designated as Corinthian Type A´),[119] and late in the 4th century a distinctly redder and coarser Type B amphora series appears.[120] The concurrence is not as close as might be hoped, but there are indications of expanding stylistic influence in the realms of both weights and amphoras in the Classical and early Hellenistic periods.

If intensity of local circulation appears alongside shared regional styles in amphoras, then the transactions involving the jars, from production to final use, seem to favour and perhaps promote similarities in their appearances across politically defined units. It is not difficult to imagine potters, farmers, merchants, and buyers all explicitly or implicitly expressing a preference for the local, familiar, shape. But local in this case might mean the entire span of Ionia or the northern coast of the Aegean (including Macedon, the Chalkidiki, and coastal Thrace). To some extent the same sort of interaction as it affects the potters might create regional styles in loomweights, too, since there are cases of weights being produced at the same workshops as amphoras. And yet, since we have seen divergences between amphora regions and loomweight regions, the situation must have been more complicated. Even so, the amphora evidence highlights the potential impact of intense interactions on the appearance of the artifacts involved (*or,* it bears stressing, the artifacts' similarities facilitated their more intense use in local circulation).

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[115] Eiring 2001; Eiring *et al.* 2002; Vogeikoff-Brogan and Apostolakou 2004; Baldwin Bowsky and Gavrilaki 2011. Most finds from workshop sites begin in the Early Roman period, see Marangou 1995.

[116] Koehler 1978; 1981; Sourisseau 2006.

[117] Whitbread 1995.

[118] Farnsworth 1964; 1970; Farnsworth *et al.* 1977; Ανδρέου 1990; Whitbread 1995; Preka-Alexandri 1992; Katić 2004; Stocker 2009.

[119] Koehler 1981.

[120] Koehler 1978, 60; autopsy of relevant fragments at Isthmia shows such dramatic differences in fabric that it is hard to imagine the same or related workshops were responsible for both the darker and the lighter fabric groups. The darker fabric may correspond to Whitbread's (1995, 277–279) Fabric Classes 3 and 4, the red Corinthian B clays.

Loomweights: Permanent markings

A clear point of similarity between loomweights and amphoras is the use of markings permanently affixed to the artifacts themselves. The most common markings are pictorial stamps and letters incised before firing. Far less often one finds words, usually names, impressed from stamps or incised before firing. There are also various marks, letters or other symbols, incised after firing. As with amphoras there is little consensus as to the meaning of the markings.[121] In the case of loomweights, though, unlike with amphoras, state control or certification has rarely been suggested.[122] Instead, suggestions have tended towards either owner's marks,[123] perhaps to 'reserve' a set; or marks related to the production process, perhaps delineating sets of weights. Studies of markings at the Corinth Tile Works support the latter view.[124] Other markings are interpreted as indicating numerical order (the best examples of this are from Italy), and may be related to their use on the loom.[125] In other cases, it is suggested, often on the basis of iconography, that the weights were marked and intended for purposes of dedication (and some post firing dedicatory inscriptions make this role clear). Clearly not all loomweight markings served the same purpose. Even more so than was the case with patterning in the shapes of weights, there have been few attempts to track when, in different regions, markings are used on weights.

The Corinth typology, again, provides the clearest overview of changing marking practices. Incised letters and gem impressions begin to appear at Corinth in the late 6th century,[126] and at least one early gem stamp appears at Archaic Clazomenae,[127] but otherwise, early markings are rare.

Gem impressions and incised letters, usually a single letter, are most common at Corinth from the mid 5th century to the mid 4th century.[128] At the Tile Works, sets including both marked and unmarked weights but found altogether seem to show fairly narrow range of variation in weight; but for most sites such data are not available. A similar mix of gem stamps and letters (both stamped and incised) is encountered at Pylos in Elis,[129] Vouteni,[130] Athens,[131] and Halae.[132] Gem stamps from Delphi are thought to date to the 4th century.[133] Olynthos shows an important shift in practice from common use of gem stamps on pyramidal and disc-shaped weights, a few gem stamps continuing to appear on conical weights, but then letters (rarely) on conical weights.[134]

On Corinthian weights in the third quarter of the 4th century and seemingly continuing into the 3rd century lettered stamps appear sometimes accompanied by a subsidiary image stamp. This is by far the most complex and systematic marking practice for loomweights. The names/words

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[121] Gleba 2008, 137–138.
[122] Cf. Ferrandini Troisi 1986 proposing tax labelling as one use of marked weights.
[123] The most explicit is a dipinto on a chance find near Siris, ⁝ Ισο | δικ | ης ε | μι (*NSc* 1912 Suppl, p. 61, fig. 63, and *LSAG* 288.1).
[124] Merker 2006, 60.
[125] Ferrandini Troisi 1986; see, too, Pagenstecher 1916.
[126] Davidson 1952, 60.
[127] Ersoy pers. comm.
[128] Davidson 1952; Stillwell 1952; and Merker 2006.
[129] Coleman and Abramovitz 1986, D103 is a pyramidal weight with a gem stamp, p. 103 discusses the greater number of spool-weights with markings.
[130] Stavropoulou-Gatsi 1998, pl. 103, see note 88.
[131] Davidson and Weinberg 1943, 74–76.
[132] Goldman 1940.
[133] Perdrizet 1908, 198, figs 877–886.
[134] Wilson 1930, 122–128.

involved are relatively limited and include: ΜΕΛ(Ι(Σ,[135] ΝΙΚΟ, ΑΡΙΣΤΟ(ΚΛ, ΓΛΥΚ, ΑΓΑ, ΑΡΧ(Ι(Σ, ΔΑΜ,[136] and ΝΟΗΜΑ. The subsidiary stamps can be simply a gem stamp, but there are also purpose-made dies that appear repeatedly, including an image of a loomweight, an amphora, and Γ or ΓοΓ in a circle. ΜΕΛ(Ι(Σ and ΓΛΥΚ both appear with the subsidiary amphora-image stamp. Much could be done in terms of study of this marking system, but for now two points are particularly significant. First, multiple dies were clearly considered necessary for some of the words (hence ΜΕΛ, ΑΡΙΣΤΟ, and ΑΡΧ spelled out to varying lengths on different stamps). One assumes we are seeing only the smallest fraction of the quantities stamped in antiquity, so many that dies presumably had to be replaced. Second, stamps of ΓΛΥΚ appear on both Corinthian and non-Corinthian clay (particularly in Athens).[137] Even if other stamps and markings pertain to one workshop, as seems to be the case with earlier stamps from the Tile Works, the ΓΛΥΚ stamps must belong to multiple locations of production. Perhaps the same person owned them all. The use of these stamps continues perhaps as late as the end of the 3rd century. The same stamps appear on weights at, not surprisingly, Perachora[138] and Athens, but then further afield at Delphi,[139] Myrina,[140] Olbia Pontike,[141] and Aradus in Syria. Although no large datasets of weighings are available for these stamped weights, Davidson does report a wide range of heights even among those weights sharing the same stamp, so the stamps are unlikely to designate weights sharing the same mass.

Elsewhere in the late 4th and 3rd centuries, loomweight marking remains fairly common, but not with the same degree of systematization seen at Corinth. Epirote conical weights at Kassope and Dodonna carry a range of markings from gem stamps and images related to coin type (but not impressions of the coins themselves nor are these gem stamps) to incised letters.[142] The earlier, late 4th-century, disc weights at Halae show the occasional letter or image stamp, but most of the marked weights there seem to be later.[143] Ephesian, Milesian and Trojan lentoid weights all can include gem stamps; other marks on these are quite rare.[144] The pyramidal weights of Crete rarely carry any markings.

The latest Hellenistic Corinthian weights do not tend to carry markings.[145] Late Hellenistic disc-weights from Delos show a wide range of image stamps (sometimes gems but often not) and incised letters (especially A, B and Γ/Λ); the same is true of the possibly contemporary, much smaller, pinched spheroid weights; but the pyramidal weights have only rare letters or puncture marks in the base.[146] A very similar series of images and incised letters appears on the later (2nd c. BC) disc

[135] The abbreviation takes on multiple forms: ΜΕΛ, ΜΕΛΙ, or ΜΕΛΙΣ, hence the notation used here.
[136] Donati 2006 mentioned this stamp in connection with artifacts indicating state ownership at Corinth; but not included in Donati 2010.
[137] Davidson and Thompson 1943, 77–78; Davidson 1952, 159–160 Knigge 2005, cat. nos. 774.2–3.
[138] Dunbabin 1962, nos. 3484–3486.
[139] Perdrizet 1908, 199 fig. 887.
[140] Pottier *et al.* 1887, 250.
[141] Брашинский 1968, 49–50, figs 4 and 5.
[142] Tsouvara-Souli 1983; 1996; 1999.
[143] Goldman 1940.
[144] Ephesos, see Trinkl 2003; 2007; Mitsopoulos-Leon 2007; Miletos, see Voigtländer 1982; Ilion, see Wallrodt 2002(2003) and Rose pers. comm.
[145] Davidson 1952.
[146] Deonna 1938.

weights at Halae.[147] The disc weights from late Hellenistic Phaistos,[148] Eleutherna,[149] Lappa,[150] and Knossos[151] show the same sorts of markings. The stamped and otherwise marked weights from Delphi might also date to this period, just on the basis of the generally similar approach to both the loomweight form and the style of marking.[152] Although certainly not as systematic or complex as the early Hellenistic practice at Corinth, these late Hellenistic marking practices on disc weights stand out for the consistency of practice over so many areas – multiple sites on Crete, Delos, and as far afield as Halae in Boeotia, at the least.

The heavy pyramidal weights, which may belong to the latest Hellenistic/earliest Roman period on Delos only show one example with an incised Γ. A weight reportedly from Roman levels at Olympia in inscribed with an H on the base.[153] Early Roman levels (*c.* 1st c. AD) from the basilica at Demetrias also show pyramidal weights (along with one conical and one disc).[154] The same pattern is seen with the early Roman weights at Ephesos and Miletos.

Amphoras and Loomweights: Markings

Apart from the examples cited in the introduction, there is little direct overlap between loomweight marks and amphora stamps. Finkielsztejn has briefly noted the possible connection between amphora stamps as certifying, for public purposes, the capacity and quality of amphoras and loomweight stamps as certifying, likely for private purposes, the weight and bulk of loomweights. His theory fits well with the preliminary results from the Tile Works, but many other cases contradict the expectations.[155] Furthermore, while some have argued that amphoras, in order to function at all in commerce, must be of a standard size (an easily refuted proposition!), loomweights do not have to be of a standard weight or size to function on the loom: the weaver simply adjusts the numbers of threads attached as needed. So this line of inquiry, while well worth pursuing where the history of standardization of stamped amphoras can be compared with the same history for marked loomweights, depends on many debatable assumptions as to artifact use. Such assumptions still need to be sorted out before the issue can be pursued with any rigor.

Indeed, even for a more general comparison of amphora markings and loomweight markings, it is often difficult to find overlap between areas of known amphora marking and well-documented practices with loomweights.

Corinth again provides the best case study. A rise in stamping and pre-firing incised marks on Corinthian Type A amphoras in the 2nd half of the 4th century just prefigures a growth in exports from the late 4th and early 3rd centuries. These markings include palmette stamps as well as incised letters or monograms.[156] Even though the kinds of marks differ between the Corinthian loomweights

[147] Goldman 1940.
[148] Levi 1965–66.
[149] Τσιγονάκη 1994.
[150] Baldwin Bowsky and Gavrilaki 2011.
[151] Catling *et al.* 1981 (from an early Roman house).
[152] Perdrizet 1908, 197, figs 871–876, where two of the more extended lettered stamps read: ΕΒΔΟΜΑ and Cωcίκλης ἐποίει.
[153] Furtwängler 1890, 206, with no. 1331. Of unspecified date (and not illustrated) are two other marked weights: Ἀγάσιππος and Ολυπ . δος.
[154] Eiwanger 1981, 100, pl. 89 iv.297–301.
[155] Thus at Athens, from the well published by Corbett (1949, 340), of 63 pyramidal weights we are told that 24 fall between 61 and 68g, 14 between 70 and 75g and 15 between 77 and 78g, but if they are evenly spread within these ranges then what we have is a peak between 77 and 78 grams, but a wide diversity of weights below that.
[156] Koehler 1978.

and the amphoras, the late 4th century prosperity attested by the amphora record coincides well with the emerging complexity of loomweight production. The problematic Corinthian Type B amphoras also see widespread stamping using images already early in the 4th century, but lettered stamps are only common from the late 4th and into the 3rd centuries. Here again there is an approximate concurrence with the most intensive period of loomweight marking.

The apparent proliferation of workshops producing Corinthian types A and B through the 4th century and the increased use of markings on the jars at the same time are matched by the proliferation of the conical loomweight form and, at Corinth and elsewhere, frequent markings.

The other period of what appears to be intensive loomweight marking occurs in the late Hellenistic period with the disc weights and their markings. With so little known of Hellenistic Cretan amphora production (and so far as is known there is no local amphora production on Hellenistic Delos), it is difficult to place this loomweight activity against a particular amphora-based background. This is, however, a period of intensive stamping and seemingly large scale, long-distance exports both to and from the Aegean basin, especially by amphora producers in the southern Aegean, i.e., right where much of the disc weight marking practice occurs.

Loomweight Distribution and Use

For loomweights, the most common approach to studying their role in ancient economies has been to study the varying numbers of weights per room in the houses of a given site in hopes of determining which room(s) was (were) intended for textile production, how many looms might have been in use at any one time, and from there whether the household might be engaged in production for external sale. By the same approach, scholars have sought stand-alone, perhaps 'professional' weaving factories. In order to postulate the presence or potential presence of loom, researchers have tended to follow the suggestion by Gladys Davidson and Dorothy Thompson with reference to finds at Olynthos and illustrations on vase paintings that roughly 65–70 weights were needed for a loom.[157] This initial assumption is problematic on many levels, both archaeological and technical. The requirement that we find a 'full set' in the archaeological record of any stratum is implausible. The material we recover is always some sampling of what was actually used in antiquity. Even weights found in a bin or *in situ* in a row on the floor are only those present in that location at the moment in time trapped by that stratum; many more weights might have been present the day before. Indeed, this approach of seeking large accumulations of weights has always proven difficult in the further interpretation of those clusters. They might indicate simply storage of weights, sets of which might be used on one loom at one time and another, perhaps much larger loom some other time.[158] Even if enough weights seem present for multiple looms, without knowing the size of the family (and slaves and other dependents) how can we propose that more cloth could be produced than was needed by the household? What if the household sometimes produced for the market and other times only for personal use?[159] After all, households expand and contract over time; and their ability or

[157] Davidson and Thompson 1943, 69–70; Davidson 1952, 147; noted by Merker 2006, 57 who suggests a narrower cloth using *c.* 20 weights might be more common; cf. the very few weights suggested as needed for early Roman cloth at Ephesos (Trinkl 2007).

[158] Sophianou 2011.

[159] While the Gortyn law code envisions all the cloth produced in the house remaining in the house to be returned in case of a divorce (Chaniotis 2005), it is unclear how widespread and reflective of daily reality this law was for Crete, for the elsewhere in the Aegean, for later (or earlier) centuries, etc.

need to produce for the external market likely changed over time as well. A further impediment to success with this approach, particularly if one is seeking changing patterns around the Aegean basin over time, is the general rarity of sufficiently extensive excavations and sufficiently detailed reports. Often at best one might read about one structure with a given number of weights in each room. But without other samples from the same site, it is hard to know if that example it typical or unusual.

Some exceptional reports, most of which are well-known in the literature on the archaeology of Greek textile production, should be noted as suggesting some general patterns of development. The initial impression of the situation at Olynthos was that the generally wide distribution of loomweights obscured any patterning. Nicholas Cahill, however, reconsidered the same data, and he was able to pinpoint some houses that seemed to be practicing textile production on a scale beyond the needs of the oikos itself.[160] At Halos, the early 3rd century scatters of weights are fairly uniform (5–14 weights per house) with the notable exception of the House of Agathon (100 weights), and again some orientation to the external market might be indicated.[161] At Halieis in the southern Argolid the loomweights are so sparsely distributed, no more than 25 weights in any of the five houses studied in detail, that no specific clusters are identified securely as indicating looms. Bradley Ault, however, does argue that the placement of looms was so variable and temporary that the eventual location of weights in the archaeological record need not indicate a permanent position for the loom.[162] From Crete there are many instances of loomweight concentrations in particular rooms or buildings, though case studies with the range of scatters of multiple houses at one site are rare.[163] Even with a fairly cautious interpretation, it would seem that some houses already in 4th century cities had unsually high numbers of loomweights compared to others at the same site (and hence subject to similar site formation processes). The possibility is reasonably higher, therefore, that these houses were producing cloth, at least at times, for an external market.

The possibility of cloth production outside the household setting is also raised by Building Z from the Kerameikos excavations. Here, particularly in the building's late 4th century 3rd phase, there were large clusters of loomweights found in many different rooms. Ursula Knigge suggests the building served the dual role of taverna and weavers' workshop.[164]

Loomweight clusters also appear in various buildings in sanctuaries. Textual sources from various *poleis* and periods attest to weaving for the sanctuary, often in terms of clothing for the cult statue.[165] And in rare cases this evidence coincides to a greater or lesser extent with finds of loomweight clusters (e.g., on the acropolis at Halae[166]). In other cases the interpretation of the weights as 'functional' or votive is less clear even when the weights are found together in one building (e.g., Lato and Foce del Sele[167]). With little or no evidence for change over time of weaving in such contexts or for geographic patterns, it is difficult to put this activity into the present framework, but it is another important sector of weaving in ancient economies.

As noted above, however, this approach based on weight distributions is fraught with interpretive problems and problems of relatively scarce evidence. An alternative involves the individual weights

[160] Robinson and Graham 1938, 209; Cahill 2002.
[161] Burnier and Hijmans 2003; Haagsma 2010, 207–208.
[162] Ault 2005, 78–79.
[163] Baldwin Bowsky and Gavrilaki 2011, 191–194.
[164] Knigge 2005, 96.
[165] For weaving sacred cloth, see Mansfield 1985.
[166] Goldman 1940, 511.
[167] See note 30 above.

themselves and the cloth they could produce. The experimental work based on Bronze Age weights published by Linda Mårtensson, Marie-Louise Nosch and Eva Andersson Strand in 2009 provides a basis for determining how likely or how easily wool cloth of different thread counts/cm could be woven using loomweights of varying thickness and weight. Here again, one is limited somewhat by the reported data: thickness of weights is rarely reported and neither is weight (though this is improving). Nevertheless, typical examples can be pulled from the various periods and regions that have been covered in preceding sections here, and the results are striking (Tables 8.1–8.6).

In Table 8.1, calculations are provided for the thread count/cm for a late Archaic loomweight from Athens of the typically small, pyramidal form (Fig. 8.10). Not a single category of thread weight results in 'optimal' results in terms of ease of production and likely evenness of the resulting cloth. If one opens the possibility that the weights were staggered in two rows for both the forward and rear rows of weights, a possibility that is not advised by Mårtensson *et al.* as leading to too much tangling, then at least the finest thread (thread requiring 10 gr tension) could be used at the lower margins of what is considered optimal conditions for production. Wool cloth produced using typical Athenian weights was tedious to produce, difficult to achieve a high quality result, and likely of very limited range of fineness. Perhaps weights were clustered together, but this would create even more space between bundles of warp threads and cause even more problems for the quality of the end result (and would be no less tedious in the production!).

Fig. 8.10 Attic loomweight from Athenian Agora deposit J2:4 (Lynch 2011, cat. no. 208, MC 1508, photo by C. Mauzy, courtesy of the American School of Classical Studies, Excavations at the Athenian Agora).

Table 8.1 Thread count per cm for cloth of varying weights of threads: Athens, late Archaic: 3.0 cm width at base, pyramidal weight, 42 gr (from Lynch 2011, 291, cat. no. 208).

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	4	2	1	1	
No. of threads/two weights	8	4	2	2	
Warp threads/cm	2.6	1.3	.67	.67	
Evaluation	*unlikely*				
With stacked arrangement of weights: threads/cm	5.2	2.6			
Evaluation	*Optimal (low)*	*unlikely*			

Table 8.2 Thread count per cm for cloth of varying weights of threads: Corinth, Classical: c. *6.0 cm diameter, conical weight,* c. *160 gr (from Merker 2006, 61, 'set 2', fig. 38).*

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	16	8	5	4	3
No. of threads/two weights	32	16	10	8	6
Warp threads/cm	5.3	2.7	1.7	1.3	1
Evaluation	*Optimal (low)*	*unlikely*	*unlikely*	*unlikely*	*unlikely*
With stacked arrangement of weights: threads/cm	10.6	5.4	3.4	2.6	2
Evaluation	*Optimal*	*Optimal*	*possible*	*unlikely*	*unlikely*

Table 8.2 reports the same calculations for a typical Corinthian weight from the Tile Works at Corinth (Fig. 8.11). Without staggering the weights, 10 gr thread can be used with optimal results; with staggered weights, 10 gr or 20 gr thread falls into the optimal category and 30 gr thread is at least possible. But again, staggering the weights is not considered ideal practice. For Corinth, however, the shape-development may have been a response to this difficulty. The higher placement of the maximum diameter of the weight with a larger portion of beveling below would mean that weights had increasing amounts of overlap in the staggered arrangement.[168] Such overlap would begin to approximate the more ideal situation with discoid weights (as noted by Mårtensson *et al.*, and see below), but a substantial height of this beveling only occurs on the latest Corinthian weights (Types XIII and especially XIV). Corinthian weights tend to keep roughly the same diameter throughout their development, but they do get taller and hence heavier with respect to their 'thickness'. In doing so, they expand the options for optimal use of a wider range of thread weights thereby slightly raising the possibility of diverse household production whether for internal or external consumption.

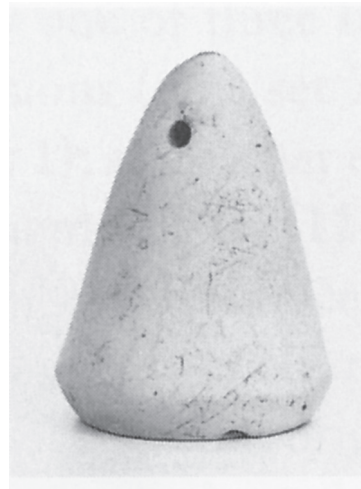

Fig. 8.11 Corinthian loomweight from the Tile Works at Corinth (from Merker 2006, 61, 'set 2', fig. 38).

The Hellenistic lentoid weights of Ephesos (Fig. 8.12) and elsewhere in Asia Minor (Table 8.3) likewise seem to require a staggered arrangement, and in doing so they too have a significant amount of overlap perhaps minimizing tangling. Without the staggered arrangement these weights only offer a possible level of thread count/cm with the lightest thread. With a staggered arrangement this figure reaches the level of optimal and a somewhat heavier thread becomes possible. But even so, the options seem limited and production would have been tedious and time consuming.

[168] A very high bevelled, nearly biconical, form found for three weights in a Roman period well at Argos, Séve 1980, 316, fig. 50.

Table 8.3 Thread count per cm for cloth of varying weights of threads: Ephesos, Hellenistic: 3.0 cm thickness, lentoid weight, 65 gr (Trinkl 2003, T36).

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	6	3	2	1	1
No. of threads/two weights	12	6	4	2	2
Warp threads/cm	4	2	1.3	.6	.6
Evaluation	*possible*	*unlikely*	*unlikely*	*unlikely*	*unlikely*
With stacked arrangement of weights: threads/cm	8	4	2.6	1.2	1.2
Evaluation	*Optimal*	*possible*	*unlikely*	*unlikely*	*unlikely*

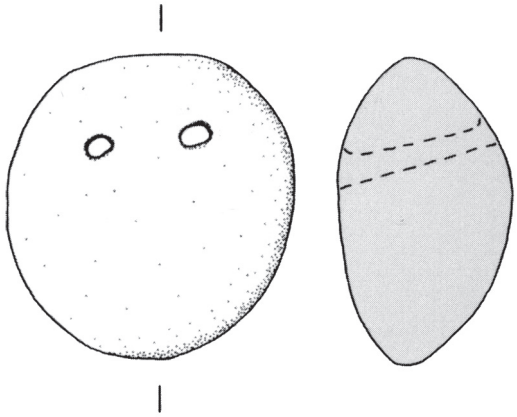

Fig. 8.12 Ephesian lentoid loomweight (Trinkl 2003, T36, drawing by E. Trinkl, courtesy of the Austrian Archaeological Institute, Ephesos Excavations)

The options for thread weights used with optimal results both for labour and product are expanded even more in the case of late Hellenistic disc weights from Crete (Tables 8.4–8.5). The first example from Lappa, with a 2.5 cm thickness (Fig. 8.13), gives optimal results for 10–30 gr thread weights and possible results for 40–50 gr thread weights. The thinner weight from Lappa (1.8 cm) (Fig. 8.14) gives optimal results through 40 gr thread weight, but then is unlikely to be used for heavier thread weights. In other words, these weights allow for relatively easy production of a wide range of cloth types. Long gone is the picture of a 6th century Athenian spending hours fiddling with tiny weights and lightweight thread, untangling knots, and not even getting a good piece of cloth to show for it. The Cretan discs even far outperform the Corinthian weights for any previous period.

The latest weights from Ephesos (Table 8.6), the heavy pyramidal forms perhaps dating as late as the 1st century AD (Fig. 8.15), are the only weights in those surveyed here to achieve optimal scores in all thread weight categories. It should be noted, however, that there is considerable range in the size and weights of this latest type, so further sampling and calculations might show that such a range of optimal performance was not always the case. It seems safe, however, to put these weights in the same category of performance as those of late Hellenistic Crete. These seemingly crudest of loomweights might be making the best cloth of all.

This application of the methodology described by Mårtensson *et al.* is in many ways an oversimplification, and the results offered here should be considered as very preliminary.

Table 8.4 Thread count per cm for cloth of varying weights of threads: Lappa, Late Hellenistic: 2.5 cm thick, disc weight, 250 gr (Baldwin Bowsky and Gavrilaki 2011, cat. no. 5).

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	25	12	8	6	5
No. of threads/two weights	50	24	16	12	10
Warp threads/cm	20	9.6	6.4	4.8	4
Evaluation	*Optimal*	*Optimal*	*Optimal*	*Possible*	*Possible*

Table 8.5 Thread count per cm for cloth of varying weights of threads: Lappa, Late Hellenistic: 1.8 cm thick, disc weight, 200 gr (Baldwin Bowsky and Gavrilaki 2011, cat. no. 12).

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	20	10	7	5	2
No. of threads/two weights	40	20	14	10	4
Warp threads/cm	22	11	8	5	2
Evaluation	*Optimal*	*Optimal*	*Optimal*	*Optimal*	*Unlikely*

Fig. 8.13 Loomweight from Lappa, Crete (Baldwin Bowsky and Gavrilaki 2011, cat. no. 5, image courtesy of the authors).

Fig. 8.14 Loomweight from Lappa, Crete (Baldwin Bowsky and Gavrilaki 2011, cat. no. 12, image courtesy of the authors).

Table 8.6 Thread count per cm for cloth of varying weights of threads: Ephesos, Early Roman: 4.9 cm wide, pyramidal weight, 534 gr (Trinkl 2003, T13).

Thread weight	**10 gr**	**20 gr**	**30 gr**	**40 gr**	**50 gr**
No. of threads/weight	53	26	17	13	10
No. of threads/two weights	106	52	34	26	20
Warp threads/cm	21.6	10.6	6.9	5.3	4.1
Evaluation	*Optimal*	*Optimal*	*Optimal*	*Optimal*	*Optimal*

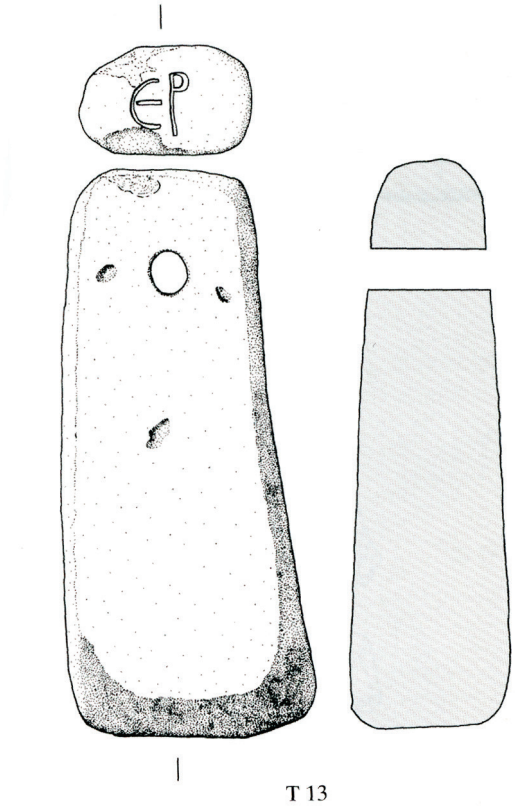

Fig. 8.15 Ephesian pyramidal loomweight (Trinkl 2003, T13, drawing by E. Trinkl, courtesy of the Austrian Archaeological Institute, Ephesos Excavations).

Specific details, such as the arrangement of the suspension holes on the weights and the possibility of multiple layers of warp lines as used for weaving twills, are not taken into account here.[169] Nor is the possibility of a greater use of flax instead of wool.[170] But since such details are ignored consistently here, the various results achieved here indicate, at the very least, changing practices over time. With further work, more refined and confident conclusions should be possible.

Amphoras and Loomweights: Distribution and use

The evidence related to distribution and use of loomweights in the Archaic period tends to support a view of minimalist household production, with little likely diversity of the cloth being produced. The evidence is admittedly slim and largely dependent on the nature of the weights rather than distributions over multiple houses at any one site, but it fits with an impression of contemporary amphora shipping that focuses on local circulation with relatively few producers aiming at a broader, long-distance market. And even those areas that are involved in the long-distance shipping rarely bring in much diversity of imports in return or distribute their own goods widely within the Aegean basin *per se*.

[169] I am very grateful to Marie-Louise Nosch for raising these questions. The tabby to twill transition at least in western Europe in the early Iron Age, perhaps extending into Greece, will complicate the assumptions behind Mårtensson *et al.*'s experimental work since they were operating with Bronze Age practices. On this transition, see Gleba 2008, 191–192; for plain weave cloth from the Kerameikos in the 5th century BC, see Margariti and Kinti 2012.

[170] Mårtensson *et al.* dealt only with wool; on the qualities of flax and wool, see Gleba 2008, 65–70 and 72–75.

Changes begin to appear in the Classical and early Hellenistic periods with the spread of somewhat more versatile weight types (conical and lentoid forms, assuming one stacks them into a double row), new evidence for more intensive production by some households and *ergasteria* (workshops), and widespread use of gem stamps and, especially in Corinth, letter stamps on the weights. Likewise, this fairly broad period saw the appearance of much more systematic amphora stamping, the emergence of more cross-regional and long-distance amphora shipping, and the early stages in a narrowing of regional styles.

These trends in amphora use and distribution continue, and even accelerate, into the late Hellenistic period. The amphora evidence clearly points to much more intensive long-distance trade especially east and west across the Mediterranean. Likewise, the very precise standardization of at least Rhodian amphoras of the late Hellenistic period indicates an increasing effort to facilitate that shipping and commercial process. From the perspective of loomweights, there is little clear change in terms of distribution at houses and other buildings (though researchers at various sites note the very large numbers of weights found, far outstripping those seen at Olynthos). There is, however, a striking change in terms of diversification of the cloth that can be readily produced. At least in some areas (e.g., Crete and Delos) diversification of options of cloth production and facilitation of cloth production seems linked with an expansion of economic opportunity as attested by the expansion of amphora shipping.

Amphoras, loomweights and economic development in Archaic through Hellenistic Greece

If the traditional segregation of the loomweights as economic artifacts of the household economy as distinct from amphoras and other artifacts of The Economy were valid, then there should be nothing gained from the comparison of the loomweight and amphora records. Patterns in one class should bear no relationship to patterns in the other. And yet, in each specific aspect – shape, markings, and use/distribution – certain parallels have begun to emerge. Bringing these three areas together here highlights the changing nature of economic interactions over the course of the Archaic through very late Hellenistic and early Roman periods in the Aegean basin.

The Archaic period can be considered a time of economic minimalism in various ways (though not in every respect). Amphora circulation within the Aegean is narrowly regionalized, and there is little additional marking suggesting further layers of organization. The local familiarity of the amphora shape presumably obviates the need for further information. Local circulation could involve frequent transactions with known partners. Of course, long distance trade did occur, too, and the economic activity surrounding this activity must have been built on the same framework of material culture even if the social networks spanned greater geographical range. The loomweight record, too, frequently seems to indicate minimal levels of organization, little patterning in terms of shapes (though the data are sparse), and a very narrow range of very time-consuming textile types within the household. Interestingly, this is a period when images of weaving are fairly common (of sometimes ambiguous mythological reference apart from the early Arachne images) – not necessarily a special celebration of weaving *per se*, but part of a broad interest in images of work and life on vase painting. If later images of weaving are intended to celebrate the importance of women in the ideology of Athenian democracy,[171] perhaps these earlier images emphasize the various elements of the successful aristocratic oikos.

[171] Bundrick 2008.

The Classical period (5th century–early 4th) for amphoras saw more crossing of regional boundaries and more markings. During this period, too, those amphoras most heavily involved in long distance trade also tend to be more distinguished either by shape or by markings from their regional neighbours. Similar developments can be noted in the loomweight record. The Classical period saw expanding regionalism of shapes and increase in loomweight marking though mostly in the way of single letters and (most often) pictorial stamps. The adoption of new shapes, however, appears to have been unrelated to the speed, quality or diversity of cloth production. Perhaps instead, potters may have been responding to desires resulting from movements of people. Despite the lack of technological change, there does seem to be an increase in textile production within and beyond the confines of the oikos, to judge from loomweight distributions and textual sources. This is also the period when men and money-bags (regardless of the purity of their intentions!) enter the iconographic world of weaving in Athenian vase painting. Visually, therefore, weaving is linked to the broader economy and the parallel changes involving both amphoras and loomweights strengthen the possibility that this was true beyond the artist's imagination.

The patterns in amphoras and loomweights show frequent concurrences, too, in the Early Hellenistic period (late 4th–early 2nd century). The spread of the lentoid weights in Asia Minor follows on and then coincides with the general expansion of the mushroom rim amphora regional style (though that style is more limited to southern Asia Minor), so again a loomweight form proliferates alongside other evidence for contact and interaction even though the weight form brings little substantial benefit to cloth production. The spread of, and increasing complexity in the marking of, Corinthian and Corinthian-style conical weights coincides with expanding trade and marking of local and regional amphoras. Markings on both weights and amphoras may have to do with increased needs or desires to certify size or quality of the object and others in the same batch. And yet, if this is the case, that precision of certified quality (whether size, weight, or form) seems very low. In the Early Hellenistic world of expanding amphora production and exportation and increased appearance of weaving-intensive households, increased marking practices are perhaps best associated with resolving various problems of organizing production and initial distribution. Such problems could include tracking production and inventory for stockpiles, maintaining order at kilnsites shared by multiple potters, as well as checking quality of the product within broad parameters and noting that the check has occurred. Even so, this expanded production and need for marking cannot be linked (at least not so far) to any significant change in the speed, quality and diversity of cloth production whether it is carried out on a small or large scale within a household or ergasterion.

The Late Hellenistic period (late 2nd century BC and likely well into the 1st century AD and beyond), on the other hand, does seem to bring radical developments in both the amphora and loomweight records. This period is characterized here as one of high levels of complexity and improved efficiency of amphora distribution thanks to improved standardization for some producers (a process that had started already by the mid 3rd century) and an increasing scale and breadth of long-distance shipping of amphoras both eastward and westward. Stamping, at least among the more successful and cosmopolitan amphora producers, increases in intensity and regularity. On the loomweight side, both the disc weight tradition, with its frequent markings, as well as the later heavy pyramidal tradition both mark a major shift in Aegean cloth production towards quickly produced, high quality, and diverse textiles. The spread of the weight shapes and related markings

is unlikely to be a matter of simply weavers preferring a different shape and potters responding. Now that loomweight-using weavers have many more options for the types of cloth they might readily produce, and now that it seems likely more of that cloth can be entering the external market, many more actors should be considered when thinking about how and why loomweight shapes change and the weights are marked. For example, one could imagine a complex network of weavers, merchants, consumers, merchants bringing feedback to weavers, weavers seeing new opportunities and technologies, potters supplying the new shapes. Similar complexities of feedback systems had likely been at work perhaps somewhat earlier in the case of the amphoras.

The various socio-economic interpretations of the amphora and loomweight records offered above only begin to address the various issues that arise when these data are considered. Of particular importance, for example, would be to consider the extent to which Early to Late Hellenistic changes facilitating the use of these economic artifacts in fact reduced prices for the related commodities. If more cloth was being produced, more easily for the external market, then prices should drop. In addition, changing roles for cloth and cloth production in ritual could be considered in light of the changing nature of the broader economy. The juxtaposition of textile production with other economic sectors is not simply a matter of identifying masculine weavers but is an important element to understanding ancient economies at all levels.

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9. The Wool Basket: function, depiction and meaning of the *kalathos*

Elisabeth Trinkl

Working outside the house was a typical male activity whereas working within the house was the responsibility of women; so ancient authors tell it.[1] One characteristic task falling within women's remit is 'wool working', including various work stages from preparing the raw material to the final production of textiles. In the following I will not go into details concerning this fundamental fact though. The tools needed for these tasks, (such as spindle, distaff, loom weights etc.) have already been discussed in detail and from different aspects elsewhere.[2] Within these discussions not much attention was drawn to one object related to wool working: the container used for gathering and storing raw wool as well as wool processed into yarn,[3] the wool basket, *kalathos* or *calathus*/*quasillum*.

Basketry is a very old craft; processing unspun fibres, it is based on a technique closely related to weaving and is older than the craft of producing fabrics using spun threads. Baskets are made in a way similar to that used for woven mats, and the same technique was used for the production of clothing in a time when textiles of finer fabrics were not yet manufactured.[4] Baskets were made of organic material, therefore little evidence of these early crafted products survives; this concerns baskets of historic times to almost the same degree.[5] Only very special environmental conditions preserve fibre and wickerwork, lodged in the degradation product of other materials (such as the corrosion of bronze or iron, or in salt); mineralised, in water saturated layers; or regions with a constant, extremely dry climate. However, most of the time, fibre and wickerwork are preserved

[1] The best known sources concerning this subject are Xenophon *Oec.* 7, 22. 35–36 and Columella 12, 25. Lewis 2002, 62–65; Günther 2000. Wool working not simply supplies the *oikos* with cloth and other textiles, but can be an economic contribution to the household income.

[2] Loom weights and their informative value are recurring themes of discussion. Important investigations have been carried out in recent years, concerning usage and interpretations of the spinning devices; mainly the evaluation of the numerous unearthed spindle whorls, further, studies of the less well documented tools distaff and spindle and their meaning, e.g. the articles dealing with objects from many regions and of different periods of time in Gillis and Nosch 2007.

[3] Whereas woven textiles were usually kept in chests: Brümmer 1985, 94–98.

[4] Gaitzsch 1986; Forbes 1987.

[5] The base of a basket found in Longola with adjacent parts of the body preserved, is one of the rare findings: Pappalardo 2011, 24 fig. 1.

indirectly, for instance as imprint – by chance or intentionally – in soil, clay or mud;[6] or as a negative in ash or lava. Indirect information about these lost items made of organic material can be gained by depictions of baskets; further, some objects made of more resistant material such as clay or stone reflect those usually made of perishable material in form and shape.

Essentially, basketry can be divided into two separate techniques which differ in the way the individual strands are interlaced: in the case of the coiled work (winding) parallel strands are connected with each other by weaving more flexible elements through them; while the 'true weave' (intertwined) consists of separate elements which are interlaced at (more or less) right angles.[7]

Baskets can be used in various ways and exist in various shapes. The form and shape of each basket is strongly related to its function: with and without lid, with circular or oval base, cylindrical or angular, with or without handle or with feet, in which case they are mostly used for foods.[8] Some baskets are made for a very specific purpose, which is indicated by their distinctive shape; for instance grain swing, press basket, or the *kanoun*, a Greek basket with three handles, used for offerings.[9]

The *kalathos* is principally a multifunctional basket. Literary sources report that, depending on the context,[10] the *kalathos* could contain wool, but also food (bread, cheese,[11] milk, fruits and vegetables), small animals or flowers.[12] The most famous usage of the *kalathos,* besides its function as a wool basket, is its use as a container for toys. Vitruvius mentions one such *kalathos* placed on the grave of a Corinthian girl: acanthus plants were growing through the woven basket and, according to Vitruvius, Callimachus was inspired by its sight when inventing the Corinthian capital.[13]

The focus of the following is the wool basket, mostly made of willow rods. The basket consists of a round base and a cylindrical, wide-mouthed, upward flaring body.[14] It usually does not show lid or handles. To judge mostly from surviving depictions, these baskets were used both for holding the combed or carded wool prepared and ready for spinning, and for storing finished balls of yarn.[15]

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[6] Unruh 2007; Betancourt 1990: baskets function as moulds for clay vessels; cf. also Lebegyev 2010. Further, see the marks of a carrying net on the Attic red figure *alabastron*, Providence, Rhode Island 25.088; BAPD 207244.

[7] Forbes 1987. For further information on plaster casts for the production of new vessels look at Lebegyev 2010, 101–105.

[8] Gaitzsch 1986.

[9] Schelp 1975.

[10] A short overview: Der Neue Pauly 6 (1999) 152 s.v. *Kalathos* (R. Hurschmann); cf. fn. 2.

[11] Columella 7, 8, 3–4: baskets used for the production of cheese are called *fiscella*/*calathos* by Columella.

[12] The *kalathos* needs to be distinguished from the cylindrical intermediate element on top of statues (*caryatids*) supporting an entablature, which is often falsely called *kalathos*, a better term is πόλος, *polos*; Der Neue Pauly 10 (2001) 40 s.v. Polos [3] (R. Hurschmann).

[13] Vitr. *de arch*. 4, 1, 9–10. It seems that a similar custom was practised on the Crimean peninsula in Roman times: grave goods were stored in lidded baskets. On the one hand stone vessels in the shape of a basket are known from the whole Roman Empire, both as urns as well as grave markers: Gostenčnik 2001. On the other hand, there was the tradition to bury the deceased in an urn whose shape referred to the profession of the dead: Hackworth Petersen 2003.

[14] Plin. *NH* 21, 23 compares the flower of a lily with the *kalathos*. P. J. Connor, following R. T. Williams, suggests dividing the ceramic *kalathoi* (see below p. 193) into Form A (flared) and Form B (non-flaring solid-walled); Connor 1973, 61. An exception is the bellied *kalathos* with a flaring rim, which is depicted on an early Roman stele in Bursa: Bursa, Museum Nr. 544; Pfuhl 1977/79, 1, Nr. 383 Tab. 62. On similar bellied baskets on late Roman monuments see *ibid*. Nr. 550. 931. 979.

[15] Baskets with the same shape as the wool basket are used for fruits and flowers. In this case, the mostly bulging filled basket is to be seen as a symbol of fertility, especially in connection with Ceres, Erotes, *genii* and the personifications of seasons. The overturned basket, often seen on Roman sarcophagi, in particular in scenes showing the abduction of Persephone, or on the so-called Triptolemos-sarcophagi, is interpreted as a reference of a happy life in the hereafter.

The wool basket could also be used for intermediate storage of raw wool. Considering the process of wool working one will recognise though that spinning is possible without using a wool basket.[16]

Kalathos – Etymology

The term *ka-ra-to* referring to a willow basket is attested in Linear B.[17] Although the production of textiles is well documented in Linear B, the basket called *ka-ra-to* was more likely used for spices.[18]

The Greek word κάλαθος, *kalathos*, seems to be descended from the Linear B term. Besides the term for a basket of reasonable size (*kalathos*), the diminutives καλάθιον and καλαθίσκος[19] are noted. Moreover a basket could be called τάλατος.[20] It seems that expressions related to wool working, like ταλασία and others, derive from this term.[21] Latin modified the Greek word to *calathus/calathum*, less common was the diminutive *calathiscus*.[22] At the same time the term *quasillus*/*quasillum* (also *qualus*/*qualum*) is noted for a conical basket, flaring at the rim, named after its use in the textile production process.[23]

Form and function

The term *kalathos* is used primarily for a basket of a specific shape, most often made of willow rods (though the main criterion for identification is not the material).[24] When the *kalathos* is imitated in other materials though, it usually lost its original function as a wool basket: examples made from clay, metal, glass and stone are known. From the Geometric period onwards, potters imitated the shape of the *kalathos*.[25] Such ceramic *kalathoi* vary in height, although miniatures (*kalathiskoi*)[26] are far more common than *kalathoi* of a functional size. The surface can be left undecorated or can be decorated with patterns referring to a woven structure; in particular triangular holes, often left in the body of such *kalathoi*, seem to imitate the texture of the woven material.[27] Of course such vessels could hold wool or yarn, but they also served other purposes.[28]

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[16] White ground *oinochoe* London, British Museum D 13; BAPD 204379. All different work stages of textile production are depicted on the Attic black figured *lekythos* New York, Metropolitan Museum 31.11.10; BAPD 310485: the wool basket can be seen in use in different activities.

[17] Nosch 2012.

[18] My thanks to J. Weilhartner, Austrian Academy of Sciences, for the help with the Linear B scripts; see Weilhartner 2014.

[19] For etymology and other literary quotations see: Frisk 1960, 759; Schipporeit 2006, 265. Taking up a suggestion by W. Darden, H. Craig Melchert recently translated the rare Hittite word *karzan*- as wool basket: Craig Melchert 1999.

[20] *Anth. Pal*. 6, 39; 47–48; 174; 274.

[21] Blümner 1875, 96–97. A τάλαρος could be used for flowers and cheese too, see Passow 1993, 1815–1816.

[22] White 1975, 70–73; Cullin-Mingaud 2010, 176–179.

[23] White 1975, 59–61; Cullin-Mingaud 2010, 197–198. There is evidence to suggest that baskets of this shape could be used in many ways.

[24] For a compilation of the literary sources see Schipporeit 2006.

[25] Casts of older baskets (‘replica’) see Lebegyev 2010, 101–102.

[26] Particularly small are some kalathoid cups of the Archaic period found in the Athenian Agora: they are interpreted by B. A. Sparkes and L. Talcott as plugs: Sparkes and Talcott 1970, no. 290–302.

[27] E.g. *kalathoi* or fragments of baskets with perforated bodies from a grave of the Athenian Agora: Smithson 1968, 98–103 no. 28–34 tab. 28. Mainz, Johannes Gutenberg University 52; BAPD 1003558.

[28] Oakley 2009 distinguishes figured painted vessels in a *kalathos*-like shape more precisely and sets apart a group of slim vessels, which were used as cups.

Ceramic *kalathoi* with figural decoration are relatively rare,[29] if found they can mainly be seen as vessels of representative character although some of them are small in size. *Kalathoi* are known as well in more recent ceramics, for instance in Gnathia ware.[30]

Metal *kalathoi* are especially magnificent; the early Roman silver *kalathoi*, some originally made with handles, are especially well-known.[31] A silver *kalathos* with a golden rim is mentioned by Homer as belonging to Helen, this one even ran on wheels.[32] In my opinion the actual use of such silver *kalathoi* as wool baskets is questionable – like the ones with figural paintings – their main purpose was more likely decorative and symbolic as described below. Sometimes silver vessels in the shape of a *kalathos* are seen as models for cups made of glass, which are not only depicted on wall paintings – mostly filled with fruits – but also survive as real artefacts in Italian cities.[33]

Archaeological, literary and epigraphical evidence

As mentioned above, textile production in antiquity was mostly a product of private households; it was not until Roman times that an industrial manufacture was established. The labour-intensive and time-consuming production of yarn, the spinning,[34] is also a household activity. The *kalathos* embodies a useful – perhaps dispensable – utensil during the spinning process with a hand spindle as it was used in private households.

Private houses

Our knowledge about the production of textiles in private households derives mainly from literary sources. Material evidence of weaving – represented by the numerous preserved loom-weights[35] – can be found throughout antiquity, but the preparation of raw wool and production of yarn seldom left tangible archaeological evidence. Not only does the material used decay easily, but also this activity was not tied to a fixed place. The utensils needed for spinning and carding are easily transportable, therefore the work can be carried out almost anywhere – depending on weather and

[29] Williams 1968; Ζαρκάδας 2009; Oakley 2009. Further Bundrick 2007, 305, considers wedding gifts in this case. See also Sparkes and Talcott 1970, 80 fn. 3, for a list of more figured painted and black-glazed examples. Interesting in the context of wedding ceremonies is the Attic red-figured stand of a Lebes, Athens National Museum 12894; BAPD 9025012: depicted are four dancing girls, a *kalathos* is placed beside each of them on the ground. Because of the vessel's shape, the image is interpreted as dance during a wedding ceremony. Further a *kalathos* is depicted among wedding gifts on the Attic red-figured *pyxis* Berlin, Antikensammlung 3373; BAPD 430. Likewise on the Attic red-figured *loutrophoros* Munich, Antikensammlungen 9493; BAPD 28803, the only depicted wedding gifts are *alabastron* and *kalathos*, apparently an allusion to sexuality and economic skills.

[30] New York, Metropolitan Museum 06.1021.221: *kalathos* of Gnathia-ware. Braunschweig, Herzog Anton Ulrich Museum 286; BAPD 1002105: *kalathos* of Gnathia-ware.

[31] Menninger 1997, no. 1 fig. 2 (section). Plaited fruit baskets in the shape of a *kalathos* have handles too, e.g. Naples Museum, Cullin-Mingaud 2010, 63 fig. 37; Herculaneum, Cullin-Mingaud 2010, 64 fig. 39.

[32] Hom. *Od*. 4, 125. 131–132: ἀργύρεον τάλαρον or. θυπόκυκλον.

[33] Naumann-Steckner 1999, fig. 3–4; see also Harter 1999, fig. 6 (House of Julia Felix, Pompeii). For the distinction of cups and baskets see Oakley 2009.

[34] For more on the literary tradition, the long time required and the usage of the spinning as metaphor for Greek women, see Carr 2000. Wool work was probably not the task of individual women but was carried out in groups. Athen. 14.618d–e mentions special songs for weavers and spinners; songs and the exchange of stories and news accompanied this demanding and at the same time tiring work. This was recently disputed by A. Karanika 2007, 146.

[35] See also the findings from Olynthus, although the room-separation of Greek houses by gender may consequently be questioned: Cahill 2002, 169–180.

lighting conditions. Pictorial sources and holes found on the rims of some *kalathoi* suggest that the wool basket could be stored hanging if not needed.[36]

Sanctuaries

Again, it is mainly literary and epigraphic sources that inform us about textile production in sanctuaries, mostly in the performance of ritual.[37] With regard to the tasks of weaving, a *kalathos* was as functional and useful in sanctuaries as during the textile production in private households. Therefore, *kalathoi* likely belonged to the features of sanctuaries related to textile production. Particularly in sanctuaries dedicated to Hera, but also in others, mainly of female deities, e.g. Demeter, *kalathoi* serving as votives to the deity are recorded, often appearing as miniature vessels. These are mostly clay models dating from the Geometric to Archaic period, although a few examples are later in date.[38] Rare examples are found in bronze, for instance the example from the sanctuary of Artemis in Lousoi.[39] The marble *kalathos* dedicated to Demeter in Knidos represents another exception.[40] Inventory lists of the Brauronion at the Acropolis in Athens count numerous *kalathoi* filled with wool – probably small in format: ἔρια μαλακὰ ἐν καλαθίσκοι.[41] After the wool was used for the ritual textile production, the empty baskets likely remained within the sanctuary because moving votive offerings out of the *temenos* was in most cases forbidden.[42]

In the sanctuary of Athena on the Acropolis in Athens textile production played a crucial role: the *peplos* for Athena, produced by the ἐργάστιναι, is one of the most famous and most discussed ancient textiles even though not a single thread of it remains.[43] Also on the Acropolis, several *manumissiones* addressed to Athena mention ταλασιουργοί – mostly translated with the general term 'wool-workers'.[44] One can observe that the term for the profession derives neither from the spindle nor from the loom but from the wool basket (as τάλατος).

Furthermore some written reports of processions where a *kalathos* seems to be the centre of religious activity survive. However, we are rarely informed about the actual content of these ritual baskets.[45]

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[36] E.g. Tarento, National Museum *IG* 8332; Reeder 1995a, 107 fig. 7; Schipporeit 2006, no. 703b: A woman storing fabrics in a big chest, a *kalathos* in the background hanging on the wall. The same motif can be found in grave chambers from South-Italy; see below note 83. – *Kalathoi* were apparently hanging; this is already shown by the two holes close to the rim of a Proto-geometric miniature *kalathos* from Athens: Athens, Agora Museum P 24792. Two holes were recognised as well on a figurative painted *kalathos*, Berkeley, Phoebe A. Hearst Museum of Anthropology 8/3342; BAPD 9088.

[37] Reuthner 2006, 267–323; Gleba 2009.

[38] Baumbach 2004, 35 (e.g. Perachora); Risser 2001, 71–76.

[39] Schipporeit 2006, no. 723.

[40] IKnidos 140.

[41] Schipporeit 2006, no. 715. Besides, bags, *othomioi*, are also known as containers for wool dedicated to the gods: Linders 1972, 19.

[42] οὐ φορά-law: Németh 1994.

[43] Reuthner 2006, 295–323. Palagia 2008a, 34 image 5–6: girls building the loom for the production of the *peplos*.

[44] Wrenhaven 2009 interprets the mentioned ταλασιουργοί as bought out prostitutes. Although some of her arguments are convincing, the iconographical explanations, especially those concerning the supposed wool basket, are problematic. Wrenhaven calls the objects in question 'working baskets'; illustrations of *symposia* show them hanging on the wall in the background. But these baskets, which Wrenhaven apparently interprets as *kalathoi*, show a rounded, not flat bottom, as it would be necessary for a wool basket standing to the feet of a spinning woman. Such baskets are also depicted in numerous images of *symposia* where no *hetairai* are present. These baskets rather serve as containers for bringing goods to the *symposium* and taking the leftovers from it.

[45] Schipporeit 2006, 266.

Burials

Objects found in graves are usually associated with notions of the afterlife, independent of the funeral rite (cremation or inhumation). The quantity and quality of the grave goods directly depended on the family's wealth, the social position of the dead and religious ideas. When grave goods are involved in a religious context, they usually represent objects of value and use for the deceased, objects which one cannot do without in the afterlife. These objects could be buried with the human remains or supplemented, or even replaced, by corresponding pictures. In a certain way grave goods reflect the life of the deceased. With regard to this aspect, objects generally associated with laborious work and livelihood might seem unusual as grave goods. Tools used for the production of textiles were, indeed, quite popular grave goods. These objects are usually interpreted as belongings of the – mostly female – deceased. Some of them, however, are made from precious material and do not show any traces of use. Such objects may have been specially manufactured for funerary purposes. This method becomes understandable when considering their symbolic value.

Baskets survive as rarely in graves as in other archaeological contexts. However, because other tools for wool working are found in graves, it is suggested that *kalathoi* very likely functioned as grave goods too. For the most part archaeological evidence is only found when the *kalathoi* were made of durable material. Miniature *kalathoi* for instance were common grave goods as early as Protogeometric and Geometric times in Greece.[46] In Italy, especially in Daunia, *kalathoi* made from clay were popular grave goods too. There, however, the ceramic baskets were filled with fruits or eggs[47] – at least in the cases where the content could be reconstructed.

It is again epigraphic evidence which demonstrates that textile production and wool working were of importance within the contexts of burials; often the wool itself is the focus of funerary inscriptions, especially when using the laudatory but standardised expression *lanam fecit.*[48]

Pictorial representations of the wool basket

Baskets are partly transparent making a realistic depiction difficult.[49] Therefore the artists often tried to emphasize the characteristics of wickerwork of a basket using colour and relief (Fig. 9.1).[50] Roman basket illustrations often show a jagged surface, which cannot refer to the actual production technique, but rather seems to be the artistic representation of the manufacturing and visual appearance of wickerwork.[51]

[46] Eleusis, so called Isis-tomb: CVA Athens (1) Plate 6, 8. 10–11. For further examples, see Connor 1973. Lebegyev (2010, 105) draws attention to the double perforation in the bottom of numerous of these miniature *kalathoi*. This tradition dates back to Mycenaean times, e.g. *kalathos* with handles and decoration in the chamber tomb underneath the temple of Ares on the Athenian Agora: Athens, Agora P 21200; Immerwahr 1971, no. VII-24 Plate 39–40. Vessels in the shape of a *kalathos*, with and without handles, are known from sanctuaries of the 2nd millennium BC but also from graves and settlements; typologically a *caesura* is noted with the beginning of the Protogeometric period: Desborough 1952, 113–117.

[47] Sguaitamatti 1983.

[48] See below, note 82.

[49] Concerning the difficulties of the depiction of non-solid objects*, inter alia* baskets, see Cohen 2014.

[50] Stele depicting a seated woman of the Penelope type, a *kalathos* is placed under her *diphros*: Rhodes, Museum; Pfuhl 1977/79, 1, no. 64 tab. 17. The wickerwork of the plain sculptured *kalathos* was illustrated in colour. A double-stele shows a big *kalathos* on its backside, here the wickerwork is represented in relief: Miletus, Museum: Graeve 1986; Fig. 9.1 (in this paper).

[51] Rauws 2012.

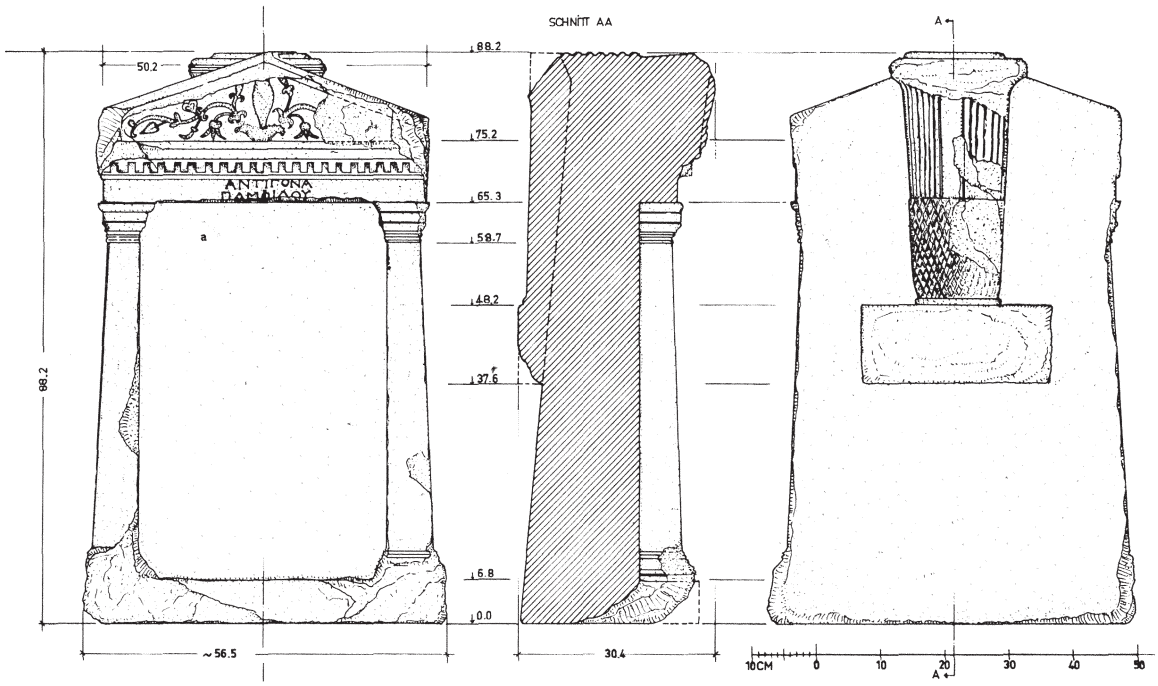

Fig. 9.1 Stele, found in Heroon I in Miletus (© IstMitt 38, 1986, 9).

For the most part the characteristic shape of a *kalathos* is clearly recognizable in pictures from every period. The depiction on a *tintinabulum* from the Villanovian period shows a basket between two spinning women. Although it differs from the wide-mouthed shape found in Greek and Roman antiquity, it can definitely be identified as wool basket because of its context[52] (the three other scenes show illustrations of textile processing too).

Generally the pictures from antiquity have a deeper meaning than simple aesthetics. The illustrations make use of an extensive repertoire of codes transferring a more complex message to the contemporary viewer than the specific content of the depiction itself. Of course the chosen topic depends on the function of the picture and refers to its audience. Although at first glance it might seem a negligible topic, pictorial representations of wool working and the production of textiles are detected throughout antiquity. Such illustrations of textile work often depict the wool basket as well, even though it was not necessarily needed in order to produce yarn.

Household

In Greek vase painting the wool basket is particularly well-documented. The *kalathos* is often seen as a characteristic feature for indoor scenes (Fig. 9.2). Specifically in pictures of scenes from inside the women's quarters, women are depicted while working wool.[53] In such illustrations the

[52] Even though the *tintinabulum* was found in a grave, the scenes depicted on it belong to a household environment: Bologna, Museum: Grömer 2004, 175 fig. 7; Gleba 2007, esp. fig. 11.1.

[53] Lewis 2002, 130–171: besides other bits and pieces characterising the environment of a scene, especially the double door and the *kalathos* as setting a scene into the women's quarters: 136. E.g. Attic red-figured *pyxis* New York, Metropolitan Museum 06.1117; BAPD 210088.

Fig. 9.2 Tondo of an Attic red-figured cup: two women preparing wool. Berlin, Antikensammlung. Staatliche Museen zu Berlin, Inv. no. F2289 (© Antikensammlung. SMB, Photo Johannes Laurentius).

wool basket is either part of the spinning process or functions as container for balls of wool.[54] The scenes from inside the women's quarters could also be moved into a mythological level. In this regard, an Attic red-figure *pyxis* is of high interest: six women are depicted busy with various tasks inside the house, whose interior is indicated by a column; one of them spinning with a *kalathos* at her feet. In the case of this *pyxis* the women are not anonymous figures but identified by several inscriptions as Iphigenia, Danae, Helen, Clytemnestra and Cassandra.[55] Other similar scenes of women's quarters are also depicted on *kalathos*-shaped vessels.[56]

Kalathoi are also depicted on Greek vases in other contexts. Illustrations on south-Italian vases make use of the *kalathos* as a symbol of a future marital relationship, for instance when showing meetings of Perseus and Andromeda, and Paris and Helen.[57]

[54] Bundrick 2007, collected about 300 Late Archaic to High Classical images of wool working; he divided them into 3 categories: during work, handling objects related to textile work, and scenes with objects for wool working in the background.

[55] London, British Museum E773; BAPD 209970; Bundrick 2007, 295, with further mythological scenes. Perhaps even the inscriptions on a fragment of an *epinetron* already point to the mythological surroundings: Athens, Acropolis collection 2644; Badinou 2003, E 36 Plate 21.

[56] E.g. Newcastle, Shefton Museum 853; BAPD 9115; Oakley 2009, Nr. 10. Instead of the figurative surface a simple network may decorate the surface. An encircling ring about half way of the vessels height additionally emphasises the imitation of wicker: Athens, National Museum 18522; Ζαρκάδας 2009, fig. 12.

[57] Ewigleben 1995, no. 7. 9. Baggio 2008. Cf. fn. 84–88.

The famous picture of Penelope, painted by Zeuxis, only survived as a literary description by Pliny: "the peculiar character of that matron appears to be delineated to the very life."[58] Since many statues named 'Penelope' are accompanied by a *kalathos,* it is possible that Zeuxis used the same attribute. The early Classical statue type depicts a seated woman apparently lost in thought, with a *kalathos* placed underneath the *diphros*.[59] The so-called Campana-reliefs that show Penelope can be compared with this sculpture-type, as can terracotta reliefs from Melos dealing with the same subject matter.[60] Even though a mythological scene is shown, as on the *pyxis* mentioned above, these illustrations essentially depict a woman within her domestic environment, with a *kalathos* being both appropriate and informative.[61]

Fig. 9.3 Loom weight: Athena's symbolic animal with distaff, spindle and kalathos (© Pennsylvania, Penn Museum CG2006-6-3).

Naturally baskets of various shapes are used anytime and in many ways in every household in all periods. Roman mosaics depict estates and fieldwork, where the relevant tools – including baskets – are presented in detail.[62] Only a few, however, depict actual wool baskets, a situation similar to numerous Roman frescoes showing baskets.[63]

Sanctuaries

The art of weaving was, like many other types of craftsmanship and artistic skills, a gift from Athena to humanity. The epithet *Ergane* highlights the technical versatility of the goddess. Thus while depictions of Athena with distaff and spindle should be expected,[64] representations of her with a wool basket remain exceptional.[65] However, loom weight stamps do show the "owl", the symbol of Athena, with distaff, spindle and also with *kalathos* (Fig. 9.3).[66] The same applies to

[58] Plin *NH*. 35.36 (Translation T. H. Riley and J. Bostock). The nature, Pliny was alluding, certainly corresponds with the short description of Penelope, the shadow of Agamemnon gives to Odysseus who travels the underworld; Hom. *Od*. 11.445–446.

[59] Kader 2007; LIMC VII 2 (1994) 291–295 *s.v.* Penelope (Ch. Hausmann), esp. 295: the intentional destruction by the soldiers of Alexander indicates that the represented woman was not yet seen as Homer's Penelope but rather a personification or allegory.

[60] Stilp 2006, 100–101.

[61] O. Palagia wants to recognise a Thasian gift to the Great King: Palagia 2008b. T. Hölscher more recently interprets the subject in relief as desire for peace: Hölscher 2011. Spartan women in Roman times consider themselves verbally as successors of Penelope; Pomeroy 2008, esp. 228–229.

[62] Blanc 1990.

[63] E.g. in Oplontis a plaited basket is depicted on the wall; for studies of reconstructions of this basket see Cullin-Mingaud 2010, 76 fig. 75–76.

[64] Villing 1998 on the places of worship of Athena Ergane see esp. p. 154. Compare also Consoli 2004.

[65] Figurine found in the Athena sanctuary in Himera: Consoli 2010, 19–20 fig. 9.

[66] Paris, Louvre CA 1744; Barber 1994, fig. 10.3; LIMC II 1 (1984) 955–1044 s.v. Athena (P. Demargne), esp. 1019 no. 44. Philadelphia, Penn Museum CG 2006-6-1 to CG 2006-6-4.

other goddesses (Aphrodite, Artemis).[67] Some epithets derive from ἠλακάτη, spindle;[68] epithets going back to the basket are not known.

Baskets in the shape of a *kalathos* adorned altars, too. Although these were seldom filled with wool, such baskets are mostly interpreted as symbols for the Eleusinian cult and for the cult of Ceres.[69]

Graves, gravestones and grave goods

Depending on stylistic and religious traditions gravestones may be richly decorated. Each element of that decoration has its meaning(s) and delivers a message addressed to its contemporaries. Again, tools for textile production appear in this context. Within the large group of Attic gravestones, depictions of *kalathoi* are relatively rare; if they are depicted, they are usually combined with distaff and spindle. All of these gravestones are dedicated to women. The deceased is depicted either doing wool work or seated with the *kalathos* placed on the ground next to her.[70]

This repertoire of images was extended on Hellenistic gravestones, in particular those from East Aegean regions where details such as the *kalathos* placed on a shelf in the background and a servant carrying a *kalathos* were added.[71] A few examples even show the *kalathos* in the pediment of the funerary stele.[72] A *kalathos* placed next to a book and flowers, on a shelf in the background is described in detail by the epigram on the gravestone of Menophila by the following words: εὐτάκτου δ'ἀρετᾶς τάλαρος μάνυμα.[73] The depiction of the book is explained by the epigram as a reference of the wisdom, σοφία, of the deceased; the basket as indication of disciplined virtue, ἀρετή.[74]

On Rhenia, funeral stelai showing the type of the 'grieving Penelope' were especially popular during the Hellenistic period; the *kalathos* is placed – as in the Classical model – underneath the seat of the deceased.[75] An outstanding example is the extravagant grave of Tertia Horaia.[76] The sarcophagus rests on a columned podium, and a grave stele showing a figural scene was placed above it. Besides the inscription and a big carved *kalathos* the sarcophagus itself was left undecorated. An Attic grave monument made from a *kalathos* placed on a small box is one of the rare examples

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[67] Işık 2008: The spindle as an attribute of the Anatolian mother goddess.

[68] E.g. εὐηλάκατος; χρυσηλακάτος (Hom. *Od*. 4.122).

[69] Schipporeit 2006, 268–269.

[70] Stears 2001, 113: "However, the paucity of scenes displaying the attributes of textile production is puzzling considering the emphasis placed upon it in the literary texts which inform us of women's roles." Cf. also Hoffmann 2001. Compare the grave stone of Kornelia, who was named *glykonos gyne* in the inscription: Brueckner 1909, fig. 26n.

[71] Verona, Museo Maffeiano 28640; Pfuhl 1977/79, 1, no. 414 Pl. 68: *kalathos* on a shelf in the background. Bursa, Museum No. 2593; Cremer 1991, K55 tab. 16: A small slave hands an oversized *kalathos* to the deceased Melissa, who is represented in the pose of the 'sorrowing Penelope'.

[72] Verona, Museo Maffeiano No. 28666; Pfuhl 1977/79, 2, no. 1877 Pl. 269: grave stone of Polla; a small servant carrying a basket; a big *kalathos* standing in the tympanum. Izmir, Kültürpark 873, Pfuhl 1977/79, 1, no. 972 (the inscription is partly eroded). Further compare the fragment of a funerary stele with an arched niche Athens, Agora I 799, Bradeen 1974, no. 74 Pl. 3.

[73] Istanbul, Archaeological Museum I 4033; Pfuhl 1977/79, 1, no. 418; Merkelbach and Stauber 1998, 408–409; Hesberg 1988, 313–316. Comparable objects are called σύμβολα in other epigrams, ib. 318. It is striking that neither the depicted objects nor the servants are represented in realistic size.

[74] The detailed and very personal epigram needs to be seen as an exception; Schmidt 1991, 139–141.

[75] Couilloud 1974, no. 466 Pl. 81. Further compare the Hellenistic stele from Rhodes, showing a woman seated on a throne and a *kalathos* placed underneath; Pfuhl 1977/79, 1, no. 965 Pl. 143.

[76] Couilloud 1974, Nr. 58 fig. 9 Pl. 93.

Fig. 9.4 White ground lekythos: Visit at the tomb. Vienna, Kunsthistorisches Museum Antikensammlung IV 3746 (© Vienna, Kunsthistorisches Museum).

where the monument itself has the shape of a *kalathos*.[77] Further, the *kalathos* placed underneath a *diphros*, depicted on a white-ground *lekythos* (Fig. 9.4), probably represents a gift brought to the grave; this item enables us to interpret the grave as a female grave.

In Roman times, too, references to textile work are found quite frequently in funerary iconography, though apparently with different regional popularity. On gravestones from Asia Minor the wool basket is often depicted in combination with distaff and spindle.[78] Further the wool basket is a popular depiction on grave stelai from Zeugma where it appears alone, without the other known textile implements, and thus represents by itself a pictorial element of women's graves.[79]

The representation of the wool basket on gravestones is also well-documented in the north-western provinces of the Roman Empire, for example, on the funerary stone of a married couple in Cologne which shows the wool basket next to the seated wife.[80] On the gravestone of Regina,

[77] Athens, National Museum 1052; Reeder 1995a, 96 fig. 7; Brümmer 1985, 704, points out the common occurrence of boxes/chests and wool baskets, the wool basket being placed on the chest. Considering the Athenian grave stone compare the Hellenistic grave stone of Antigona from Miletus (Fig. 9.1), Schörner 2007, Cat. A16 fig. 94.

[78] While various 'male' sepulchral elements are known, deriving from divergent spheres, the funerary symbolic of females is focused primarily, for example in Asia Minor, on spindle, distaff, wool basket and comb: Nollé 1985. In the plain of Tembris, Phrygia, the wool basket is depicted in combination with a songbird: Lochmann 2003, 75.

[79] Wagner 1976, 115–116. 158–159. Often the basket is additionally combined with distaff and spindle. In this region the spinning tools are often found in the hands of the deceased (especially popular in the region of Palmyra), an iconographical detail which is spread across the whole Roman Empire.

[80] Cologne, Römisch-Germanisches Museum, Insel 108,24 Inv. no. 86; *CIL* XIII 8283: the names of the deceased are

a freedwoman from South Shields, a basket near the feet of the deceased is unusually represented with two handles; it contains round objects, which may well be identified as balls of yarn.[81] In Italy *kalathoi* are represented on some funerary monuments too – these are seen as pictorial supplements to the common inscription, *lanam fecit*.[82]

Similar to the actual grave goods, *kalathoi* are found among the painted objects of graves. Objects for the afterlife are depicted between scenes from the life of the deceased or mythological scenes.[83]

Further contexts

Wool working is represented in mythological pictures too. The wool basket appears, for example, in images of the thread of life being spun by the Moirai/Parcae, even though the *kalathos* does not play an essential role in this or any other ancient myth.[84]

The representation of *kalathoi* is especially conspicuous in Apulian vase painting, for instance among depictions of the chained or just released Andromache.[85] Further, in scenes of Heracles and Omphale the *kalathos* represents an additional element of wool working, a woman's task Heracles is committed to do.[86] The *kalathos* acts in a similar way in scenes showing Achilles among the daughters of Lykomedes.[87] Moreover, pictorial representations of graves show the *kalathos* among the grave goods, for example, illustrations of the grieving Niobe standing at the grave of her daughters show *kalathoi* next to the grave, and these are probably to be understood representative of the dead daughters.[88] Grave pillars crowned by a *kalathos* are noted on Italian vase paintings.[89] Roman coins from Alexandria even depict a basket in the shape of a *kalathos* alone, although filled with poppies and ears of corn.[90]

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known due to the inscriptions: Marcus Valerius Celerinus, *veteran* of the 10th legion, and his wife Marcia Procula: Larsson Lovén 2007, fig. 37.1; more grave stones see Larsson Lovén 2007, 46–52. Baskets in the shape of a *kalathos* but with different functions are known (compare above) e.g. a big turned over fruit basket in the corner of a pediment of a tomb from Neumagen at Trier, Rheinisches Landsmuseum 9996, and many other scenes with fruit baskets, especially in sepulchral context.

[81] Phillips 1977, no. 247.

[82] Larsson Lovén 2002, 82–83.

[83] For example the Lucanian grave of the black rider, Paestum, Andriuolo, grave 58: In the background behind the prothesis of a young woman, a turned-over basket and balls of yarn are shown; Pontrandolfo and Rouveret 1992, 153. 213 fig. 3. Cf. note 36.

[84] LIMC VI 1 (1992) 636–648 *s.v.* Moirai (St. De Angeli).

[85] For example an Apulian red-figured volute *krater*, Malibu, Getty Museum 85.AE.102, CVA Malibu 4 (USA 27) Tab. 190–192; Apulian red-figured *oenochoe* Ewigleben 1995, no. 9. Further see LIMC I (1981) *s.v*. Andromeda (K. Schauenburg) no. 10. 11. 15. 16. Compare note 57 above.

[86] LIMC VII 1 (1994) 45–53 *s.v*. Omphale (J. Boardman); Cottica 2007, 222: "the objects exchanged between Omphale und Heracles are traditional symbols of feminine and masculine gender."

[87] The wool basket is not necessary but enriches the scenario of wool working, like in older scenes of women's quarters; compare LIMC I 1 (1981) 37–200 *s.v.* Achilleus (A. Kossatz-Deichmann), especially no. 102 (bellied baskets fully stuffed with wool) and 175 (overturned basket when discovering Achilleus).

[88] LIMC VI 1 (1992) 904–914 *s.v*. Niobe (M. Schmidt). Generally grave goods are often depicted in South-Italian vase painting.

[89] Examples see Schipporeit 2006, no. 737.

[90] Schipporeit 2006, no. 741–744.

The *kalathos* as a symbol[91]

In a predominantly illiterate population images naturally play an important role. Therefore ancient images are far more than depictions of real circumstances. They constitute a system of artistic ciphers constructed to allowing the images to convey corresponding statements: representations of deities, for instance, can be identified via their depicted attributes. Moreover characteristic elements for the representation of humans were developed, giving information about their status, social position, physical condition and more, hence the staff identified a draped male person as Athenian citizen in Attic art.

G. Ferrari,[92] who intensively studied the interaction of men and women in ancient Greece, defines wool working "the quintessential marker of feminity" in the period from Late Archaic to Late Classic. E. J. W. Barber notes the high social significance of textiles: "Society has apparently used the fiber arts – both the products and their manufacture – for social as well as practical purposes almost from the start."[93] Consequently textiles were more than a protection from the weather; they acted as expressions of interpersonal discourse. Evidence suggests that representations of wool working, such as those introduced above, can also be read and interpreted in a similar way; even the tools needed for wool working may be used in such a 'symbolic' connotation. This was repeatedly proposed especially for images of spinning women and depictions of the required tools, spindle and distaff.[94] Moreover this explains the alienation of the devices in the following way: there are objects shaped like distaff and spindles which definitely were not functional due to material, scale etc. We have a comparable evolution in objects shaped like a *kalathos*; some of them can not be used easily because they are too small or because of the rich decoration.[95] In this perspective I suggest adding the *kalathos* to the group of devices used for textile production, and thus ascribe to it a similar, more ambitious meaning. Which part of femininity was emphasised by wool working is a matter of considerable debate especially in the study of Greek art.[96] An *alabastron* in Paris shows a couple, the male figure standing, the female seated with a *kalathos* next to her.[97] The inscriptions add a new level of meaning to the otherwise anonymous scene and define the couple as just married: Τιμοδήμος καλός and the rare η νύμφη καλή.[98] The *kalathos* is a "metaphor for the woven fabric of marriage and the oikos" in Attic vase paintings.[99] Like the numerous depictions from women's quarters, the *kalathos* is a symbol for a well-run household. Gravestones from the same period arguably use the same symbolism.[100]

From the Roman period onwards, tools such as a knife, plough, writing tablet and so on, are commonly depicted on grave monuments, and so too are tools of textile production. These images

[91] This aspects will be discussed in more detail in Trinkl forthcoming.
[92] Ferrari 2002.
[93] Barber 2007; compare also Reeder 1995b.
[94] Cottica 2007; Larsson Lovén 2007.
[95] The alienation is best seen by extremely decorated distaffs and spindles which are often made by precious material: Trinkl 2004, esp. fn. 22.
[96] Compare the summary of the discussion from Bundrick 2007 and Wrenhaven 2009.
[97] Attic red-figured *alabastron* Paris, Cabinet of Médailles 508; BAPD 21648.
[98] Similar is an inscription on the white ground *lekythos* in Harvard, Sackler Museum 1991.28, BAPD 28615: The inscription η παις καλή belongs to a woman, who is depicted between distaff and *kalathos*; this inscription is for some scholars an indication to identify the woman as an hetaira, for others to see a woman doing housework.
[99] Bundrick 2007, 320–327. Concerning the context marriage see note 29.
[100] Although Menophila, mentioned above, died unmarried – as we know from the grave inscription.

are not just allusions to the biographical data of the deceased. Like funerary inscriptions, the decoration of gravestones became standardised; the visual and linguistic vocabulary communicates in ciphers to the contemporaries. Therefore the tools for textile production, which are of interest here, do not only reflect primarily a manual craft, but also address a social position and have a representative effect. The image of the *kalathos*[101] is such a cipher,[102] too. Especially during the Early Empire wool working is used as political and/or moralising propaganda;[103] again the focus is mostly drawn to the production of yarn (spinning) or fabrics (weaving). During these activities the wool basket is not essential, and yet on some monuments it is depicted alongside the other tools.

Notwithstanding the fact that Christianity changed almost everything fundamentally, many elements from the iconography, including the *kalathos*, continued to be used: apocryphal images of the Annunciation show a *kalathos* on the floor beside the enthroned Virgin Mary.[104]

Summary

Out of all the collected diverse sources, essentially two statements concerning the *kalathos* and its function as a wool basket can be gained. First, it is a useful but not necessarily needed object for wool working, especially for spinning. Second, the *kalathos* is used as a symbol of skills and domesticity of ancient women in varying contexts. Finally, the *kalathos* is not only used as a container for raw wool, wool strands and balls of wool but also for other objects, like fruits, flowers and others.

Acknowledgments

My thanks go to the editors of this volume who invited me to submit a paper, and to C. Löckher and M. Lawall who patiently improved my English.

[101] Vergil names the wool basket *calathus Minervae* and uses it as a symbol diametrically opposed to war craft; Verg. *Aen*. 7.805. Two different spheres are facing each other on an Attic black-figured *epinetron* Paris, Louvre MNC624; BAPD 303430: on one side wool working women are depicted, on the other three armed amazons. Again a work tool is removed by the figured painting its original use in this case. More on wool working represented on black figured *epinetra* see Badinou 2003, 20–21.

[102] Comparable to epithets used on grave stones, the pictorial attributes lose their individual meaning over the centuries and degenerate to stereotypes. However, the specific 'representative' use linked to social and cultural traditions, remained. For more on female epithets see Hesberg-Tonn 1983, 212–217.

[103] Larsson 1998; Larsson Lovén 2002, 135–140. Compare e.g. the myth of Lucretia, Mencacci 2005. A reference to female virtue is to be found on the frieze of the so-called Nerva Forum, showing the myth of Arachne: Ambra 1991.

[104] E.g. Throne of Maximian, Ravenna, Archiepiscopal Museum.

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10. Unravelling the Tangled Threads of Ancient Embroidery: a compilation of written sources and archaeologically preserved textiles

Kerstin Droß-Krüpe and Annette Paetz gen. Schieck

Did gender of late 19th and early 20th century lead to the fatal mistranslation – and thus misinterpretation – of textile terminology mentioned in ancient texts? Were handicraft magazines for the good housewife responsible for the male misunderstanding of embroidery as the most common textile decoration technique in Antiquity? Male academics enjoyed translating ancient texts into modern languages, as well as collecting, investigating and trading ancient objects of daily use, such as late Roman textiles from Egypt, while their wives were educated to care for their homes and become experts in needlework. Always seeking for new inspiration, authors like Thérèse de Dillmont[1] published embroidery pattern books based on historic motifs contributing to a general confusion about the application of embroidery in antiquity in general (Fig. 10.1). And, while upper-class women and middle-class housewives may have known that the motifs they stitched into cloth were originally woven in tapestry technique, their husbands, who sat nearby to translate the ancient sources, could only think of the term 'embroidery' when it came to decorating textiles, since this was what they saw when they looked up at their wives. Starting from this presumption, this chapter reinvestigates ancient embroidery in a joint approach: analyzing written sources in their original language and contexts alongside preserved archaeological textiles. This approach will shed new light on ancient textile decoration, coming from two directions mutually enriching and stimulating one another.

Some decorative textile techniques

Annette Paetz gen. Schieck

Several ways of decorating textiles can be attested to in antiquity. Some, such as flying shuttle, painting, printing, resist dyeing, appliqué of leather or textiles, beads or pendants, sewing, and embroidery,[2] are purely decorative, while others are both constructional and decorative at the same

[1] Th. de Dillmont, *Motifs de broderie Copte I–III, L'Art Chrétien en Égypte*, Bibliothèque D. M. C., Mulhouse (about 1900). Even though de Dillmont was aware of the ancient techniques of the textiles she took as models, she chose a title for her publications that implied that original Coptic textiles were embroidered.

[2] The flying shuttle technique is a slight exception to this rule. It is employed while weaving the textile in tapestry weaving technique. A separate yarn is added to the weave with a needle, carried on the main-side of the textile, producing fine lines and sketching an image. The thread only dives into the textile to wrap around a warp-thread to gain hold. For

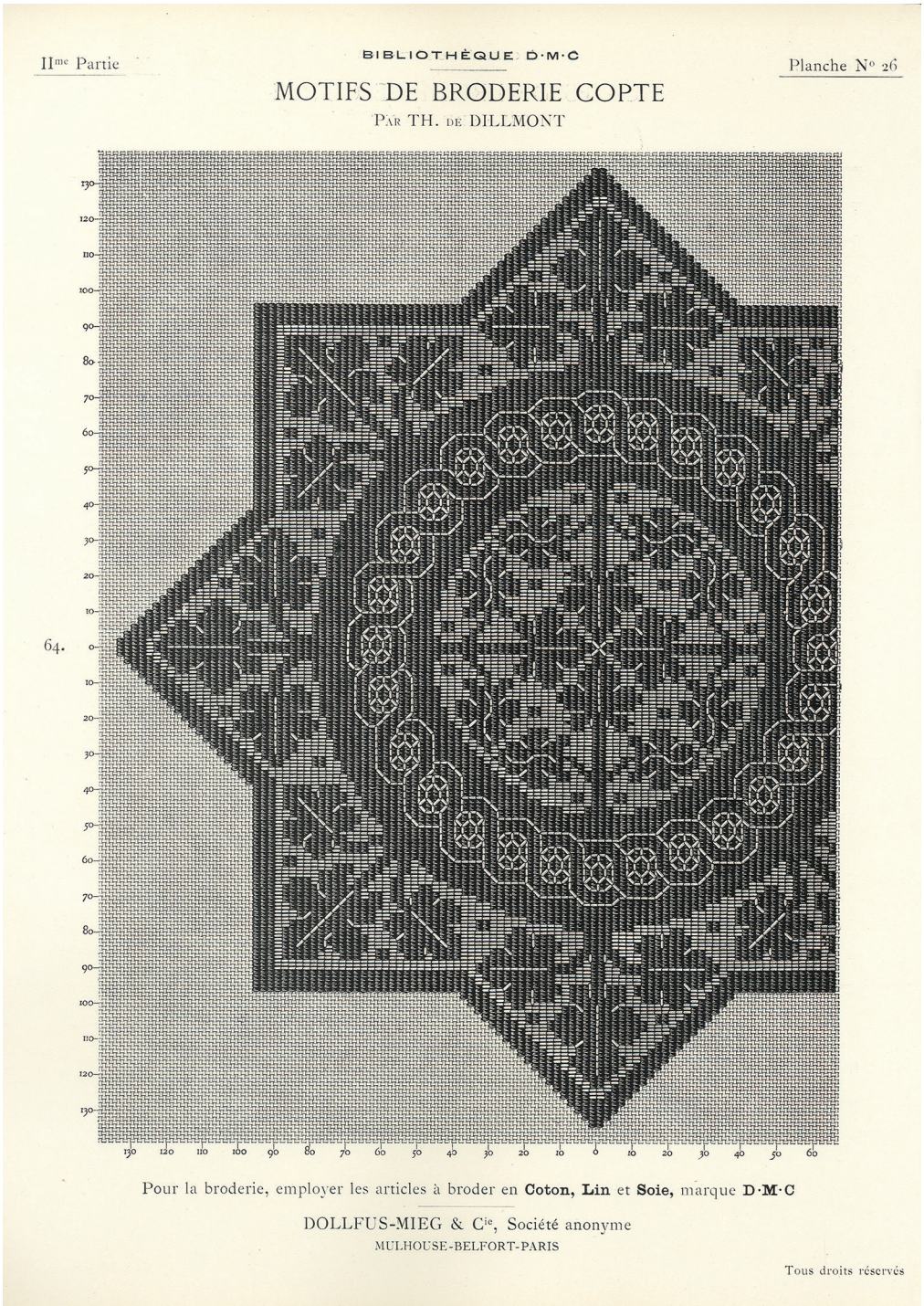

Fig. 10.1 After Thérèse de Dillmont, Motifs de Broderie Copte II, L'Art Chrétien en Égypte*, Bibliothèque D. M. C., Mulhouse (about 1900), pl. 26.*

time.[3] Among those, all kinds of weaving techniques are identified, such as tablet-weaving, tapestry weave, twill, brocading, taqueté, damask, and samite, and even sprang and needle-binding, that create the ornament while producing the cloth[4] (Fig. 10.2a). The main factor determining the first group is that all techniques – except that of the flying-shuttle – are employed on a finished piece of textile (Figs 10.2b–d). As A. J. B. Wace states: "… a pattern is added, usually by another person, with a needle to a finished woven fabric after removal from the loom."[5] Embroidery is an elaborate sewing technique, being an added thread of purely decorative and non-constructional purpose. It derives from first attempts of employing threads of colours other than the weave in order to create a nicely designed line of stitches.[6] Embroidery creates a neat face and a less attractive back, just like the flying shuttle in tapestry weaves. But like sewing, embroidery is applied with a pinpoint tip needle with thread eye serving as the transmitter through the textile. When the pointed tip drives through the cloth, it disregards the woven structure, often harming the woven yarns or even piercing right through them, wherever the decoration requires it.[7] Finally, unlike tapestry woven ornaments, embroidered decoration goes across seams and edges.

Part I – A compilation of ancient written sources on embroidery[8]

Kerstin Droß-Krüpe

Introduction

Embroidery (Figs 10.2b–d) is said to have been a "tremendously common art" in classical antiquity.[9] Hugo Blümner devoted a whole chapter of his fundamental work on technology and terminology of

appliqué textiles and gold elements in ancient Egyptian times: Vogelsang-Eastwood 2010, 25; applied amber buttons and sewn on glass pendants at Verucchio, Italy, 8th century BC, see von Eles 2002, 174 pl. 80 no. 228 a–c, pl. XX.3 no. 228.

[3] See for instance paintings: Cat. Krefeld 2003, 106 no. 220; De Moor 2008, 18, 21–25 fig. 13–20, 114–115; printed ornaments in resist-dye: van Raemdonck, Verhecken-Lammens and De Jonghe 2011, 231 fig. 12; De Moor 2008, 132–133; painted ornaments in resist-dye: Cat. Krefeld 2003, 107 nos. 221–222; De Moor 2008, 80 fig. 112, 134–135; Vogelsang-Eastwood 1995, 89, fig. 151; dyes: Cat. Krefeld 2003, 109 no. 227; appliqué tapestry weaves: Cat. Krefeld 2003, 35 no. 35; 71 no. 133, 72 no. 135, 81–83 no. 161–164, 85–89 nos. 169–176, 91–94 nos. 182–192; appliqué gold elements: Paetz gen. Schieck 2009, 104, 278 no. 83; compare Vogelsang-Eastwood 1995, 31–34.

[4] See for instance brocading: Cat. Krefeld 2003, 103 nos. 211–213, 106 no. 219; De Moor 2008, 208–209; taqueté: Cat. Krefeld 2003, 105 no. 218; De Moor 2008, 78 figs 109–110, 158–159; silk samite: Cat. Krefeld 2003, 104–105 nos. 214–217; De Moor 2008, 14 fig. 9, 60–62 figs 68–73, 82–84 figs 115–123, 89 fig. 130, 128–129, 192–195, 234–247; sprang: Bénazeth 2011, 21–23 figs 9–12; De Moor 2008, 75 fig. 98, 178–179; Fluck and Froschauer 2011, 57–59 figs 3–5; Kwaspen 2011; looping technique: De Moor 2008, 74 fig. 95, 130–131.

[5] Wace 1948, 52, see also 53: "Embroidery again where Plautus has none! It is an obsession of all classical translators."

[6] See for instance Pritchard 2006, 39 figs 13 a–b, 104 figs 4.46 c–d. For the variety of sewing and embroidery stitches, see: Boser and Müller 1984; Winslow Grimm 1993.

[7] Needles employed consist, for instance, of wood, bone, fishbone, bronze, iron, etc. – Janssen 1990, 12 fig. 8 (bird bone serving as a container for 15 bronze needles, New Kingdom, 2nd half of the 2nd millennium BC, Petrie Museum UC 7721); Hall 1990, 57–61, 59 fig. 43–44; Shamir 1999, 99 fig. 21 (wooden needle); Vogelsang-Eastwood 1995, 35–36 figs 54–55 (she mentions three types of needles in Egypt: short needles with two pointed ends, one bearing a hole; needles with one pointed and one flattened end bearing a hole; needles with one pointed and one bent to form a thread eye); Gostencnik 2011, 49 figs 16–17.

[8] This research benefited from a grant from the Prof Dr Adolf Schmidtmann Foundation. I gratefully acknowledge Mary Harlow (University of Leicester/CTR, Copenhagen) for valuable suggestions and discussions, Peder Flemestad (Copenhagen) and Berit Hildebrandt (CTR, Copenhagen) for providing many of the ancient sources I might have been missing otherwise. I would like to thank Matthias Bode (Marburg) for his comments on the English version of this paper. Remaining errors are my own.

[9] "ungemein verbreitete Kunst", Blümner 1875, 218.

Fig. 10.2a–d Tapestry weave versus embroidery – (a) tabula of a child's tunic in tapestry weave, 3.1 × 3.6 cm, linen warp and wefts of wool and linen, about 4th century AD, Deutsches Textilmuseum (DTM) Krefeld inv. no. 12604 © D. Gasse, DTM; (b) chain stitch, (c) running stitch, (d) half back stitch carried out by Laila Glienke © L. Glienke, Copenhagen.

ancient arts and crafts to this method of textile decoration. Embroidery, he explains, was recognized early ("früh bekannt")[10] and this elaborate technique was practiced not only by Greeks and Romans, but also by Egyptians, Babylonians and Phrygians. Fabio Vicari states: "L'arte del ricamo – *acu pingere* – era appannaggio di artigiani specializzati".[11] The elaborate decorations mentioned in the *Liber Pontificalis* are – according to modern researchers – to be considered as embroidered on silk.[12] Any ancient Greek and Latin dictionary provides us with a range of words for embroidery or embroidered textiles: ποικίλτης, πλουμάριος, *plumarius*, ποικίλτα, *pictae vestes* and many others. When it comes to actual archaeological evidence, however, we hardly possess any textiles

[10] Blümner 1875, 218.
[11] Vicari 2001, 7. Similarly Ruffing 2008, 724.
[12] Osborne 1992, 319.

embroidered with colourful yarns – is this just a matter of coincidence? Was embroidery really an omnipresent technique in ancient textile manufacturing?

Looking at passages by ancient authors, as early as 1948 A. J. B. Wace doubted that embroidery was the prevalent way of decorating textiles.[13] Since his paper was little noticed in scholarly research – especially in the field of ancient history and philology – and since he took into consideration only a selection of ancient sources, mainly Homer, this issue is worth a more thorough investigation. This part of the chapter is organized as follows: the first section gives an overview of the ancient literary sources referring to textile decoration, using vocabulary often translated as 'embroidery' in scholarly literature and translated editions. The second section examines documentary sources (i.e. papyri and inscriptions) to present ancient occupational titles of people involved in textile decoration, usually referred to as 'embroiderers'. Some conclusions are drawn in the final section.

Literary sources – from Pliny to Homer and back again

Ancient literary sources mention the art of decorating textiles using different phases as ποικίλλω and variations of this Greek verb, and *pingere, pictus* or *plumatus* in Latin. These terms are usually used to characterise precious, colourful garments; dictionaries translate them as embroidering.[14] This part of the chapter aims to analyse ancient literary sources, trying to find hints whether embroidery was actually meant by these phrases. It investigates the terms used by ancient authors and modern editors alike to describe textiles with patterns or pictorial representations to find out if they really indicate a widespread use of embroidery as a technique of decoration.

When it comes to identifying the origins of embroidery, one constantly comes across a passage quoted from Pliny's *Natural History*.[15] According to him, hints for textiles with pictorial representations (*pictae vestes*) can be found in the works attributed to Homer. He also states that the Phrygians were the first to use a needle (*acus*) to create those textiles (*facere id*), which were thence called Phrygian (*Phrygioniae*). This most likely means that people in the 1st century AD held the opinion that the Phrygians invented the art of embroidery. As a result most modern scholars have read *pictae vestae* as embroidered textiles, which in this context is likely to be correct. Next, Pliny refers to King Attalus II of Pergamon (159–138 BC), whom he calls the inventor of weaving (*intextere*) golden threads. Finally, Babylonians are supposed to be highly praised for their textiles, which show colourful representations (*colores diversos picturae intexere*). Again he uses the verb *intextere*, meaning to weave something in – so most likely tapestry weave. It is interesting to see that Pliny swiftly switches between different ways of decorating textiles – on the one hand embroidering (*acu facere*), on the other hand weaving golden threads and pictures into the cloth (*intextere*). Embroidery and tapestry weave are mentioned here side by side, most likely clearly distinguished by Pliny – and his sources and ancient readers alike. It is therefore quite astonishing to see that all translations of this paragraph provide only one textile technique – embroidery.[16]

[13] Wace 1948.

[14] E.g. Liddle-Scott-Jones 1940, s.v. ποικίλλω: work in embroidery, embroider garments; Slater 1969, s.v. ποικίλλω: embroider.

[15] Plin. *NH* 8,196.

[16] E.g. Philemon Holland (1601): "In Homer's time also they used garment embroidered with imagerie and floure-worke: and from thence came the triumphant robbes. As for embroiderie it selfe and needle worke, it was the Phrygians invention: and hereupon embroiderers in Latine bee called Phrygiones. And in the same Asia, king Attalus was the first that devised cloth of gold: and thence come such clothes to be called Attalica. In Babylon they used much to weave their cloth of diverse colours, and this was a great wearing among them, and cloths so wrought were called Babylonica".

Greek authors

Pliny refers to the works of Homer and the decorated garments mentioned there. When looking carefully at the *Iliad* and the *Odyssey*[17] there are only a few sections of text Pliny might have had in mind when writing about *pictae vestes*: When Homer introduces Helen, he chooses a domestic setting within the *megaron* of Priam's palace:[18] Helen is presented weaving a purple garment of double fold, in which scenes from the battle of the Trojans and the Greeks were figured. Homer explicitly mentions Helen's loom, therefore she is busy weaving, indicated by the use of the verb ὑφαίνω. Again we face a textile that was probably somewhat of the nature of tapestry weave, and most likely not decorated by embroidery.

Another Homeric example of a woman producing a garment is Penelope, weaving the shroud for her father-in-law, Laertes.[19] Again we find the verb ὑφαίνω combined with the mentioning of a large loom – the same phrase that was used when presenting Helen's skills as a weaver. Thus, these verses indicate that the textile was actually woven – and they do not mean that it was decorated after finishing using a needle and thread. As neither colours nor motifs are mentioned, Penelope's weave is – in contrast to the famous depiction of this scene on an Attic red figured *skyphos*, the name vase of the Penelope Painter[20] – simply plain.

This setting is nicely repeated by Homer's description of Andromache, Hector's wife.[21] She is creating a decorated textile as Helen does, but instead of depicting the Trojan war, she has chosen a much more conventional and maybe less challenging motif – Andromache is ornamenting the garment with a floral pattern.[22] Again, the cloth is clearly said to be still on the loom (for Hector's wife is still weaving), and so it is highly unlikely that ποικίλ᾽ means embroidered in this phrase as one would finish the weave before starting any further processing. It most likely indicates "coloured" or "decorated" in a fairly general sense.

A similar phrase appears in the description of the *peplos* Hecabe devotes to the goddess Athena:[23] This *peplos* is said to be a ποίκιλμα. Bearing in mind that ποικίλ᾽ in *Il.* 22,440 can hardly mean 'embroidered', one starts doubting whether ποίκιλμα is really meant to designate an embroidered garment, though this time clearly referring to a finished garment. It might equally have been used to indicate that this dress was colourful regardless of the technique used to apply the colour. The conclusion must be, therefore, that the use of forms deriving from ποικίλλω cannot be understood as an indication of embroidered textiles in the *Iliad* or the *Odyssey*. Other women weave in the Homeric

John Bostock, H. T. Riley (1855): "[...] embroidered garments are mentioned by Homer, and in this class originated the triumphal robes. The Phrygians first used the needle for this purpose, and hence this kind of garment obtained the name of Phrygionian. King Attalus, who also lived in Asia, invented the art of embroidering with gold, from which these garments have been called Attalic. Babylon was very famous for making embroidery in different colours, and hence stuffs of this kind have obtained the name of Babylonian". H. Rackham (1942): "[…] and they had embroidered robes as far back as Homer, these being the origin of those worn in triumphs. Embroidering with the needle was discovered by the Phrygians, and consequently embroidered robes are called Phrygian. Gold embroidery was also invented in Asia, by King Attalus, from whom Attalic robe got their name. Weaving different colours into a pattern was chiefly brought into vogue by Babylon, which gave its name to this process".

[17] Cf. Mueller 2010.

[18] *Il.* 3,125.

[19] *Od.* 2,104–106 and 19,138–150.

[20] ARV² 1300.2. A plain weave would of course raise the question how she could convincingly pretend to work on this textile for three years.

[21] *Il.* 22,440–441.

[22] Cf. Salzmann-Mitchell 2005, 121–123.

[23] *Il.* 6,294–295 and *Od.* 15,107–126.

epics, such as Circe and Calypso.[24] However, none of the garments they produce are described in detail, so we have no idea if they were decorated with figures or flowers or not. The only thing we know is that both Circe's and Calypso's weaving is not yet finished but still set on the loom, so they cannot, in this state of production, be embroidered. All this leads to the assumption that neither the *Iliad* nor the *Odyssey* contain satisfying proof for embroidery: the *pictae vestes* Pliny says are mentioned in the Homeric epics are all far more likely to have been created by weaving.

When collecting evidence for ποικίλλω and words connected to the same root, one immediately realizes the wide range of subjects that these words can be connected to. From the 7th centruy BC until the 5th century AD ποικίλλω appears in literary sources. In about one quarter of these, it refers to a textile context. It may also be used to describe the night or the sky, as by Aeschylos in the opening paragraph of *Prometheus Bound*. The use of the word in this context indicates a meaning of 'beautiful', 'decorated' or 'precious'. The kind of decoration it might refer to becomes clear when taking into consideration a similar section from Euripides' play *Helen*, where we find Helen praying to the goddess Hera:[25] here again, it is not a garment or cloth is said to be ποικίλματος, but the sky – decorated with stars. In that sense the expression is also used by Plato in his *Athenaion Politeia*.[26]

It is remarkable that forms of ποικίλλω are also used to describe various animal species – birds, amphibians and mammals. For example Plutarch uses ποικιλία to describe a fox[27] and an ibis[28] whereas Athenaios in his *Deipnosophistai* uses it for the feathering of guinea fowl.[29] Again the meaning is the same as before: the appearance of all these animals – be it of feather, fur or skin – is remarkably beautiful, nicely decorated or shimmering.

Apollonios Rhodius is best known as the author of the *Argonautica*, an epic poem about the heroic adventures of Jason and the Argonauts on their quest for the Golden Fleece. This poem is the only surviving Hellenistic epic and was written during the first half of the 3rd century BC. For Apollonios the adjective ποικίλος refers to the flowers (ἄνθεα) the nymphs are plucking.[30] ποικίλος is used by Apollonios to demonstrate that these flowers were not just ordinary blossoms but very beautiful and precious ones. Again the term has nothing to do with textiles or textile decoration but is an adjective used to describe something beautiful in appearance.

Forms deriving from ποικίλλω are often used by the 4th century BC philosopher Plato. They appear in almost all his works in various contexts – referring to sounds or music,[31] words or numbers, differences, colours and many more. The meaning of 'beautiful' or 'decorated' are not convincing as interpretations for Plato's use of the term. Trying to find a reasonable translation, Ellen Harlizius-Klück convincingly stated that for Plato ποικίλλω means a "bunte Mischung abzählbarer Elemente" (i.e. a mixed bag of countable elements).[32] This may even mean that Plato had some textile context at the back of his mind as the set-up of an upright loom with its warp threads that were both well counted and exactly arranged.

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[24] *Od.* 10,222 (Circe), *Od.* 5,62 (Calypso).
[25] Euripides, *Helena*, 1095 ff.
[26] 529d–e.
[27] *Septem sapientum* 155c.
[28] *Iside* 382c.
[29] 14,71. Snakes in Theognis, *Elegiae* 602.
[30] 4,1144.
[31] To describe the sound or melody of various instruments: the poet Pindar used the phrase in the in the 5th century BC (e.g. *Olympian* 3,8 or *Nemean* 44,6).
[32] Harlizius-Klück 2004, 297.

The following examples, presented in chronological order, starting in the 5th century BC, present the use of ποικίλλω in textile contexts:

In Euripides' tragedy *Hecuba* the chorus describes the *peplos* presented to the goddess Athena in the Parthenon of Athens and carried at the Panathenaic festival every four years.[33] ποικίλλω is used here to describe the garment as decorated with flowers and figurative representations of the fall of the Titans. This extract has been dealt with by J. M. Mansfield and E. J. W. Barber who suggest that this decoration was created by tapestry weave.[34] They believe a Greek audience would have understood the textile process and recognise that the term would not have meant embroidery. Our own research thus far would support their position. So, ποικίλλω again is used to present a beautiful and decorated item. There are other examples where Euripides mentions women who decorate fabrics with scenes from myths and other figural representations. In *Iphigenia in Tauris* it is the heroine herself who is asked by her brother Orestes for the textile designs she created featuring the tale of Atreus and Thyestes and the golden lamb and a representation of the sun.[35] A similar scene is presented in *Ion*, when Creusa talks about a textile showing the representation of Gorgo[36] and again when a textile decorated with various representations of mythological scenes is described.[37] In these cases Euripides uses another verb, ὑφαίνω, instead of ποικίλλω, demonstrating beyond any doubt that these scenes were woven into the garment by tapestry weaving.

In the 3rd century BC, Theokritos, in yet another genre, that of Greek bucolic poetry, uses ποικίλλω to describe the wall hangings in the palace of Ptolemy II in Alexandria in his poem Συρακούσιαι.[38] Once more these Egyptian textiles were certainly extremely precious and highly decorated – but there is no supporting evidence to suggest they were embroidered.[39]

After a long break ποικίλλω as a way of describing a garment appears again in the works of Plutarch (2nd century AD). In his biography of the Athenian statesman Aristides he describes the battle of Plataea, fought between the Greek allies and the Persians in 479 BC. As Aristides was *strategos* and commander of the Athenian forces it was his role to address the soldiers in the run-up to the battle. In order to increase the fighting spirit of his men, he refers to the battle of Marathon gloriously won by the Greeks. Nothing has changed since then, Aristides states – it is still weak men they are facing, covered with gold and dressed in decorated garments he calls ποικίλματα.[40] The intention of this speech is obvious: it is meant to stereotype the Persian enemies as being morally and physically weak and effeminate – no real challenge for a Greek warrior. The differences in armour and outward appearance – *inter alia* dress – are apparent. ποικίλλω is here connected to eastern garments, different from the ones the Greeks are wearing. It is used to distinguish friend and foe. A similar use of a phrase deriving from ποικίλλω appears in another of Plutarch's biographies, the *Life of Marcellus*, also in a military context. Marcellus was a Roman military leader. The dress of the Gallic king Viridomarus, Marcellus' enemy at the battle of Clastidium in 222 BC, is described as ποικίλμασι. Again Plutarch's depiction of the enemy presents the *topos* of a weak, effeminate and inferior despot, this time coming from territory to the north of the Roman heartland.

[33] 466–474.
[34] Mansfield 1995.
[35] *Iphigenia in Tauris*, 811–818.
[36] *Ion* 1417–1423.
[37] *Ion* 1143–1154.
[38] Theokr. *Epigrams* 15,78–83.
[39] Pindar (4th century BC) also used ποικίλλω to describe textiles from the East *Nemean* 8,14–16.
[40] Aristides 16,4.

Decorated clothing is used as a *topos* to describe 'the other', no matter where they are located. This is not uncommon in Greek and Latin literature.[41] Plutarch also uses forms of ποικίλλω for items not belonging to foreign enemies. In the *Life of Timoleon*, an Athenean statesman of the 4th century BC, a ribbon (ταινία) is said to be Νίκας ἐμπεποικιλμένας – decorated with the figure of a Victory. It is not clear if this Victory was created by embroidery or tapestry weaving – but compelling reasons for preferring an embroidered decoration are not apparent.

To sum up: the possible meanings of ποικίλλω and forms deriving from it vary. They are used to describe the appearance of animals, the design of textiles (often foreign ones), the look of flowers, music, words, numbers and many more items. When connected to textiles there is no clear evidence for the use of embroidery as a technique. Quite to the contrary, most of the precious garments are likely to be created and decorated with the aid of tapestry weave, especially when the depiction of figurative representation is mentioned.[42] ποικίλλω is thus used to describe textiles as precious and colourful – not to point out a special technique of textile decoration.[43]

Roman authors

Roman authors describe the art of embroidery as "painting with the needle" (*acu pingere / artem acu pingendi*) in different literary genres from poetry, satire, history to philosophy. Cicero, Ovid, Virgil, Martial, and Tacitus all use this term in the same manner.

The term *pictus* is used by Cicero, this time not referring to eastern rulers but to Dionysios of Syracuse, a figure usually viewed very critically by the vast majority of ancient authors. In his *Tusculanae disputationes*, Cicero made a considerable contribution to Dionysios' bad reputation. The moral anecdote commonly referred to as 'the Sword of Damocles' presented there is particularly famous.[44] Dionysios makes his courtier Damocles sit on a very beautiful dining-couch (*pulcherrimo stragulo*) covered with textiles that are said to be decorated (*textili magnificis operibus picto*).

Ovid uses *pictus* in his narrative poem *Metamorphoses*, when telling the story of Arachne, who dared to say she could produce better textiles than the goddess Athena. Arachne is clearly decorating with a needle.[45] Only a few lines later he describes in detail the goddess' textile and compares it with the one made by Arachne: both are creating fabulous designs, showing complex mythological scenes as Athena and Neptune competing for the right to be the patron deity of Athens or Jupiter impregnating Danae in the guise of a golden shower.[46] The verbs Ovid uses are *pingere*, *inscribere*, *designare*, *facere* as well as the adjective *intertextus* and the noun *picta*. Using different phrases does not necessary indicate different ways of decoration. Instead Ovid uses them for literary reasons, to make his text livelier and to avoid verbal repetition (and for a better metrical form). All phrases definitely refer to ways of decoration but the words used here create no connection to embroidery as use of needles is not mentioned in this passage. It appears that Ovid distinguished between decorating with and without a needle, just as his contemporary Pliny did in the *Natural History*.

[41] Cf. Harlow 2004; von Rummel 2007.
[42] Cf. Wagner-Hasel 2000, 147–149.
[43] Cf. Barber 1992, 313 and 327 n. 8.
[44] Cic. *Tusc.* 5,61.
[45] Ov. *Met.* 6,23.
[46] Ov. *Met.* 6,70–124.

Acu pingere is also used by Virgil in his epic poem, the *Aeneid*. He mentions it as a way of decorating tunics and mantles, saying *pictus acu chlamydem*[47] and *pictus acu tunicas*.[48] The first phrase refers to the mantle of Arcens, a noble Sicilian, who fought against Aeneas. Arcens' equipment is specified as being *Hibera* – Spanish. So the embroidered garment is characterized as something foreign, not Italian. Taking into account the passage from Cicero mentioned above it is interesting to see that again a way of decoration that could maybe mean embroidery is connected to Sicily. The second phrase is used to describe Chloreus, former priest of the oriental Goddess Cybele, in the battle between Aeneas and the Trojans against King Turnus of the Rutili and his allies. Chloreus' armour and dress are said to be *peregrina* and *barbara* (i.e. foreign and barbarian) in the very same paragraph. So, Virgil creates Chloreus as a true oriental, using *topoi* deriving from Greek sources.[49] Again, the art of embroidery is connected to eastern regions and an oriental way of appearance.

A needle is also mentioned in Martial's satires in the 1st century AD.[50] He refers to Babylonian textiles, just as Pliny had done some years earlier. For Martial even Semiramis, the legendary queen, who had built the city of Babylon, used a needle to decorate textiles. This does indeed suggest actual embroidery – not coming from Rome or the Mediterranean but being some 'oriental' way of ornamenting garments. This *topos* was obviously common in the 1st century AD as it is familiar from Pliny, who also connects the art of embroidery with Babylon.

Tacitus mentions decorated oriental textiles in the *Annals*. He describes the preparation for the battle between Pharasmanes of Iberia and Orodes of Parthia during the reign of Emperor Claudius. In this context he mentions the Medes to be *picta auro* (i.e. decorated with gold), maybe really meaning some embroidered garment.[51]

Chronologically, the next author is the Roman poet and philosopher Lucretius who referred to "pictured textiles" (*textilibus in picturis*) in *De rerum natura*.[52] The purpose of the poem is didactic, arguing against the supernatural and against the fear of death. The phrase referring to decorated textiles (*textilibus in picturis*) derives from the prologue of the second book, extolling the Epicurean life of detached tranquillity. The decorated textiles are used as a counterpart to garments of the common people (*plebeian veste*) and are therefore meant to indicate wealth and prosperity. The phrase does not indicate embroidery; it is much more likely that tapestry weaving created the pictures in these textiles.

To sum up: The Latin expressions *acu pingere* or *pictus* (connected to a textile) are most probably to be interpreted as embroidery as long as foreign garments are concerned. Ancient authors use them most frequently when they refer to non-Roman rulers, be it 'orientals' or Sicilians. Decorating textiles by using needle and thread appears not to be a Roman technique but to be connected – at least in the perception of ancient literati and their audience – to foreign people.

The Roman comedian Plautus (late 3rd/early 2nd century BC) introduced another term that is usually translated as embroidery or embroidered textiles, namely *plumatus*. By 1st century AD this was established in the profession of *plumarius*.[53] The Latin *plumatus* shows interesting similarities

[47] *Aeneid* 9,582.
[48] *Aeneid* 11,777.
[49] Cf. Reed 2007, 59.
[50] 8,28,18.
[51] 6,34.
[52] Lucr. 2,34–36.
[53] *Epidicus* 230.

to the use of ποικίλλω as it can be connected to various items, including animals[54] and mythological creatures.[55] Tertullian (3rd century AD) even uses it to describe God.[56] As far as I can ascertain, *plumatus* is just once used in a textile context. Lucan in *The Civil War* describes in detail Julius Caesar's stay in Egypt. Coverings (*stata*) are mentioned in his depiction of Cleopatra's palace *pars auro plumata nitet*.[57] These gold shining textiles could have been decorated with embroidery – but as the technique of weaving golden threads into a textile was known,[58] a final decision between embroidery and weave cannot be made, but the tapestry weaving technique is preferred.

The profession of a *plumarius* appears only once in the literary sources: Vitruvius, best known for *De architectura*, a treatise on architecture, mentions workshops of these craftsmen: *plumariorum textrina*.[59] As *textrina* definitely means weaving workshops (*texere* = weaving), Vitruvius' *plumarii* are not embroiderers, but more likely weavers. Another profession usually interpreted as embroiderer is found in Plautus' *Menaechmi*.[60] A mantle (*palla*) is to be taken to a *phrygio*. This *phrygio* is supposed to repair it and to add something to it. Remembering Pliny and his description of the Phryigians as the first to decorate textiles with a needle the interpretation seems to be self-evident: what else could a *phrygio* be other than an embroiderer? However, there are several problems with this easy answer: first, there is a considerable time difference between the authors. Plautus' *Menaechmi* was first presented in 200 BC; Pliny published his *Natural History* around AD 76–78. The meaning of the word *phrygio* might have been different in Plautus' time. In addition, the text itself gives further reason to doubt the equation of *phrygio* with embroiderer. For this person is supposed to repair the garment and to add additional *opera* – whatever this might be. Decorating the textile is not mentioned, nor are colours. Thus the main work of this *phrygio* might indeed have been repairing garments. Making him an embroiderer because of an interpretation deriving from a source almost 300 years later is not too convincing – though is it likely that he indeed used a needle – for repairing but not necessarily for decorating the textile.[61]

Documentary sources – textile decoration provided by professionals[62]

Most ancient authors – if they care at all about the producers of garments – seem to refer to (noble) women weaving within their own household to produce their own garments. Professional textile production, existing alongside domestic, was beyond their sphere of interest. Our knowledge of ancient professions is mainly based on documentary sources such as papyri and inscriptions. Among the professions mentioned are several textile crafts, demonstrating that this economic sector was of great importance in ancient times and provided a living for a large number of people.[63] Professions deriving from the verbs ποικίλλω and ὑφαίνω do appear, the craftsmen are called ποικίλτης and

[54] Petronius 55,6,6 uses it for the feathering of a peacock, Apuleius in the *Metamorphoses* twice for birds (2,1,24 and 3,21,19).
[55] As Cicero in his *De natura deorum* (2,114,17), describing the Lernaean Hydra.
[56] *Apologeticum* 3,21,36.
[57] *Bell. civ.* 10,122.
[58] Cf. Pliny *NH* 8,196. Further see Alfaro 2001.
[59] Vitr. 6,4,2.
[60] 426.
[61] Mannering 2000.
[62] All papyri are cited according to the Checklist of Greek, Latin, Demotic and Coptic Papyri, Ostraca and Tablets (last updated 1 June 2011 – http://library.duke.edu/rubenstein/scriptorium/papyrus/texts/clist.html).
[63] Cf. Ruffing 2008, 113 and 122: Out of 636 different professions documented in Greek documentary sources 150 belong to the economic sector of textile production, forming the far largest group of specialised workers.

ὑφάντης/ὑφάντρα. It is quite remarkable that ὑφάντης/ὑφάντρα only appears in Ptolemaic texts (the only exception is an inscription from Saiitai, dating to the 2nd century AD).[64] Later on the term γέρδιος seems to have replaced it completely.[65] On the other hand ποικίλτης covers a much wider time range. Ten papyri (3rd century BC–6th century AD) but no inscriptions attest to this profession.[66] Compared to the evidence for weavers covering the same time period (10 ὑφάντης/ὑφάντρα and more than 300 references for γέρδιος), this does not amount to much evidence. It might be interpreted as a hint that this was not a widespread profession. The exact work carried out by these craftsmen is not elucidated in the documentary sources.

Late Roman documents also mention the profession of πλουμάριος – the Greek equivalent of the Latin *plumarius* – which is usually interpreted as a synonym for ποικίλτης, though in one papyrus the same person is said to be both, ποικίλτής and πλουμάριος.[67] The profession appears 31 times (16 inscriptions, 15 papyri) from the 4th to the 7th century AD.[68] Taking into account that we are facing the Hellenised form of *plumarii*, who are not embroiderers but tapestry weavers as was shown by analysing Vitruvius, it is rather unlikely that a πλουμάριος was embroidering textiles. These craftspeople should be interpreted as weavers. The same goes for the few epigraphic examples of *plumarii*. Only three inscriptions mention this profession.[69]

The Edict of Maximum Prices (*Edictum de pretiis rerum venalium*) of Emperor Diocletian from AD 301 includes, among various professions and their wages, *plumarii*/πλουμάριοι. They are listed close to other textile professions as *gerdia* (= female weaver) or *fullo* (= fuller).[70] It is notable that these craftsmen were not paid daily or monthly wages: They were paid per ounce (*unica*), presumably of raw material used. Thus, the Edict of Diocletian supports the suspicion that these men were not using needles but shuttles when working, being weavers, not embroiderers. The

[64] Ruffing 2008, 808: *P.Cairo Zen.* 1/59080 (Philadelpheia; 257 BC); *P.Cairo Zen.* 2/59176 (Philadelpheia; 255 BC); *P.Hib.* 1/67 = *W.Chr.* 306 (Ankyronpolis; 228 BC); *P.Hib.* 1/68 (Herakleopolites; 228 BC); *P.Col.* 4/77 (r) (Philadelpheia; 245–239 BC); *CPR* 13/8b (Ankon, Lysimachis; 3rd century BC); *P.Tebt.* 3/703 (Tebtynis; ca. 210 BC); *PSI* 6/599 (Philadelpheia; 3rd century BC); *P. et O. Eleph. DAIK* 6 (Elephantine; 2nd century BC); *SB* 16/12330 (2nd century BC).
[65] Ruffing 2008, 414; Droß-Krüpe 2011, 58–86.
[66] Ruffing 2008, 724: *P.Lond.* 7/2055 (Philadelpheia; 3rd century BC); *SB* 16/12695 with BL 8/385 (Oxyrhynchos; 143 AD); *P.Fuad. Univ.* 8 (2nd century AD); *P.Oxy.* 12/1519 (Oxyrhynchites; 247/248 or 257/258 AD); *P.Oslo* 3/144 (Oxyrhynchos; 272–275 AD); *P.Oxy*. 6/980 (Oxyrhynchites; 3rd century AD); *P.Oxy.* 14/1677 (Oxyrhynchites; 3rd century AD); *P.Oxy.* 46/3300 (Oxyrhynchos; 3rd century AD); *BGU* 1/34 (Hermopolites; *ca*. AD 322); *P.Cairo Masp.* 2/67163 (Antinoopolis; AD 569).
[67] *P.Cair. Masp.* 2/67163, (Ptolemais Euergetis, AD 569).
[68] *Ed. Diocl.* 20,1 u. 1a; *I.Kilikia* DF 38 = *SEG* XXXVII 1345 (Tarsos; 5th/6th century AD); Heberdey, Wilhelm 1896, Nr. 108 (Pompeiopolis); *I.Lesbos* Suppl. 112 (Lesbos); *IG Occid. Chr.* 153a (Syrakus; Christian); *MAMA* III 285 = *ETAM* 22 Kry 456 (Korykos; Christian); *MAMA* III 364b? = *ETAM* 22 Kry 413b (Korykos; Christian); *MAMA* III 391? = *ETAM* 22 Kry 235 (Korykos; Christian); *MAMA* III 403 = *ETAM* 22 Kry 414 (Korykos; Christian); *MAMA* III 429 = *ETAM* 22 Kry 281 (Korykos; Christian); *MAMA* III 441a = *ETAM* 22 Kry 573a (Korykos; Christian); *MAMA* III 496 = *ETAM* 22 Kry 519 (Korykos; Christian); *MAMA* III 523? = *ETAM* 22 Kry 390 (Korykos; Christian); *MAMA* III 665 = *ETAM* 22 Kry 177 (Korykos; Christian); *MAMA* III 685 = *ETAM* 22 Kry 473 (Korykos; Christian); *I.Tyr. Epit.* 171 (Tyros; Christian). *P.Oslo* 3/161 (3rd century AD); *P.Aberd.* 59 (5th/6th century AD); *P. et O. Eleph. DAIK* 324 (Elephantine; 4th/5th century AD); *SB* 16/12838 (Thebais; 5th century AD); *SB* 16/12839 (Thebais; 5th century AD); *SB* 16/12840 (Thebais; 5th century AD); *P.Cairo Masp.* 2/67163 (Antinoopolis; AD 569); *SB* 20/14105 (6th/7th century AD); *SB* 14/11543 (616/617 AD); *P.Prag* 2/153 (Arsinoites; 7th century AD); *P.Apoll.* 38 (Apollonopolis; 7th century AD); *P.Apoll.* 65 (Apollonopolis; 7th century AD); *P.Apoll.* 75 (Apollonopolis; 7th century AD); *P.Apoll.* 83 (Apollonopolis; 7th century AD). Cf. *P.Oxy.* 24/2421 (Oxyrhynchites; AD 312–323).
[69] Vicari 2001: #50 (= *CIL* 6/7411, Rome), #51 (= *CIL* 6/9813, Rome), and #317 (= *AE* 1976, 500; AD 232, *Mogontiacum*, uncertain reading).
[70] *Ed. Diocl.* 20,1–4.

same applies for the *barbaricarius* or βαρβαρικάριος listed in the same section.[71] The different materials these craftsmen specialised in (e.g. gold and *holoserica* – silk) might then refer to the weave of blended fabrics, made of threads or yarns of different textile raw materials.[72]

Conclusions

A thorough analysis of the literary and documentary sources presenting terms often translated as embroidery has shown little evidence for this technique of textile decoration. Only the Latin expressions *acu pingere* and *pictus* (if connected to textiles) might be interpreted as actual embroidery. All other cases are either highly uncertain or even indicate the use of tapestry weaving instead of embroidery. It seems as if modern scholars confused tapestry weaving with embroidery and *vice versa* – be it a lack of knowledge, be it a lack of interest in these 'subtleties'.

Part II – Embroidered textiles in the Mediterranean – a compilation of archaeologically preserved textiles

Annette Paetz gen. Schieck

Introduction

Apart from the major functions of covering and protecting the human body, textiles also serve decorative purposes.[73] As Kerstin Droß-Krüpe has shown in the first part of this paper, written records of textiles – or better their translations into modern languages – starting from Homeric times, often mention the term 'embroidery' as the major technique employed to create decorations.[74] When investigating preserved textile finds of the Mediterranean, though, it becomes evident that truly embroidered textiles are very rare, being rather singular phenomena.[75] Textiles with embroidered ornaments first appear in 18th Dynasty Egypt,[76] and it is not before Hellenistic and early Roman times that embroidery can be traced again. The number of embroidered textiles slightly increases in late Roman times, but they do not become a (relatively) common phenomenon until the Byzantine and early Islamic period.[77]

The following section serves as a compilation of ancient embroidered textiles, relying primarily on published material, except for six objects stored in the Deutsches Textilmuseum Krefeld (DTM), Germany (Figs 10.3–8).[78] The quantity of known embroidered textiles may rise with further discoveries, but it will remain relatively low in comparison to other types of textiles. The textile finds introduced here all derive from the Mediterranean – the region of classical Antiquity – and a glimpse of textiles originating from beyond the borders of ancient Greece and Rome is

[71] *Ed. Diocl.* 20,5–8.
[72] Pruneti 1998–1999.
[73] The main task to be examined here is the question: 'Weaving or Embroidery?' discussed by A. J. B. Wace (1948) and Barber 1992 'New Kingdom Egyptian Textiles: Embroidery vs. Weaving'.
[74] Wace 1948.
[75] See also: Wace 1948; Barber 1982, 442–444.
[76] See: Riefstahl 1944, 1; Barber 1982; Vogelsang-Eastwood 2010, 23, 25. For prehistoric embroidered textiles see: Grömer 2010, 190–193.
[77] For Roman embroidery see for instance: Inv. no. 0955 and 1031, Bender Jørgensen 2000, esp. 260 fig. 8, 261 fig. 9; for Byzantine embroidery see for instance: Cat. Mariemont 1997, 186 no. 70 (= Cat. Brussels 1988, fig. 100); Forrer 1891, 13 pl. XIV figs 1–7, pl. XV–XVII.
[78] DTM Krefeld inv. nos. 10180, 10274, 11209, 12564, 12697, 12899 (= Cat. Krefeld 2003, 34 no. 33, 109 no. 228, 110 nos. 229, 231).

provided. The objects are arranged according to chronology and stylistic groups. Islamic textiles of medieval times will not be included since they represent a large group deriving from non-figurative Mesopotamian contexts.

Earliest evidence for embroidered textiles – Egyptian tomb treasures of the New Kingdom

Due to climatic conditions the oldest cloths of Mediterranean cultures were preserved in the dry sands of Egypt, where innumerable textiles survive, including many garments from Pharaonic times.[79] These textiles permitted scholars like E. Riefstahl, E. J. W. Barber and G. Vogelsang-Eastwood to set up a chronology of garments, according to cut, style, and decoration, over very long time periods.[80] Textiles of Pharaonic times were in general woven as plain white linen tabby; decorations consisted of self-bands, and loop weaving.[81] Suddenly, in 18th Dynasty patterned and coloured textiles appear, along with innovative textile techniques such as brocading, outline-style, tapestry weave, warp-faced pattern weave, card-weaving and embroidery.[82] According to Barber, these techniques were implemented in Egypt by copying foreign textiles and experimenting,[83] some of them disappeared after a while, others, such as embroidery, were reactivated in later times.

The earliest decorated textiles derive from the treasures of Senmut,[84] Thutmosis IV, Kha[85] and Tutankhamun, found in the Valley of the Kings at Thebes-West, Egypt[86] – the appearance of the names reflects the chronology of the burials.[87] Of them, the Thutmosis IV[88] and the Tutankhamun treasure preserved embroidered textiles, while Tutankhamun's textiles provided the wider portfolio of techniques in general, including loop-weave, tapestry weave, warp-patterned textiles, appliqué, sewn-on beads, gold discs and plaques.[89] The most prominent objects of this context are two embroidered tunics, an artificial leopard skin and a pair of 'wings'.[90] The smaller tunic is completely covered with rows of red and dark blue crosses of two types, all of them are carried out in dyed linen yarns, in chain stitch, and the centres of the crosses show appliqué gold discs.[91] The second tunic is of adult size decorated with separately produced and applied embroidered textiles showing hunting scenes, vases, griffins, and sphinxes, carried out in chain stitch, outline stitch, blanket stitch, random filling stitch, and isolated knot.[92] The garment was investigated by R.

[79] See for instance Pfister 1936; Riefstahl 1944; Vogelsang-Eastwood 1993; Vogelsang-Eastwood 1995.
[80] Riefstahl 1944; Barber 1982; Vogelsang-Eastwood 1993; Vogelsang-Eastwood 1995.
[81] Riefstahl 1944, 16 fig. 19, 17–18; 25 fig. 33.
[82] E. Riefstahl investigated the depictions of Egyptian tombs of the Old and Middle Kingdom, presenting people dressed in colourful garments. She tried to match the images with preserved textiles, and draws several conclusions: (1) the paintings rather refer to textile garments decorated with beadwork and others made of painted leather rather than representing textiles; (2) the representations do not picture daily life and real situations but some sort of afterlife; (3) paintings of the Middle Kingdom present processions of visitors from the neighbouring countries, such as nomads, Syrians, Cretans, Nubians, etc., all of them dressed in their colourful and ornamented ethnic costumes. See: Riefstahl 1944, 1–2, 18–19. – For plain woven, unpatterned linen textiles see also: Barber 1982, 444.
[83] Barber 1982, 444.
[84] End of 16th century BC. Riefstahl 1944, 20.
[85] Riefstahl 1944, 21–23 fig. 31.
[86] Riefstahl 1944, 20–32.
[87] Thutmosis IV reigned from 1397 to 1388 BC, Tutankhamun reigned from 1332 to 1323 BC.
[88] Crowfoot and de G. Davies 1941, 116; Riefstahl 1944, 20–21.
[89] Riefstahl 1944, 24–26.
[90] Vogelsang-Eastwood 2010, 14, 23–25, esp. 24 fig. 2.2.
[91] Vogelsang-Eastwood 2010, 24 fig. 2.2.
[92] 113.5 × 95 cm, without fringes, sleeves of 36 cm length.

Pfister, E. Riefstahl, G. M. Crowfoot and N. de G. Davies, and Vogelsang-Eastwood.[93] All of them claimed this tunic to be non-Egyptian since Egyptian tunics of these days were not equipped with sleeves, and due to the fact that embroidery is rare. Most relevant, though, is that the spectrum of the decorative motifs shows a mixture of Egyptian elements (the Pharaoh's cartouche) with Syrian (griffin). Barber calls these motives "steppe land animal-style" which she locates in Mesopotamia or Syria.[94] Vogelsang-Eastwood is convinced that the tunic *in toto* is of Syrian origin, and she considers it to have been a precious gift of the Mitanni court,[95] while Barber is convinced that the craftsmen were of foreign provenance working in Egyptian court workshops.[96]

Embroidery in Classical Greece

Among the very few preserved textiles of Greece, only one bears traces of embroidery.[97] This fragment was preserved in a bronze urn found at Koropi near Athens, dating to the late 5th century BC. The textile consists of a plain linen weave in tabby made of Z-spun yarns; the embroidery is carried out with linen threads wound about with metal foil, possibly silver plated. The decoration shows an arrangement of a regular lozenge pattern bearing tiny striding lions in their centres.

Embroidery of Roman times

Almost no embroidered textiles have been found in Roman Italy, neither in the catacomb burials of Rome, nor among the fragments found at Pompeii.[98] The only exception seems to be one fragment mentioned by M. Gleba, consisting of a woollen rep-structured textile dyed in murex purple, decorated with embroidery carried out in gold threads.[99] Still it has to be admitted, that research on these finds has just begun and no representative position can be taken, at this stage.

Roman finds from Egypt reveal few embroidered textiles. The waste dumps of the imperial porphyritic quarry at Mons Claudianus in the Eastern Desert of Egypt,[100] preserved large amounts of textiles of extremely worn condition dating to the 1st half of the 2nd century AD, among them a few embroidered textiles originating from bags with ornamental design.[101] At Qasr Ibrim, located on the east bank of the Nile in Nubia, textiles from 150 to 350 AD have survived.[102] Some of them show embroidered hems with blue dyed twined cotton yarns, carried out in chain and short stitch, depicting human faces, a scorpion, and flower-motifs of the daisy or sunflower-type reflecting Meroitic influence.

In Palestine, sites such as 'En Rahel, a way-station on one branch of the spice-route joining Petra and Gaza (1st century AD),[103] and the Cave of Letters of the Bar Kokhba Period (*terminus ante quem*

[93] Pfister 1936; Crowfoot and de G. Davies 1941; Riefstahl 1944; Vogelsang-Eastwood 2010, 24–25.
[94] Barber 1982, 444.
[95] Vogelsang-Eastwood 2010, 24–25.
[96] Barber 1982, 444.
[97] Muthesius 2001, 148–150, fig. 18.1 (Victoria and Albert Museum T 220A, B-1953), and further bibliography. Gleba 2008, 73 table 1 no. 65.
[98] Mitschke and Paetz gen. Schieck 2012; Paetz gen. Schieck, Mitschke and Melillo 2014.
[99] The purple cloth with gold-embroidery was found in a cremation burial at the Via dei Granai di Nerva, the yarns are z-spun: Gleba 2008, 72 table 1 no. 49, 2nd century AD.
[100] The quarry was exploited by free Egyptian craftsmen, imperial workers and Roman soldiers – the population being mainly male. Egyptian craftsmen such as stone masons originated from Alexandria and Syene, imperial workers from Anatolia and Semistic speaking areas, see Bender Jørgensen 2000; Bender Jørgensen 2004, 69.
[101] Inv. no. 0955 and 1031, see: Bender Jørgensen 2000, esp. 260 fig. 8, 261 fig. 9.
[102] Wild 2011, 111, 115–116, figs 12–13.
[103] Shamir 1999.

135 AD),[104] preserved large amounts of textiles dating to Roman times, but none showed evidence of embroidery, while at Masada, on the south-west-end of the Dead Sea (*terminus ante quem* 73 AD), at least one piece of embroidered textile was found. It served as a document-wrapper; the cloth was cut down from a former garment woven in diamond twill of the "Virring type", which, according to L. Bender Jørgensen, was most likely of northern European provenance.[105] The edges are equipped with an embroidered band, and the narrower sides are additionally aligned with a zig-zag-embroidered decoration carried out in chain stitch.

Turning further to the east of the Roman Empire, two desert sites in the former province of Syria preserved large amounts of ancient textiles: Palmyra, a town located in an oasis of the Syrian Desert, served as the resting, starting and trading post for the silk-road bringing luxurious goods from China to Rome.[106] Through trade, Palmyra acquired enormous wealth, which was expressed especially through luxurious textiles. These ended up as the torn up bands of worn garments in the richly equipped burials of the upper class families of the 1st–3rd centuries AD.[107] The number of these objects is large, therefore they cannot be listed in this paper individually. They have been investigated by R. Pfister, A. Schmidt-Colinet and A. Stauffer,[108] who could show that the portfolio of motifs and techniques is wide and embraces tapestry woven ornaments of western, Roman style as well as of Persian origin. They could even prove different types of silk weaves such as plain silk tabbies, damasks, taqueté, which, even as woven ornaments themselves, could carry additional embroidered ornaments carried out in silk yarns. Some of these textiles are clearly of Chinese origin,[109] others seem to be of local production.[110] It becomes quite evident that contact with eastern cultures and the enormous wealth of the population at Palmyra triggered the great variety of different kinds of textiles at this site. To give an idea of the exceptional nature of Palmyra, Dura-Europos and its great number of preserved textiles should be mentioned. It is located further east in the Syrian Desert, on the Euphrates, serving as an outpost to a garrison defending a section of the eastern *limes* of the Roman Empire. It was defeated and abandoned in 256 AD, but unlike Palmyra none of the textiles found here showed traces of embroidery. This may be due to the fact that Dura was off the Silk Road.[111]

Embroidery in Late Roman Egypt

The number of embroidered textiles increases relatively speaking in Egypt in Late Antiquity (4th–7th centuries AD), but still, the total amount is very small compared to the thousands of contemporary textiles of tapestry weave. Unlike the objects described before, very little is known about the provenance, region, find contexts, or former owners of the late Roman and early Islamic textile ornaments. This is due to the fact that most of the textiles were acquired by private collectors and collections in the late 19th and early 20th centuries, when finds of the late phase of Egypt first received attention as interesting and collectable goods. Methodology and scientific approaches in archaeology were at a very early stage, and this lack of care or awareness caused great damage

[104] Yadin 1963.
[105] Sheffer and Granger-Taylor 1994, 223–226, esp. 225, figs 140–142.
[106] Stauffer 2007, 72–87; Stauffer 2013, 132–136.
[107] Schmidt-Colinet and Stauffer 2000, 1–5, 55–57, 91.
[108] Pfister 1934; Pfister 1937; Pfister 1940; Schmidt-Colinet and Stauffer 2000.
[109] Schmidt-Colinet and Stauffer 2000, 26–28, 47–48, 58–81.
[110] Schmidt-Colinet and Stauffer 2000, 30–31.
[111] Pfister and Bellinger 1945; Schmidt-Colinet and Stauffer 2000.

to the objects. Taking tunics as an example: colourful ornaments were cut out of the completely preserved garments, while the undecorated sections – which were more than 90% of the garment – were cast away. This means that investigations focus on the information gleaned from the preserved fragment namely technical data, material and ornament, rather than the entire garment. For this reason, due to the larger amount of objects, and since they show clear preferences for certain types of decoration,[112] these textiles will be described in more detail than the earlier ones. They are grouped according to motifs and chronology reflecting trends of contemporary tapestry weaves, such as bicoloured ornamental[113] and bicoloured figurative designs (3rd–5th centuries AD). Among them, for instance, are framed square and oval shaped *tabulae* and *orbiculi* bearing human figures combined with vases;[114] bands decorated with friezes of vases and individual vases.[115] Polychrome designs show mainly square *tabulae* depicting busts of personified seasons,[116] while others depict flower ornaments generally employed on curtains.[117] With regard to embroidery techniques: blanket stitch, chain stitch, satin stitch, stem stitch and couching, seem to have been the most common types of stitches, employing yarns of wool and linen.[118] Silk is being employed in later times, in the Byzantine and Islamic period.

Ornamental purple design embroidered on linen ground

For ornamental purple designs, just one fragment is known: an eight-edged embroidered ornament composed of two squares shifted at 90 degree angles to each other,[119] (compare Fig. 10.1). Each of them is framed by a frieze; the very centre bears four medallions from whose corners ivy leaves stick out. The object is dated to the 4th–5th century AD.

Figurative purple design embroidered on linen ground

The second type of embroidered purple decoration on linen ground depicts figures of the Dionysian canon in a square frame, surrounded by vases and ivy-leaves. A completely preserved tunic of this kind is kept by the Romisch-Germanisches Zentalmuseum at Mainz, Germany. It has been published by W. F. Volbach[120] quite thoroughly, but it will soon be published in detail by P. Linscherid. One of these designs is kept in the Louvre, Paris, showing a hunter, mounted on a horse, chasing a lion,[121] dating to the 4th–5th century AD. A few details are carried out in orange yarns reflecting gold tapestry weaves.[122] The sketch of the figure is quite detailed, being carried out with white yarns in flying shuttle technique. A *tabula* found at Antinoopolis (now in Lyon) is also framed by

[112] For some general notes on late Roman embroidery see: Vogelsang-Eastwood 2010, 25–26; Lamm 1938.
[113] See for instance Cat. Krefeld 2003, 45 nos. 64–66.
[114] See for instance Cat. Krefeld 2003, 35–39 nos. 35–46; Schrenk 2004, 367–370 no. 174; Trilling 1982, 50 no. 28, 53 no. 34.
[115] See for instance Cat. Krefeld 2003, 39 no. 47, 48.
[116] See for instance Schrenk 2004, 444–448 no. 216; Cat. Krefeld 2003, 69 no. 129; Trilling 1982, 32 no. 4.
[117] Compare Cat. Krefeld 2003, 99 nos. 204, 205.
[118] Vogelsang-Eastwood 2010, 26.
[119] Ernst (without year), pl. 35; Mérat 2013, 128–130, figs 1a–b (with two further objects).
[120] Volbach 1932, 114–116 no. 286a pl. 15; inv. no. 0.22708.
[121] Dated to 4th to 5th century AD, Louvre inv. no. AF 5714, 9.5 × 9.5 cm (*tabula*); linen tabby of s-spun yarns, 10 × 10 threads per cm; embroidery: purple woollen yarns, z-spun. – The *tabulae* is framed by a frieze of medallions and vases, embracing a circular field carrying a horse-riding hunter moving to the right. His face is shown frontally, his right arm is bent upwards. The lion is positioned beneath the horse. – du Bourguet 1964, 51 fig. A7; Cat. Nantes 2001, 51 fig. 24; Mérat 2013, 126 fig. 3.
[122] Such as Trilling 1982, front cover, 27 no. 83 pl. 7.

a frieze of vases and shows two figures standing frontally with hands raised.[123] The left figure seems to wear a skirt while the figure on the right seems to be naked. The depiction is rather simple and stylized, being dated to the 4th–7th century AD. A fragment in the Vatican Museum dates to the 4th century AD. It was ripped from the shoulder of a linen tunic, preserving a large section of a *tabula* and *clavus*. Both elements are framed by rays pointing outwards and bearing dots in the interspaces.[124] The *clavus* is decorated with acanthus-scrolls and vases, while the *tabula* is framed by a frieze of vases and medallions, presenting two Dionysian figures shown frontally, a naked maenad on the left and a naked shepherd on the right. Of the same type, and possibly deriving even from the same garment, a smaller *tabula* also at the Vatican Museum should be noted, framed by similar rays. It presents the bust of a male person, frontally. He wears a tunic with *clavi* and he is framed by two shrubs.[125]

Fig. 10.3 Purple wool embroidery on white linen tabby; tabula of a tunic showing the bust of a man framed by vases; 3rd to 4th century AD; DTM Krefeld inv. no. 12564 © A. Paetz gen. Schieck, DTM.

The collection of the DTM Krefeld possesses a few textiles of this period with embroidered decoration. One of them is a fragment of a *tabula* framed by a frieze of vases and bearing the bust of a man shown frontally (Fig 10.3).[126] The figure is embroidered with dark purple woollen yarn and its details like the facial traits, the hairstyle and the garment are additionally embroidered on top with z-plied yarn. The state of preservation is quite bad, most of the woollen yarn has fallen off the textile but some details still reveal the decoration.[127] The Museum of Fine Arts Budapest keeps a tiny medallion of oval shape.[128] This fragment is cut along

[123] Dated to 4th to 7th century AD, Musées des Tissus et des Arts décoratifs de Lyon inv. no. 28520/11, 28 × 22 cm (in total); linen tabby, woollen embroidery. www.musee-des-tissus.com/en/02_02/co101/tis14/print.html.

[124] 4th century AD, Vatican Museum inv. no. T 88, 17 × 31 cm (in total), 11.5 × 11.5 cm (*tabula*), 2.7cm (*clavus*), linen tabby with self-bands and purple woollen embroidery, Renner 1982, 75–78, pl. 28 no. 39.

[125] 4th century AD, Vatican Museum inv. no. T 90, 34 × 59 cm (in total), 6.5 × 7 cm (*tabula*), linen tabby with self-bands and purple woollen embroidery. See: Renner 1982, 78–79, pl. 28 no. 40.

[126] 3rd to 4th century AD, DTM Krefeld inv. no. 12564, width 7.3 cm, height 7cm. Tabby with self-bands, S-spun linen yarns, 23 warp-threads per cm, 16 weft-threads per cm. The needle-pointing consists of dark blue woollen yarn, two simple S-spun yarns, Z-plied. Due to preservation and conservation conditions, most of it fell off and no types of stitches or stitching systems can be identified. Additional embroidery of linen yarn, two S-spun, strongly Z-plied, was applied to characterise facial features in casting stitch and dress in laid couching stitch or self couching stitch. The fragment was cut out in modern times and was sewn onto modern linen cloth in 1963. The fragment was bought from C. Harald, Ronco, Switzerland, in 1961, and it was found in Girgah, Egypt.

[127] Compare DTM, inv. no. 12483; Trilling 1982, 75 no. 70, 76 no. 72, 84 no. 89.

[128] 4th century AD, of unknown provenance, Museum of Fine Arts Budapest inv. no. 97.74.A, 4.7 × 3.5 cm, linen tabby,

the contour and there is uncertainty about its former use. Embraced by undecorated broad band, the frontally depicted bust of a young male is shown dressed in a tunic with *clavi* bearing two crossed lines on the chest. The man's hair is arranged in two spiral curls at each side of his head and two further spiral motifs on his shoulders.

Some decorations focus on vase-motifs, just as the *tabula* kept in the Victoria and Albert-Museum, London.[129] The square element is framed by a simple band, embracing a kind of Greek vase with a narrow stand, a heart-shaped body and narrow neck. Two handles are arranged symmetrically. They are of S-shape and melt into two ivy-garlands coming out of the neck-opening and running down at the sides of the body. Friezes of vases of the same kind, bearing two branches of ivy interchanging with stylized baskets were quite common in tapestry and have been illustrated by embroidery once in a while, as well. Doubled bands serving as *manicae* are kept in the Museo Nazionale di Ravenna,[130] resembling features in the objects of the Vatican Museums. An elaborately designed vase on a tiny stand, a wide and heart-shaped body, a wide opening and S-shaped spiral handles arranged symmetrically, is kept at Skulpturensammlung und Byzantinisches Museum, Berlin.[131] Its neck carries a decoration of two clover leaves and on the rim, two birds take a rest. The motif is carried out in red and violet yarns.

A group of five children's tunics researched by C. Fluck, and kept in various museums, show a symmetrical concept of decorating the neck-opening and the shoulders with simple *tabulae*.[132] Fluck has also published a sketch-like embroidery depicting Amor and Psyche, kept at Münster.[133] Finally, a uniquely embroidered bird in profile, oriented to the left, is preserved on a linen tabby, should be noted. It is also part of the DTM Krefeld collection (Fig 10.4),[134] dating to the 3rd–4th century AD. The bird has a dark purple body; the tiny beak and short red legs are carried out in reddish yarns. One wing and the eye are carried out in white linen yarn, in a secondary stage of production.

Polychrome vegetal designs

Among the polychrome designs, five linen tabby textiles are decorated with floral motifs and petals of pinkish flowers. These textiles reflect designs from tapestry weave generally employed for curtain textiles of the Brussels kind.[135] The embroidered versions are kept in the Victoria and Albert Museum, London, in the Abegg-Stiftung, at the Vatican Museums, the Louvre, and in the Lamm Collection at Roslags-Näsby. [136]

purple woollen and white linen embroidery. See: Cat. Budapest 2005, 94 no. 41.

[129] 4th to 5th century AD, from Akhmim, Kendrick 1920, 123 no. 299 pl. XV.

[130] 4th century AD, Museo Nazionale di Ravenna inv. no. 2455, Antinoopolis, purchased by A. Guimet in 1902, 21.5 × 10.5 cm, 19,5 × 2.6 cm (bands), linen tabby, purple woollen and white linen embroidery. See: Cat. Ravenna 1993, 34, 45–46.

[131] 6th to 7th century AD, Berlin inv. no. 9207, linen tabby, woollen embroidery carried out in red and purple yarns, 26 × 24 cm. See: Wulff and Volbach 1926, 137 no. 9207, pl. 85.

[132] Fluck 2011, 77–82; Vogelsang-Eastwood 2010, 27 figs 2.3a–b.

[133] Fluck 2011, 83 fig. 23; compare: Letellier-Willemin 2013, 22–23, with further objects.

[134] DTM inv. no. 10180, Cat. Krefeld 2003, 34 no. 33, 8.8 × 6.6 cm, tabby, S-spun linen yarns, 25 warp-threads per cm, 17 weft-threads per cm. The embroidery is carried out in dark purple woollen yarn and white linen yarns, both kinds consist of two single yarns which were then Z-plied. The bird is created in needle-pointing. While the body, beak and legs were created by some sort of cross stitches or lines of diverging stem stitches, the white details are made in couching stitches.

[135] Cat. Brussels 1988, 15, 16; O'Neill 1995, 22, 23.

[136] Victoria and Albert: Kendrick 1920, 47 no. 22 pl. VIII–IX (= Fluck 2011, pl. XII); Abegg-Stiftung: Schrenk 2004, 395–396 no. 186; Vatican Museums: Renner 1982, 52–53 no. 14 pl. 13; Louvre: Mérat 2013, 132–133 figs 4a–b; Lamm Collection: Lamm 1938, 24 fig. 1.

Fig. 10.4 Purple wool embroidery on linen tabby; bird, possibly a dove, with purple body, red beak and red feet; 3rd to 4th century AD; DTM Krefeld inv. no. 10180 © A. Paetz gen. Schieck, DTM.

Fig. 10.5 Polychrome wool embroidery on linen tabby with self-bands; 4th to 5th century AD; DTM Krefeld inv. no. 10274 © A. Paetz gen. Schieck, DTM.

Polychrome circular designs

Four fragments stored in different collections present very simple and roughly made embroidered designs. The most elaborate one is kept at Museum Simeonsstift, Trier.[137] It shows a star-like motif with a row of dots in yellow, orange, red green and blue. Two circular embroideries belong to the Haifa Museum, one with embroidered dots and flowers carried out in blue, green and pink silk threads on linen tabby, while the other one shows no distinctive motif in blue and coral-red satin stitch.[138] A fourth embroidered circle is kept in DTM Krefeld (Fig. 10.5):[139] a fragment of tabby weave bears an oval decoration which is framed by several lines and subdivided into four compartments, each of a different colour. On top, lines of brownish yarn subdivide the areas. The embroidered medallion was cut out of its former context and appliqué on an ancient linen tabby in recent times. The colours employed are red, yellow, green and blue. Since all of these decorations were cut out of larger textiles, their former use can no longer be determined.

Polychrome venationes (hunting scenes)

One piece of embroidered textile is unique in its design. It consists of a square panel with an inscribed medallion containing a scene of a man (left) fighting a lion (right).[140] The iconography refers to characteristic scenes of Herakles fighting the Nemean lion, a type of image that was also taken over into circus scenes as well as early testament scenes of David fighting the lion.

[137] 5.5 cm in diameter, see Nauerth 1989, 141 VII.169, pl. 12.
[138] Baginski and Tidhar 1980, nos. 263, 264.
[139] DTM inv. no. 10274, 24.5 × 17 cm, roundel 6 to 6.6 cm, tabby weave with self-bands, linen yarns, S-spun; the needle-pointing is carried out in polychrome woollen and white linen yarns, Z-spun. The fragment was sewn onto ancient linen weave in 1955.
[140] Cat. Rouen 2002, 115 no. 69, Louvre inv. no. AF 5854.

Polychrome tabulae presenting human busts

A relatively large group of decorations is of the *tabula* type, bearing the bust of a human figure. While some of the *tabulae* are framed by simple broad lines, others show frames of several decorative bands. The earlier ones, supposedly, depict nimbed busts in a more complicated three-quarter perspective with slightly turned faces and shoulders, the others present the persons frontally. Two embroidered *tabulae* are kept at the Byzantine Museum of Athens.[141] Their frames are simple, the main field is circular, and the corners are filled with lotus-flowers. The busts depict winged and nimbed females with faces slightly turned to their right. They are dressed in tunic and coat, wear heavy necklaces and hold fruit, possibly peaches. Two *tabulae* at the Whitworth Gallery, Manchester show the same composition. A broad zone of tiny check-pattern frames the square and keeps the bust of a nimbed female figure in a slight turn to her right.[142] The one *tabula* presents a young woman equipped with a heavy golden necklace, arm-rings, long pearl-earrings, and a flower crest. She holds a piece of cloth in front of her chest containing fruits like peaches and grapes. The second *tabula* depicts an elderly lady with veiled head and completely covered body without jewelry, her only accessory being the leafless branch of a tree. The younger woman is interpreted as harvest time, while the elder woman personifies winter.

Finally, a single *tabula* at Brooklyn shows a frame of several zones, the central one carrying flowers. The bust is depicted frontally, showing a young and nimbed woman holding a flower-basket and a palm leaf, possibly signifying summer time.[143] Quite close in design, but in very bad condition, are the two fragments of the Victoria and Albert Museum, London.[144]

Simple Christian crosses

Christian crosses seem to have been embroidered into garments often. The simplest version consists of a tiny cross with gabled ends.[145] Others offer a mere outline sketch,[146] and one textile at the DTM Krefeld is composed of pinkish and dark blue outlines, filled with compartment carried out in yellow, green and blue, reminding of a metal cross covered with gems (Fig. 10.6).[147] Only one embroidered Christian cross is of elaborate design, showing a detailed wreath of laurel leaves embracing a cross of regular shape with slightly enlarged ends, being decorated with gem- and pearl-motifs.[148] The four angles are filled with birds. The textile is kept at the Victoria and Albert Museum, London.

Christian Saints in silk embroidery of 7th and 8th centuries

A distinctive group of tunic decorations of *clavi* and *orbiculi* date to the 7th and 8th centuries AD. They have been worked in silk embroidery on separate panels which were then applied to linen tunics. One of the medallions, now in the Louvre was found in Akhmim and depicts the adoration of

[141] Apostolaki 1932, 179 fig. 152 (= Lamm 1938, pl. II B; Renner-Volbach 1996, pl. 2 fig. 2); Renner-Volbach 1996, pl. 2 fig. 3.
[142] Pritchard 2006, 30–31 figs 3.3–3.4 (= Renner-Volbach 1996, pl. 9 fig. 11, 12).
[143] Thompson 1971, 26–27 no. 8 pl. V (= Renner-Volbach 1996, pl. 3 fig. 4).
[144] Lamm 1938, A, B pl. III.
[145] Renner 1982, 183 no. 95 pl. 55.
[146] Renner 1982, 138–140 nos. 96, 97.
[147] Inv. no. 12547, Cat. Krefeld 2003, 110 no. 231. – 13.4 × 15.3 cm, tabby, linen bearing an embroidered cross of 9.5 × 7.4 cm, carried out in satin stitch and stem stitch (along the dark blue outlines of the shorter lines of the contour). The yarns consist of simple S-spun woollen yarn, Z-plied, the red yarn is even made of three Z-plied threads.
[148] Kendrick 1921, 15 no. 318 pl. V.

Fig. 10.6 Wool embroidery on linen tabby with self-bands, depicting a simple cross; 4th to 5th century AD; DTM Krefeld inv. no. 12547 © A. Paetz gen. Schieck, DTM.

the three Magi.[149] Others kept at the Victoria and Albert Museum depict the bust of an archangel surrounded by a petal-frame, the annunciation to Mary, the apostles at a table, and worshippers in front of a throne.[150] *Clavi* were designed corresponding to the roundels, one of which depicts the birth of Christ,[151] while a fragment at Frankfurt shows three adoring figures and the feet of a fourth figure,[152] and one at the Victoria and Albert Museum shows an indeterminate scene,[153] while a *clavus* at Brussels[154] presents a completely different design: it has the rounded lower end of the *clavus*, being framed by a petal frieze filled with medallions with busts of saints.

Woollen birds and flowers of the 9th and 10th centuries

Three embroidered roundels of less than 5 cm in diameter are stored in the Brooklyn Museum.[155] Two of them show birds of the guinea fowl kind, while the third depicts a vase of narrow stand and two small handles. The ornaments are carried out in lines of stem stitches and cover the whole ground. A very similarly designed bird of has been published by A. Lorquin.[156]

A rather large scale ornament is an embroidered flower motif kept at the DTM Krefeld, found at Fustat, Cairo[157] (Figs 10.7a–c). The woollen embroidery is carried out in chain stitch on a woollen tabby weave. The decoration formerly covered the whole ground but is now partly missing. These sections reveal black outlines sketching the design on the tabby, to be embroidered at a second stage. Another fragment, also deriving from Fustat, shows the same technique but in a figurative design. It is kept in Göteborg[158] and has been published by Lamm with further embroidered textiles of this kind, showing other human figures and a centaur.[159]

[149] Cat. Mariemont 1997, 186 no. 70 (= Cat. Brussels 1988, no. 100).
[150] Kendrick 1922, 57–58 no. 778–779 pl. XVI, 784 pl. XVII (woollen embroidery); Rutschowscaya 1990, 132–133.
[151] Cat. Nantes 2001, 137 no. 101 (= du Bourguet 1964, 213 E67; Rutschowscaya 1990, 128–129, 133).
[152] Cat. Frankfurt 1986, 32–33 no. 13.
[153] Kendrick 1922, 59 no. 782 pl. XVII.
[154] Cat. Brussels 1988, fig. 99.
[155] Thompson 1971, 32 no. 11 a–c pl. VIII.
[156] 3.7 × 4.7 cm, see Cat. Cluny 1992, 241–242 no. 93.
[157] DTM Krefeld inv. no. 12899, 41 × 9.4 cm, see Cat. Krefeld 2003, 109 no. 228. The needle-pointing consists of vertical lines carried out in vertical lines of stem stitch, giving the impression of a sort of cross stitch. The yarns employed consist of wool, two simple yarns, Z-plied.
[158] Erikson 1997, 162–164 no. 20 (= Lamm 1938, pl. IV A).
[159] Lamm 1938, pl. I, IV B.

Fig. 10.7a–c Wool embroidery on wool tabby; flower, completely covering the textile ground; missing embroidery yarns reveal black outline sketches applied onto the cloth; 9th to 10th century AD, DTM Krefeld inv. no. 12899 © A. Paetz gen. Schieck, DTM.

Christian motifs in wool and silk embroidery of 10th to 13th centuries

A remarkable fragment of linen tabby is owned by the DTM Krefeld. It bears two embroidered human figures shown frontally while praying (Figs 10.8a–c).[160] They are arranged one above the other, accompanied by Greek letters and a Christian cross. The figures measure 19.2 and 22.5 cm; they are dressed in striped garments. Due to exact parallels in design, the Krefeld textile can be assigned to the same embroiderer who produced a large textile in the Louvre measuring 4 m in length. This textile depicts 12 figures of the Krefeld type, all in the same posture.[161] The number of figures and the inscriptions suggests the figure are the 12 Apostles. Three quite similar textiles that may have served as altar cloths or scarves in liturgical rites are also stored in the Louvre.[162] From the same period come a series of linen tunics bearing embroidered decorations illustrating

[160] DTM Krefeld inv. no. 12697 A, B, found in the Fayum oasis, Egypt, dating to 10th to 12th century AD, see Cat. Krefeld 2003, 110 no. 229. The needle-pointing was created with very thick woollen yarns. They are S-spun, and heavily Z-plied, and employed doubled. The yarns are stitched in rows of stem stitch creating a dynamic surface structure.
[161] du Bourguet 1964, 650 L6 (= Cat. Rouen 2002, 132 no. 97).
[162] du Bourguet 1964, 648–649 L4–L5 (= Cat. Rouen 2002, 133 no. 98), 651 L7.

Fig. 10.8a–c Wool embroidery on linen tabby; two orans figures and a Christian cross; 10th to 13th century AD; DTM Krefeld inv. no. 12697 © A. Paetz gen. Schieck, DTM.

archangels, Mary and the child Jesus, St. George and some crosses, all carried out in silk yarns on linen. These appear to have been quite common garments of the 13th century AD.[163]

Outer-Mediterranean embroidery of Hellenistic to Late Roman period

While the number of embroidered textiles in the Mediterranean region is quite small and only slowly increases towards the Arab period, regions beyond the Mediterranean and the former borders of Classical Antiquity in the Middle and Far East provide large numbers of embroidered textiles throughout the same period. To give just an idea some of these finds are detailed here.

Three exceptional textile fragments belonging to a uniquely luxurious cloth dating to 3rd century BC were found in a lead coffin of a woman buried in a mound at Sokolova Mohyla near the Greek site of Panticapaeum (Kertch) on the Krim.[164] The textiles consist of a woollen repp material dyed with murex purple. It is covered with gold embroidery depicting ivy-leaf garlands.[165] Further to the East, at Zagunluk in the Qarqan-region in the Taklimakan basin (770–221 BC), large numbers of embroidered textiles were found in the nomad necropolis.[166] Others originate from burials at Sampula, Lop-region, Hotan-district in China (Han to Jin period, 206 BC–420 AD).[167] All of these textiles are covered by varieties of chain stitch, covering the whole ground. The motifs are mainly ornamental, consisting mostly of spiral ornaments. The greatest variety of textile techniques is found among the remains of the kurgans of the nobility of the Yiong-Nu at Noin Ula, the northern region of Mongolia.[168] They consist of many embroidered textiles, mostly deriving from kurgan 6 and 25, in fragments of dress, wall-hangings, floor-coverings, saddle-cloths and banners. Embroidered cloths are found made of wool, linen and silk; many of them show a great variety of stitches and needle-painting,[169] depicting tiger skins, turtles, Chinese dragons, etc., and the textiles seem to have been produced in eastern textile centres possibly in China or in the North-Pontic region, while others, like those of kurgan 25, show rather western, Hellenistic influence presented in griffins and palmetto friezes.[170] This cultural amalgam is interpreted as purely Bactrian and the textiles may well have been acquired as precious gifts, or as plunder in raids from the end of the 1st century BC to the beginning of the 1st century AD.[171]

[163] Volbach 1927, pl. 14 a–b (Mayence), pl. 15–17 (two tunics at Cairo, Moallakachurch; Berlin; Leipzig); Cat. Hamm 1996, 370–371 no. 423; Cat. Rouen 2002, 131–132 no. 96.

[164] Gleba 2008, 66–67 figs 1, 2, 74 table 1 no. 78.

[165] Unfortunately, the types of stitches were not classified.

[166] Cat. Mannheim 2007, 196–197 no. 96.

[167] The dating ranges are quite wide and need further specification which cannot be provided in this article. Cat. Mannheim 2007, 207–208 no. 103, 216 no. 116, 220 no. 123.

[168] Polozmak and Barkova 2005, 30, 137; Paetz gen. Schieck 2009, 104–109. For other types of decoration see: (1) felted appliqué: Polozmak and Barkova 2005, 28–29, 66, 109, 112–127, 129–130, 132, 140–147, 150–153; (2) leather appliqué, partly gilded: Polozmak and Barkova 2005, 44–49, 52–57, 60–61, 108, 110; (3) applied threads sewn onto textiles: Polozmak and Barkova 2005, 49 no. d, 92–95; (4) appliqué beads: Polozmak and Barkova 2005, 96; (5) Taqueté: Cat. Mannheim 2007, 55–56, 74, 81, 84, 85, 260 no. 162; 250 no. 149; 251 no. 152; (6) painted garments: Cat. Mannheim 2007, 236–237 no. 136; (7) resist dye: Desrosiers, Debaine-Francfort and Idriss 2001 (the site was abandoned in the 1st half of the 4th century AD, both finds derive from houses that still have been inhabited in the 3rd century AD. Both consist of cotton, tabby weave with Z-turned threads, having been imported to China from India.); (8) golden palettes with grenadine: Cat. Mannheim 2007, 258–259 no. 159, 271 no. 164, 280 no. 169.

[169] The grave must have been covered and packed with precious textiles. Among them felted carpets, wall-hangings, banners etc. See: Rudenko 1969, 108–112, pl. 137–162, pl. IX, XIII, XVII, XXXIX, XLI–XLV, XLIX, L–LIX, LXII–LXVII; Stawiski 1979, 82–85, fig. 54.

[170] Trever 1932; Rudenko 1969, 93, LX–LXI; Stawiski 1979, fig. 55–56; Cat. Mannheim 2009, 385–386 no. 312.

[171] Kurgan 6 served as resting place of the emperor Wu-chu-liu Jo-ti-hsien who was buried in 12–13 AD.

Chinese finds from Loulan-Gu Cheng, in the Qarkilik-region, provided several embroidered textiles and garments in grave burials. They resemble motifs and ornaments of the earlier embroidered textiles from Sagunluk and Sampula, with designs carried out in chain stitch in silk yarns.[172] While some fragments show wavy lines, spirals and elements reminiscent of stylized leaves, the trousers of 'the man from Yingpan' worn beneath a kaftan, show a regular lozenge design, into which cross-shaped elements were inserted, covering the complete textile.[173]

Conclusion

When investigating preserved and published textiles, the impression grows that technological input into textile production was triggered by the east, throughout the centuries. This is evident in the textile treasures of the New Kingdom, when Egypt was closely related to the Syrian court and once that relationship declined the knowledge of techniques such as embroidery was lost. Again, after about 1400 years, when Rome reached out to the East, a new range of textile techniques comes in, among them once again, embroidery. When investigating preserved embroidered textiles, the greatest varieties in materials, in stitch types and in motifs can be attested in Asia, particularly in China, and it is not surprising that the textile finds from Roman period Palmyra reflect this Chinese impact, while other contemporary sites in the region produce very small numbers of individual objects or no embroidered textiles at all. It is likely that the technique was transmitted to the West along the Silk Road via Persia, Parthia, and Syria, especially Palmyra, through decorated textiles as trade goods, or even by travelling craftspeople teaching their techniques. In the Late Roman period the number of embroidered textiles increases, possibly due to trade goods coming into the Empire from the east. But unlike the Asian textiles, which show very neatly made lines of very regularly arranged stitches expressing great experience in this technique, contemporary embroidered textiles from Egypt present irregularly arranged stitches and uneven structures. The Egyptian textiles evoke the impression that embroidery served as a technique to add an ornament or simply colour the finished weave, while the quality of the embroidery was of secondary importance. The number of embroidered textiles increases again in the early Islamic period, and embroidery becomes one of the most frequently employed decorative textile techniques. The quality of embroidered decorations greatly improves, demonstrating the techniques of its craftspeople in regular structures, and the intentional employment of variations and combinations of different kinds of stitches in one object. This again reflects the eastern influences on technology and fashion, in particular of the Abbasid and the Fatimid courts.

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11. New Archaeological Data for the Understanding of Weaving in Herakleia, Southern Basilicata, Italy

Francesco Meo

This chapter is based on the hypothesis advanced by Liliana Giardino in reconstructing the economic and social transformation of Herakleia and Metaponto,[1] two Greek towns in Southern Italy, between the 3rd century BCE and the beginning of Roman imperial period (Fig. 11.1).[2]According to Giardino, the archaeological data, as well as literary and epigraphic evidence, demonstrate that sheep husbandry in the surrounding territory (*chora*) of Herakleia and wool weaving in its urban areas were among the most important economic activities of the site in the 2nd century BCE.[3] Herakleia is a second-generation Greek colony of Southern Italy (*Magna Graecia*), founded in 433 BCE by the Greek colonies of Taranto and Turi along the Ionian coast on the high ground between the Agri and Sinni Rivers. Giardino's hypothesis is based on a text by Varro who attributes to Herakleia the function of *emporium*.[4] Michael Crawford however holds the correct transcription is *Heracleae oram* and not *emporium*;[5] thus he hypothesizes that Varro's text is evidence for the movement of flocks between mountain areas and coastal regions.Crawford's interpretation does not decrease the validity assigned to the role of breeding and the presence of flocks, but only to the existence of an *emporium*.

Another main research theme is to define the possible existence of a relationship between Taranto, a settlement for which numerous studies have dealt with its wool production,[6] and Herakleia. The comparison between archaeological data and historical sources will be used as a starting point,

[1] The following contribution introduces part of the preliminary results of a PhD project in Ancient History at the University of Salento, Italy, entitled *Breeding and wool industry between III and I century BCE in Southern Italy through literary sources and archaeological data. Herakleia, its territory and the Ionic coast between Taranto and Sinni river* (Meo 2013). I would like to thank L. Giardino, iniciator and first promoter of the project as well as my PhD supervisor, for our constant moments of comparison and debate about Herakleia; A. De Siena for facilitating the study of materials in his capacity as Director of Metaponto Museum and Soprintendente per i Beni Archeologici della Basilicata, and for his kindness; M.-L. Nosch and E. B. Andersson Strand for their wonderful hospitality and the important suggestions in the research development on the occasion of my stay in the Danish National Research Foundation's Centre for Textile Research, Copenhagen; M. Lombardo and F. Frisone for their constant supervising activity in the PhD course; C. Bianco for her patient help with drawings and images and her constant support.

[2] Giardino 2004.

[3] Giardino 2004, 429.

[4] Varro, *Res Rust.* 2. 9. 6.

[5] Crawford 2003, 19; 2004. In his opinion the text *in metapontinos saltus et heracleae emporium* would be the result of an interpolation by Poliziano in the 1472 transcription and since then always accepted.

[6] Ghinatti 1975; Morel 1975; 1978; Mele 1997; Lippolis 2004, 283–285.

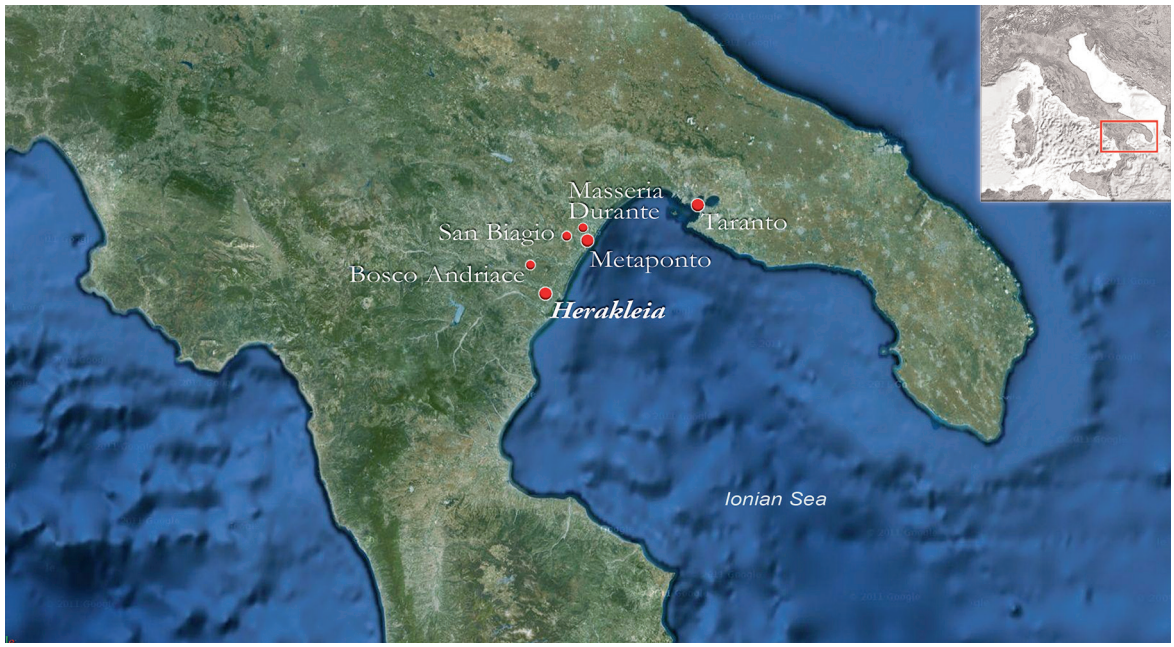

Fig. 11.1 Southern Italy. Main towns of the Ionic arc and the three settlements in Metaponto and Herakleia territories analyzed together with Herakleia. (Author).

to try to verify whether this second town is linked to wool production activity in the 3rd and 2nd centuries BCE and to also establish how the industry developed and the economic role it played.

In order to answer these questions, a central part of the project is devoted to the systematic recording and study of the material coming from the western district of the Castle Hill of Herakleia (Fig. 11.2), particularly to material related to weaving.

This chapter introduces data emerging from the systematic analysis of all the objects linked to the wool activity in the housing context of Herakleia. In particular it will define the functional relationship between different typologies of loom weights (Fig. 11.3): are discoid circular weights contemporarily used with the truncated pyramidal weights as elements of a same loom, or does the first type allow the realization of different textile products? Are their chronological and geographical distributions identical, or does the presence of the discoid circular loom weights exclude the truncated pyramidal loom weights?

Despite the fact that the greatest part of the archaeological literature identifies discoid circular and hemispherical loom weights as such,[7] interpretations on their function have been numerous and often conflicting until today.[8] One interpretation, elaborated by Percy Gardner, understands them as labels affixed to pouches of coins or on sacks of goods.[9] More recently Ciro Santoro, following

[7] To cite a small selection of the most recent bibliography: Dotta 1989; Caminneci 1996; Manganaro 2000, 124–125; Rossoni and Vecchio 2000, 887–891, fig. CLXV (2); Rubinich 2006, 230–236; Nicotra 2007, 241–248; Spatafora and De Simone 2007, 38–40; Anelli 2008, 224; Bonanno 2008 ; Bonanno and Sudano 2008; Foxhall 2011.

[8] I will review previous scholarship according to their interpretations and not in chronological order of their publications.

[9] Gardner 1883; Wuilleumier 1932, 48–49.

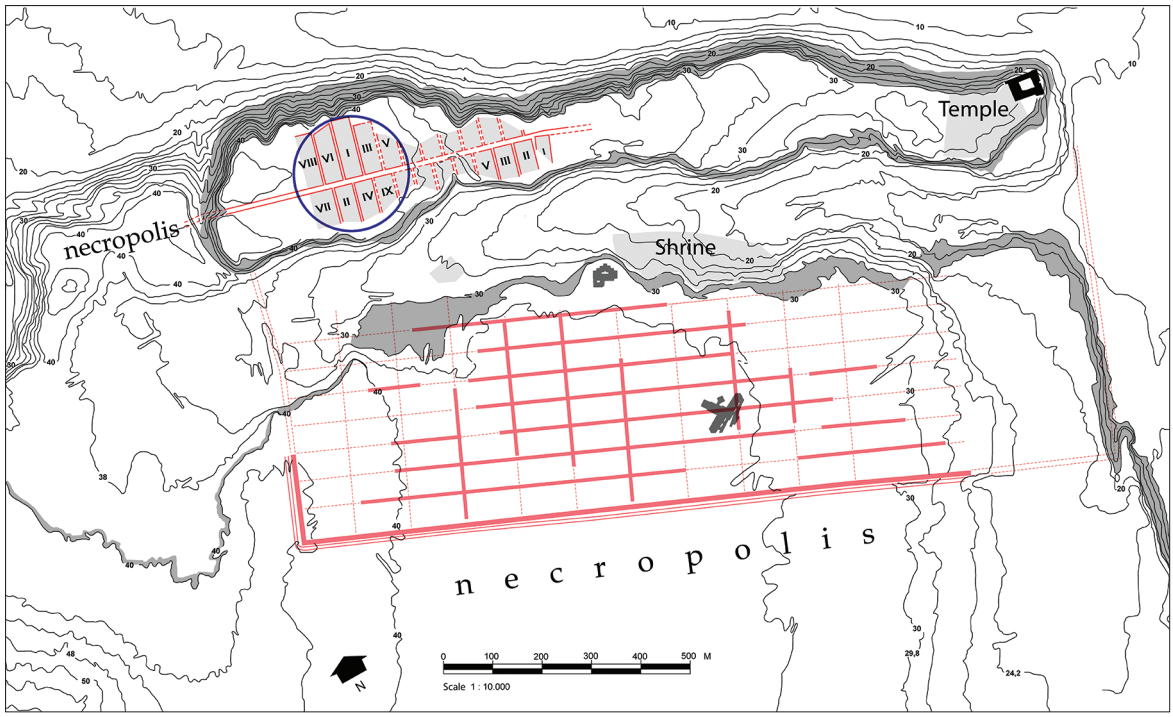

Fig. 11.2 Herakleia: the Castle Hill with the western quarter in evidence in the northern part. (Laboratory of Classical world town planning, University of Salento).

Pierre Wuilleumier, suggested that the discs could be an indicator of fiscal tax.[10] Another hypothesis assigns a religious and apotropaic function to these objects, identifying them with *oscilla* (from the Latin term *oscillum*).[11] Founding his hypothesis on the previous interpretations by Paolo Orsi and Biagio Pace,[12] Piero Orlandini believes that the discs would have been suspended during religious festivals and therefore exhibit a sacred character.[13]Angela Marinazzo shares the same thought: according to her, *oscilla* "were hung on the lintels of the doors of houses".[14] Paolo Mingazzini, while not doubting the primary use of such objects as loom weights, proposed a series of re-utilization or secondary uses based on stamps and inscriptions.[15] Despite the fact that the greater part of the studies and interpretations related to such discs date to no less than about thirty years ago, the

[10] The connection of the discs with labels for sacks of goods has also been sustained initially by Wuilleumier, who nonetheless welcomed this second hypothesis in 1939 (Wuilleumier 1939, 223); Santoro 1970, 149.
[11] Orlandini 1953.
[12] Orsi 1906, 678–680. Despite the fact that Orlandini underlines the votive functions of these objects, he above all maintains their use as loom weights, he focuses his attention on symbolic and votive functions, in his opinion testified by the presence of inscriptions and dedications. Pace 1945, 460–462: writes that the so-called *oscilla* were suspended from trees during some religious celebrations.
[13] Orlandini 1953, 443.
[14] Marinazzo 2004, 72; 2009, 138.
[15] Mingazzini 1974. His view is shared by Franca Ferrandini Triosi (1986).

Fig. 11.3 Herakleia, western quarter of the Castle Hill. Examples of typologies of loom weights. (Author).

subject still needs attention. The work of Marinazzo[16] and PhD research recently concluded by Monica L'Erario on the function of the so called *oscilla* from Taranto demonstrate this.[17]

As many studies based exclusively on the analysis of inscriptions and decorations are partial, an overview of the chronology, distribution and numerical quantity is necessary to try to clarify the function of this class of objects. The bibliographical survey of these aspects is vast and raises a number of hypotheses. It nevertheless has to be stressed that what is emerging from publications

[16] Marinazzo 2004, 72–73; 2009, 138–139.

[17] I would like to thank M. L'Erario for the interesting comparison we had shortly after her PhD dissertation, titled *Catalogo e interpretazione funzionale e storico-economica dei c.d. "oscilla" di Taranto*.

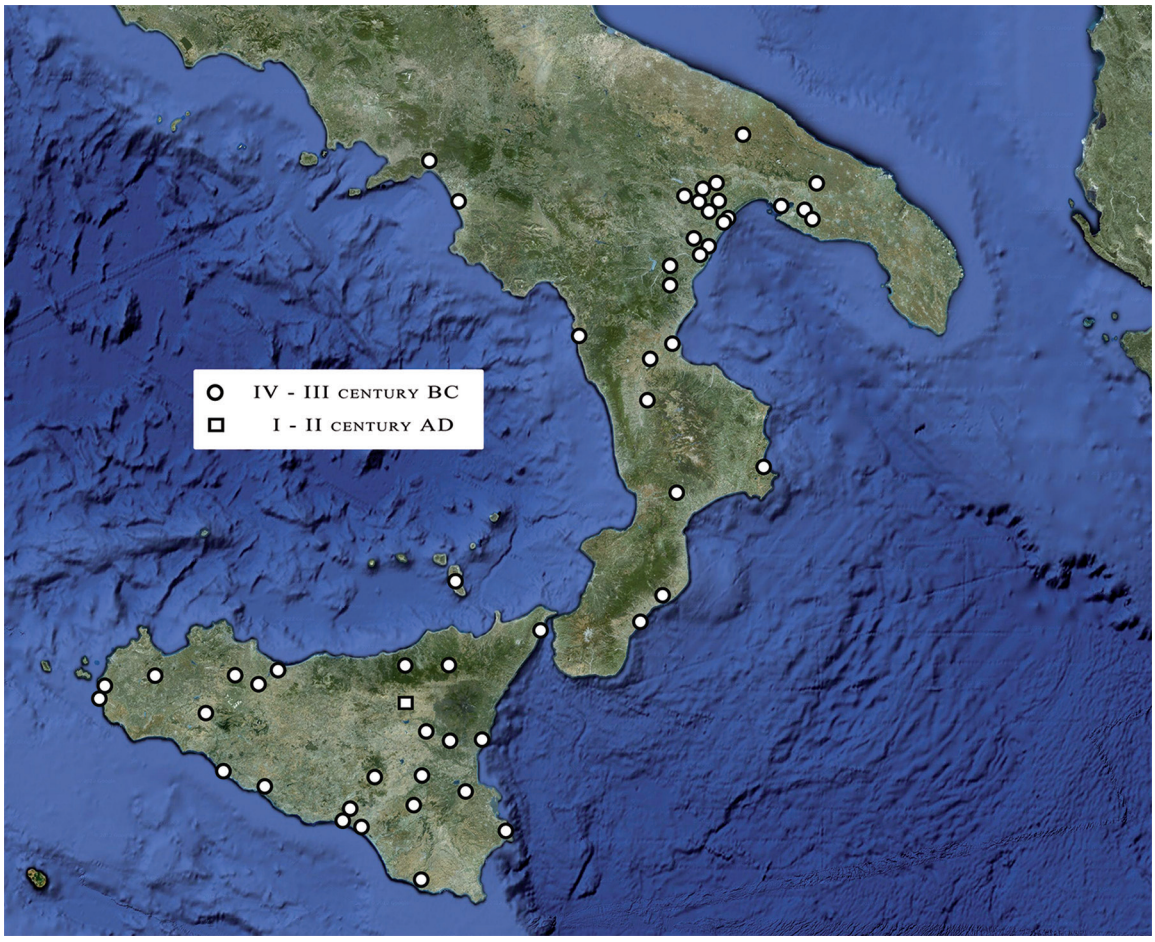

Fig. 11.4 Distribution and chronology of published discoid circular loom weights in Southern Italy and Sicily. (Author).

cannot be considered a mirror of the reality, since a selective tendency and a clear predilection for the inscribed or decorated discs is evident.

Almost all the find contexts, and therefore the same discs, are generically dated from the 4th to 3rd centuries BCE (Fig. 11.4). Only in one case, in Enna province, is the context dated in relationship to the recovery of oil lamps of the imperial period to the 1st to 2nd centuries AD.[18] This is however an isolated case that requires further examination.

The distribution and quantity of the published discoid circular weights instead led to a consideration of the presence of such objects in a culturally homogeneous area, corresponding to the Greek colonies of Sicily and Southern Italy (Fig. 11.5). In particular, a significant presence

[18] Militello 1961, 368–369, fig. 21.

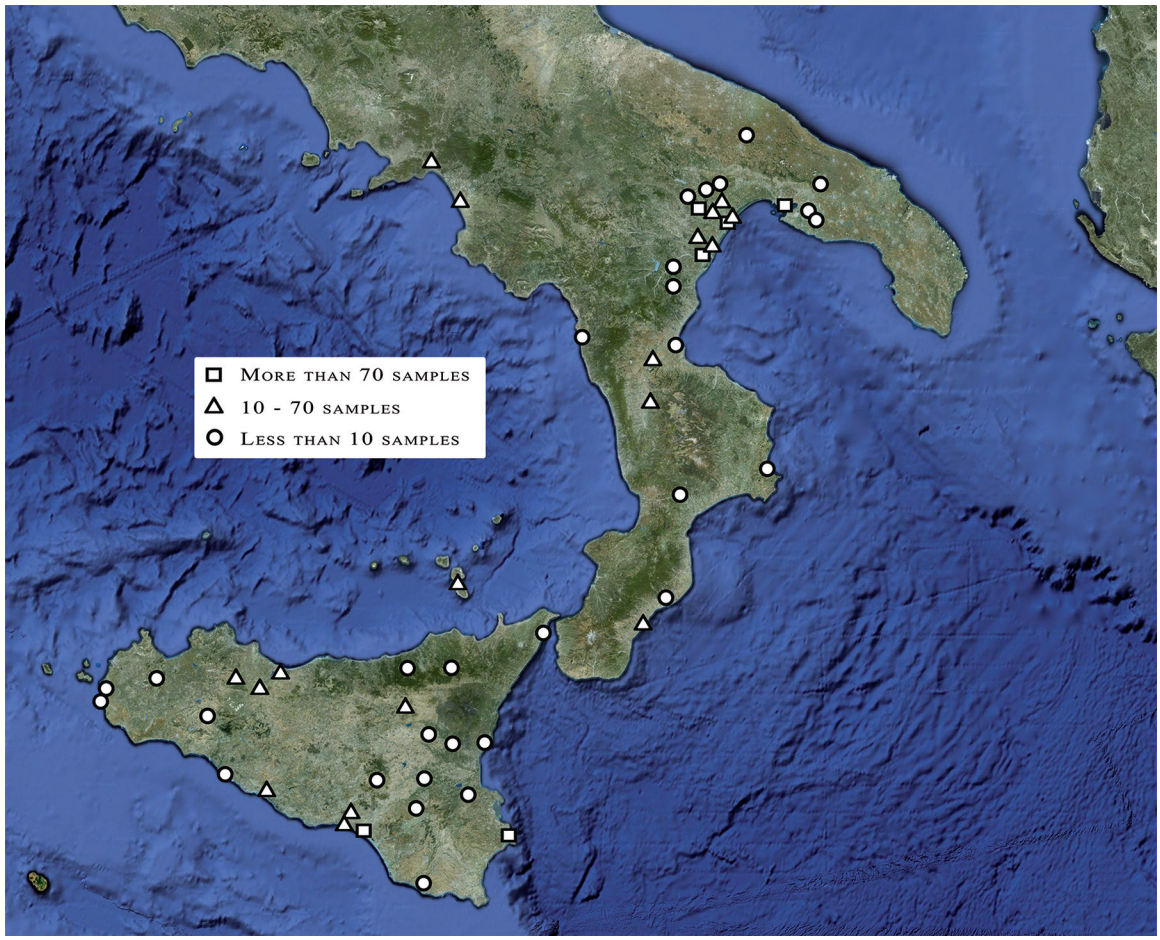

Fig. 11.5. Quantity of published discoid circular loom weights in Southern Italy and Sicily. (Author).

seems to be attested at Gela,[19] Syracuse,[20] and in the Greek towns of the Ionian coast and their *chorai*.[21] This data must nevertheless be considered partial since it is not related to a quantification

[19] Orsi 1906, 678–680; 1906a; Adamesteanu 1954, 130: numerous *oscilla* are among the archaeological finds of a furnace dump; Orlandini and Adamesteanu 1956, 335–336, 341, 345, 358–359 fig. 3, 370, 374: their most interesting nucleus is a huge group of specimens recovered in a dump near a Hellenistic house at Capo Soprano; Adamesteanu 1958, 304, 307, 311; Orlandini and Adamesteanu 1960, 104–105 fig. 26, 155 fig. 4, 158, 161, 179–180 figs 19–20, 196–197 fig. 21, 205 fig. 5, 211: their most interesting nucleus is the one recovered at S. Ippolito, made of defective pieces and furnace waste.
[20] Cultrera 1943, 107: one find has three holes instead of two; Gentili 1951, 284, 330; 1954, 314 fig. 12, 323, 331, 347;1956, 135.
[21] For Taranto: Viola 1884, 120–121; Patroni 1897, 223; Wuilleumier 1932; 1939, 222–223.; Lo Porto 1964, 273, fig. 90 (5); Santoro 1969, 88–95, figs XIV–XV; 1970; Bejor 1973, 200; Laporta 1976. For Metaponto: Lo Porto 1966, 148, 153, figs IV–V; 1988–89, 325 fig. 26, 401–402 fig. 115; *Metaponto I*, 58–60 fig. 46, 62 fig. 48, 104–106 figs 99–100, 133 fig. 137, 136, 222, 225 fig. 233, 287–288 figs 300–301, 309 fig. 329, 442–443 fig. 72; Morel 1970, 105–108 figs 29–31; du Plat Taylor 1977; Foxhall 2011. For Herakleia: Lo Porto 1961, 139, 142 fig. 19; Neutsch 1967, 173–175, figs XXXIX–XL; Giardino 2004, 420–422, fig. XLI; Meo 2011; 2012. The great quantity of this kind of objects, particularly from Taranto, is also testified by the notable number conserved in museums or private collections as for instance: Laporta 1976, 100–101; Rubinich 2006, 230–236.

of the traditional (truncated pyramidal and truncated conical) loom weights. This deficiency can be explained by the fact that truncated pyramidal or conical loom weights cannot be isolated in a well-defined chronological period since they have been produced for a long period.

For example, the small number of discoid circular loom weights known from some sites such as Monte Sannace[22] or Sibari[23] is incomplete if not compared to the hundreds of other types of loom weights recovered. The impression that the use of truncated pyramidal or truncated conical weights clearly prevails over the discoid circular loom weights and that the latter types occur rarely or are entirely absent in the indigenous world, emerges from the same bibliographical analysis.

Returning to Herakleia: the direct analysis of the materials and their distribution inside the recovery contexts allows for the possibility of identifying emerging patterns. The material in this study has been recovered during the excavations carried out by Giardino in the western district of the Castle Hill of Herakleia in the early 1970s.[24]

Specifically, the material from blocks (*insulae*) I, II, IV and VI, and several closed contexts (houses individualized inside such *insulae*) has been analysed (Fig. 11.6). Furthermore, the material from Herakleia is compared with three sites: two located in the *chora* of Metaponto (Masseria Durante e San Biagio alla Venella) and the third in the *chora* of Herakleia (Bosco Andriace) (Fig. 11.1).

For the moment, around 1300 loom weights of various forms and dimensions have been recorded (Fig. 11.7a).[25] The greatest quantity of loom weights examined to date (1115 of 1297 samples, *c.* 86%) are of discoid circular type with a few, rare variations of convex, discoid, circular (8 samples, *c.* 0.6%) and hemispherical weights (33 samples, *c.* 2.5%). Truncated pyramidal loom weights are relatively few (108 samples, *c.* 8.3%), as are flat trapezoidal ones (28 samples, *c.* 2.2%); the pinched weights are even rarer (just 5 samples, *c.* 0.4%).

The 38% of the discoid circular loom weights analysed until now are decorated, and less than 4% (42 samples, *c.* 3.7%) have one or more inscriptions (Fig. 11.7b). There are two typologies of decoration: the most attested (*c.* 27.5% of the total number of weights) consists of moulded stamps with the wheel and four rays as well as varying, stylized floral motives as the most diffused types; the second (*c.* 10.5% of the total number of weights) consists of embossed elements with depictions of the *Gorgoneion* and Aphrodite on a pair of swans as the most attested types. Inscriptions are moulded inside a stamp, or more frequently with letters engraved before firing. Until now, recovered inscriptions are almost exclusively in Greek.[26] The detailed study of decorative themes and inscriptions, whose reading has been the starting point for the different interpretations of the discs, surely represents a fundamental point of the research. The documentation of the finds has nevertheless been a priority in this preliminary phase with the purpose of obtaining a more complete and general overview of typologies and the provenance context of samples.

The first significant result is related to the distribution of the documented finds: the large number of loom weights inside the identified houses coincides with a relatively limited number of them in the other areas, identified for most part as productive. Such data is important for reconstructing the production system (Fig. 11.8).

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[22] Scarfì 1962, 110, 146, 246; Rossi 1989, 198–199, figs 356–361, 364 (4–7).

[23] *Sibari V,* 262–263 fig. 241, 379 fig. 384, 383, 387–388 fig. 395, 439 fig. 438, 446, 550 fig. 536, 552–553 fig. 538; Novellis 2003, 43–46.

[24] Giardino 1999, 313–317.

[25] A first detailed presentation of the material is in Meo 2011.

[26] A moulded Latin writing is on one sample, nevertheless the detailed analysis of the inscriptions still has to be conducted.

Fig. 11.6. Herakleia, western quarter of the Castle Hill. Plan of the excavated blocks with three typologies of houses individualized. (Laboratory of Classical world town planning, University of Salento).

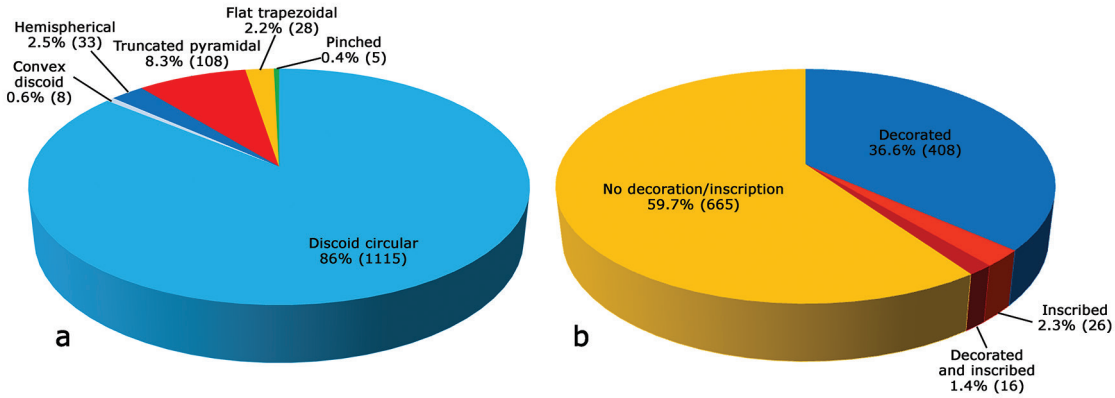

Fig. 11.7 Herakleia, western quarter of the Castle Hill. Typological classification of loom weights and percentage of decorations and inscriptions on until now filed discoid circular weights. (Author).

A confirmation in this sense seems to come from a precious source for the understanding of production dynamics during the first half of the 3rd century BCE along the Ionian coast: the epigrammatist Leonida of Taranto.[27] His epigrams reveal that wool workmanship is conducted by women and develops in domestic environments; moreover, these women do not produce for themselves but instead, for someone who will deal with the commercialization of their product. Women are not owners of the livestock or wool, but they earn from their own task. This production model excludes the possibility of having large benefits from such activity. What emerges from these few verses seems therefore to mirror the situation revealed in the analysis of archaeological data from the western district of the Castle Hill of Herakleia.

A further contribution for understanding the production with discoid circular loom weights is the experimental research conducted at the CTR (Danish National Research Foundation's Centre for Textile Research, University of Copenhagen) which facilitates an understanding of both the existing possible relationship between traditional (truncated conical and truncated pyramidal) and discoid circular loom weights, and to ascertain the nature of the fabric produced through the relationship between the weight and thickness of loom weights.[28]

This research demonstrated that the discoid circular weights allow a different disposition of the warp threads and therefore the production of fabrics of different qualities. Comparing warp threads extended by the two different types of loom weights demonstrated that the traditional loom weights have the tendency to create an overhand, 'fan effect',[29] while the discoid circular loom weights allow the thread to fall vertically thanks to the possibility of placing their faces side by side.

It is therefore evident that discoid circular loom weights guarantee a denser warp and the production of fabrics of better quality or, at least, higher thread count than traditional weights.

[27] Leon. *Anth. Pal.*, 6. 286, 288; 7. 726. Alfonso Mele has thoroughly studied the matter and has been able to draw a sufficiently reliable picture from three epigrams found in Taranto: Mele 1997, 97–104.
[28] *Technical Report* 2007; Mårtensson *et alii* 2009; Andersson Strand 2010: the limit of this research is the use of discoid circular loom weights with one hole.
[29] *Technical Report* 2007, 9, figs 8, 10.

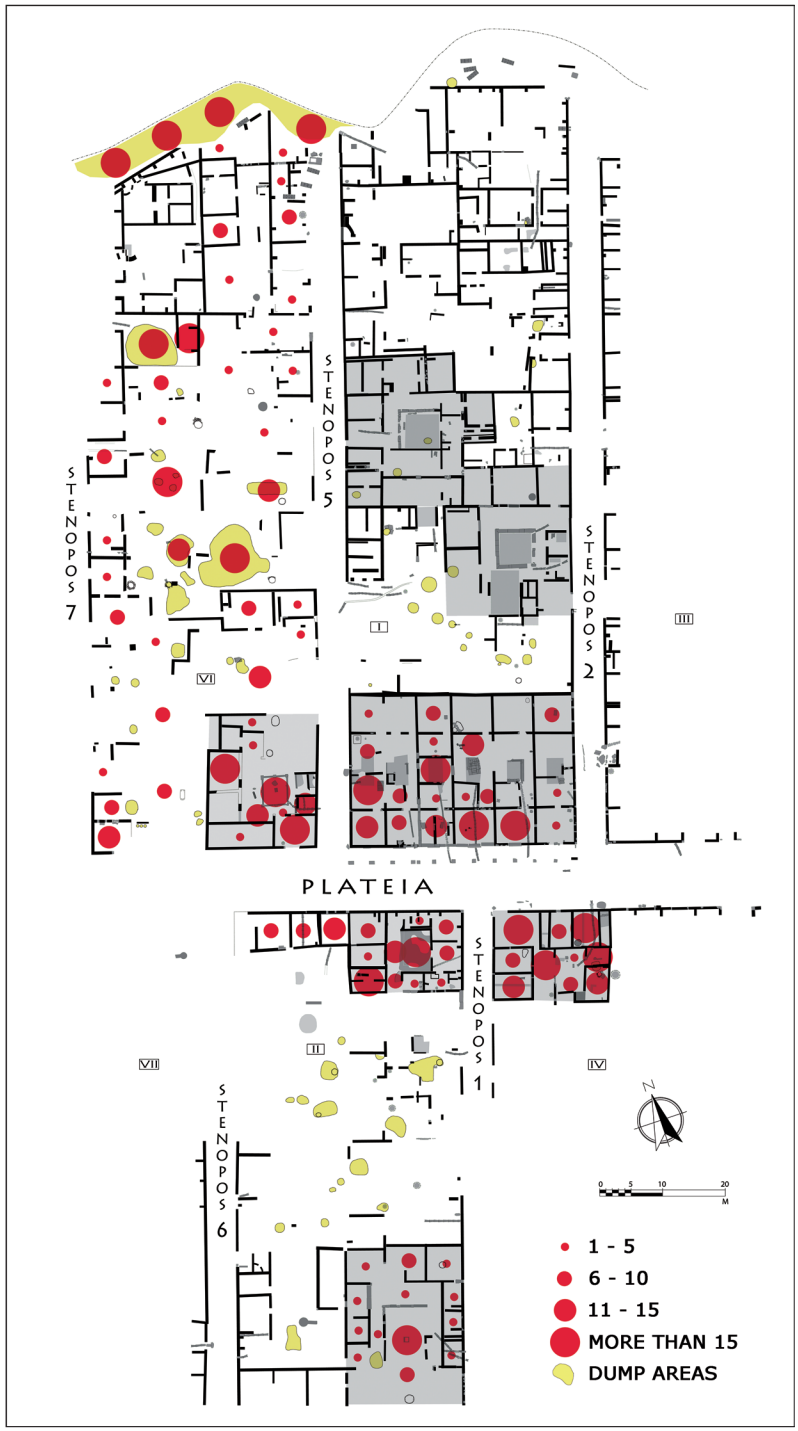

Fig. 11.8 Herakleia, western quarter of the Castle Hill. Quantitative distribution of loom weights inside the areas analyzed until now. (Author).

The fundamental functional factors for producing a fabric using the discoid circular weights are therefore thickness, on which density of the warp depends, and weight, on which tension of the threads and their number per cm depend; diameter is the least meaningful dimension.

The appearance of discoid circular loom weights (with the variation of hemispherical form), can therefore be defined both chronologically and geographically in a culturally homogeneous area, where they seem to replace truncated pyramidal loom weights. It is nevertheless necessary to investigate in detail each single closed context in order to have a paradigmatic vision of their use.

The investigated area was occupied from the beginning of the 3rd century BCE to the end of the 1st century BCE; it is possible to individualize a series of phases corresponding to three different typologies of houses. The 'courtyard house' is attested in two houses set to the south of the main street (*plateia*), in blocks II and IV (Fig. 11.6, in blue), used between the beginning of the 3rd century BCE and early imperial times.[30] From the end of the 3rd century BCE a new type of house, the 'arcaded courtyard house', appears (Fig. 11.6, in yellow); despite the enormous diffusion in the central district, this type is attested only in block I in the western quarter, with a house in the central-northern part and a series of particular structures which, according to Giardino, would have linked the housing function to the commercial one, with the entrance from the main street.[31] A third type of house consists of the 'peristyle house', settled in blocks I, II, VI (Fig. 11.6, in red). The diffusion of this type, in particular in houses of blocks I and II, is coeval with the other two types, starting from the beginning of the 3rd century BCE; the house of block VI seems to possess a later plan and life, between the 2nd and 1st centuries BCE.[32]

Analysis of the spatial distribution of weights has been carried out for these contexts room by room, excluding the surface finds. Since the excavation of 1973 was not carried out using the locus (*unità stratigrafica*) system, more detailed special distribution analysis is not possible.[33]

The first closed context analysed is House 'A' of block II: this is a 'courtyard house' built at the beginning of the 3rd century BCE, continuously occupied throughout the entire 2nd century BCE, with traces of occupation in the early imperial times.[34] Inside the house a total of 158 loom weights have been discovered (Fig. 11.9): the vast majority are discoid circular weights (144 samples), while convex discoid (1 sample) and hemispherical (7 samples) loom weights are rare; the number of truncated pyramidal (3 samples) and flat trapezoidal (3 samples) loom weights is very limited.

Through the distribution of the weights in every room, it is possible to isolate two areas where several weights are concentrated: room 8 and the courtyard, room 3c. From the latter room, a spool with concave body and flat extremities has also been recovered.[35]

Morphological analysis of the discoid circular loom weights shows a presence of two distinct groups of objects: the first group of weights present in room 8 (23 in total) have thicknesses between 1.5 and 2 cm, and weights between 105 and 130g; the second group, recovered in the courtyard (38 in total), consists of weights with thicknesses between 1.8 and 2.2 cm and weight between 135 and 175g. These two groups are likely to represent the remains of two looms with which two different

[30] Giardino 1996, 142–144, fig. 6; 1998, 180, 214 fig. 13; 2004, 402–403; De Siena and Giardino 2001, 144–145, fig. 10 (1).
[31] Giardino 1996, 149–152: in this case Giardino also hypothesizes the presence of a third house with such typology but it has to be verified because of the lack of building traces do not allow a clear, defined plan; 1998, 180–181, 214 fig. 13; 2004, 413–415; De Siena and Giardino 2001, 145–146, fig. 10 (2–3).
[32] Giardino 1996, 152–156, fig. 14; 1998, 181–182, 214 fig. 13; 2004, 415.
[33] Samples found in surface levels have been excluded from such distribution as not precisely locatable.
[34] Giardino 1996, 142–150, fig. 7; 1998, 177–183; 2004, 402–403, fig. 7; De Siena and Giardino 2001, 144–145.
[35] For the description of the sample and conclusions about its discovery see: Meo 2011, 7, 10, fig. 11.

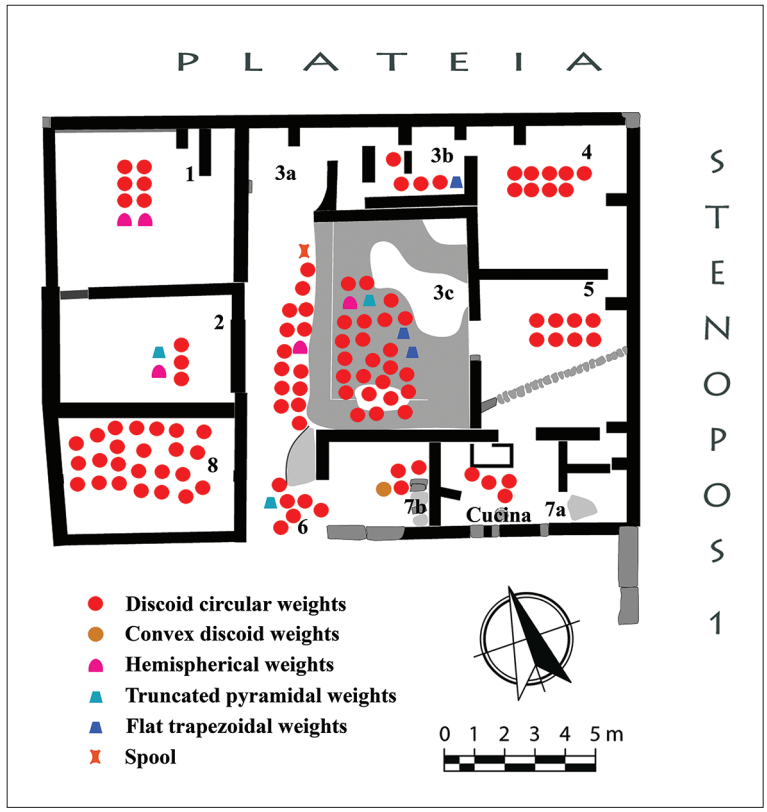

Fig. 11.9 Herakleia, western quarter of the Castle Hill, block II, 'courtyard house'. Distribution of loom weights and other textile staff inside the rooms. (Author).

warps that have been worked: the first one in room 8 would have been used to weave finer fabrics in comparison to those produced using the second group of heavier weights in the courtyard, room 3c.[36] However, both fabrics are of good qualities, probably for clothing or finer domestic textiles.

New methods of investigation now allow us to match the quality of the fabric produced through analysis of the relationship between weight and thickness of the loom weight: the weight of a loom weight determines how many threads can be attached to it while the thickness is able to establish their number.[37] Such innovative methodology, developed thanks to the research conducted at the CTR in Copenhagen, will be applied to each group of loom weights identified as a possible part of a set for the workmanship of fabrics.

Applying this new methodology to the data introduced above it is possible to produce meaningful results: the loom inside the courtyard would have produced a very thin fabric, with warp threads of 12.5g tension. Production with threads of 10g tension would also have been possible but the heterogeneity, resulting from the excessive discrepancy of density between 12 and 23 threads per cm, produces a tendency towards a production of a slightly thicker fabric (Fig. 11.10a).

[36] About elements which are at the base of this differentiation see *infra*.
[37] The applicable methodology is well explained in Andersson Strand 2011.

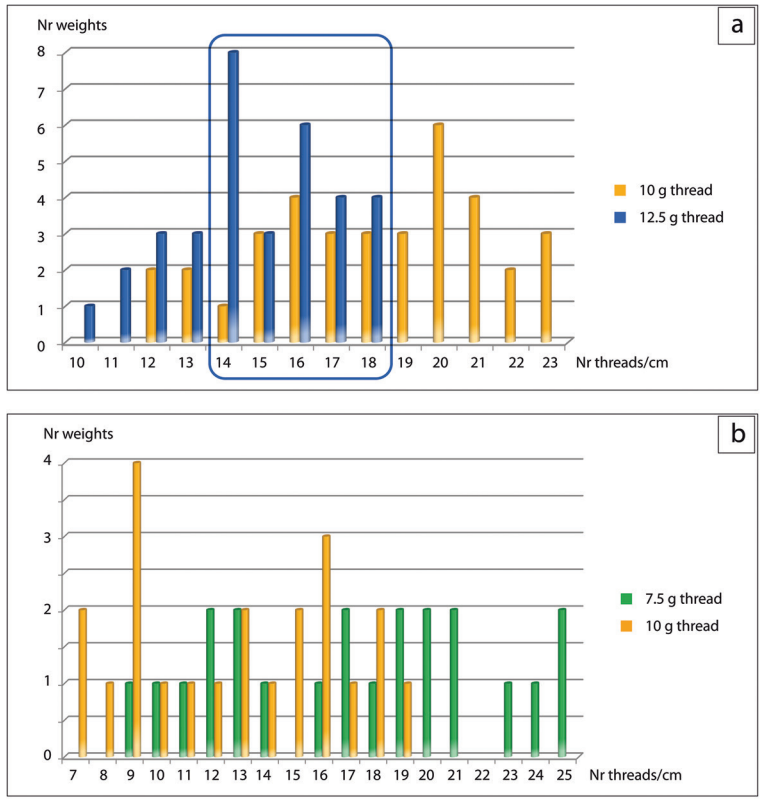

Fig. 11.10 Herakleia, western quarter of the Castle Hill, block II, 'courtyard house'. Fabrics from groups of loom weights found in the house. (Author).

Concerning the loom in room 8, it is not possible to identify one single set of production, despite the fact that the loom weights' thickness and weight are more homogeneous than those of the courtyard; it is only possible to hypothesize the manufacture of a fabric of slightly superior quality than the first, using threads requiring 7.5–10g tension (Fig. 11.10b).

The second 'courtyard house' is located in the northwestern corner of block IV. It has been used contemporaneously to the previous one (from the end of the 3rd century BCE to the end of the 1st century BCE),[38] thanks also to the recovery of a family hoard buried in Caesarian age.[39] Inside the house a total of 143 loom weights have been discovered (Fig. 11.11). Also in this case the vast majority are discoid circular weights (134 samples) with just 1 convex discoid sample; the number of truncated pyramidal (7 samples) and flat trapezoidal (1 sample) loom weights is very limited.

Two groups of weights have again been identified thanks to the distribution of the finds inside the rooms: the first one in rooms 3 and 5, the second in rooms 11 and 12.

Detailed analysis of the weight and thickness of the discoid circular weights here show once more two groups which are more homogeneous than the two of the previous house. The group

[38] Giardino 1996, 143 fig. 6, 148; 2004, 402; De Siena and Giardino 2001, 144–145.
[39] Siciliano *et al.* 1993; Giardino 1996, 148.

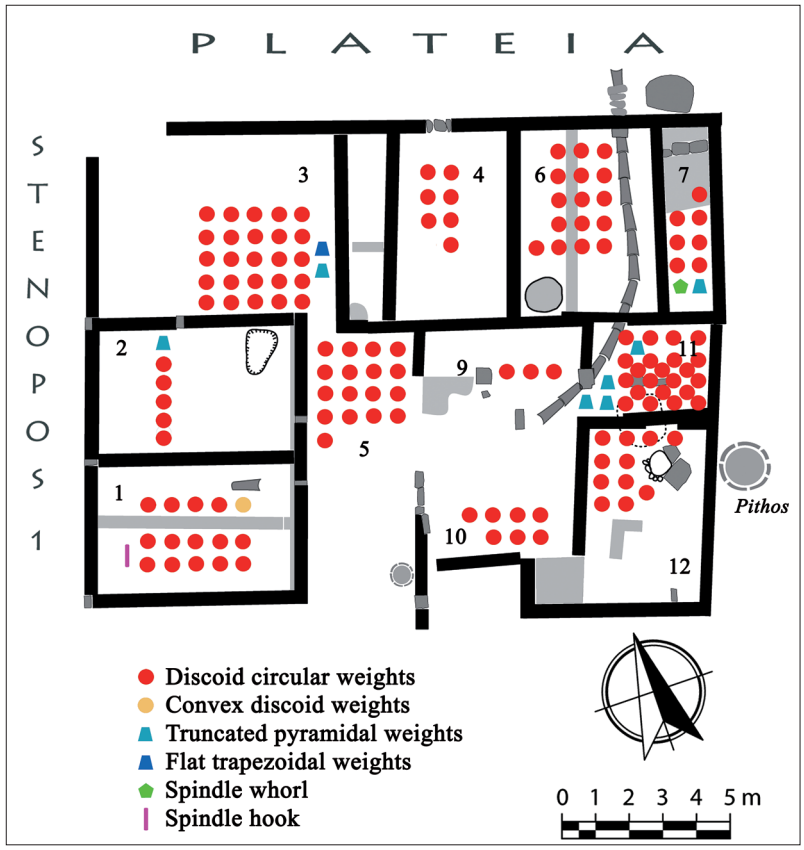

Fig. 11.11 Herakleia, western quarter of the Castle Hill, block IV, 'courtyard house'. Distribution of loom weights and other textile staff inside the rooms. (Author).

recovered in rooms 3 and 5 consists of 43 samples with a thickness between 1.8 and 2.2 cm and weights between 160 and 210g. The second group consists of 37 weights with a thickness between 1.9 and 2.3 cm; and weights between 190 and 220g.

These two groups most likely belong to two looms used for producing similar products but slightly coarser in comparison to those made in the previous houses' looms.

We cannot exclude the possibility that the looms in rooms 3 and 5 could produce a fabric with warp threads of 15g tension despite a thinner one, with threads of 12.5g tension, could be possible too (Fig. 11.12a).

Weights of the second loom would also have produced fabrics both with threads of 12.5g tension and with 15g tension; nevertheless production with 15g thread tension seems more probable as the resulting fabric would be more homogeneous (Fig. 11.12b). These fabrics are of fine to medium quality and probably for clothing or fine house textiles.

Also, a spindle hook and spindle whorls have been identified inside the house (Fig. 11.13). The spindle hook is made of a sheet of bronze, shaped like a spout and topped with a hook; it is 3.9 cm

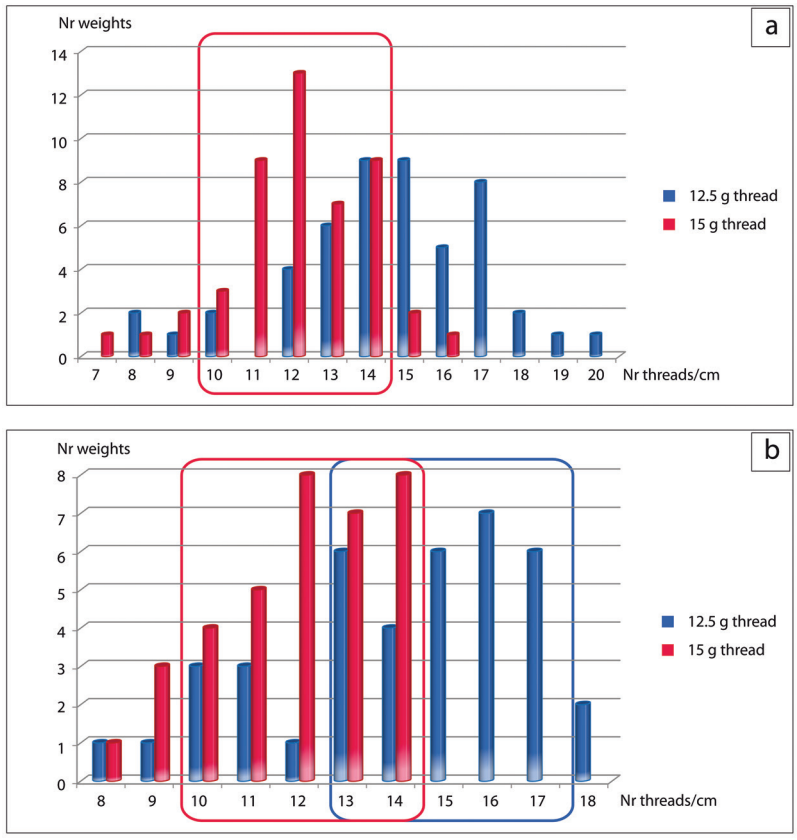

Fig. 11.12 Herakleia, western quarter of the Castle Hill, block IV, 'courtyard house'. Fabrics from groups of loom weights found in the house. (Author).

long with a diameter for the hole for embedding the wooden spindle of 0.5 cm. Finds such these are rare and difficult to date; a similar sample has been recovered in Ephesus.[40] The spindle whorl is spherical, with a diameter of *c.* 2.5 cm and weight of 11g.

The 'Peristyle houses', three in number, as already seen, are contemporary with the 'courtyard houses' while the third one, in block VI, has a more recent plan (see above). Currently only two of these have been analyzed. The house at the south-eastern extremity of block II does not allow an easy reading as a notable quantity of archaic materials has been found in inside, but even if it has not been completely excavated, the identification of a probable set of weights allows for a series of considerations. Inside the house, a total of 58 loom weights have been discovered (Fig. 11.14). Also in this case the vast majority are discoid circular weights (41 samples), while all the others are truncated pyramidal (16 samples); in both groups there are some samples in lead: 5 among the discoid circular and 6 among the truncated pyramidal weights.

[40] Trinkl 2007, 84, fig. 13.5: on the discovery of spindle hooks from Sardis in contexts from the archaic to the Byzantine periods.

Fig. 11.13. Herakleia, western quarter of the Castle Hill, block IV, 'courtyard house'. Spindle hook. (Photo and drawing: C. Bianco).

The lead discoid circular samples have thicknesses of 0.6–0.7 cm, diameters between 7.2 and 7.4 cm and weights between 225 and 245g. The lead truncated pyramidal weights have squared base; they have heights between 6.5 and 7.5 cm, with the lower base between 2.9 and 2.5 cm, and the upper base between 1 and 1.5 cm and weight of 200–300g.

All lead discoid circular weights have the same stamp, a 4 rayed wheel, with a diameter of 1.5 cm. The presence of such decoration, together with the notable homogeneity in dimension and weight of all specimen, allows us to hypothesize that they belonged to a set. To hypothesize the presence of a small portable loom with discoid circular lead weights is nevertheless very uncertain as such a minimized thickness for all samples would have involved the production of a too dense warp, with around 50 threads of 15g warp tension per cm or around 40 threads of 20g warp tension per cm (Fig. 11.15a). Furthermore the low number of lead weights does not suggest a loom. However, three of the five lead weights have only one passing hole rather than two: one hole has in fact ben partially closed by melting the metal and it is only visible on the decorated face.

The truncated pyramidal lead weights could instead be part of a set for a portable loom; it was in fact possible to weave with a thread of 10–12.5g warp tension, even though the woven fabric would have been very thin but of poor quality because of the low number of threads per cm (Fig. 11.15b).

Over these two groups, a nucleus of weights in rooms 29 and 33 can be identified: it consists of 20 samples with thicknesses between 1.9 and 2.3 cm and weight between 190 and 220g. Through the analysis of data, similar fabrics can be hypothesized once more since the used thread would have been of 12.5–15g tension in weight (Fig. 11.15c).

From the same area, a spindle whorl and two spools have also been recorded beside the weights: the spindle whorl is spherical;[41] spools of the same typology as those recovered in the 'courtyard house of the same block, with concave body and flat extremities,[42] are probably part of a set for preparing the edge of the warp to be attached to the loom.[43]

[41] It has a diameter of *c.* 3 cm and weight of 27g.
[42] Type B1 in Gleba 2008, 143–144, fig. 99; Meo 2011, 7, fig. 11. The first sample is 4.8 cm long and 5.2 cm wide at the two extremities and 2.9 cm wide at the centre of the body; its weight is 80g. The second, only partially preserved, is *c.* 4.6 cm wide at the extremities and 3.2 cm wide at the centre of the body.
[43] *Technical Report* 2007; Gleba 2008, 140.

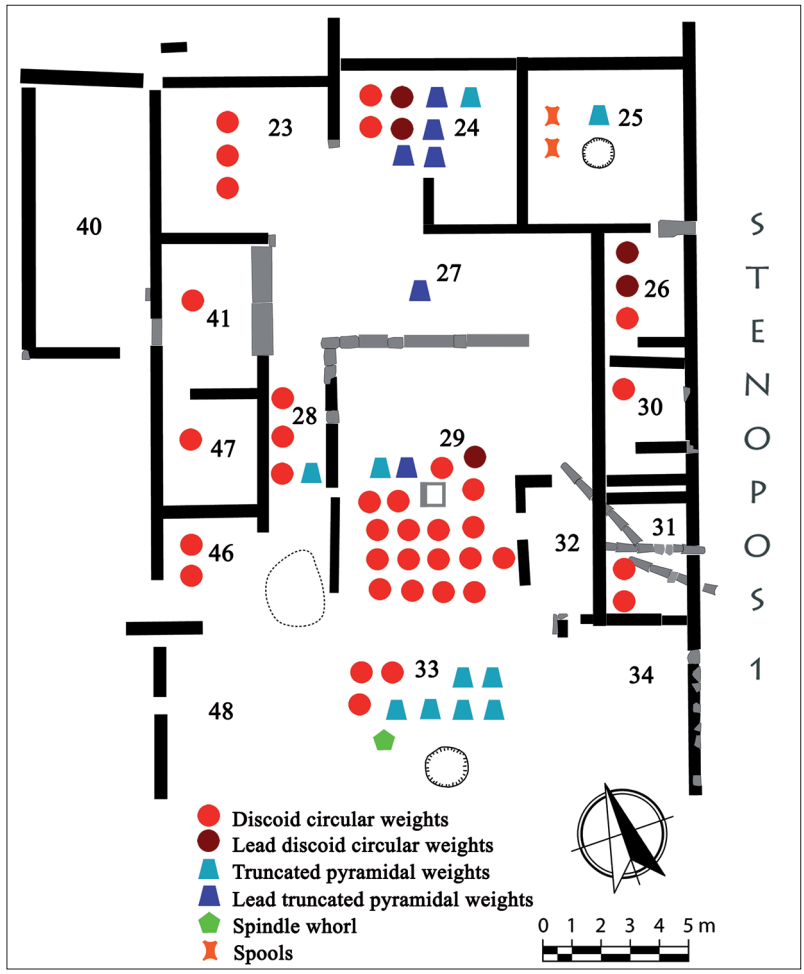

Fig. 11.14. Herakleia, western quarter of the Castle Hill, block II, 'Peristyle house'. Distribution of loom weights and other textile material inside the rooms. (Author).

The second 'peristyle house' is in block VI, built at the beginning of the 2nd century BCE and in use between the 2nd and the 1st century BCE.[44] Inside this house, 126 loom weights have been found (Fig. 11.16). In this case, again, the majority of loom weights are discoid circular (114 in total, with two more examples of hemispherical weights), while there are only 8 truncated pyramidal and flat trapezoidal loom weights (of which 3 of the first type and 5 of the second one), and 2 pinched weights. The spatial distribution of the weights inside each room also indicates the presence of two separate groups: the first one in room 36 and the second near the peristyle (in rooms 1, 2, 3 and 4).

The two groups of weights have meaningful functional characteristics. The weights of the more homogeneous group (33 examples) found in room 36, have a thickness of 1.9–2.2 cm, but it is not

[44] Giardino 1996, 152–156, fig. 14; 1998, 177–183.

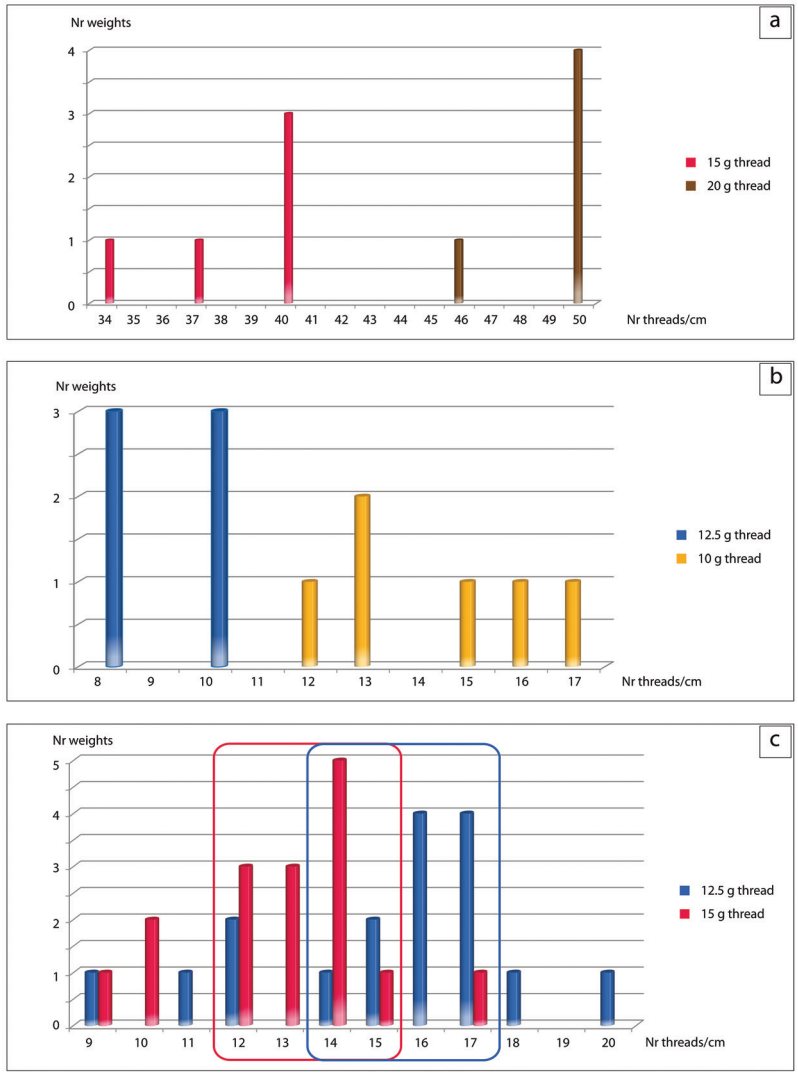

Fig. 11.15. Herakleia, western quarter of the Castle Hill, block II, 'Peristyle house'. Fabrics from groups of loom weights found in the house. (Author).

possible to identify a precise range for their weight. The weights of the group recovered around the peristyle (55 in total) have a wider range of thicknesses, between 1.8 and 2.3 cm, but a well-defined and narrow weight range, between 200 and 220g. Hence, in this case too, it is possible to hypothesize the presence of two looms and in the case of the peristyle group, it is likely that they were used to produce a fabric different from that produced in house 'A' of block II but similar to the one produced in the other two presented houses. Also in this case, analyzing data with the CTR method, it is possible to hypothesize the presence of two looms for the production of a very thin fabric, with warp threads of 12.5–15g tension in both cases (Fig. 11.17).

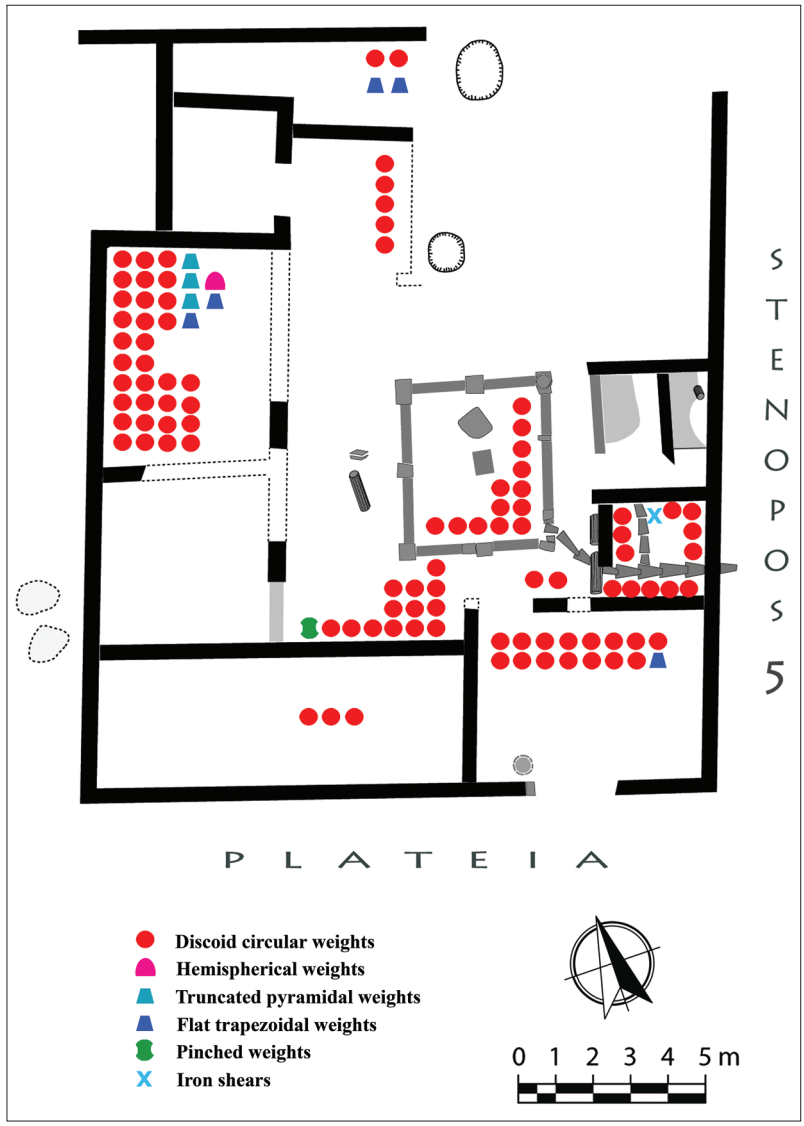

Fig. 11.16. Herakleia, western quarter of the Castle Hill, block VI, 'Peristyle house'. Distribution of loom weights and other textile material inside the rooms. (Author).

In addition to loom weights, a pair of iron shears was found in room 2, near the peristyle.[45] The shape is common to all shears datable between the 5th to 4th and the 1st centuries BCE recovered in Italy: two triangular blades (knives) with a rectangular tank attached to simple U-shaped spring (Fig. 11.18).[46] The blades are *c*. 11 cm long while the total length of the shears is *c*. 20 cm. This is the only example of shears published so far from Herakleia, and the only pair found along the entire

[45] Meo 2011, 8, 10, fig.14.
[46] Gleba 2008, 93–97.

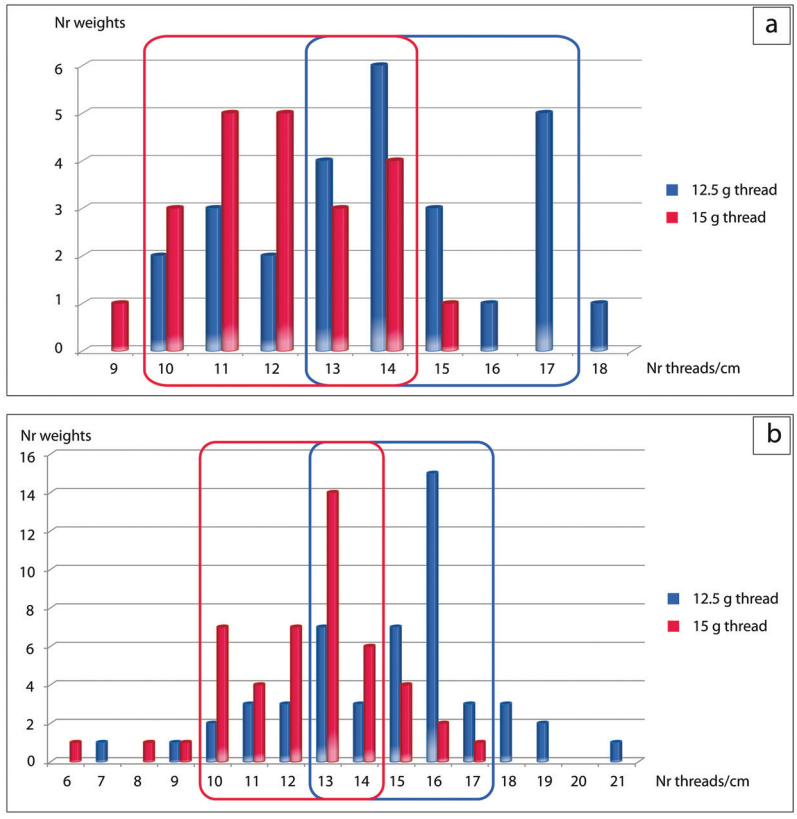

Fig. 11.17 Herakleia, western quarter of the Castle Hill, block VI, 'Peristyle house'. Fabrics from groups of loom weights found in the house. (Author).

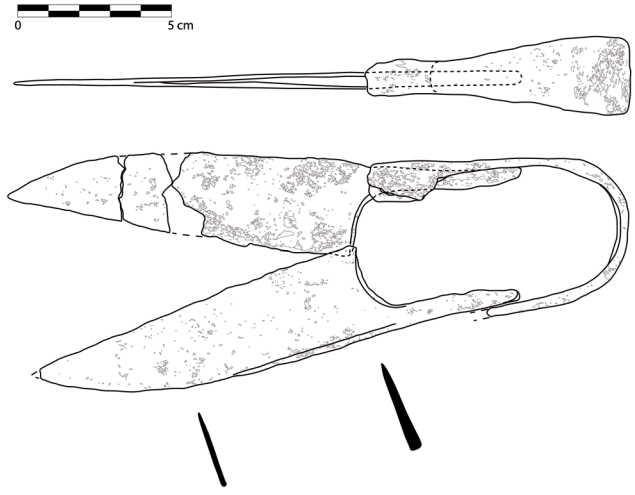

Fig. 11.18 Herakleia, western quarter of the Castle Hill, block VI, 'Peristyle house'. Iron shears. (Drawing: C. Bianco).

Ionic coast that comes from a house or settlement context. Two other examples published to date come from female burials: grave T 76 of Pantanello, in the *chora* of Metaponto, datable tentatively to between the end of the 5th and the beginning of the 4th century BCE;[47] and grave 6 of Taranto, dated to the second half of the 4th century BCE.[48] The shears' length, too short to be used in the shearing process, together with the recovery of tools of similar sizes in female burials, and the identification of a loom in the peristyle, suggests a direct connection with the weaving process rather than with shearing.

Conclusions

Based on the data presented above, a series of preliminary conclusions can be drawn.

In terms of chronology, the contexts attest to the presence of discoid circular loom weights in levels dating from the 3rd to 2nd centuries BCE and the absence of contexts dating to the 2nd half of the 4th century BCE in the investigated area. This is in contrast to the generic dating of 4th to 3rd century BCE given for this type in the archaeological literature as they are in use for the duration of the 2nd century BCE.

The contextualization of loom weights inside the houses and, more specifically, inside specific rooms allow us to also illustrate the organization of textile production: the presence of seven looms seems to demonstrate that weaving took place inside the houses and not inside special workshops. It is further possible to hypothesize that textile production was not only a simple domestic activity but a real economic activity.

Subsequently, weaving processes would be developed in domestic circles and fibre would be delivered to women from a trader who subsequently would collect the fabrics produced, only paying for the labour. The realization of a finished product involves a series of necessary steps preceding the weaving phases for which direct traces are scarce or entirely absent so far in the inhabited centre of the western district of the Castle Hill of Herakleia.

Nevertheless, the presence of a certain number of discoid circular loom weights made from Taranto clay (55 examples of 1297, a little over 4.2%) with the same decorations as the Herakleia weights allows us to hypothesize that Herakleia and Taranto belong to a unique production system. Such a hypothesis assumes great validity because the origin of Herakleia as a colony of Taranto, and the presence of numerous literary testimonies about the wools of Taranto, which integrate perfectly with what is emerging from the archaeological data for the colony.[49]

The analysis provided by experimental archaeology also contributes new results concerning the finished product: the finished fabric was of very thin/thin quality since the threads used never surpass 15g in warp tension. The contemporary presence of a notable number of looms for weaving fabrics of warp thread tensions of 12.5–15g can also be interpreted as a probable standardization of production due to a demand for a certain kind of finished goods.

However, in future a more detailed and complete picture which provides the definitive proof for the attestation of such remarkable production activity along the whole Ionian coast will be possible only with the analysis and the comparison of individual contexts, their contextualization in a more general overview and a subsequent study of the decoration and inscriptions on the loom weights.

[47] Carter 1998, 266 n. 51, 817–818 H8s, fig. 20.19.
[48] De Juliis 1984, 407 XXXIX n.4.
[49] Sartori 1967; Lombardo 1996; Giardino 2004, 391. For a detailed picture on sources about Taranto wool: Morel 1978, 94–99.

Abbreviations

AnnBari	*Annali della Facoltà di Magistero, Università di Bari*
ArchStorPugl	*Archivio Storico Pugliese*
Mon. ant.	*Monumenti Antichi pubblicati per cura della R. Accademia dei Lincei*
NSc	*Atti della Accademia Nazionale dei Lincei. Notizie degli Scavi di Antichità*
RicStBrindisi	*Ricerche e Studi. Museo Provinciale Francesco Ribezzo, Brindisi*

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12. Roman Art: what can it tell us about dress and textiles? A discussion on the use of visual evidence as sources for textile research

Lena Larsson Lovén

In ancient Roman society huge amounts of textiles were produced of which very few remain today. Textiles are rapidly destroyed over time and only fragmentary evidence of the mass of textiles once produced in the Roman world are left for us to study. In addition to the relatively small quantity of textiles preserved, finds from archaeological contexts are often both fragmentary and in a poor state of preservation. In spite of the general poor condition even minute finds can contain substantial information which can be extracted by modern analytical methods and provide information on aspects such as raw materials, fibre qualities, dyes, weave patterns, and ancient textile technologies. However, the general present state of textile finds does not accurately reflect the importance of textiles either in terms of the scale or the variety of products and qualities that Roman textile production embraced. This situation implies complications as well as challenges when aiming at a broader interpretation of ancient textiles.

In spite of their importance in the ancient past, textiles have long been a neglected field of research. During the past ten to fifteen years there has, however, been a steadily growing interest in dress and ancient textiles. The current scholarly interest has led to a new awareness of the significance of textiles in the past.[1] Some effects of this trend are that we have began to understand how dress worked in creating identities in a given time and social setting but we are only at the beginning of appreciating the economic importance of ancient textile production. In spite of the new focus on dress and textiles, the situation in ancient sources remains unchanged but in the case of archaeological evidence methodologies have developed in order to better analyse fragmentary remains.[2] Fortunately, sources other than archaeological finds may provide complementary information to help understand

[1] One example is the recent project DressID: Clothing and Identities. New Perspectives on Textiles in the Roman Empire, funded by the European Union. This project has resulted in several publications and an exhibition Die Macht der Toga and a publication with the same title (eds M. Tellenbach, R. Schulz and A. Wieczorek), 2013. For an overview of this project see Tellenbach 2013, 282–291.

[2] One important exception is Roman Egypt where excavations at several places such as Berenike (F. C. Wild 2004), Mons Claudianus (Bender Jørgensen 2000; Mannering 2000) and Kellis (Bowen 2008) have resulted in extensive textile finds. For a recent overview of textile finds in Egypt and neighbouring countries see Schrenk 2006. Occasionally more extensive finds of textiles do appear in excavations from other regions outside Egypt as well such as S. Martre -les-Veyre in France (van Drier-Murray 1999) and in Masada (Yadin 1953; 1965; 1966; Granger Taylor 2011) in Israel; Wild 2013 (Vindolanda). For more examples of information extracted from textile finds from various regions see Stauffer and Raeder Knudesn 2013 (Verucchio); Stauffer 2013 (Palmyra); Mitschke 2013 (The Rheinland); Reifarth 2013 (Roman Gaul).

the importance of textiles and textile production in Roman society. This chapter will be based on visual evidence with the aim of discussing how various artistic genres can be used as sources for dress, textiles and textile production in Roman Italy.

Visual evidence and Roman textiles – some methodological issues

Ancient Roman society was a culture that regularly expressed itself visually. Large quantities of art were produced which in its original contexts was used in both public milieus and in private houses. Art works that were placed in public settings, especially in urban communities, could be seen by large groups of people and functioned as a way of ancient mass communication. In a society where literacy could not be expected from everyone, images and visual communication were open to a wider population than just those who had learnt to read. The human figure is a main motif in Roman art and, with the exception of people of divine or heroic status, ordinary men, women, and children are normally depicted clothed. The key questions discussed in the following are what sort of information various artistic genres may comprise about Roman dress and textiles, and how dress worked as a means of visual communication. From a methodological point of view it must, however, be clear that it was never a primary aim of any artistic medium to render detailed representations of either Roman clothing, or of any other textiles, or of textile production. Still, a rich body of visual evidence with depictions of clothes and other textile related motifs is available to us and can be used to seek a variety of information in this field.

In contrast to archaeological textile finds, large numbers of sculptures and other artistic works from the Roman world have survived to the present. They offer an extensive body of visualisations of clothes in particular, and occasionally other textiles too. So far this rich and diversified source category has only played a minor role in the field of Roman textile research. It is true that photographs appear in almost every study of Roman dress and textiles. The purpose may be to offer some complementary information of, for instance, what can be found in an ancient text or to underpin the author's argumentation in a paper. To include photos with art works such as sculptures or paintings as illustrations in a research paper is, however, not a method comparable to that of working from visual sources and using images as a primary source. The practice of using images as illustrations of a text, either ancient or modern, is frequent in modern studies but what can images *per se* tell us? Can they provide only supplementary information of that found in literature and other written sources or can one expect to find information exclusive to visual evidence?

'Roman art' is a very wide embracing concept and it covers a very long period of time. It includes various artistic media, from large scale sculptures to a range of miniature art from the Roman Empire. Some genres and motifs were used primarily in public settings while others occurred more often in private houses. Some works of art were commissioned by private persons for domestic use or as funerary monuments while others were for public display, sometimes with a political message. As mentioned above, Roman art is populated with human figures who appear in any genre and who are normally depicted with their clothes on. Images will give an idea of both how civilians and soldiers were dressed.[3] This chapter will explore the potential, and limitations, of art and images as a source of information *per se* to discuss how images can be a source to a better understanding of the importance and use of textiles in Roman society, primarily on examples from Imperial

[3] A recent study on the dress of Roman soldiers see Nosch 2011.

times of Roman Italy. Large scale stone sculptures were extensively produced in this period but with practically nothing left of the original colours. To add the richness of colours to the textiles it is, however, necessary to include examples from other sources too. This contribution does not aim to be an exhaustive survey of clothing items and textiles appearing in Roman art forms but rather to use a limited number of examples to demonstrate how visual evidence can contribute to our knowledge of textile production and its products, and how to understand dress as a means of visual communication.

Funerary art and textile production

When searching for information of how textile production may have been visualised in Roman art, the most rewarding material to look at is funerary art. This is especially true for memorials raised by and to men and women among the working classes. In the 1st century BC, Roman society experienced a significant increase in the commissioning of funerary monuments with the overall purpose of preserving the memory of a deceased individual for future generations. A memorial of a more elaborate style could be decorated with both an inscription and images that related to the life of the deceased. Sometimes motifs from work were chosen for this purpose. Although scenes from work were never an extensive category in Roman funerary iconography there is a series of motifs which reflect the production and trade of textiles.[4] This genre consists of a number of more or less standardised motifs where textile manufacture and trade are more often represented by symbols and tools than by actual work scenes. The motifs representing various stages of textile production are unevenly diffused in number but altogether the scenes embrace more or less all stages in the chain of production, from raw material to a ready to wear textile product. However, very few images are linked to the stage of producing raw materials and there is a higher frequency of images with textile products being presented and traded.[5]

Fig. 12.1 shows an instance from Rome, a funerary plaque from the mid 1st century BC commemorating a man and a woman, their family and freed slaves. To the left is seen an image with the combination of symbols of an occupation and the social status of the man and the woman. The possible occupational symbol is a sheep and above the sheep is depicted a pair of joined hands, one of them a woman's arm with a bracelet.[6] The sheep is a rare symbol in the iconography of Roman textile production but it clearly underlines the importance of wool as a textile raw material. A man and a woman clasping hands – the gesture of *dextrarum iunctio* – is a much more recurrent iconographic symbol and it usually represents a married couple.[7] Slaves were part of the Roman social and legal system all through Antiquity and society depended on slave labour. Slaves did not have the same rights as free citizens, such as that of a legal marriage but it could be acquired through manumission. In funerary iconography it was of particular importance for people, such as ex-slaves, who had not always been included in citizen rights to demonstrate their newly acquired rights and status. The inscription in the right field contains two names, male and female. The man is the ex-slave C. Cafurnius Antiochus and the woman is Veturia Deutera, also a former slave.

[4] See Zimmer 1982, 25–29, 120–132.
[5] For an overview of textile related motifs in Roman and Gallo-Roman funerary iconography see Larsson Lovén forthcoming.
[6] *CIL* 6.9489; Zimmer 1982, fig. 34; Larsson Lovén forthcoming (n.1.1.1).
[7] Larsson Lovén 2010, with further references.

Fig. 12.1 Funerary plaque of a lanarius, the freedman C. Cafurnius Antiochus and his wife. C. *50 BC, in the courtyard of Palazzao di Fide Propaganda in Rome. Photo by the author.*

Through manumission they could enter a legal marriage, symbolised by the joined hands, an important sign of their social success.

The inscription also contains a job title, that of *lanarius.* The specific meaning of this occupational title has not been possible to interpret with accuracy but the close connection to wool, *lana*, is obvious. It is likely that the sheep symbolises the occupation. It is interesting to note that there is no job title for the woman who was an ex-slave of the Veturii family. This family is known from several other inscriptions of freedmen in Rome and famous for its engagement in textiles and the dyeing trade. Slaves worked in all kinds of jobs and as a slave the woman in Fig. 12.1 must have done some kind of work. For a female slave of the Veturii family (hence her name Veturia) it does not seem unlikely that she had been engaged in some stage(s) of textile production. Considering the tendency of women marrying colleagues of different families but in the same line of work it seems fully plausible that Veturia Deuteria may have been involved in a family-run textile business, both as a slave and in her marriage to the *lanarius* Antiochus. Her work has, however, not been specified by a job title in the commemorative inscription.[8] It is a general trend in Roman memorials, in both epigraphy and iconography, that the work of women is made less visible than that of men.

For women, spinning implements, wool baskets and bundles of wool appear as the most prominent symbols of textile work, in funerary iconography. Fig. 12.2 shows the portrait of a woman in a niche and beside her is a wool-basket.[9] In this case the portrait of the woman and the wool-basked are separate from each other. In many other examples the symbols of wool-work are commonly held by a woman but only rarely seen in use. Attributes of spinning were never associated with men. Instead, male work in textile production is represented by other symbols and one recurrent tool is the wool-shears as in Fig. 12.3. This stele is from Aquileia in north eastern Italy and it commemorates three persons, one man and two women, all of freed status. The decoration consists of a wool-shears, a *forfex*, and an unidentifiable box-like item.[10] There is no job title in the short inscription and it is not possible to identify with accuracy which specific occupation(s) is represented by the wool-shears. The *forfex* was used when shearing the fleece and was, thus, a tool used at an early stage in the chain of manufacture. Variants of shears and scissors were, however, multi-functional implements which were also used at several later stages in textile manufacture, such as in workshops and when cutting a piece of cloth.

A regular, standardised textile motif dominated by men are scenes from the 1st and 2nd centuries AD in Italy where one or more men are holding up a piece of cloth and the textile product is always made clearly visible to the viewer. Fig. 12.4. is a funerary stele from Milan where such a

[8] For a discussion on this item see Dixon 2001b, 119–121.

[9] *CIL* 1.1930; Frenz 1985, 159f., no. 151, pl. 63:2; Larsson Lovén 1998, pl. XIX; Dixon 2001a, pl. 8: Larsson Lovén forthcoming (no. 1.5.2).

[10] *CIL* 5.1183; Zimmer 1982, 25f, n.152; Larsson Lovén forthcoming (no. 1.2.3).

Fig. 12.2 Partly preserved funerary monument of a woman. Her portrait is seen to the right and to the left of is a wool-basket, a quasillum*. Museo archeologico delle Marche, Ancona. Photo: DAI/Rome Inst.Neg.80.106.*

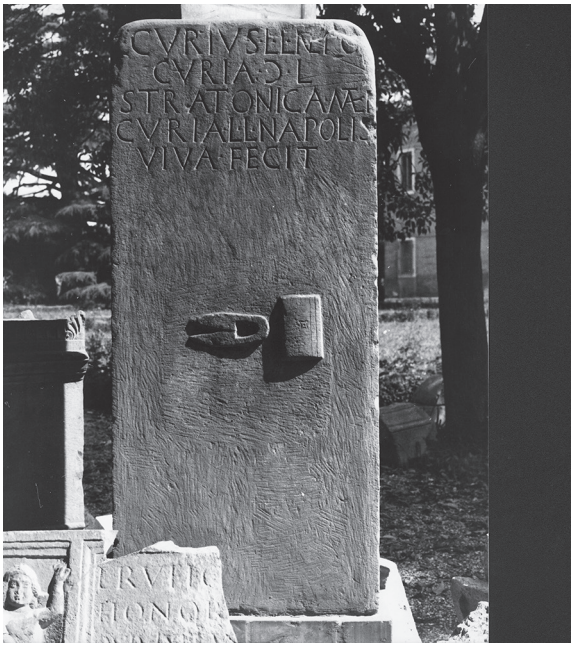

Fig 12.3 Funerary stele of one man and two women and the symbol of a forfex*, a wool-shears. Museo Archeologico di Aquileia. Photo: DAI/Rome Inst.Neg.82.62.*

Fig 12.4 Funerary stele of a man who may have been a draper, illustrated in the bottom scene. Museo Archeologico, Milano. Photo: Sopraintendenza Archeologico di Milano.

representation occurs. The scene is placed at the bottom of the stele, below several rows of portraits of men and women some of whom are freed.[11] This kind of scene always shows men and textile products, and this motif has repeatedly been interpreted to represent a professional activity in the textile business. Mostly it has been suggested to represent 'quality control' of the textile product, or as an illustration of retailers of cloth or clothes, or even as a possible emblem of the whole textile manufacture. [12]

To conclude, these are a few examples from the iconographic repertoire of scenes related to textile manufacture. What can images like these tell us about Roman textile production? All examples discussed above include either tools as symbols for textile production or a textile product demonstrated to the viewer. The implements testify to various instruments used in textile manufacture. From inscriptions the names of the deceased person(s) are known and occasionally the inscription provides a name of a job which can help to identify a specific occupation and how it is represented in iconography. This information reflects the Roman job market which in turn can give some insight in the organisation of textile production. However, names of occupations do not alone offer a full understanding of what tasks a person in a specific line of trade performed.

Images from funerary monuments can tell us about the ideology of work, of specific jobs and if they were supposed to be done by men or women. As such they are a mirror of gender ideologies. The frequency of a motif or an occupation may reveal the status of a particular work or line of trade. Higher frequency of a motif in iconography may be read as a job of higher status and more attractive to represent than of those that are seldom or never visually represented. A decorated funerary monument was an investment not available to everyone and as such it also reflected the economic status of the commissioner. Due to the costs involved in erecting a memorial it was probably out of reach for those with jobs of low status and low income, such as, for instance, weavers, who do not appear in the iconographic repertoire and only in a few funerary inscriptions.

It is not possible to extract detailed information of the organisation of Roman textile production from the images. Literary sources give some insights into the scale of production and the textile trade. It is especially rewarding to look for information coupled to army supply. For instance, the author Livy (59–17 BC) relates an episode where in 204 BC a cargo of 1200 togas and 12,000 tunics were sent to supply the Roman legions serving in North Africa at that time.[13] This amount of garments was extensive but only a couple of decades later a much larger quantity of clothing appears to have been contracted for the Roman army. In 169 BC a transportation of 6000 togas and 30,000 tunics was requested to be sent from Rome to supply the army in Macedonia (Livy 29.36). The figures reflect the scale of Roman textile production and the need for garments in the Roman army and also the extensive textile trade linked to the army (Livy 44.16). Episodes like these and other information testify that Roman textile production was organised on a large scale but few details of how the production was organised are provided in the literary sources and practically none in the visual evidence.[14]

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[11] *CIL* 5.6123; Zimmer 1982, 122f., no 36; Balzer 1983, no. 10; Larsson Lovén forthcoming (no. 4.1.1).

[12] There is an extensive discussion on this motif and especially based on examples from Gallo-Roman funerary iconography; see Drinkwater 1982; Balzer 1983, 41–43; Gabelmann 1987, 196; Schwinden 1989, 297; Drinkwater 2001.

[13] This episode took place towards the end of the Second Punic War (218–201 BC).

[14] For a discussion on textile production and trade in literature and written sources see Wild 2000; Harlow 2005b. See also Dross-Krüpe 2011 for information on this issue from papyri and Liu 2011 discussing clothing supply mirrored in inscriptional evidence.

Visual representations of clothing and textile products

Ancient Roman society was a socially complex, stratified and hierarchical construction where the social and legal status of an individual could be expressed in a number of different ways. In this society the clothed body was the norm and everyone, regardless of social class, used clothes on a daily basis.[15] Roman clothes were highly diversified in quality and colour and furthermore according to aspects of social status, age and gender. Thus, clothes were a mirror of the social stratification, of gender constructions and a visible means of communicating a person's general status. How may visual sources reflect such structures?

The toga

Some garments were automatically associated with a certain status, such as the toga for adult men, the most well-known and iconic Roman clothing item. The so-called *toga virilis* was a garment made of wool and to be worn by men only. It required a large amount of cloth, especially from the 1st century AD when possibly 5m of a 2.5m wide cloth was needed for a single toga. The toga was draped and carefully arranged around the body and it was worn with a tunic underneath. Many preserved sculptures show men in togas. From the extensive number of sculptures of men dressed in togas and from a longer period of time, it is possible to see a development in the style and draping of the toga, and of a change of fashion. In Late Republican times (the 1st century BC) togas covered the body and both arms while in the 1st century AD the mode of draping left the right arm free.[16] Fig. 12.5 represents a statue in the collections of the Ny Carlsberg Glyptotek as an example of how a toga was draped in the early 1st century AD.

The right of wearing a toga was coupled with Roman citizenship and as such it was a mark of a man's legal and social status.[17] These rights could be inherited from freeborn parents or could, like the right of a legal marriage, be acquired by slaves through manumission. A manumitted slave, like C. Cafurnius Antiochus in Fig. 12.1, would probably have acquired the right of wearing the toga although he is not depicted by portrait on his memorial. Another example from the city of Rome is shown in a memorial for a man called P. Aiedius Amphio and his wife Aiedia Fausta Melior.[18] They were both of manumitted status and their relatively modest memorial commemorates them as a married couple. The man is dressed in a toga of the late Republican style. The memorial of P. Aiedius Amphio and his wife is not unique but one of many similar examples of manumitted men dressed in toga, the male dress of prestige. The toga was an important and regular agent particularly in freedmen's self-representations on memorials, demonstrating their new identity as Roman citizens and members of the civic body. Compared to their former life as slaves this was a vital change in their social and legal position, clearly signalled and visualised by the toga.

There was a wide range in status and rank among men who were entitled to wear the toga which could be further emphasised by details on the garment. Such details are for instance a broad purple border that marked the high status of a Roman senator who had the right to wear a *toga praetexta*. Such borders however, are in general not visible on sculptures as their original colours are now lost.[19] The *toga praetexta* was also the name of the clothing item worn by children of

[15] Harlow *et al.* 2005, xii.
[16] See Wilson 1924; 1938; Goette 1989 for discussions and details of the development of the draping of togas.
[17] For the symbolic value of the toga, see Stone 1994; Vout 1996; Davies 2005.
[18] Kockel 1993, cat. 1.1., Taf. 56d and 62 a+b, Altes Museum, Berlin Inv. no. SK840.
[19] See Goette 2013, 42, for an example how the coloured border of the toga might be placed.

Fig 12.5 A togatus *from the early first century AD in the collections of Ny Carlsberg Glyptotek. Photo by the author with the permission of Ny Carlsberg Glyptotek, Copenhagen.*

Fig. 12.6 A statue of a young man wearing a toga with a bulla. *Photo by the author with the permission of Museo Nazionale Romano, Rome.*

Roman citizen.[20] It too was decorated with purple borders but appears to have been a more gender neutral garment than the male adult toga as it was worn by boys and girls alike. Still, it was a significant marker of status as it was exclusive to children of Roman citizens. Apart from the toga, boys had an additional symbol of their status as children of citizens, the *bulla*, a pendant worn around the neck. This was given to new-born babies at a ceremony, the *lustratio,* which was held for freeborn girls eight days after birth and for boys nine days after birth.[21] There is some debate about whether *bullae* were given to baby girls as well but in artistic representations *bullae* appear as an exclusive symbol for boys. Fig. 12.6 is a partly preserved sculpture which shows a young male dressed in a toga and with a *bulla* around his neck. The head of the sculpture is not preserved and there is nothing else to identify either the name of this person or his specific age. Still, from the clothed body alone it is possible to give an estimation of the person's age and status. The toga identifies him as the child of a Roman citizen and as a baby this free-born boy had been given a *bulla*. *Bullae* were worn by boys until they

[20] Gabelmann 1985; Sebesta 2005.
[21] Rawson 2003, 110–111.

performed a rite-of-passage from the stage of boy to an adult man, marked by a change in clothing. At this occasion the child toga, the *toga praetexta*, was replaced by that of the adult man, the *toga virilis*, and after this ceremony the *bulla* was no longer worn. The age of boys when this ceremony usually took place was flexible but it appears often to have occurred in the mid teens.[22] As this boy still has his *bulla* but is not represented as a very young child, a rough estimation of his age could be anything between 10/11–15 years old.

The toga was worn over a tunic – an all around piece of garment that was used by both Roman males and females but adjusted according to the age, gender and status of the wearer. In sculptures it is often seen under the toga, below the neck and as a short sleeve on the right arm, as in Fig. 12.5.[23]

High status female dress

Married Roman women from a higher social stratum were called *matronae* and they had a dress equal in status to that of toga clad men. High status female dress consisted of several layers of clothing of which the most significant items were the *stola* and the *palla.* The *stola* was a long, sleeveless garment which was fastened on each shoulder by shoulder straps, *institae*.[24] A fine example is part of an alabaster cameo in the British Museum (Fig. 12.7) which shows the head and upper body part of a woman wearing a *stola*. It was worn over a tunic and could be worn either girdled or unbelted. In contrast to large scale sculpture where the mantle is very often the most visible female garment, as in the example discussed below, this small alabaster piece shows both the tunic, the *stola* and its shoulder straps very clearly. Compared to the preserved number of sculptures of men in togas, representations of females dressed in the *stola* are much fewer. To judge from a survey of sculpture, girdled *stolae* appear to have been more common until around AD 40. After that time the unbelted *stola* seems to have become more frequent although the evidence from sculpture is not unambiguous.[25] The outfit as such may not have been altogether clear in terms of social status as also freedwomen appear to have been allowed to wear the dress of the matron from some time during the Republic. It has been argued that freedwomen married to freeborn citizen men had the right to wear the *stola*, perhaps as early as during the Second Punic War (218–201 BC).[26] How frequently this may have been practiced is not possible to determine from visual evidence as a possible *stola* is often covered by a mantle, rich in cloth and covering most of the body and sometimes the head – the sign of a married woman.

An adult married woman would cover her head in public as a sign both of her marital state and her modesty. For this purpose part of the *palla* was used to cover her head and most of her body whilst a woman who did not use the *palla* covered her head and body in the same way but with a mantle and for the same purpose. Fig. 12.8 shows two standing females, an adult woman and a girl who could perhaps be around 7–8 years old. This group is most likely designed for a funerary monument and originally it may have included a third person, a man, to form a family group.[27] The girl is dressed in a *toga* which signals her status as the child of a Roman citizen. There is no further information available about the girl's name, age or family situation but her freeborn status

[22] Dolanksy 2008.
[23] See Pausch 2003 for a detailed study of Roman tunics.
[24] For detailed studies of the dress of the Roman matron see Scholz 1992; Olson 2008.
[25] Scholz 1992, 88.
[26] Olson 2008, 28–31.
[27] Family groups is a recurrent motif in Roman funerary iconography. For a discussion of this scene, see George 2001, 178–180.

Fig. 12.7 Onyx cameo portrait bust of a woman wearing a stola*. From Alexandria, Egypt, now in the collections of British Museum, London. Photo courtesy: the British Museum.*

is clearly mirrored by her dress and underlined by the hairstyle and a necklace that together give the impression of a child in a well off family. If the girl represents a child of around 7–8 years old a Roman female could be married off a couple of years, already at the age 12 or 13. A marriage would mean a change of clothes, from the childhood *toga praetexta* to the dress of an adult woman. If she was a member of a wealthy family, on the wedding day she was likely to be dressed in a special bridal outfit, made by herself. From literary sources we know several details about a Roman wedding. At a traditional wedding the bride was supposed to wear a special wedding dress in wool and made

Fig. 12.8 A group of an adult woman and a girl, Musei Capitolini, Rome. Photo courtesy: Archivio Fotografico dei Musei Capitolini, Rome.

Fig. 12.9 Mosaic from Pompeii with a group of street musicians, Museo Archeologico, Napels. Photo source: Wikimedia commons (public domain).

by herself.[28] Although images of married couples are standard in Roman art, unfortunately there are no known visual representations that can add any information to our knowledge about how a girl was dressed on her wedding day.

The woman of the group represents traditional female clothing with foot-long clothes and her body and head are covered, probably by a *palla* which implies she may be wearing a *stola* underneath. In this case the *stola* is not clearly visible but the V-necked draping resembles the arrangement on other sculptures of women dressed in *stolae* so there is reason to believe that the woman in Fig. 12.8 wears a *stola* and a *palla*. This sculpture exemplifies some of the difficulties in studying and analysing dress from sculpture which, as mentioned above, never aimed to offer detailed representations of clothing.

For a woman dressed in a *stola* and a *palla,* the clothes were a visual mark of her legal status and social class. This outfit is most often associated with women of the higher social levels and not a dress for female slaves or for women of low status, nor for those of non-Roman ethnicity.[29] The female outfit was a sign of both Roman identity, *romanitas*, and of social class, which can be compared to the status of the male toga with its special demands of its wearer.[30] Thus, both the *stola* and the *toga* were vital parts of demonstrating a male and a female Roman identity, especially in public.

Men, women and children dressed up on the Augustan Altar of Peace

The Augustan Altar of Peace, the *Ara Pacis Augustae,* is a public monument in Rome which can be used as an example of how men and women were expected to appear at public occasions. The altar was built to honour Augustus (30 BC–AD 14), the first Roman emperor, and *pax Augusta*, the Augustan peace. Especially during the early reign of Augustus a number of traditions were revitalized and clothes played a central role in the revival of allegedly old Roman traditions. Both male and female members of the Imperial household were important as role models for the citizen body. There are a large number of examples of sculptures preserved where both men and women in the family of Augustus are depicted in the traditional clothing of high social status. One of the best examples of the importance of proper clothing, male as well as female, and of conduct is

[28] La Follette 1994; a recent volume on the Roman wedding is Hersch 2010.

[29] Potthoff 1992, 179f. For examples of how ethnicity was used as a marker in dress, see Rothe 2009 for the Rhine and Moselle regions; female dress, from the regions of Noricum and Pannonia, see Rothe 2013 and Rothe in this volume; Carroll 2013

[30] For a wide range of representations of togas see Goette 1989; Kockel 1993. See also Goette 2013 for an overview illustrating how the toga was draped through the centuries, from Republican times to late Antiquity.

clearly demonstrated on the north and south friezes on the *Ara Pacis Augustae*.[31] This monument was erected between 13–9 BC in the Field of Mars and along one of the main roads, the Via Lata, leading into the centre of ancient Rome. The decoration of the monument was visible to any passer-by, both people living in Rome and to visitors, and it was used as a display window for conveying messages in accordance with the imperial policy where the idea of restoring the Republic and the reintroduction of traditional Roman values were central.

Both the north and the south frieze depict processions at a public occasion where the emperor is performing a sacrificial ritual.[32] On the southern side frieze Augustus, the emperor himself, appears at the head of the procession. He is only partly preserved but enough to see that he is dressed in a toga and has part of it over his head as a sign of performing a sacrifice. Male and female members of the extended imperial family and members of the social and political elite in Rome also take part in the ceremony, and they are dressed according to their status and social roles. A group of priests of high status surrounding the emperor are seen dressed in the official dress of *flamines* with peculiar hats, said to be made of goat skin. Like Augustus, most other men in the procession are dressed in toga which was revived in this period as the proper official clothing for Roman citizens. There is also one man wearing the uniform of a Roman general. All adult males depicted on the altar represent men from the upper echelons in society – priests, generals, politicians and members of the imperial family – and they are dressed accordingly, to match their positions in society.

The Augustan Altar of Peace is a rare example where non-mythical women and children appear in the decoration of a public monument. Women in Roman society could not hold public offices but as members of families of influential men they possessed prestige and some unofficial power. They too are dressed up in a way to mirror their position in the social hierarchy. They wear foot-length tunics, a *stola* and a *palla* – all garments rich in cloth and drapery. Like the toga, the traditional female dress was revived in this period. Most of the women have their heads covered by the *palla*, but one of the women, who is often interpreted as Antonia the Younger, a niece of the emperor, has a flower garland on her head. Next to her and the man in military uniform are a couple of children, two boys and one girl. The children on the south side wear the *toga (praetexta)* whose Roman identity contrasts to some non-Roman children in the frieze. By clothes and hairstyle they have been suggested to represent young foreign princes whose non-Roman ethnic origin is visualised through dress.[33] The figures on the *Ara Pacis Augustae*, a public monument, are all marble white as are the other sculptures discussed above. Nowadays this is the typical feature of ancient stone sculpture, regardless of whether the sculptures were made for private use, or were meant to be displayed in a public place or as a memorial – they all lack colour. Ancient stone sculptures were regularly painted, often in bright and strong colours. Occasionally traces of colour can still be seen on sculptures, but in general very little of the original colour remains today.[34] The Roman world and its clothes were

[31] For images of the *Ara Pacis Augustae* see Simon 1967. The Augustan programme for restoring old Roman traditions, the methods and the significance of these reforms have been thoroughly discussed by Paul Zanker: Zanker 1988. For the *Ara Pacis Augustae* especially see Kleiner 1978. See also Sebesta 1998 for a discussion about women's clothing and civic morality in the age of Augustus. For a recent study including aspects of the dress and ideology in the Augustan period, see Wallace-Hadrill 2008, 38–70.

[32] Normally thought to be on either the 4th July 13 BC when the inauguration of the sacred place where the altar was going to be built or on the 30th January 9 BC when the altar had been built and was inaugurated. See Simon 1967, 8; Zanker 1988.

[33] Rose 1990.

[34] The use of colours in ancient sculpture, in particular Greek sculpture, has recently been much high-lighted through a number of exhibitions with coloured full-scale reconstructions of well-know sculptures. See www.glyptoteket.com/

not white or without colours as they may appear in sculpture but clothes came in a wide range of colours, with patterns and symbols. The purple border on some kinds of toga, mentioned above, is only one example of colour symbolism on clothes.[35] Sculptural representations give an idea of how Roman clothes looked and how they were used as markers of gender and social class. As the original paint on sculptures are largely lost, they do not have much to tell about the colours of clothes and textiles. There are, however, more visual media where clothes and textile products are represented and where colours are still preserved. Such evidence can come from Roman paintings and mosaics which are more rewarding to use for information on the colours of textiles.

The colour of textiles

Painting was a widespread art form in the Roman world, from small portable pictures to large scale wall paintings. Much less has survived of this once common art genre than of sculpture, and in Italy it is mostly wall paintings from the Roman era which have survived. Our best source to Roman wall painting is Pompeii, a country town in Campania destroyed in the volcanic eruption of Mount Vesuvius in AD 79. Paintings were part of the decoration in private houses, which in the case of Pompeii, were all deserted in AD 79. Another way of decorating the houses was with mosaics, either on the wall or as floor mosaics. A variety of motifs were used both in painting and in mosaics, including everyday life scenes, mythological motifs, scenes based on famous Greek literary works, cityscapes and more.

As paintings and mosaics have colours preserved they have a great advantage compared to sculptures when studying textiles. As in sculpture people in paintings and mosaics are normally shown with clothes on, in accordance with the social norm. Motifs from daily life are particularly interesting as in such scenes people are represented in their everyday clothes and not primarily in high-class garments such as togas or *stolae*, or dressed up for a public occasion. Instead, in such scenes people are seen in various situations in the city, at work, shopping or other daily activities. A regular type of clothing in these images is the tunic. The tunic was the basic Roman garment and used by everyone, slaves and people of high status, men and women alike as well as children and adults. The tunic could be worn with or without sleeves. The gender of the wearer was marked by the length of the garment, with longer tunics for women than for men, and the status was marked by the quality of the cloth and the colours. Men with heavy jobs of low status had short and sleeveless tunics, sometimes belted, however, normally a belted tunic would imply a higher status. A 1st century BC mosaic from Pompeii shows a street scene with three musicians, one female and two males, and a fourth, smaller person dressed in a brown, short, belted and short-sleeved tunic[36] (Fig. 12.9). He does not wear any shoes and the smaller size of this person may indicate that he is a slave or a (slave) child. The female is dressed in a foot-long garment which could be a tunic. She also wears a mantle which does not cover her head. Her clothes are in yellow, green and brown shades. Both male musicians are probably dressed in tunics in yellow, green, bluish shades and each of them has a mantle tied around the waist. The mantle of the man to right is pink and the other man's mantle is white. Parts of the lower legs of both men are visible, below the mantles,

explore/research-glyptotek for current research at the Ny Carlsberg Glyptotek, Copenhagen, on colours of Greek and Roman sculpture. See also the chapter by Skovmøller in this volume.

[35] See Sebesta 1994 for a general discussion of colours of Roman clothing.

[36] The mosaic is from the Villa of Cicerone, and signed by the artist Dioskouros of Samos.

indicating the shorter length of male tunics than that of females. This mosaic comes from the so-called Villa of Cicero in Pompeii and it represents a scene from a Greek comedy. Musicians and entertainers in general had a very low social standing in Roman society and clothes in a scene like this are likely to represent ordinary but still gender specific clothes.

In a wall-painting, likewise from the so-called Villa of Cicero in Pompeii, a group of four women are shown.[37] A woman seated on a low table, with two instruments, is in the centre of the painting and is the attention of the other women. She is dressed in a foot-long dress, possibly a tunic, and a half transparent mantle covering the upper part of her body. Her feet rest on a low foot stool. Of the other three women one is sitting and two are standing. They are all dressed in clothes rich in colours such as green, yellow, light brown, and shades of purple. The cloth in their dresses, including the transparent cloth, looks softer and lighter than in the previous example which indicates fabrics of higher quality and more costly clothing. On the table is a multi-coloured cloth with a pattern in green, yellow and violet/light purple, pointing to an indoor scene. The women are dressed in traditional foot-length garments but indoors and in the presence of only other women they need not have their heads covered. The woman with the instruments is not to be interpreted as on the same social level as the woman in the previous example. This woman could be a housewife or a daughter in a family where she had been taught music as part of her upbringing, to be performed at home among family and friends, but not on stage or in the streets.

Fig. 12.10 Mummy portrait of a young man dressed in a tunic with clavi*, Nationalmuseum, Stockholm. Photo©Erik Cornelius, with permission Nationalmuseum, Stockholm.*

Another visual category of evidence with colours preserved is the painted portraits, mostly preserved from Roman Egypt. They are painted on thin wooden panels and represent heads and parts of the upper body of men and women of various ages. Normally they do not show the person in full length and, thus, we do not see the whole dress but still with important information at hand. One of the most significant and recurrent features on mummy portraits are the red stripes of the male tunic. They are known from literary sources but only very rarely preserved in sculpture (cf. Fig. 12.6). However, in mummy portraits they are often shown very clearly as in Fig. 12.10 of a young man dressed in a tunic with two brown-red, clearly visible stripes, *clavi*.[38] On each shoulder are dots that may mark the shoulder seams. There were two particular types of stripes, the *latus*

[37] See Tellenbach 2013, 15, fig.2.
[38] Parlasca 1980, no. 614, Tav. 145:4.

clavus – the broad stripe – on the tunics of Roman senators, and the *angusti clavus*, on tunics of members of the equestrian order. These types of *clavi,* thus, had a particular meaning of rank and status visualised on the tunic but other groups of men too wore tunics with *clavi* of various widths.[39]

These are a few examples of paintings and mosaics which illustrate some of the richness and variations in colour that characterised Roman dress and textiles. Although sculpture is much more extensively preserved than both paintings and mosaics, the significant feature of colours is almost completely missing in that source. The colours in art forms such as paintings and mosaics are important when trying to capture the colourfulness of Roman textiles and dress. Sculpture is a rich source to how in particular Roman dress was visualised but only more rarely are other textile products represented in sculpture. In addition to clothing, in paintings and mosaics also other textile products, such as table cloths and cushions, may appear. As demonstrated above, they too could be made in multi-coloured patterns.

Roman art: dress, textiles and textile production – an interdisciplinary field of research

In various artistic genres textile production and especially textile products are regularly visualised – but what do they tell us about Roman dress and textiles? What kind of information is there and what is not there? As discussed above, funerary art will give some evidence of how clothes were visualised but also of moments of textile production, which tools were used, and of how men and women were commemorated in their (professional) roles related to textile production. Although female jobs are fewer than those of men we can have a glimpse of how textile jobs and production were ranked according to status and gender.

Freestanding sculpture can give information on how dress was perceived and visualised and of how clothes were a mirror of gender, ethnicity and social status. The *togatus*, a man dressed in a toga, was a standard motif in Roman sculpture for centuries. The high frequency of this motif reflects the attractiveness of the toga as a garment and of being depicted and commemorated in as it automatically bears witness of a certain status of the wearer, primarily as that of a Roman citizen. Literary sources claim that the toga was the 'original' Roman dress used by both men and women but from perhaps the 3rd century BC it was no longer worn by women. There are no images preserved from the early centuries of Roman history to support this information nor do the abundance of sculptures of *togati* accurately reflect the use of the toga in everyday life through the centuries. Some written evidence claim that only women who were prostitutes or accused of adultery wore the toga but this information is not supported by any visual evidence. From written sources we learn that the toga was turned into a dress used only at public occasions or ceremonies rather than everyday clothing. This may have occurred already in late Republican times as Augustus tried to revive a more general use of the toga. Hence the importance of having members of his family dressed up properly on the Ara Pacis. Not only large scale sculpture supplies information about clothing and dress details, even minor art forms can contribute with important details, such as in Fig. 12.7.

From a methodological point of view it is important to remember that sculptures are not snapshots from ancient Roman everyday life but depictions directed both by artistic conventions and deliberate choice by artist and patrons. Men and women of the elite, and in particular of the Imperial family, were represented in visual media in several different public roles. Most people did not have the

[39] For a discussion of *clavi* and overview of previous interpretations see Bender-Jørgensen 2011.

same opportunities. A memorial with sculptural decoration or a large scale sculpture in stone was an economic investment and most people did not have many, if any, sculptural self-representations made and would therefore often choose to be remembered in the most prestigious way. For a man this often meant the toga and for women it could be in the stola, and/or with jewellery and with a complicated hair style. The manner Romans presented themselves in stone is not completely unlike self-representations in the early days of studio photography when people dressed up for the rare occasion of being portrayed by a photographer.

Obvious rapid changes or innovations in Roman clothing practices are not detectable from the visual arts. However, examples of some slow changes are seen in sculpture such as the draping of the toga and the gradual change in the *stola* of the high status female dress. Until *c.* AD 40 the latter appears in sculpture as a girdled clothing item, and after that mostly without a girdle. Gradually, it fell out of fashion in everyday life and, like the toga, the *stola* became primarily an article of clothing used on public occasions. After *c.* AD 170 the *stola* appears only rarely in the visual arts while the toga appeared continuously into Late Antiquity. [40]

To sum up, sculpture constitutes a rich body of evidence but not strikingly rich in information of either dress practices in Roman daily life or of many details of textile production. Sculpture will furthermore not give the names of garments nor currently give any substantial evidence of the original colours of clothes. How the Romans labelled their clothes and the different shades of colours used are instead known from literary sources. The rich spectrum of colours in textiles, sometimes mentioned in literary sources, are reflected in paintings and mosaics and give us some idea of the colourfulness of Roman clothes and textiles. What we do see in sculpture, especially on public monuments and in funerary imagery but deprived of its original colours, is rather a constructed official image of how Roman men and women and their clothes were supposed to look. This is not to say that they were never dressed in the way they are represented in the images but in Imperial times people mostly wore various kinds of tunics in their everyday lives.

In order to reconstruct a more complex picture of Roman textiles, the process of manufacture, its economic importance and the labour involved in the production, a combination of sources must be used and new methodological approaches applied to the evidence available. Information on various aspects of textiles comes from material remains such as workshops for textile work, and finds of various implements used in textile production. From ancient literary sources we may also gain some understanding of the variety of textile products and the original richness in colours which are only rarely reflected in the archaeological record. Although there is no ancient Roman 'handbook' on either textile manufacture or Roman dress, literary sources are frequently used and a great deal of information has been extracted from them on which several previous studies are based. Papyri is another category of written evidence that bears witness for instance of apprentice contracts with details of how young workers were trained in textile production. This evidence, however, primarily reflects the situation in Hellenistic and Roman Egypt. Epigraphy, and especially funerary epitaphs, is another category of material which has given us the names of hundreds of job titles, including textile occupations. They mirror work, predominantly that of men, and the organisation of production and trade in the Roman world.[41] As discussed above images are another

[40] For the development of the *stola* in sculpture see Scholz 1992, 10, 75. For female dress in the later Roman Empire and late Antiquity see Harlow 2004b; for male dress in the later Roman world, see Harlow 2004a.

[41] See Treggiari 1975; 1976; 1979 for an overview of job titles in epigraphy. Inscriptions will mainly give evidence of male occupations; Joshel 1992.

rich source and, even with inherent limitations, still the best available evidence to how their clothes were visualised and perceived by the Romans and how dress was a means of visual communication. Research into textiles from the Roman world is by necessity an interdisciplinary field of study as none of the sources will give a full picture of any aspect of textile production and its products but together the various source categories give information that will help us to a better understanding of the scale, structure and complexity of Roman textile manufacture and dress practices.

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13. Where Marble Meets Colour: surface texturing of hair, skin and dress on Roman marble portraits as support for painted polychromy

Amalie Skovmøller

The original painted polychromy of Roman white marble sculptures has over the last ten years become the focus of a growing scholarly discipline. Museums and research institutions in many countries are participating in this interdisciplinary and international research field to broaden our knowledge of the original visual effects of the iconic marbles of art historical and material culture studies. Since 2008, the *Tracking Colour Project* has constituted part of this research field.[1] Based at the Ny Carlsberg Glyptotek in Copenhagen the project has access to many well-known Roman marble sculptures.

Results of scientific investigation show that the white marble sculptures of the Roman cultures were more or less completely painted.[2] Research data is being gathered on their now-forgotten painted polychromy, which is adding new information to an over 500-year-old scholarly tradition, in which focus on the aesthetic qualities of the white marble has predominated.[3]

Using white marble for sculptural and architectural designs is strongly rooted in Western art, which makes the acceptance of the fully-painted Roman predecessors difficult. Without its iconic whiteness, the use of marble as a material for sculpture appears to be superfluous, and a frequently asked question, which seems to concern most people, is: Why use marble in the first place, when it would just be painted over? This question should, however, not only be interpreted as a fear of any devaluation of the aesthetic values of white marble, but also as genuine astonishment at the actual purpose of using marble for painted, three-dimensional sculptures instead of other materials which were easier to obtain and work such as wood or clay. Research into marble provenance shows that the craftsmen of the Roman Empire went to extraordinary lengths to obtain specific white marble types for their sculptural and architectural projects, transporting white marble by sea from quarries to cities and workshops all over the Mediterranean.[4] Results of marble provenance

[1] All the scientific examinations used in this article have been conducted by *Tracking Colour Project* conservators Rikke Hoberg Therkildsen and Maria Louise Sargent under the supervision of project leader Jan Stubbe Østergaard.

[2] Visit the website of the *Tracking Colour Project*; www.trackingcolour.com, for detailed information on all research results, including the Preliminary Reports of the project. New information is being uploaded regularly, keeping the website up-to-date with the activities of the project.

[3] Bukdahl 2004, 15–24; Hollein 2009, 14–17; Bradley 2009A, 427–428.

[4] Moens, Paepe and Waelkens 1992, 247–250; Moens and Ulens 1995, 199–206; Attanasio, Conti, Platania and Turi 2002, 141–148; Moltesen, Bald and Herz 2002, Attanasio 2003, 15–26; 101–106; Yavuz, Attanasio, Elci, Brilli and Bruno

studies have revealed that the workshops in Rome and Italy did not, for example, exclusively make use of marble from the nearest quarries, but also had large rough-hewn blocks of marble imported from distant provinces in Asia Minor and Greece. Shipwrecks loaded with marble found in the Mediterranean Sea around the coast of Italy testify to a flourishing marble trade during the Roman Empire.[5] The selection and use of types of white marble for the individual sculptures were therefore not entirely fortuitous. But when the sculptures were originally painted, their whiteness could not have been the deliberate aesthetic end goal, as scholars and artists praising marble since the 18th century would have us believe, which means that we have to change our perception of white marble as a material for sculpture.

Focus and aims

What is missing so far, and what this chapter will argue for, is an examination and evaluation of the coexistence of marble and paint as a symbiosis, where the material qualities of the marble and the techniques of painting supplement rather than conflict with each other. This chapter seeks to link the growing research field of sculptural polychromy with the well-established field of marble provenance studies and marble materiality. It will argue that the craftsmen of the Roman sculptural workshops chose their white marbles on the basis of their material properties (including elasticity, luminosity, size of grain) *because* they were going to paint on them.

This chapter will include a short presentation of the current knowledge of the painting techniques used for three dimensional marble sculptures in the Roman Empire by highlighting some of the results provided by the *Tracking Colour Project* at the Ny Carlsberg Glyptotek and its international collaborators. The sculptural polychromy research field is constantly expanding, and the current theories and methodologies are being questioned, debated and developed along the way. Secondly the chapter will include a discussion on the role of sculptural display and the visual experience between sculpture and viewer, and the aesthetic and semantic role of the artistic de-materialisation of the marble stone through surface texturing, detailing and painting, creating impressive optical illusions of human skin, hair and different dresses and textiles. Finally, the chapter will discuss the possibility of using the results of the examination of the marble types and their textural detailing and finishing as a way of gaining new knowledge of the painting techniques used for three-dimensional marble sculptures, and how this contributes to the studies of Roman dress and textiles.

Painting on white marbles

Considerable research is needed before we can say anything absolute or conclusive on the techniques of marble sculpture painting during the Roman Empire. Most sculptures in museum collections have been subjected to years of exposure to weathering, dust or sunlight and extensive post-antique cleaning processes, which have removed most of the remaining original paint. In some extreme cases the original marble surface with its texturing and painting can be impossible to locate; however an astonishing number of sculptures from collections all over the world still have traces of their original polychrome additions, which can be revealed when photo-analytically and microscopically

2006, 93–110; Attanasio, Bruno, Yavuz and Elci 2008, 216–227; Hirt 2012, 10–31. For more on marble provenance studies see the published ASMOSIA proceedings. The proceedings of the tenth ASMOSIA conference in Rome (May 2012) are forthcoming.

[5] Maischberger 1997, 33–54.

examined. The standard examination procedure used internationally[6] exposes and identifies most pigments to be found on ancient marbles, but not the techniques used to apply them.[7] Information on such factors as: 1) the use of organic binder mediums, 2) the mixture and concentration of pigments and their tonal values and 3) applied paint-layers, is sparse.

Binding media

Information on the nature of the different binding media used for painting on marble sculptures during the Roman Empire is highly relevant to how we interpret and reconstruct their original visual look, because the finish would, to some degree, have been affected by the chosen binder. The use of, for example, egg, animal glues or casein would leave a somewhat matte finish, while the use of, say, wax would give the surface a more glossy finish. Unfortunately we know very little of the binders, as their organic nature have caused them to deteriorate over time. Today scholars have been able to identify protein based binders (most likely egg yolk, casein and/or animal glues), gum Arabic and wax on both Greek and Roman marble and lime sculptures.[8]

It is likely that the binding media used for marble sculptural painting, would not necessarily have been a question of either/or, but perhaps a combination of different binders with different finishes determined by the position on the surface and the concentration of pigments. Wax could have been used alongside egg yolk on the same sculpture to obtain different effects according to grounding layers and final highlights. But so far this is mainly speculative, and remains to be supported by further analysis.[9]

Concentration of pigments and tonal values

The second factor that needs to be further investigated when reconstructing the original visual appearance of the Roman marbles in the round is the concentration, mixture and tonal values of the pigments used for painting. Almost all of the traces of paint discovered on marble sculptures represent the same range of colours, which are normally referred to as historical pigments.[10] These pigments are obtained from organic and mineral sources, with the one exception of Egyptian blue (and green) which is synthetically created by heating calcium, copper and sand.[11] The historical pigments make up a very strong colour palette ranging from deep blue to pink (Fig. 13.1). The question therefore remains, whether these intense colours would have been directly translated to the marble sculptures, or whether the craftsmen within the Roman Empire mixed and altered the pigments, subsequently altering their tonal values.[12] In most cases of microscopically-examined marble sculptures the data obtained has not proved sufficient to draw any absolute conclusions, which leads us to look for analogies among Roman contemporary material with a greater extent of surviving paint.

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[6] Brinkmann 2010, 16–19. Methodologies primarily used by the Tracking Colour team are microscopic and photographic examinations, including Visible Induced Luminescence (VIL), Ultra-Violet Fluorescence (UV-FL), and XRF analysis.

[7] Brinkmann 2009, 227–233.

[8] Kakoulli 2001, 261–274; Kakoulli 2002, 61–63; Kakoulli 2009, 11–12, 35–36; Stege, Fiedler and Baumer 2009, 216–217. See also the results from the scientific examinations of IN 2687: Østergaard 2009, 209–215 and on the web-page www.trackingcolour.com. Also Bourgeoise forthcoming article in *Les Cahiers de Mariemont* on the Berenike II head from Musée Royal du Mariemont (Inv. B.264) should be mentioned.

[9] Bourgeoise (forthcoming).

[10] Brinkmann 2009, 227–234; Eastaugh, Walsh, Chaplin and Siddall 2004, xi–xxxix.

[11] Hansen and Jensen 1991, 30–38.

[12] Piening 2010, 108–114.

Fig. 13.1 A selection of historical pigments and their raw material form. From right to left: Madder lake; umber (brown ochre); Egyptian blue; yellow (and behind it red ochre); cinnabar/minum; azurite; malachite. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

A small wall painting in the Ny Carlsberg Glyptotek (IN 888b) has been examined using VIL-imaging technology (Fig. 13.2). The painting measures 0.65 × 0.49 m. and is dated to the 2nd century AD. It was purchased in 1892 in Rome together with another small wall painting and two stucco reliefs, which all originate from the burial complex of L. Sempronius Atratinus and Sempronia Atratina situated outside the Porta Latina in Rome.[13] The wall painting represents a young woman, wearing a tunic and a cloak wrapped around her lower body and flung over her left arm against which she also holds a staff. Looked at with the naked eye, the tunic appears to be painted with a mixture of light blue and brownish/red colours, and when the painting was examined by VIL-imaging the blue pigment used for the pastel blue paint mixture was identified as Egyptian Blue. The Egyptian Blue pigment is found on numerous marble sculptures, indicating that the synthetic pigment was commonly used for painting both two- and three-dimensional surfaces. On the marble sculptures the VIL examinations identifies remains of the pigment so deeply embedded in the marble that even the microscope cannot detect it. In such cases the VIL method only identifies the Egyptian Blue pigment, which testifies to an original fully polychrome painting of the sculpture in which the blue pigment was used for the paint mixtures. As the wall painting illustrates, the Egyptian Blue pigment could have its tonal value altered considerably before being applied, meaning that the identification of the pigment does not necessarily mean, that the surface was originally painted blue. On most Roman marble portraits the Egyptian Blue pigment is identified on the skin, which does not mean that the persons portrayed had blue faces, but rather that the pigment was used as part of a paint mixture imitating life like skin tones (Fig. 13.3).

[13] Østergaard 1996, 251 (cat. No. 157).

Fig. 13.2 IN 888b: Roman wall painting. H. 0.47 m. Dated to the 1st–2nd century AD. Tungsten photography to the left. VIL examination to the right: The white, luminous particles indicate the use of Egyptian blue. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

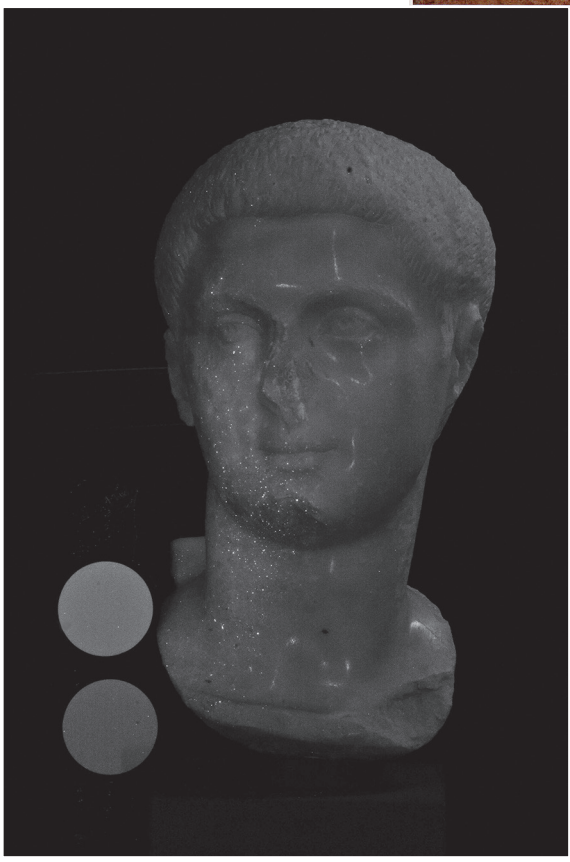

Fig. 13.3 (left) VIL photographic examination of a portrait of Maximus (IN 826): The bright fluorescence indicates Egyptian blue pigment. H. 0.34 m. Dated to c. *235–238 AD. Made of Göktepe marble. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.*

Paint layers

The last factor which needs to be considered and explored in more detail in the future is the question of paint layering on marble sculpture. When the marble sculptures are examined using microscopes, the only traces of original paint are the above-mentioned historical pigments scattered over the surface. Only in a few cases has it been possible to take enough samples to document any actual layers of paint.[14] The paint layering is an important aspect of painting white marbles, because the number and thickness of the layers determine the visual impact of the marble material in the final appearance of the sculpture. Unfortunately only a few Roman sculptures have been examined for paint layers so far, which

[14] For other sculptures in the round with examined paint layers see: Scharff, Hast, Kalsbeek and Østergaard 2009, s. 19–33; Verri, Opper and Deviese 2010, 43–50; Østergaard 2009, 209–215 and IN 2815 on the www.trackingcolour.com website. Also Bourgeoise forthcoming.

Fig. 13.4 IN 2815: Roman woman. H. 0.53 m. Dated c. *AD 160. Unidentified white marble. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.*

leaves us with little knowledge from which to proceed when reconstructing their original look. To some extent contemporary analogies with extensive remains, such as the wall painting mentioned above, can prove helpful. But it must be kept in mind, that the techniques for painting on sculptures in the round would most likely have been different from painting two-dimensional wall paintings regarding the thickness and number of paint layers.

A female head in the Ny Carlsberg Glyptotek (IN 2815) was examined by the Tracking Colour team in 2012 (Fig. 13.4).[15] It originates from the Hadrianic Baths in Aphrodisias, where it was found in 1904 together with a group of so-called Caryatids all dating to the 2nd century AD.[16]

[15] To see the results of the scientific examinations go to www.trackingcolour.com.
[16] Johansen 1995A, 208–209 (cat. No. 85); Abbe 2008, 139–140; Abbe 2010, 277–289.

The hair has been plastically rendered, forming the elaborate so-called 'Aphrodite's bow', and the head was most likely shaped for insertion into a statue judging by the rounded neck line and the rough hewing of the back.

The head has extensive traces of original paint in the hair and on the remaining areas of original skin surface on the face and neck, which has not been too affected by modern cleaning. Compact, multiple coloured layers of yellow, red, black and blue can be seen in the hair, together with black as a ground layer in the rills of the deeper drilled hair locks. Also a few spots of gilding were found on top of some of the plastic hair locks. Red colour can be seen accentuating the irises and between the lips together with a layer of white. And on the skin parts sporadic layers with a pinkish tone have been documented indicating an original fully painted skin surface. A cross section was made from a sample taken from one of those areas on the cheek, which revealed two very thin paint layers (Fig. 13.5): one light-yellow layer applied directly onto the marble surface covered with a darker, red/brownish layer. The layers, which once covered the skin surface of the portrait, consists of mixtures with a lower concentration of very finely grinded pigment grains than what was used for painting the hair, making the layers used for the skin more transparent. When observed with the naked eye, the visual effect of the combination of the thinly applied, transparent layers of yellow placed directly on the polished, luminous, white marble surface, beneath an even thinner, transparent layer of a red/brownish paint mixture, is that of a pinkish/orange colour, which imitates a fair, Caucasian skin tone perfectly (Fig. 13.6).

The examinations of the original painting of the female head reveals a close connection between the layering of paint and the surface texturing and overall shaping of the three-dimensional marble sculptures. Delicate brush strokes were used for accentuating chiselled details, dark/black shading was applied in deeply drilled furrows beneath the subsequent colouration, and the illusion of a Caucasian, pinkish skin colour was created through an artistic exploration of the material properties of the polished white marble beneath two transparent, thinly applied paint layers. The nature of

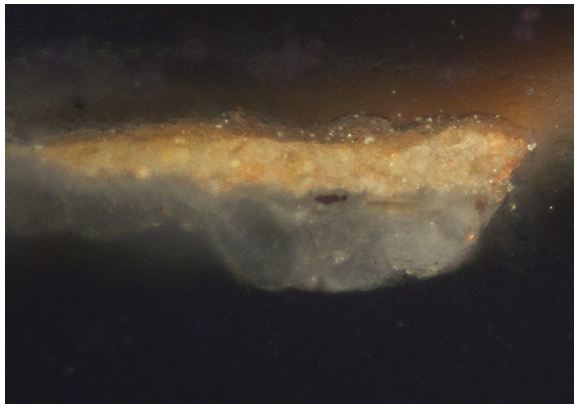

Fig. 13.5 IN 2815: Cross section of paint sample taken from the neck: Two thin layers can be seen on top of the marble. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

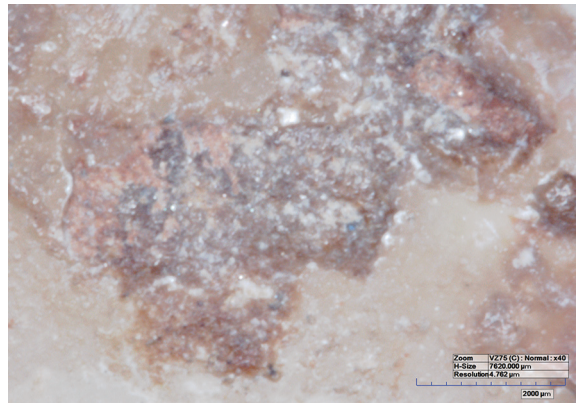

Fig. 13.6 IN 2815: Microscopy of the skin paint. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

the paint layers varies in thickness and compactness according to the areas of the portrait and the different textures of the marble surface.

Thereby the nature of the surface texturing and sculptural detailing becomes more than just a base for the subsequent paint; it is in fact directly incorporated into the final, visual result, making the white marble an influential factor in the original polychrome look of Roman sculptures. Due to this symbiotic relationship between the artistic execution of the marble carving and any applied polychrome effects and additions, the sculpting of three dimensional marble sculptures should also be taken into account and incorporated in polychromy studies.

The properties of white marbles and surface texturing as ground for painted polychromy

Interpreting and explaining the tool marks on marble sculptures as manipulations of the materiality of the stone through deliberate surface texturing was not an imperative in previous, traditional art historical and archaeological studies of Roman sculpture, until examination of their painted polychromy gained momentum. So far the study of the surface finish of antique white marbles has been limited to catalogue descriptions and the like, and has never constituted an independent scholarly discipline. But as research into the original painted marble surfaces has gained momentum, so have scholars become increasingly aware of the role of the surface texture.[17]

Basically marble sculptures were created in the Roman Empire with the same tools as are used today.[18] The sculptors would use a percussive tool (hammers and mallets) and chisels (flat, point, tooth and rounded in varying sizes) to carve the stone and give shape to the sculpture (Fig. 13.7). Light use of tooth and flat chisel would even out the surface, while the point (and flat) chisel would be used for the rough cutting as well as finer detailing such as eyes and strands of hair. Sometimes also the running drill, which basically consisted of a rapidly rotating point or rounded chisel, would be used to accentuate hair locks or folds in the clothing or any other deep-cutting, plastic shaping of the stone. For finishing, the sculptors would use files and rasps to smooth the surface, and sometimes an abrasive would be employed to polish the surface to varying degrees. Traces of the antique uses of the tools are recognisable on most Roman marble sculptures (if they have not been cleaned too harshly), leaving distinctive traces when used for surface texturing.[19]

The material properties of white marbles: carving the portrait statue of Fundilus

As noted in the introduction, white marbles were transported from all over the Mediterranean during the Roman Empire (Fig. 13.8). Since the late 1980s scholars have specialized in analysing and documenting the material properties of the different marble types by use of a range of methodologies, including isotopic analysis and measurement of grain sizes.[20]

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[17] Bourgeois and Jockey 2000, 498–499; Blume 2010; Abbe 2010, 278–279.

[18] Archaeological and iconographic material supports the notion that Roman craftsmen used much the same tools as today when disregarding electronic powered tools. But this does not mean that the Roman craftsmen used the same carving techniques. How the Roman craftsmen used the various mallets, chisels and abrasives would most likely have been dependent on the individual workshop and local traditions. More on this see Rockwell, 1991, 127–143.

[19] For more on marble carving tool marks see www.artofmaking.ac.uk; Rockwell 1991, 127–143; Rockwell 1993, 31–155; Rockwell, Rosenfeld and Hanley 2004, 24–34.

[20] Monna 1988, 3–5.

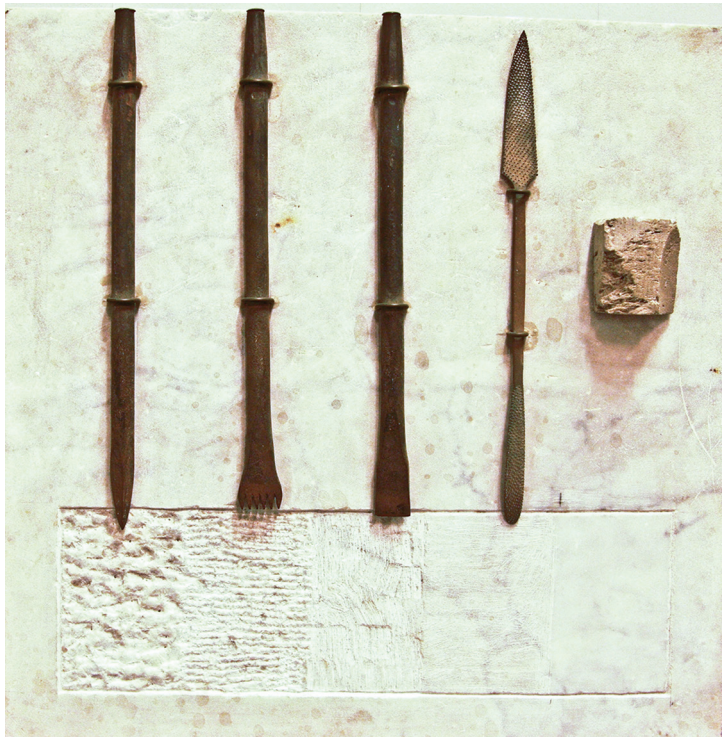

Fig. 13.7 Small selection of marble carving tools and their tool marks on marble: From left to right: Point chisel; tooth chisel; flat chisel; rasp/file and pumice stone. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

Fig. 13.8 Map of the Mediterranean basin with a few of the most well known white marble quarries exploited during the Roman Empire: 1: Afyon/Docimeion. 2: Aphrodisias. 3: Göktepe. 4: Ephesus. 5: Naxos. 6: Paros. 7: Hymettos. 8: Doliana. 9: Pentelicon. 10: Thasos. 11: Marmara/Proconnesus. 12: Carrara. 13: Incio. 14: Estemõz. 15: Alconera. 16: Macael. For a more detailed map see Pensabene and Bruno 1998, 4, fig. 1.

The material qualities of the white marbles vary according to colour and grain sizes, which are determined by their individual geological origins.[21] Even within the same quarries the marbles can be different. But in the case of some of the best-known white marble types which have been commonly used as sculptural material since the Roman Empire their material qualities and how they react to the different chisels, rasps and abrasives are well known.[22] Göktepe and Aphrodisian marble from Asia Minor, and Carrara marble from Northern Italy, are amongst the most fine-grained, taking, for example, a high-gloss polish perfectly.[23] Most other materials, or even large-grained marble types such as Parian lychnites, would not react as well to a high-gloss polish of the surface. Given such a range in the material properties between the white marbles, it seems likely that the sculptural craftsmen of the Roman Empire would have chosen their white marble types according to the tasks before them. When carving portraits with extraordinary surface detailing and texturing, finding the best-suited piece of marble must have been essential to the subsequent artistic carving and painting processes. This can be illustrated by the portrait statue of Gaius Fundilius in the Ny Carlsberg Glyptotek dated to the middle of the 1st century AD (IN 707). The statue was acquired in 1891 (Fig. 13.9), and originates from the Sanctuary of Diana Nemorensis, just north of Rome. It stood in a room together with the portrait statue and a portrait herm of Fundilia (the former owner of Fundilius who gave him his freedom) and five other portrait herms, which were excavated in 1885 (the outer half of the room) and again in 1887 (the remaining inner half).[24]

Fig. 13.9 IN 707: Portrait statue of Gauis Fundilius. H. 1.83. m. Dated to the 1st half of the 1st century AD. Afyon marble. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

[21] Attanasio 2003, 33–53, 153–203; Pensabene and Bruno 1998, 5–15.
[22] Rockwell 1993, 26–29; Rockwell 2004, 8–34.
[23] For more on the carving qualities of the different white marble types see Rockwell 1993, 26–29. On the high-gloss polish on Roman portraits see Poulsen 1921, 84–94; Pfanner 1989, 228; Abbe 2008, 140; Skovmøller and Therkildsen 2011, 35–46.
[24] Johansen 1994, 182–183 (cat. No. 79); Guldager Bilde 2000, 96; Moltesen, Bald Romano and Herz 2002, 101–106; Fejfer 2008, 285–305.

Fundilius' portrait statue is executed from one single block of fine-grained Afyon marble from Western Asia Minor (modern-day Turkey), except for the left hand and right arm from the elbow downwards, which are missing and may have originally been separately carved and then attached. A fracture following the rim of the tunica by the neck indicates that the head was once broken off but later reattached. Fundilius is portrayed as a mature, clean-shaven man with short hair. His toga is draped over his left shoulder and hung over his left arm. Underneath the toga he wears a tunic and on his feet he wears soft boots made of what appears to be some sort of textile or very thin leather. His weight rests on his left leg, with the right leg slightly bent, pushing the right foot back. Placed on the base behind his left foot is a book casket with an inscription, which is repeated on the base. The inscription tells us, that Fundilius was DOCTUS APPOLINIS PARASITUS, meaning that he was trained in acting or/and singing.

Fig. 13.10 IN 707: Detail of right side eye and ear. The hair has been worked in flat chisel. There are still traces of his originally, chiselled eyebrows. The skin surface has been given a velvet-soft matte polish. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

The sculptural detailing and surface texturing of the portrait statue is exquisite from head to toe and follows the trend of the middle of the 1st century AD portraits on a high artistic level. The short hair is combed forwards from the back of the head, to the front, and with a delicate use of point and flat chisel the thin hair has been indicated by small individual, comma-shaped locks. The face has a stern expression, but the skin has been smoothed with a rasp or file and then rubbed with an abrasive to a matte polish to give the stone a soft, velvet-like appearance (Fig. 13.10). The tunic is carved using various chisels and smoothed with files, rasps and abrasives, giving the illusion of a thin textile revealing the contours of a fit, male chest underneath. For the toga the stone has been carved to represent a heavier fabric contrasting with the underlying tunic. It has been executed with the use of a chisel and running drill for the deep, heavy folds. The surface of the toga is one of the most fascinating elements of the statue: Small folds give the illusion of a wrinkled fabric, and the borders of the toga, which run along the edge of the garment slung over his left arm, are wavy (Fig. 13.11). The surface texture of the toga is that of a soft polish, but above the polish the marble has been scratched by some sort of rasp or file in criss-cross patterns (Fig. 13.12). This brings a life-like dynamic to the marble sculpture completing the illusion of a textile texture which the viewer can almost feel.

The exploitation of the properties of the fine/medium-grained Afyon marble through high artistic craftsmanship is impressive: as with the softness of the facial skin and soft boots, the surface texturing of the toga does not remind the viewer of the stone material from which the statue has been created. The only part of the entire portrait statue which resembles the material from which it is made, is the base, providing a contrasting visual point of departure for the viewer.

Fig. 13.11 IN 707: Detail of right thigh and knee with small wrinkles in the fictive fabric. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

Fig. 13.12 IN 707: Detail of drapery folded over left arm with the wavy seams. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

The illusion of soft boots, light and heavy textiles, velvet-like skin and thin hair creates an impressive visual experience, because the eye is tricked into recognizing and believing in the authenticity of different fabrics and human skin, even though the viewer knows – reminded by the base – that all he/she sees in reality is stone. Providing that the statue was placed near the viewer's eye-level, as is the case with its current display in the Ny Carlsberg Glyptotek, the surface texturing (with additional polychromy) would have made the statue seem strikingly lifelike to the viewer despite its marble material.

The original polychromy of the Fundilius portrait statue: results from scientific examinations

The statue of Fundilius was examined by the Tracking Colour project in early 2013.[25] Unfortunately the statue has been extensively cleaned in modern times, leaving little of its original painted polychromy. The sparse remains of Egyptian blue and red ochres in the hair and on the facial skin reveals, that it was once fully covered in paint, but this is not enough to make an exact reconstruction of the original look of the painted portrait head. But as in the case of the above mentioned female head from Aphrodisias, it seems highly likely that the painting techniques would have complimented the high quality of the carving, incorporating the finely chiselled details of hair and eyebrows and velvet soft surface finish of the skin.

On the tunic and on the toga Egyptian blue was used in the deep folds of the fictive garments, most likely for subtle accentuating the deep cuttings of the chisel and drill creating shade and depth. On the toga was found remains of a red/orange ochre based painting, which on the back side of the statue (which is not nearly as affected by modern cleaning as the front side) the red paint seems to form one – maybe two – borders following the draping of the textile (Fig. 13.13). The red paint layer consists of a paint mixture with a low concentration of very finely grained red ochre pigments placed directly onto the marble surface. Whether the red ochre constitute the original tonal value of the paint mixture is difficult to conclude. As there was found nothing

[25] For more details on the results from the scientific examinations of IN 707 see www.trackingcolour.com and Skovmøller and Sargent 2014, 19–20.

Fig. 13.13 IN 707: Microscopy of the remaining red paint layer on the back side of the toga. Museum photograph. Ny Carlsberg Glyptotek, Copenhagen.

more on the surface of the toga, and since the original surface texture of the fictive garment is well-preserved on front and especially the back, it seems likely to conclude, that the painted borders was the only polychrome addition to the sculpted textile. The polychromy of the toga was therefore mainly provided by the luminous white Afyon marble, which explains the impressive high level of surface detailing, including the small wrinkles, and overall beautifully smoothened surface texture.

The role of sculptural display and visual experience

In the case of the portrait statue of Fundilius the choice of a fine-grained marble was not fortuitous. The Afyon marble permits the velvet-like, soft surface texturing of the skin and boots, and the manipulative detailing which helps accentuate and differentiate the textiles of the almost transparent tunic from the heavy fabric of the toga. The time-consuming material manipulation conveys, at least in this particular case study, some basic aesthetic and semantic purposes.

The portrait statue of Fundilius was on display together with a portrait statue and a herm portrait of his former owner, Fundilia, and three other herm portraits in a small room within the sanctuary dedicated to Diana Nemorensis just 20 kilometres northeast of Rome at the foot of the Albanian mountains. The sanctuary was located in a forest (Nemorensis means "in the forest") at the banks of Lake Nemi.[26] The site attracted many wealthy Romans during the late Republic and early Imperial periods and the ruins of at least four great villas have been excavated in the area. Written sources tells us that prominent Romans, such as Julius Caesar, had their private villas erected in these areas, and the Emperor Caligula had two enormous ships, which were more or less floating villas, placed on the lake.[27] The north-eastern wall of the sanctuary was occupied by several small rooms forming the central portico of the sanctuary (Fig. 13.14). The small rooms were facing the paved terrace and was measured to be between 6 × 4.5 and 8 × 4.5 m. The portrait sculptures including that of Fundilius were found in and around the so-called room A[28] – also known as room 5.[29] The walls inside the room were painted red, as the two pillars which framed the entrance, and the floor was paved by a white and black mosaic. The statues were placed against the back wall, flanked by the four herm portraits placed against the left and right side walls. The combination of the small room either lit by a limited amount of sunlight or by torches or lamps, the simply painted red walls and the black and white mosaic, would have left the portrait sculptures as the main "attraction" of the room drawing the full attention of any viewer who entered.

The extraordinary surface detailing of the portrait statue of Fundilius defines the rank and social position which he either held or aspired to while alive by accentuating, in particular, the toga through demanding shaping and surface detailing. Using the costume on portrait sculptures to indicate social status was common practice within the Roman Empire.[30] On the statue of Fundilius the toga is accentuated as an important part of a semantic message to be read and interpreted by the viewer: only men who held Roman citizenship were allowed to wear such attire. This makes the garment a distinctive item of clothing shared between Romans; a particular honour bestowed on some but not all.[31] The additional painted details on Fundilius' toga further marked the rank of the owner. If the red colour found on the front and back side of the toga constitute the remains of originally painted borders, the toga can be reconstructed as a *toga praetexta*. The toga *praetexta* was worn by high-officials such as magistrates and priest, and was sometimes

[26] Guldager Bilde 2000, 93.
[27] Guldager Bilde 2004, 2.
[28] From the 1885 excavations by Lord Savile.
[29] Guldager Bilde 2000.
[30] Edmondson 2008, 21; Koortbojian 2008, 75.
[31] More on the different togas of the Roman Republic and Empire and their symbolic meanings, see: Edmondson 2008, 26–32.

allowed other Roman citizens to wear as a sign of special honour.[32] According to written sources the colour purple used for the toga *praetexta* could change in nuance from toga to toga ranging from a vague, reddish nuance to a strong, intense and dark purple.[33] The nuance revealed the social status or *cultus* of its wearer; the darker or more purple the colour, the higher social status of the owner.

Fundilius was most likely the dedicator of his portraits within the room, and due to its high level of execution one can only assume that the commission including the dedication within the sanctuary would have been expensive. Purchasing these portraits and having them put on display in the sanctuary marked his success, and the visual experience between the portraits and the viewers who entered the room to view them up close was meant to leave an impression. The social rank of Fundilius was central in the sculpting of the statues, telling the story through marble and paint of how the slave came to be a distinct Roman citizen.

The emphasis on the surface manipulation of the statue of Fundilius testifies to a sculptural tradition where the final visual experience between portrait and viewer was essential to the overall artistic sequence of sculptural creation. The delicate, time-consuming detailing of Fundilius would have been pointless if the contextual display had prevented visual admiration on the part of viewers passing by. Portraits placed in frequented spaces, such as equestrian statues in public squares on high pedestals with long inscriptions, would probably have been textured more roughly and given more ostentatious polychrome additions (such as gilding) corresponding to their monumental forms which needed to attract the viewer's attention. In other words, it is likely that the form of the portraits, their material property and texturing and subsequent-applied polychromy were, to some degree, fixed within the systems of spatial environments and human traffic in the Roman Empire, both diffusing and channelling the attention and movements of the viewers.

Summary and further considerations

We return to the question posed in the introduction: "Why use marble in the first place, when it would just be painted over?"

First of all, it is important to remember, that the aesthetic qualities of the white marbles, which seem to clash with the idea of a fully painted surface, are in most respects a modern construction.[34] If we try to see beyond our modern perception of the pure whiteness, and towards a more practical appreciation of the white marbles and their material properties, the answer to the question comes naturally.

Through systematic macroscopic, microscopic and photo-analytical examinations of a few chosen Roman portraits from the collections of the Ny Carlsberg Glyptotek, the tentative conclusion must be that marble plays a distinctive role in the final, visual appearance of the painted portraits.[35] The individual marble types, (especially as regards their grain sizes) would have determined the degree of detailing and surface texturing in their polychrome end result. In cultures within the Roman Empire, which emphasized optical illusions and visual experiences, and where sculptures played an important role in the official, private, religious and recreational spatial environments, the choice of

[32] Edmondson 2008, 21; Bradley 2009, 197–201.
[33] Bradley 2009, 197–201.
[34] Bradley 2009B, ix–xii.
[35] On painting on high gloss polished portraits from the 3rd century AD: Skovmøller and Therkildsen, 2011.

sculptural materials would have been of considerable importance.[36] The craftsmen carefully chose their marble material for three-dimensional sculptures because the white marble provided an extra aesthetic dimension to the final polychrome result, which other sculptural materials such as wood, clay or wax could not rival.

Research into the combination of white marble and its polychrome additions will not only prove fruitful to our understanding of Roman portraits and sculpture in general, but, as this chapter has hopefully set forth successfully, the two must have supported each other. Information on Roman sculpture is given through examination of its additional painting, but a great deal of information on the additional painting and overall visual purpose can also be obtained through examination of the sculptural techniques used on the works themselves.

The symbiotic relation between sculpting and painting of white marble portraits can also provide information on some aspects of Roman dress and textile. As so few remains of actual textile has been delivered to us from the Roman Empire, it makes it difficult to reconstruct the fabrics used for the different garments, including togas. Today scholars are able to identify some standard toga types, including the toga *praetexta*, but this does not rule out the possibility, that the Romans coloured, dyed and decorated their togas in various other ways. Texturing and painting of three-dimensional sculptures, such as the one of Fundilius, can therefore reveal a lot on the desired colour, texture and decoration of the fabrics chosen for the characteristic dress. Such information is difficult to obtain from wall paintings and other two dimensional reproductions of togas because they lack the volume of three-dimensional sculptures. This makes marble sculptures with extensive detailing, such as the portrait statue of Fundilius, important source of information, and further examination of the numerous toga statues might improve our knowledge of the decoration and colouration of the Roman toga.

[36] Stewart 2008, 108–142; Elsner 2007, 289–302; Bradley 2009A, 441.

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14. Dressing the Adulteress

Jessica Dixon

The toga was the iconic clothing of the Roman male. Statues, art and literature all depict the elite male wearing the toga and it symbolised his citizen status and engagement with traditional Roman values. Conversely, it was also associated with the prostitute and for her it acted as an outward symbol of her sexual transgression and loss of feminine virtue and chastity. A handful of sources also suggest that the adulteress was included in this. Scholarly debate has recently centred on whether Augustus' attempts at social control actually compelled prostitutes and adulteresses to wear the toga or whether it was instead a social norm and a choice on their part. Thomas McGinn has argued that the *lex Iulia de adulteriis coercendis* did impose a dress code onto the adulteress, and that this was the toga.[1] However, there is no evidence within the classical jurists or the legal compilations of Theodosius and Justinian to support this and it will be shown that the evidence from literary sources is patchy and inconclusive.

In 18 BC two pieces of legislation were introduced that were key to Augustus' restoration of the *mos maiorum* – the *lex Iulia de maritandibus ordinibus* and the *lex Iulia de adulteriis coercendis*. The marriage law, which was later amended in AD 9 by the *lex Papia et Poppaea*, introduced rewards for those who married and had children, and also penalties for those who did not. It also restricted senators and their descendants from marrying freedmen and women and also actors.[2] The non-senatorial freeborn population could marry freedmen and women[3] but they could not marry prostitutes, pimps, procuresses or convicted adulteresses.[4] These restrictions also applied to senators.

The *lex Iulia de adulteriis coercendis*[5] made *adulterium* (defined as sex with a married woman) a public crime, whereas previously punishment had been the responsibility of either the adulteress' or the husband's family. There was also a second charge, *stuprum*, although the jurists disagree over exactly whom this covered; most seem to agree that sexual relations with a widow or virgin were liable under *stuprum*.[6] Charges were also brought against a husband who did not divorce a

[1] McGinn 1998, 171.
[2] Paul, *de leg. Iul. et Pap.* book 1, *D.* 23.2.44.pr.
[3] Celsius, *Dig.* book 30, *D.* 23.2.23.
[4] Ulpian, *de lex Iul. et Pap.* book 1, *D.* 23.2.43.
[5] From here on referred to as the *lex Iulia.*
[6] Modestinus, *Diff.* book 9, D. 50.16.101.pr.; Papinian, *de Adult.* book 1, *D.* 48.5.6 1; Modestinus, *de Reg.* book 1, *D.* 48.5.35.1.

wife accused of *adulterium* and against anyone who helped an adulterous couple carry out their affair. If a woman was convicted of *adulterium* she was no longer able to marry a Roman citizen[7] and was lowered to the level of a prostitute: *uxorem pateretur adulterari meretricio quodam genere* (he has allowed his wife to commit *adulterium* in the manner of a prostitute).[8] These two pieces of legislation, therefore, sought to define clearly who was available for marriage (or other forms of permanent relationships, like concubinage) and also who was available for casual sexual relationships.

The primary punishments under the *lex Iulia de adulteriis coercendis* for both the adulterer and adulteress were loss of property and *relegatio* to an island, the only legal source for which is Paul.[9] They were to be sent to separate islands and, although no indication is given in the text for how long this relegation should last, it was to be a temporary measure[10] and did not involve the loss of citizenship. Once convicted, they would lose the liberties which separated citizens from the other members of Roman society and suffer *infamia* (infamy, disgrace). The adulterer would lose the right to give testimony or act as a witness for a will.[11] Similarly, the adulteress would not be able to give testimony or act as a witness.[12] A woman convicted of *adulterium* was not allowed to marry a Roman citizen.[13] If she did so the husband would be charged with *lenocinium* (pimping).[14] Ulpian also included in this restriction women who were convicted of *stuprum* under the *lex Iulia*.[15] However, there were no restrictions on an adulteress being kept as a concubine.[16] What is more, the *lex Iulia* introduced the *ius occidendi* (the right of killing). This allowed the father of the adulteress to kill both his daughter and the adulterer if he found them together in either his house (even if she did not live there) or the house of his son-in-law.[17]

Tacitus and Suetonius both record numerous trials for *adulterium* within the imperial elite and invariably the punishments that they record fit with this image of the processes for the punishment of *adulterium*.[18] Martial and Juvenal, on the other hand, do not refer to the punishments as stipulated

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[7] Modestinus, *Res.* book 4, *D.* 23.2.26.

[8] Ulpian, *de Adult.* book 4, *D*. 48.5.30.4.

[9] Paul, *Sent.* 2.26.14: "*adulterii convictas mulieres dimidia parte dotis et tertia parte bonorum ac relegatione in insulam placuit coerceri: adulteris vero viris pari in insulam relegatione dimidiam bonorum partem auferri, dummodo in diversas insulas relegentur.*" (It is agreed to punish women convicted of *adulterium* by the loss of half of their dowry and a third of their property and relegation to an island: likewise the male adulterer by relegation to an island and half his property will be taken away, provided that they are relegated to different islands).

[10] The other provisions of the legislation, for example that a convicted adulteress could not remarry (Modestinus, *Resp.* book 5, *D.* 23.2.26) or that the adulterer could no longer give testimony (Papinian, *de Adult.* book 1, *D.* 22.5.14), suggest that the *relegatio* could only have been temporary, as such measures would have had little impact on a person banished to a provincial island.

[11] Papinian, *de Adult.* book 1, *D.* 22.5.14.

[12] Paul, *de Adult.* book 2, *D.* 22.5.18; Ulpian, *ad Sab.* book 1, *D.* 28.1.20.6.

[13] Paul (*ad leg. Iul. et Pap.* book 2, *D.* 23.2.47) says that a senator's daughter who was a prostitute or actress, or who had been convicted of a criminal charge such as *adulterium*, was able to marry a freedman. Therefore, the restrictions on remarriage were only in regard to marriage with freeborn Roman citizens.

[14] *CJ.* 9.9.9, AD 224.

[15] *de Adult.* book 4, *D*. 48.5.30.1.

[16] Ulpian, *ad Leg. Iul. et Pap.* book 2, *D*. 25.7.1.2.

[17] Papinian, *de Adult.* book 1, *D.* 48.5.23.2; Ulpian, *de Adult.* book 1, *D.* 48.5.24.2. The right to kill both the adulteress and the adulterer was only given to the father as it was believed that the *mariti calor et impetus* (heat and impetuosity of a husband) in such a situation would make him act too hastily (Papinian, *de Adult.* book 1, *D*. 48.5.23.4).

[18] See Marshall (1990) for a survey of women on trial before the senate in the 1st century AD, including cases of *adulterium* and *stuprum* and Treggiari (1991, appendix two) for a list of adultery prosecutions under the Julio-Claudians.

by the legal sources. In relation to the adulteress, Martial says that she is stigmatised (*notare*)[19] by the *lex Iulia* and that she can be convicted (*damnatum dicere*)[20] but no further details about the trial or the penalty are given. However, he does say that one potential consequence for her will be that neither the husband nor the adulterer would claim paternity of her child.[21] However, Martial twice suggests that an adulteress deserved to wear the toga as a sign of her sexual transgression and loss of feminine virtue.[22] Likewise, the only discussion of punishment of the adulteress in Juvenal is a vague reference to the toga.[23] This chapter will examine these sources alongside the other scant references to the adulteress and the toga to show that they cannot be used to support the argument that the *lex Iulia* itself forced the convicted adulteress to wear the toga.

Clothing and appearance have always been a highly visible and significant marker of status; expensive and luxurious fabrics, bright colours, jewellery, branded and designer clothing have all at one time or another signified wealth and elite status. Clothing has also been linked to ideas of morality so that for centuries a woman had to cover her legs with long dresses so that even a sneak glimpse of ankle became erotic; this period was followed by the 'sexual revolution' of the 1960s and the miniskirt. Clothes are also indicators of character. Take, for example, the modern stereotype of the 'hoodie', which serves to create a preconceived opinion about a youth who is dressed in this style and also creates a 'uniform' by which young people can associate themselves with a lifestyle. The term 'hoodie' then becomes a marker of status and character in itself, regardless of the actual behaviour of the individual concerned.

Clothing was seen as just as much of an indicator of status, morality and character in ancient Rome. It acted to reinforce the sign system of status hierarchies, whilst at the same time allowing an expression of the self.[24] Moreover, dress was a marker of civic identity.[25] A man wearing a toga and a woman wearing the *stola* demonstrated their identification with Rome and with Roman values. However, the toga and *stola* were not the everyday wear of the Romans and they held particular ceremonial (especially political) associations.[26] Nevertheless, their representation in art and literature shows that they are the ideal and represent the model characteristics of the Roman. That there were distinct ideas about the appropriate dress for both chaste and moral women and also for prostitutes and slaves is clear from the praetor's edict as discussed by Ulpian:

> *si quis virgines appellasset, si tamen ancillari veste vestitas, minus peccare videtur: multo minus, si meretricia veste feminae, non matrum familiarum vestitae fuissententiarum si igitur non matronali habitu femina fuerit et quis eam appellavit vel ei comitem abduxit, iniuriarum tenetur.*
>
> If someone accost maidens, even those in slave's garb, his offense is regarded as venial, even more so if the women be in prostitute's dress and not that of a matron. Still if the woman be not in the dress of a matron and someone accost her or abduct her attendant, he will be liable to the action for insult.[27]

[19] 6.22.3.
[20] 10.52.2.
[21] 10.95: *"infantem tibi vir, tibi, Galla, remisit adulter./ hi, puto, non dubie se futuisse negant."* (Your husband, Galla, has sent back to you the infant, your *adulter* has too. They deny, I think, without doubt that they did the fucking). Juvenal also shows the unease surrounding the paternity of children and the exposure of affairs through their appearance (6.76–81, 592–601). See Dixon (1988, 72, 94) for the importance of female chastity in determining paternity.
[22] 2.39; 10.52.
[23] 2.68–70. All three passages are quoted below.
[24] Olson 2002, 387.
[25] Edmondson 2008, 22.
[26] Edmondson 2008, 22; Olson 2002, 390–391.
[27] Ulpian, *ad Ed.* book 57, *D.* 47.10.15.15.

However, these distinctions were not always upheld, with *matrona* dressing like a whore and vice versa. The problem then lay in how women were demonstrating their sexual availability visually – by wearing clothing not fitting her status a woman blurred the status boundaries that the *lex Iulia* was trying to reinforce.

Augustus was certainly not unaware of the significance of clothing:

> *etiam habitum vestitumque pristinum reducere studuit, ac visa quondam pro contione pullatorum turba indignabundus et clamitans: "en Romanos, rerum dominos, gentemque togatam!" negotium aedilibus dedit, ne quem posthac paterentur in Foro circave nisi positis lacernis togatum consistere.*
>
> He was also keen to restore the former habit of dress, for when he saw one day a crowd wearing dark clothing in public he was enraged and shouted: "Behold the Romans, masters of the world and a toga clad people!" He gave orders to the *aediles* that hereafter no-one was to be seen in the Forum or near it unless they were wearing the toga and had taken off their cloaks.[28]

We also know from Tertullian that there were later attempts under Tiberius to make *matronae* wear the *stola* and to punish those who did not.[29] However, there is no reference within the juristic texts on the *lex Iulia* that the legislation made the toga the appropriate dress for the adulteress. Nor is there any legal evidence that any other law or statute did so.

In early Rome, the toga had been the dress of both men and women:

> *GENTUMQUE TOGATAM bene 'gentem', quia et sexus omnis et condicio toga utebatur, sed servi nec colobia nec calceos habebant. togas autem etiam feminas habuisse, cycladum et recini usus ostendit.*
>
> AND PEOPLE OF THE TOGA '*gentem*' is correct, because the toga was used by people of both sexes and all positions, but slaves did not have *colobia* or shoes. Moreover, the use of the *cyclades* and the *recinium* shows that women also wore togas.[30]

At some point before the Late Republic women had stopped wearing the toga and the appropriate dress for a matron became the *stola*, a long dress that covered her feet and became an outward symbol of marriage and chastity.[31] The *toga praetexta*, however, remained the dress for children, both male and female. The large purple border was both a signifier of their innocence and also a protective boundary that marked their purity.[32] However, a woman who wore the toga became associated with feminine immorality and particularly prostitution. This new subtext of depravity is first evident in Cicero:

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[28] Suet., *Aug.* 40.5.

[29] *de Pall.* 4.9: "*converte et ad feminas. habes spectare quod Caecina Severus graviter senatui impressit, matronas sine stola in publico. denique, Lentuli auguris consultis, quae ita sese exauctorasset, pro stupro erat poena; quoniam quidem indices custodesque dignitatis habitus, ut lenocinii iactitandi impedimenta, sedulo quaedam desuefecerant.*" (And now turning to women. There you may see that Caecina Severus gravely impressed upon the senate that women were in public without the *stola*. Then, by the decrees of the augur Lentulus, those women who discharged themselves like this were punished as if for *stuprum*; since certain women have purposely become unaccustomed to this dress, which is the witness and guardian of rank, throwing it aside for being an impediment to prostitution). This speech of Caecina (cos. suff. 1 BC) has been associated with a speech he made on the issue of wives accompanying their husbands to the provinces whilst on military and administrative duty, which would place it then in AD 21 (Tacitus, *Ann*. 3.33–34; McGinn 1998, 161). The subsequent decree of Lentulus is dated to the end of Tiberius' reign (McGinn 1998, 161).

[30] Serv., *de Aen.* 1.282. Cf. Pliny the Elder, who describes the equestrian statute of Cloelia as being dressed in a toga (*Nat. Hist.* 34.28).

[31] For discussion of the nature of the *stola* see Sebesta 1994, 48–50; Croom 2000, 75–76; Olson 2008, 27–33.

[32] See Sebesta 2005.

> *sumpsisti virilem, quam statim muliebrem togam reddidisti. primo vulgare scortum, certa flagitii merces, nec ea parva; sed cito Curio intervenit, qui te a meretricio quaestu abduxit et, tamquam stolam dedisset, in matrimonio stabili et certo collocavit*.
>
> You assumed the toga *virilis,* which you immediately made a *toga muliebris*. At first you prostituted yourself as a whore, there was a fixed price for your disgrace and it was not small. But soon Curio came along, who led you from the profession of a *meretrix* and, as he had given you the *stola*, led you into stable and unerring matrimony.[33]

Accusations of men wearing women's clothing are a well-attested form of invective and there are repeated examples of this within Cicero's speeches.[34] In this passage, however, it is not that Antony has made himself effeminate by wearing women's clothes, he has instead worn the *toga muliebris* and so has become a *scortum*, a prostitute. A woman wearing a toga, therefore, is identified by Cicero as a prostitute and is also associated with *flagitium* (disgrace).

Three further references to women in togas can be dated before the introduction of the *lex Iulia.*[35] The togate female is associated with the *scortum*[36] and at the same time opposed to the *matrona*.[37] Moreover, they are sexually available. That feminine sexual immorality was associated with the wearing of the masculine toga is clear to see. However, we are not told whether this was a personal choice on the part of the prostitute or whether they were made to wear it. For one, the toga was a bulky and uncomfortable garment to wear and so does not easily make sense when viewed as the dress of a prostitute, who needed to advertise herself and be accessible.[38] Furthermore, there are numerous references to other types of clothing worn by prostitutes in the ancient sources (from Coan silks and luxurious dresses down to nothing) but they do not mention the toga.[39] Moreover, there is no association within these sources between the adulteress and the toga.

We now come to the three passages from Martial and Juvenal already mentioned. These sources form the ancient evidence that adulteresses also wore the toga:

> *coccina famosae donas et ianthina moechae:*
> *vis dare quae meruit munera? mitte togam.*

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[33] *Phil.* 2.44.

[34] For example Clodius at the Bona Dea dressed in women's clothes (*De Har. Res.* 4, 44).

[35] "*sit tibi cura togae potior pressumque quasillo/ scortum quam Servi filia Sulpicia*" (the girls in togas and the whore pressed down by the wool basket are more of a concern for you than Sulpicia, the daughter of Servius; Tibullus 3.16.3–4); "*bonam deperdere famam,/ rem patris oblimare, malum est ubicumque. quid inter-/ est in matrona, ancilla peccesne togata?*" (To throw away a good reputation, to muddy your father's affairs is always a bad thing. What does it matter whether you sin with a *matrona* or with a togate slave-girl?; Hor. *Sat.* 1.2.61–63); "*nec magis huic inter niveos viridisque lapillos/ (sit licet, hoc, Cerinthe, tuum) tenerum est femur aut crus/ rectius, atque etiam melius persaepe togatae est*" (however it seems to you, Cerinthus, her thigh is not softer nor her calf straighter amongst white pearls and emeralds, and it is more often better with a girl in a toga; Hor. *Sat.* 1.2.80–82).

[36] There is also another, much later 4th/5th century reference from Nonius Marcellus, who (quoting the comic writer Titinius, early 2nd century BC) also associates the *scortum* with the toga (653L): "*dicitur et tectum* [sc. toga]. *Titinius Gemina*: '*si rus cum scorto constituit ire, clavis ilico abstrudi iubeo rusticae togai nec sit copia,' id est, tecti.*" (Thus shelter can be described as a toga. Titinius in his *Gemina*: 'if he decides to go to the countryside with a prostitute, I order the keys to be hidden immediately so that there is no means for undercover business in the country.' That is, of shelter). See McGinn 1998, 158.

[37] Cf. Horace's *Satire* 1.2, in which he claims that relationships with both types of women are equally as damaging and instead suggests that freedwomen are the best sort of sexual partner.

[38] Croom 2000, 93. Cf. Horace *Sat.* 1.2.101–102, where the speaker recommends prostitutes for they wear clothes that allow you to see their body so there are no surprises.

[39] Olson 2002, 396.

> You bestow scarlet and blue on the infamous *moecha*. Do you wish to give a gift which she deserves? Give her the toga.[40]

> *Thelyn viderat in toga spadonem,*
> *damnatam Numa dixit esse moecham.*
>
> Numa saw the eunuch Thelyn in a toga and he convicted him as a *moecha*.[41]

> *est moecha Fabulla;*
> *damnetur, si vis, etiam Carfinia: talem*
> *non sumet damnata togam.*
>
> Fabulla is a *moecha*; Condemn Carfinia also, if you wish: however, once condemned she will not assume the same toga.[42]

The term used to describe the women in these passages is *moecha*; a Greek word used in colloquial literature to mean either an adulteress or as a general term to denote a 'sexually immoral woman', translated as 'harlot' or something similar.[43] It is perhaps interesting that it is not *adultera* that is used in these passages, nor are any references made to the *adulter* or to *adulterium*. However, *moecha* is found much more frequently than *adultera* in both Martial and Juvenal and so their choice of this term in these passages is not unusual in itself.[44]

The women in these passages are referred to solely as *moechae*, without any further detail as to their marital status but with reference to their clothing. However, both Martial and Juvenal associate the toga-clad woman with being *damnata* (condemned). There is, therefore, a criminal association with these women and the only known legislation that punished *moechae* is the *lex Iulia*. A further passage from Martial refers to a *matris togatae*, we are not told her status or circumstances but as she is the mother of someone who has written scathingly about Martial's poems it must be assumed that she belongs to the educated classes and so would have been married and thus potentially an adulteress: *sed patris ad speculum tonsi matrisque togatae/ filius, et possit sponsam te sponsa vocare* (but you are the son of a father shaved in front of the mirror and of a togate mother, and your wife is able to call you wife).[45]

Further evidence that adulteresses wore the toga is taken from two scholiasts writing about Horace *Sat.* 1.2.63 in the 3rd century AD:

> *togatae autem in publicum procedere cogebantur feminae adulterii admissi convictae.*
>
> But women convicted of committing *adulterium* were forced to go out in public wearing the toga.[46]
>
> *matronae, quae ob adulterium a maritis repudiabantur, togam accipiebant sublata stola propter ignominiam; toga autem meretrici apta. ita enim solebant prostare cum solis pullis togis, ut discernerentur a matronis; et ideo quae adulterii damnatae fuerant, hac veste utebantur. aliter: togatae dicebantur in publicum procedere feminae adulterii admissi <causa>. alii togatam dicunt libertinam, quia antea libertinae toga utebantur, stola vero matronae.*

[40] Mart., 2.39.1–2.
[41] Mart., 10.52.1–2.
[42] Juv., 2.68–70.
[43] See Adams (1983) for the development of the Greek term *μοιχός* into the Latin *moechus* and *moecha.*
[44] For further discussion of the use of the terms referring to adultery within Martial and Juvenal see Dixon 2013, chapter 4.
[45] Mart., 6.64.4–5.
[46] Porph., *schol. Hor. Sat.* 1.2.63.

> *Matronae*, who have been divorced by their husbands for *adulterium*, take up the toga since the *stola* is refused them on account of their disgrace; indeed the toga of the prostitute is apt. Thus in fact they are accustomed to prostitute themselves in dark togas only, in order to be distinguished from *matronae*. For this reason those who are convicted of committing *adulterium*, wear this garment. In other words, women convicted <on a charge> of *adulterium* are said to go out in public *togatae*. Others call a freedwoman *togata*, because the toga used to be worn by freedwomen but the *stola* was worn by *matronae*.[47]

Porphyrio is the only source that specifically says that adulteresses were forced (*cogere*) to wear the toga. Pseudo-Acro instead says that the *stola* was refused to the adulteress (*tollere*) and so they took on the toga of the prostitute. But both scholiasts agree that the woman had to have been convicted of *adulterium* to be forced to wear the toga.[48] However, these scholia are much later works and so the reliability of their understanding of the social and legal norms surrounding the wearing of the toga in the 1st and 2nd centuries AD must be questioned. With these two texts as the only extant sources that specifically discuss a legal requirement for adulteresses to wear the toga, this claim becomes increasingly uncertain. Particularly as these two passages are discussing Horace *Sat.* 1.2.63, which in fact does not talk about adulteresses at all. The togate woman is instead an *ancilla* (slave girl) and so their discussions of whether the adulteress wore the toga bear no relation to Horace's text.

It is clear to see that there was an association between women who had crossed the boundaries of acceptable sexual behaviour and the toga. Prostitutes had been connected with the toga since the late republic and the term was used as a metonymy for prostitute.[49] It was not until after the introduction of the *lex Iulia*, however, that the toga became associated with the adulteress. Nonetheless, there is no evidence that the *lex Iulia* itself forced adulteresses to wear the toga.[50] Moreover, the late date of the scholastic evidence must be considered and this evidence treated with greater caution.

The increased focus on female sexuality and adultery would have brought the status distinctions between the *matrona* and the *meretrix* and adulteress to the forefront. It is unsurprising then if a greater emphasis on distinguishing these two groups through outward appearance developed. And so, though the *lex Iulia* may not have included in its statutes a requirement for adulteresses to wear the toga, its public vituperation of adulterous women and its close association of them with prostitutes meant that adulteresses now also became linked to the image of the sexually immoral togate female. As a result, to call a woman *togata* becomes an easy way to refer to an adulteress and a prostitute, regardless of whether that individual wore the toga or not.

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[47] Ps.-Acro., *schol. Hor. Sat.* 1.2.63.
[48] McGinn 1998, 166.
[49] Adams 1983, 340.
[50] The lack of visual evidence for women wearing the toga may also be telling (Olson 2002, 396); one statue from Carlisle appears to show a woman wearing a toga, but it remains problematic as it may represent a goddess or be a female head that has been placed onto a male body (Goette 1989, 80–82 and plate 70, n. 6).

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15. Looking Between Loom and Laundry: vision and communication in Ostian fulling workshops

Elizabeth Bevis

> "…although it was late at night, they found [Lucretia] dedicated to her wool, sitting in the middle of the house among her late-working servant girls."
>
> Livy *Ab Urbe* 1.57[1]

Lucretia and her busy maids spinning into the night is an especially vivid image of Roman textile work. Here, as elsewhere in Roman literature, the process of making clothing is conflated with the definition of elite female virtue.[2] Beyond the character of Lucretia, this brief quotation also reveals other facets of the production of Roman dress that deserve further attention. First is the involvement of Lucretia's maids in the scene. While the study of dress often revolves around the clothing of the elite, textiles were a ubiquitous part of every Roman life. Much of their production, finishing, and care would have been the labour of slaves and the freeborn poor. Second, Lucretia and her maids work together in the atrium of her house. Textile work as an occasion for social interaction is well known in connection to modern practices (such as quilting bees or tweed waulking),[3] but less acknowledged in the context of Roman textile studies.[4]

Social interaction is the medium by which relationships are created and maintained. It would have been just as important to the non-elite workers in quasi-industrialized areas of the Roman textile industry as to workers in a domestic environment. While much is known about the importance of work relationships in the social and personal lives of the Roman non-elite through funerary inscriptions, these are statements 'after the fact' and are removed from the context of labour itself.[5] Furthermore, staff communication is an under-acknowledged factor in the textile production process. The purpose of this chapter is to begin to redress some of these gaps by investigating

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[1] *…sed nocte sera deditam lanae inter lucubrantes ancillas in medio aedium sedentem inveniunt.*

[2] Larsson Lovén 1998; Langlands 2006, 86–87 (see Langlands 2006, n. 30 in particular for a compilation of the primary sources and earlier scholarship related to the topic of textile work and the construction of elite female virtue.)

[3] For tweed waulking see Thompson 1969, 46–56.

[4] Notable exceptions include the work of Miko Flohr, who has delved into personal interaction and wider social questions of Roman fulling. (See Flohr 2007, Flohr 2009, and Flohr 2011 in particular.) Clarke 2003, 98–118 considers the social lives of Roman textile workers in relation to Pompeian wall paintings. Broader recent contributions include Robinson 2005, 92–95 on the relationship between the textile trades and the social aspects of urban topography at Pompeii, and Liu 2009, 180–208 on social relationships within textile dealers' *collegia*.

[5] Joshel 1992, 136; Flory 1978.

opportunities for communication among one group of non-elite Roman textile labourers in their work environment, namely the fulling workshops of Ostia.[6]

Fulling, communication, and vision

In the context of Roman textile production, fulling is a set of post-weaving processes that clean, shrink, and manipulate the surface of textiles. This refines the texture and appearance of linen along with improving the density and durability of wool.[7] Roman fullers appear to have been responsible both for finishing newly woven cloth as well as laundering clothing and other textiles after use. Fulling seems to have included a range of processes. These processes include methods of cleaning such as treading cloth by foot with detergents derived from substances such as urine or soapwort and soaking, scrubbing and rinsing the cloth in vats. (These processes could also be used to felt woollen fabric in a controlled manner.) Roman fulling workshops also seem to have performed a variety of surface treatments upon fabrics. These include rubbing the cloth with fuller's earth or colored chalks; bleaching with sulphur smoke; brushing up and clipping a nap; or pressing with a large screw press or glass rubber.[8]

Certainly not all treatments would be suitable for all types of cloth, nor plausible in all workshops. But with the possible exception of textiles produced and finished entirely at home, it seems likely that most articles of clothing and furnishing textiles would have passed through a fuller's shop at some point in their useable life.

Clearly, this was a complicated process that required a skilled staff and coordination among co-workers to proceed smoothly. Good communication in a workshop would have been vital for training new workers and developing their professional judgment. Effective conveyance of the desires of customers and management for specific projects would also have demanded that the

[6] Relatively little is known about the workers in the fulling workshops of Ostia. Unlike Pompeii I.6.7 (the Fullery of Stephanus) there is no indication that the workshop staff may have lived on-site. While it is not clear from the archaeological evidence whether the fulling workers at Ostia were enslaved or members of the freeborn poor, in all cases fulling seems to have been a low-status activity. For example, Dio. Cass. *Roman History* 46.4–5 and Plut. *Vit. Cic.* 1.1 both deal with rumours surrounding Cicero's background and suggest that his enemies used association with fulling as a way of calling into question Cicero's identification with the Roman elite. While Lucretia's maids were engaged in the female-coded task of spinning, it is generally assumed that the staff of Ostian fulling workshops were primarily male (Pietrogrande 1976, fig. 26 is a clear illustration of this.) However, the visual evidence present in the painted columns from Pompeii VI.8.20 suggests that women were involved in parts of the working life of that fulling workshop in roles that did not demand the physical strength required to move large bundles of wet cloth. (See the brief discussion in Clarke 2003, 116–117). I would suggest that whatever the gender of the staff, effective interpersonal communication was important to the smooth functioning of fulling workshops.

[7] Here there is a small problem of terminology. "Fuller" and "fullery" are the English words that are closest in translation to the Latin "*fullo*" and "*fullonica*." However, the Latin word embraces a much larger concept than the corresponding English word. "Fulling" technically only refers to finishing woollen cloth, and specifically to the process of controlled felting. From literary and epigraphic references (Pliny *HN* 35.57; *CIL* II.5181) it is clear that Roman *fullones* performed both cloth finishing and laundry. It is also clear that both linen and wool were used for Roman clothing and furnishing textiles and so, likely passed through a *fullonica* at some point in their use-life, whether for laundry or post-weaving finishing. Therefore, in this chapter I use "fulling" with a wider semantic range than the strict English meaning of the word.

[8] The list of possible processes and materials above is compiled from many literary sources, augmented with archaeological evidence. The most important literary sources include: Cato, *Agr*. 10.5, 14.2; Pliny *HN* 24.68, 35.57; Martial 6.93; *Prices Edict* 22; Apul. *Met*. 9.22–24, among many others. The most important visual sources for the fulling process are found in two sets of wall paintings from Pompeii (See Clarke 2003, fig. 56 and pl. 4–6 for excellent recent photographs). Wild 1970, 83; Uscatescu 1994, 43–45; and Bradley 2002, 23–24, 28 all provide various compilations citing different sources. Bradley in particular points back to the extensively referenced entry in Dar.-Sag. 2.2, 1349–1352.

staff of a workshop be able to communicate well with each other. In all of the examples above, good communication could lead to a better final product, while inadequate communication could lead to mishandled, shrunken or damaged textiles.

Fulling workshops have been found throughout the western Roman provinces, from Sainte-Romaine-en-Gal, France to Timgad, Algeria to Barcelona, Spain.[9] The fulling workshops at Pompeii have received the most scholarly attention to date and often serve as the model for all fulling workshops.[10] However, most Pompeian workshops are later additions to domestic spaces, which in general retained their domestic functions even after the fulling equipment was built.[11] The domestic context of the Pompeian workshops is actually quite unusual as the majority of fulling shops found at sites outside of Pompeii preserve no traces of domestic occupation. Rather it seems likely that these were solely places for labour. This provides an opportunity to investigate communication and relationships in a solely work environment.[12]

Extant fulling workshops range in size from small *tabernae* that could have held only two or three workers, to installations with a rational design and the appearance of quasi-industrialization. Representative examples include the Large Fullery on the Street of the Fulleries in Ostia (II.11.2) or the massive fullery at *Casal Bertone* outside of Rome.[13] While the scale of these workshops varies, they share common features, which allow them to be identified with the fulling trade. Such features include remains of the durable masonry equipment, the most characteristic pieces of which are rinsing vats and treading stalls. In the smallest workshops, dedicated rinsing vats are often absent. The workers may have used tubs of wood, large *dolia*, or some other, relatively perishable material. In larger workshops, the rinsing vats are masonry structures. Smaller workshops such as the Fullery on the *Cardo* (I.13.3) from Ostia often have only a single vat built above ground, while the larger workshops such as the Fullery of Stephanus (Pompeii I.6.7) or the Fullery on the Street of the *Augustales* (Ostia V.7.3) often have a series of vats linked in sequence by drains that allow them to be filled from the city water supply. This series of drains also allows for water to be easily moved from vat to vat based on cleanliness, and finally discharged into the municipal waste water system.[14]

The other piece of equipment that identifies a fulling workshop is the treading stall. Like rinsing tanks, masonry stalls are not found in all fulling workshops, however they seem to be standard in Roman Italy and North Africa.[15] These stalls consist of a shallow masonry or terracotta basin

[9] Leblanc 1996; Wilson 2001; Beltrán de Heredia Bercero 2000.

[10] This reliance on Pompeii can be seen quite clearly in Ciarallo *et al.* 1999, fig. 119, where a three dimensional model of the Fullery of Stephanus (Pompeii I.6.7) is one of two illustrations of the Pompeian fulling industry. The bibliography on the fulling industry at Pompeii is extensive. Bradley 2002 and Flohr 2009 provide good starting points for delving into the literature.

[11] Spinazzola 1953, 780–785.

[12] For example, in the fulling workshops from Timgad presented by Wilson (2001, figs 12.01–12.07) the individual workshops are quite small and the masonry equipment appears to fill the majority of the workspace. That said, many of the *insulae* at Timgad appear to have been multi-story buildings, so it is possible that fulling workshop staff may have been housed in a now-lost upper floor (Wilson 2011, 175).

[13] Killgrove 2008, 36–37.

[14] These features and the treading stalls described below conform to M. Alberti's "Group B" classification for identifying dyeing and textile washing facilities. (Alberti 2007, 60–61). Furthermore, in the earliest excavation of the Large Fullery on the Street of the Fulleries (Ostia II.2.11) uncovered a large quantity of fuller's earth, one of Alberti's "best indicators" (Alberti 2007, 60) for washing and dyeing facilities. (Vaglieri 1913, 72–73).

[15] The fulling workshops at Sainte-Romaine-en-Gal preserve no stalls (Leblanc 1996, 137–138), while funerary reliefs from Sens, France and Forli, Italy depict treading in freestanding tubs with attached rails. For Sens see Wild 2003, 91

flanked by a pair of low walls, approximately one metre high and ten centimetres wide, which the person treading cloth in the basin could use for support as they stepped up and down in the slippery mixture of detergent and wet fabric. The narrowness of the stalls defines a workspace that could be used by only one person at a time. Furthermore, although there could be some variety of positions within the stall, workers in adjacent stalls would have been literally shoulder-to-shoulder with each other. While this may have made it easy to converse, the close confines of the space would have made it difficult to turn in the full range of possible positions while treading. This would have made it difficult to clearly see an adjacent co-worker.[16]

The durable masonry equipment found in Roman cloth finishing workshops confines the action and limits the motion of the people using it, thus influencing what of the life of the workshop a person could see and how they might interact with co-workers. While it is, of course, possible to carry on an effective conversation with a person one cannot see, non-verbal forms of communication, such as gesture, posture, facial expression, and tone of voice are important for clear and effective communication and encode far more information than the spoken word alone.[17] Visual assessment of the face and body plays an important role in many of these modes of non-verbal communication, and so it is the role and control of the visual field on which this paper will focus. While the nuances carried by these modes of communication are culturally specific, the existence of non-verbal communication seems to be universal.[18] The Romans themselves appear to have been highly aware of nonverbal communication in all classes of society, as seen by the highly stylized oratorical gestures described by Quintilian or the interplay of a theatrical audience.[19] Furthermore, as the major port of the city of Rome, Ostia must have been an intensely multilingual environment. It seems plausible that workers in the textile workshops of Ostia may not have shared a common language.[20] In this situation, the nuances of gesture and facial expression must have been even more crucial to effective communication than in a monolingual environment.

The masonry equipment of fulling workshops allows us to locate the position of single workers at specific points of the fulling process. Because rinse tanks and treading stalls influenced the spatial position, movement, and field of view of individual workers, and because non-verbal communication is an important component of effective interpersonal communication, we can investigate the opportunities for communication available to workers in specific locations within a given workshop via the physical arrangement of the workspace. I accomplish this investigation by mapping the area of a workshop visible to a worker at a specific workstation, and comparing these areas of visibility. A workstation with a greater visible area will allow a worker more opportunities for functional communication with co-workers and a better knowledge of the social dynamics of the workshop as a whole.

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and fig. 2.15; for Forli see Larsson Lovén 2001, 48–49 and fig. 7.

[16] An explanation of the disadvantages of peripheral vision is below. In addition the messiness and unpleasant smells of the work may, at times, have made verbal communication impractical or undesirable.

[17] The often-cited statistic that non-verbal cues convey 55% of the total meaning in interpersonal interactions is an over-simplification based the foundational studies of Mehrabian and Weiner (1967) and Mehrabian and Ferris (1968), which attempt to create a concrete description of the importance of nonverbal content to successful communication by quantifying the relative input of different channels of communication.

[18] For example, basic human facial expressions (smiles, frowns, surprise) seem to be universal but the nuances of meaning and what constitutes appropriate use appear to be culturally specific. (Eckman, Sorenson, Friesen 1969; Eckman *et al*. 1987).

[19] Quint. *Inst.* 11.3.65–136; Aldrete 1999, 6–8; Brilliant 1963 is the fundamental study for gesture in Roman art history.

[20] See Adams 2003 for a thorough recent study of bilingualism in all classes of Roman society, Adams 2003, 363–365, 761–762 in particular.

The visual field mapped onto these workshops is determined by the physiology of the human eye. The normal human field of vision is approximately 120 degrees of binocular sight, with roughly 30 degrees of less acute vision (the 'temporal crescent') at either side.[21] Because of the difference in visual acuity between the central visual field and the temporal crescent, I do not use the entire 180-degree visual field for my analysis. However, neither do I use only the 120-degree field listed above; this is a static measurement and it is rare for people to keep their heads and eyes absolutely still. To take this subtle but frequent motion into account, I have chosen a slightly wider angle of 140 degrees. To approximate the field of view of a worker from each selected workstation, I catalogue what is visible within a 140-degree arc from that workstation and what may be hidden by the architecture of the workshop. While a range of positions may have been possible in any given stall, I have chosen to analyse what might be visible to a worker looking directly into the workshop with his back to the wall at the rear of the treading stall. From these maps of visible areas (a 'viewshed'), I evaluate the opportunities for communication available from several workstations. In addition to evaluating what may be visible from specific workstations, I also will consider other criteria for easy communication. Rows of three people allow for ease of communication, while a concave arrangement of the space allows for face-to-face interaction and visibility among the entire group.[22]

While we cannot recreate the specific verbal encounters that may have fostered and defined relationships among the staff of a specific workplace, we may have more success investigating how control of the workers' field of view might have contributed to the opportunities for accurate and rich communication on a non-verbal level.[23] Of course, fulling workshops were not built with the goal of enhancing or controlling worker communication. These workshops were built solely for practical purposes, responding primarily to the architectural limitations of space and infrastructure. Any influence these workshops might have had on the opportunities for communication available their staff would have been largely unintentional. However, the unsocial effects of our physical environment can be no less powerful for their lack of intention.

The fulling workshops of Ostia

While the fulling workshops of Pompeii have been the subject of increased scholarly attention in the previous decade, the fulling workshops of Ostia have been less intensively investigated. What follows are case studies of the visual and social dynamics of two workshops at Ostia; the Large Fullery on the Street of the Fulleries (II.11.1), and the Small Fullery on the *Cardo Maximus* (I.13.3). In each workshop, I will examine the available visual fields from the identifiable masonry equipment as well as consider how these and the spatial arrangement of the workshop itself could influence the opportunities for communication available to the workers in that particular workshop.

[21] Harrington and Drake 1990, 96.

[22] Consider, for example, the Late Republican and Early Imperial form of the *triclinium*, in which three couches of three diners are arranged around a central table (Dunbabin 2003, 39).

[23] Studying the acoustics of ancient spaces is difficult as acoustic properties depend heavily upon the shape and material of ceilings and wall finishes, and the furnishing and human occupation of a space. All too often in archaeological contexts, these elements are lost and so acoustics become highly speculative. Furthermore, non-verbal forms of communication can be effective in situations where verbal interaction is either unavailable or unwanted.

The Large Fullery on the Street of the Fulleries (II.11.1)

The Large Fullery [Fig. 15.1] is located in the northeast of Ostia, in Region II, between the Tiber and the *Decumanus*, on the north side of the Street of the Fulleries, a major secondary street in the neighbourhood. The Street of the Fulleries runs from west to east between the Street of the Corporations, east of the *Piazzale delle Corporazione* and the Street of the *Vigiles*. The *Piazzale delle Corporazione* is the most notable landmark to the west, and the two entrances to that space from the Street of the Corporations may have contributed to foot traffic in the neighbourhood. The south side of the Street of the Fulleries is occupied by a large bakery (II.6.7) and the Barracks of the *Vigiles* (II.5.1–2). The bakery appears to have occupied the entire lower floor of *insula* II.6.7 and was a large establishment with at least ten grain mills and two ovens, suggesting it was a large enterprise that would have employed many people. The Barracks of the *Vigiles* housed between 320 and 640 men who rotated between Rome and Ostia in four-month shifts.[24] Further south is found the large Antonine complex of the Baths of Neptune. The buildings further east along the Street of the Fulleries have not been fully excavated or identified as to their function. There are several identified apartment blocks in this area. South of the bakery are two blocks of shops and apartments, The House of the Painted Ceiling (II.6.5–6) which faces the Street of the Fountain and the House of the Infant Hercules (II.6.3–4) which faces the Street of the Corporations. To the east of the Baths of Neptune is a third apartment block, the House of the Street of the *Vigiles* (II.3.3–4). These factors, together with the presence of the large baths create the impression of a busy mixed-use neighbourhood, which (while not strictly residential) had a steady, though transient, population.

The Large Fullery is the largest, best excavated, and most thoroughly studied portion of a complex of Hadrianic workshops (II.11.1 and II.11.2).[25] It was excavated and reconstructed in two campaigns in 1958 and 1959.[26] The fabric of the Large Fullery building includes both new construction from the era of Hadrian and the remains of older structures that existed on the site.[27] The discovery of a coin of Constantius Chlorus suggests that the building was in use until at least the 4th century AD.[28]

The basic plan of the workshop is comparable to the other large fulling establishments found in Ostia, such as the Fullery on the Street of the *Augustales* and the remains of a fulling workshop under the podium of the Temple of the *Fabri Navales* (III.2.1–2).[29] The current reconstruction of the structure presents the workshop as a large, rectangular workspace, roughly 300 m^2 with an adjoining secondary space of approximately 98 m^2. Three slender piers on the central axis of the workshop appear to have supported a lightweight roof over the main workspace. Four heavy buttresses support the eastern wall, which is a pastiche of Hadrianic and earlier construction (Fig. 15.2).

[24] Hermansen 1981, 36.

[25] The Large Fullery appears to have been built as an early addition to the original Manufacturing Complex (II.11.2) during the Hadrianic period. The original access to the Large Fullery was only through the Manufacturing Complex space via a tripartite door on axis with the monumental tripartite entrance to the Manufacturing Complex on the Street of the Corporations. The buildings appear to have been separated and a new door to the Street of the *Vigiles* cut soon after. The Manufacturing Complex also continued to be in use into the 4th century AD. The extant building includes identifiable workshops for both fulling and dyeing. While it is clear that these were architecturally separate spaces, the extent of their business relationship as well as the extent and nature of the contact between their workers are unrecoverable. Therefore, it seems prudent to treat these as separate workshops.

[26] Pietrogrande 1976, 27.

[27] Pietrogrande 1976, 27–28.

[28] Pietrogrande 1976, 29, 41.

[29] For the fulling workshop under the Temple of the *Fabri Navales*, see De Ryut 2001, 188.

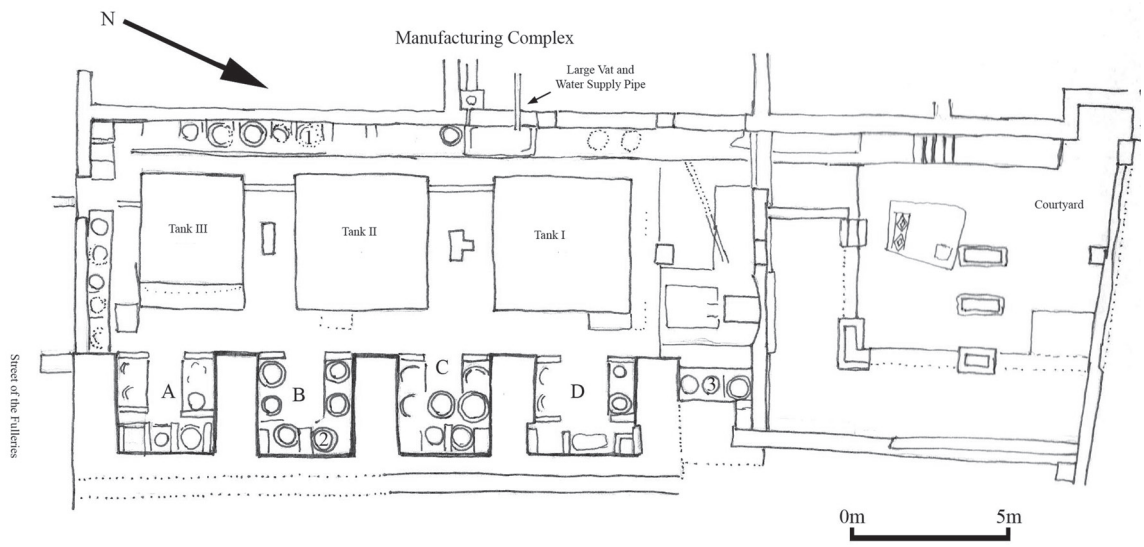

Fig. 15.1 Plan of the Large Fullery on the Street of the Fulleries, Ostia II.11.1. Drawing by the author, after Pietrogrande 1976, fig. 4.

Fig. 15.2 Photograph of the Large Fullery on the Street of the Fulleries, Ostia II.11.1, showing rinse tanks, treading stalls, and alcoves A–D. View from the main entry on the Street of the Fulleries. Photograph by author, used by permission of the Ministero per i Beni e le Attività Culturali – Soprintendenza Speciale per i Beni Archeologici di Roma.

A small courtyard space to the north of the main workroom is a renovation that postdates the construction of the Large Fullery.[30] This space has been interpreted in a variety of ways, such as a business office or *collegium* meeting space, but these do not preclude other uses such as storage or drying small textiles. Heavy piers encircling the courtyard and stairs in the northwest suggest that there may have been a second story above the space. The area between the piers and the south and east walls contains a large L-shaped platform of masonry and earth. (The east leg is 7 m long by 2.5 m wide, while the south leg is 4.5 m long by 2.5 m wide.)

The series of rinse tanks are the most prominent feature of the Large Fullery. These tanks are situated in the central open space of the building, built of brick below the level of the floor and lined in *opus spicatum* and layers of waterproof plaster.[31] The depth of all three tanks is approximately 0.9 m. The two northern tanks measure approximately 16 m^2, while the volume of the southern tank was decreased by the addition of a heavy brick shelf as a repair to the west wall that reduced the area of the tank from 16 m^2 to approximately 9 m^2. The water source for the rinsing complex appears to come from the fountain on the north wall of the main workroom.[32] The floors of the rinse tanks slope slightly from north to south to facilitate drainage of water through the tank system. Used water drains from the southern tank into the city sewer system through a terracotta pipe into the masonry sewer beneath the Street of the Fulleries.[33]

The fulling stalls arranged along three of the four walls of the main workspace average 0.5 m in width. There are clear remains of five stalls along the south wall and another ten along the west wall. The fulling stalls at the east side of the workshop are arranged in groups of six in four alcoves (A–D, each approximately 7.6 m^2) created by large masonry buttresses that support the re-used masonry wall that predates the construction of the workshop.[34] A smaller niche, only 1.5 m deep holds three more stalls in the northeast corner of the workshop. Many of the stalls show signs of frequent restoration, including re-plastering the support walls and the replacement of treading basins as seen in alcove A.[35]

The physical remains of the Large Fullery indicate that the process of fulling practiced here was similar to other large workshops in Ostia. Like the Fullery on the Street of the *Augustales* (V.7.3) and the late 1st century AD fulling workshop under the temple of the *Fabri Navales* (II.2.1–2), the series of linked, below-ground rinse tanks suggests a parallel series of soaks with the cloth moving from the south to north in stages of progressively cleaner water.[36] In addition, the rows of treading stalls suggest that the workshops were of similar size and organization.

Several specific details of the architecture and spatial arrangement of this workshop would have influenced communication among the workers in this building. First, while the central row of rinse tanks does not inhibit the visible areas of the workshop, these tanks do limit the available pathways across the workshop. The row of pillars along the north-south axis of the workshop further inhibits travel across the central workspace. To reach the east side of the workshop, a worker would need to travel either north or south around the entire set of tanks rather than being able to cross the

[30] Pietrogrande 1976, 40.
[31] Pietrogrande 1976, 31–32.
[32] Pietrogrande 1976, 32.
[33] Pietrogrande 1976, 32.
[34] Pietrogrande 1976, 27.
[35] Pietrogrande 1976, 35.
[36] Flohr 2006, 195–196.

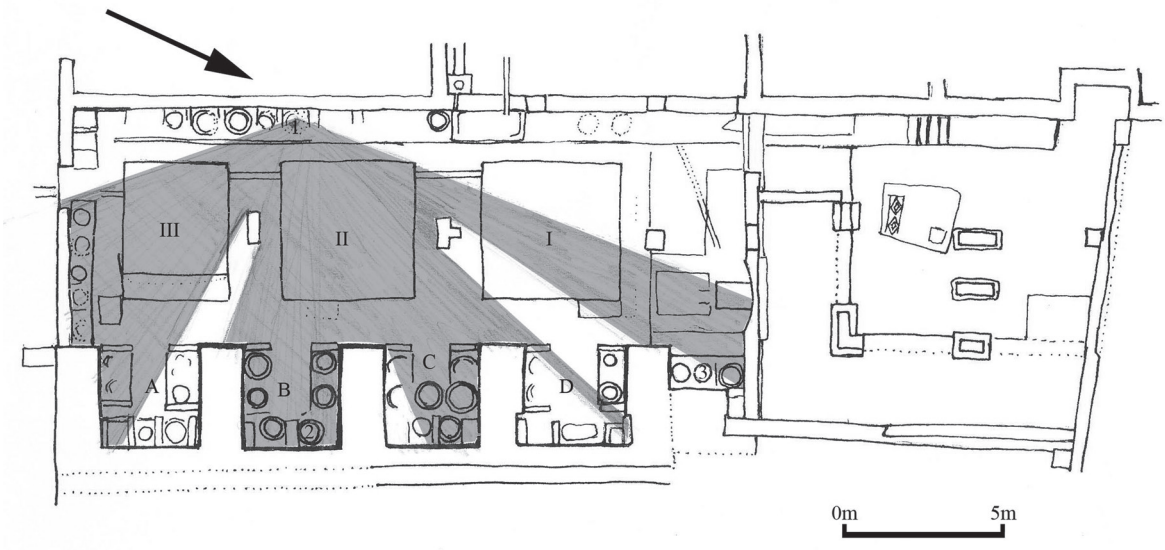

Fig. 15.3 Plan of the Large Fullery on the Street of the Fulleries, Ostia II.11.1, showing the viewshed from stall 1. Drawing by the author, after Pietrogrande 1976, fig. 4.

workshop by the narrow causeways between rinse tanks. Second, while the pillars are too slender to support a second story, they still noticeably disrupt the visual field of the workspace.[37] Third, niches A–D may have encouraged excellent communication among small groups of workers while restricting communication with the workshop as a whole. Finally, the small niche in the northeast corner of the workshop would restrict communication among workers the most, since the small space, remote location, and limited viewshed would isolate any workers in that area.

Analysis of the field of view from three specific treading stalls reveals further details of the possible dynamics of communication in the Large Fullery. Figure 15.3 shows the field of view from stall 1 on the southwest wall of the workshop. The available viewshed from this particular position in the workshop covers the majority of the main work area of the Large Fullery. Rinse tanks II and III are entirely visible, as is the central third of tank I. In addition, alcove B is completely visible, as are sections of alcoves A and C. The brick piers along the north-south axis of the space create the only significant disruption in the field of view available to the worker in this position. In addition, the entire row of stalls along the south wall was visible, as was any traffic through the entrance to the workshop from the Street of the Fulleries.

Alcoves A–D require special consideration, as the physical form of each of them would encourage communication among a small group of workers while discouraging interaction with the workshop as a whole. For example, the viewshed from stall 2 [Fig. 15.4] in alcove B would have provided a noticeably smaller field of vision for a worker at that place than offered by stall 1 considered above. Only the treading stalls along the west wall and little more than half of tanks II and III are

[37] It should be noted that the severity of this disruption is less than many other workshops. Consider, for example, the heavy piers surrounding the rinse tanks in the Fullery on the Street of the *Augustales* (V.7.3). See Flohr 2008, 1–6 for a recent discussion of this workshop.

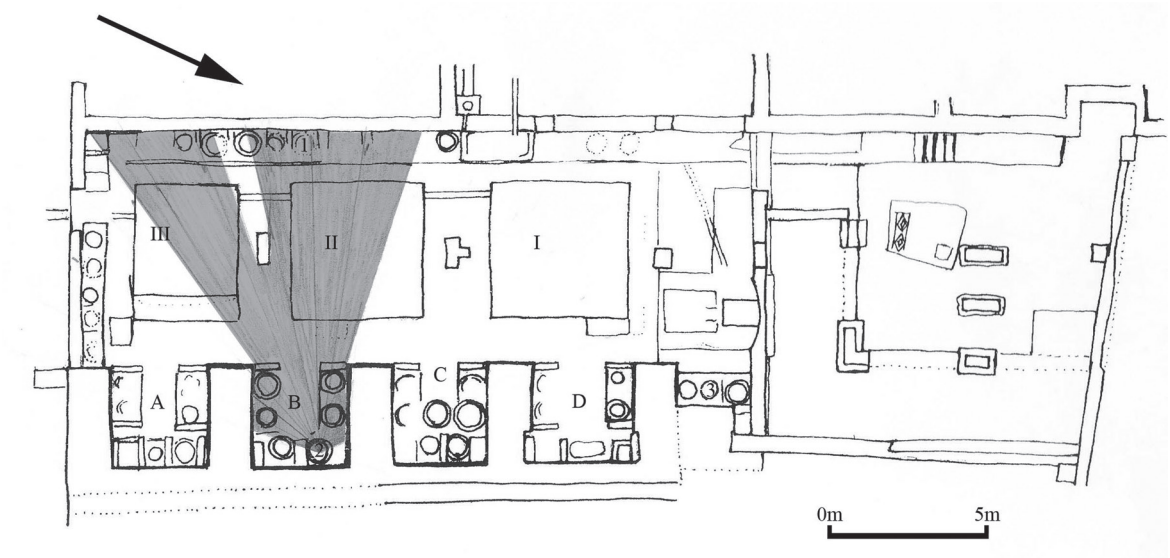

Fig. 15.4 Plan of the Large Fullery on the Street of the Fulleries, Ostia II.11.1, showing the viewshed from stall 2. Drawing by the author, after Pietrogrande 1976, fig. 4.

visible from this workstation. In spite of these limitations the spaces created by the alcoves are more intimate than the large open space of the workshop. These spaces are similar in size and shape, allowing them to hold the same number of potential occupants as a *triclinium*. They may have functioned in a similar way to foster closer connections among the small groups of workers who used them. These alcoves are the product of the architectural history of the workshop and certainly were not designed with reference to *triclinia*. That said, while this is certainly not Dunbabin's elite networking across the banquet table, these spaces may have had a similar effect by providing an opportunity to create relationships within the larger group of workers.

The small niche by the fountain [Fig. 15.5] is also worth considering from the perspective of social opportunities influenced by the arrangement of the workshop space. There would be both advantages and disadvantages to working in that specific part of the Large Fullery. The short row of three stalls would allow for conversation between all of the workers in that space, although the close confines and side-by-side position would make face to face interaction among these three workers difficult. The separation from the rest of the workshop may have fostered private communication among those workers, but that same separation may also have contributed to a sense of isolation from the workshop as a whole. As seen in Fig. 15.5 the field of view available from stall 3 is extremely limited. In essence, a person at this workstation would be unable to see workers in any other part of the workshop, except for traffic passing to and from the rear courtyard.[38] This limited visual range may have encouraged a sense of isolation among workers in this particular part of the Large Fullery.

[38] Only two treading stalls are clearly visible on the site plan of this part of the workshop.

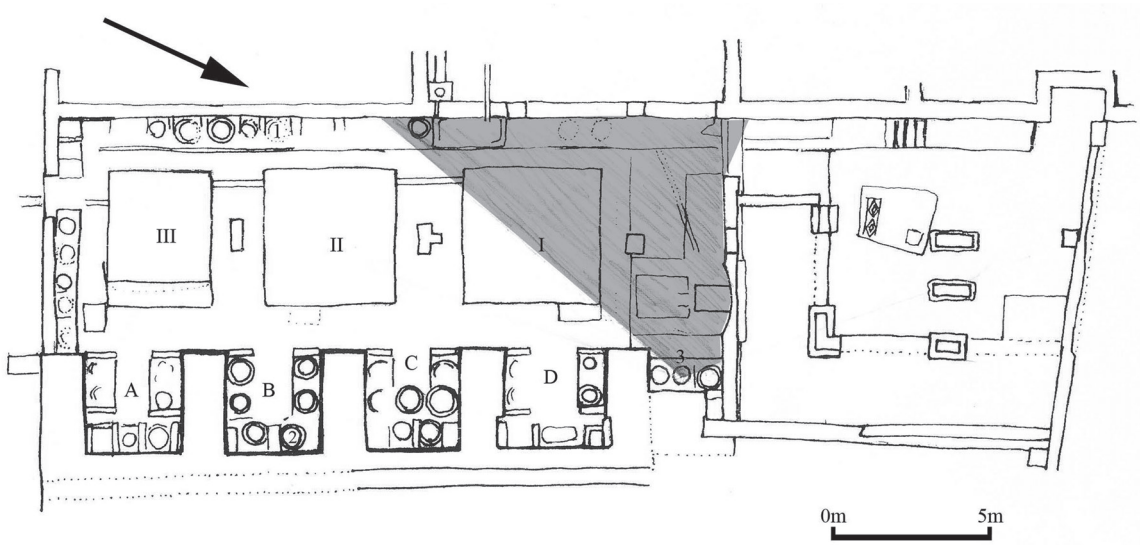

Fig. 15.5 Plan of the Large Fullery on the Street of the Fulleries, Ostia II.11.1, showing the viewshed from Stall 3. Drawing by the author, after Pietrogrande 1976, fig. 4.

The Small Fullery on the Cardo

The Small Fullery on the *Cardo Maximus* (I.13.3) [Fig. 15.6] is the best-preserved small fulling workshop known from Ostia. It is located on the southern section of the *Cardo Maximus* between the Forum and the Laurentian Gate in a location that is convenient to several major landmarks, such as the *palaestra* of the Forum Baths. Therefore, this location may have been well travelled although it is not, in itself, conspicuous. Surrounding buildings farther south along the *Cardo* include a large bakery and milling facility at I.13.4. The district directly west appears to be largely residential.

The workshop itself is part of a row of shops fronting a building (I.13.2) that is dated to the reign of Hadrian by its masonry. Workshop I.13.3 shows evidence of a long history of renovation and refurbishment, but coins found beneath the masonry of the fulling equipment provide a *terminus post quem* for the installation of the fulling equipment of the first quarter of the 3rd century AD.[39] Construction details of these late stages of the workshop, such as the floors of low-quality *cocciopesto* and the single rinse tank suggest that this workshop was a modest operation.

The workshop consists of two rooms: a large front room containing the remains of features that are not directly connected with fulling, and a rear room that contains a masonry fulling installation. In essence, the entire front of the shop was open to the *Cardo*. There is a second entry to the first room from a corridor to the south of the workshop. Near the northwest wall the base of a *dolium*, 0.4 m in diameter is embedded in the floor. A drain made of re-used roof tiles leads from the *dolium* toward the street. In the north corner of the front room are the remains of a concrete structure that appears to have once been a vat with a concave bottom, 1.7 m^2. The vat appears to have been replaced by two short masonry walls (0.3 m high) that appear to have supported a bench or counter.[40] Two drains originate in this area and may be associated with the earlier vat. How the

[39] Pietrogrande 1976, 10.

[40] Pietrogrande 1976, 9. It is possible that this feature could have been a latrine. The low walls could have supported

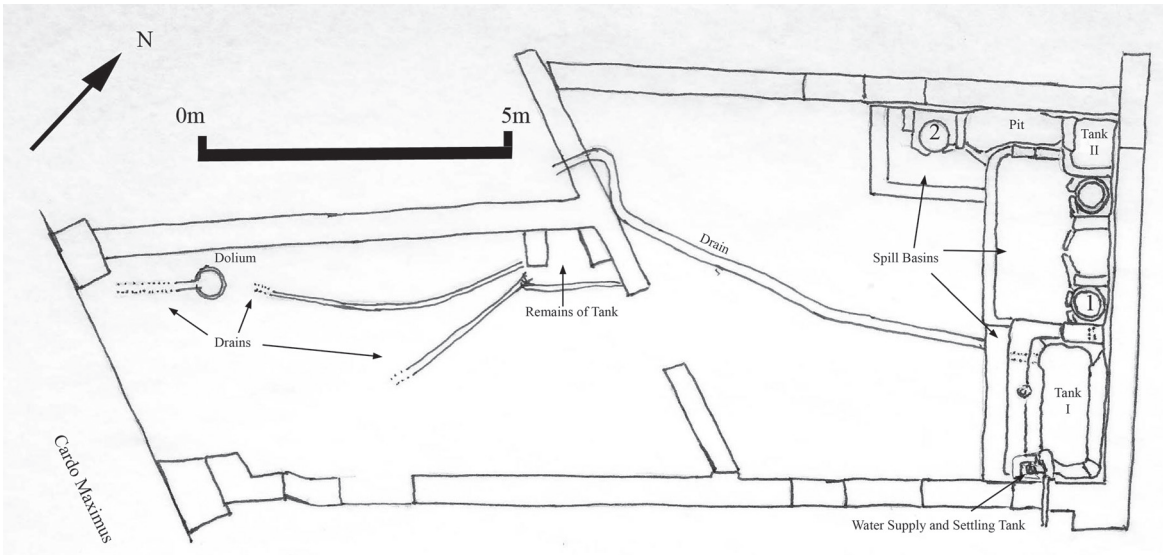

Fig. 15.6 Plan of the Small Fullery on the Cardo Maximus, Ostia I.13.3. Drawing by the author, after Uscatescu 1994, fig. 18a.

masonry structure and the two drains were integrated into the processes of the workshop is unclear, and so the analysis below will focus on the equipment in the second room.

The rear room contains substantial masonry equipment that meets the expected form of a fulling installation (fulling stalls, tanks). Here the equipment is built from re-used brick covered in a thick layer of *opus signum*. It covers an area of roughly 15.7 m^2 along the north end of the workroom, overlaying a closed doorway in the southeast wall and repairs in the northeast wall. Perhaps the most distinctive feature of the fulling installation in this workshop is the emphasis on spill control and containment. The floor in front of the tanks and treading stalls is paved with the same thick *opus signum* that lines the rest of the equipment, and divides the space into distinct zones by low, rounded masonry barriers.

The largest feature of the masonry fulling equipment in this workshop is the large tank in the east corner, which measures 2.6 m^2 and 0.8 m deep. Water enters through a pipe about one meter above the floor. An overflow drain in the northeast wall of the tank directs overflow into the adjacent fulling stall, while a drain at the base of the southwest wall allows the tank to be emptied completely through a terracotta pipe that connects directly to the sewer beneath the shop at I.12.9. A small tank is found in the north corner of the work area. It measures 0.48 m^2 and from the remains of *opus signum* on the walls appears to have been 0.5 m deep. There is no discernible water supply for this tank, nor is there a drain.[41] This suggests that it was filled and drained by hand and therefore may have contained a liquid used in relatively small amounts, such as a detergent.

a wooden seat and there are drains that flow away from this area. This feature, however, is very visible from the street and Hobson doubts the likelihood of a possible latrine in Pompeii VII.3.3, precisely because of its unrestricted public visibility (Hobson 2009, 119).

[41] Pietrogrande 1976, 10.

Four treading stalls can be identified in this workshop, three of which preserve shallow terracotta basins sunk into the working podium. The walls that divide the stalls are 0.5 m high and each stall is 0.75 m wide. (The basin has been dug out of the interior of stall 2.) The inside of each stall is lined in *opus signum*, which curves slightly toward the interior of the stall, overhanging the basin at the open end of the stall.[42] Like the masonry barriers defining spill-control zones in the floor, this detail suggests a preoccupation with controlling splashing and spilling on the part of the designer of the fulling equipment.

The final feature of the working area of this workshop is the shallow pit along the west wall. Like the basin in stall 2, the bottom was dug out of this pit at some point prior to its excavation. But as with the small tank, the original depth of 0.5 m is partially visible from the remains of *opus signum* on the pit walls.[43] This feature has no parallels in extant fulling workshops, although the plaster lining suggests that the original contents of the pit may have been wet.

A worker in the front room would have had the best opportunity to interact with members of the public, both clients and unrelated passers-by on the *Cardo*, due to the exceptionally wide entryway to the shop. The situation in the rear workroom is more complex. However, this may have provided a good opportunity for communication among those workers, as well as possible control of their interaction with the public, as only a limited number would have had visual access to the room at the front of the shop.

Treading stall 1 is particularly well placed for communication among workers in the rear workroom. Figure 15.7 approximates the field of view at that particular stall. The area indicated includes the treading stall on the north wing of the work area and a view through the front room to the street beyond. This stall would adequately position a worker to be able to communicate verbally between both parts of the workshop. However, the door between the front and back rooms of the Small Fullery is only 1.3 m wide and so prevents the worker at stall 1 from actually seeing a fellow worker at the equipment in the front room of the workshop. This renders the visual aspects of non-verbal communication difficult to engage in unless the worker in the front room stepped into the area visible through the doorway.

The treading stall at the north wing of the work area is a more difficult area for communication. Figure 15.8 shows that, while much of the rear workroom is visible, only a very small part of the vestibule can be seen from this position. Therefore, it may have been that information about events in the front room and happening on the street must have been relayed through workers with a better view of the workshop as a whole.

Conclusions

As one can see in the two workshops presented above, the work environment for the non-elite labourers in the quasi-industrialized fulling workshops of Ostia seems radically different from the moralizing image of domestic production drawn by Livy. While the lives and specific emotional interactions of individuals involved in the fulling trade may not be recoverable through the means available to us, information about the physical and social context experienced by some textile workers is knowable through a careful study of the physical environment of fulling workshops.

[42] Pietrogrande 1976, 10.
[43] Pietrogrande 1976, 10.

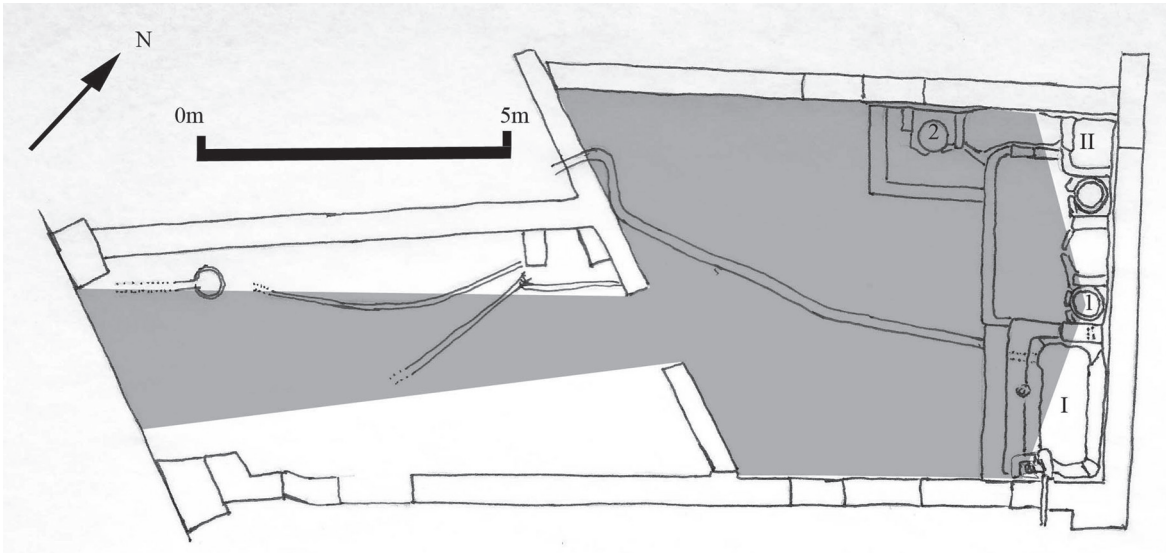

Fig. 15.7 Plan of the Small Fullery on the Cardo Maximus, Ostia I.13.3, showing the viewshed from stall 1. Drawing by the author, after Uscatescu 1994, fig. 18a.

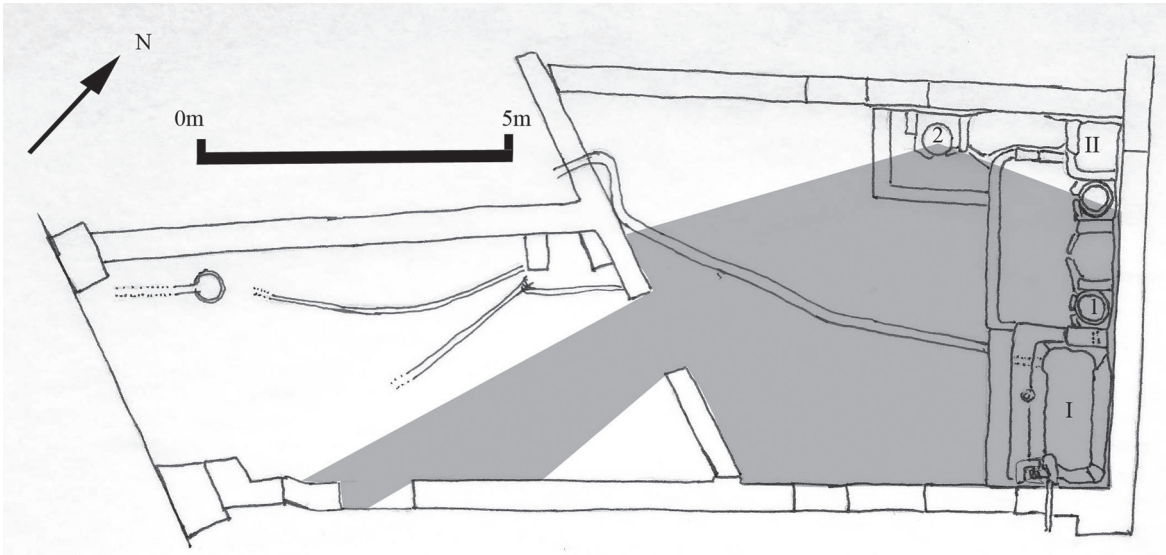

Fig. 15.8 Plan of the Small Fullery on the Cardo Maximus, Ostia I.13.3, showing the viewshed from stall 2. Drawing by the author, after Uscatescu 1994, fig. 18a.

Because important pieces of durable masonry fulling equipment (treading stalls, rinse tanks) limited the movement and position of individual workers at specific points in the fulling process, it is possible to use this equipment to locate a position of a single worker in the space of a workshop and analyse that worker's visual environment in terms of how it may have aided or hindered opportunities for social interaction.

In addition to the personal importance of good communication, effective interaction with co-workers had a functional importance in textile workshops. As iterated above, communication is an under-studied contributor to the successful production of textiles, especially in a quasi-industrialized urban environment where it is possible workers may not have shared a common language. Clear, effective communication would have been vital to training, customer relations, and process regulation as well as social interaction among co-workers.

The two workshops presented above demonstrate some of the possibilities of visual analysis, how that might be combined with knowledge of the fulling process, and the larger topographical location of the workshop within the city. By using the physiology of the human eye, it is possible to map the areas of a workshop that might be visible to a worker at a particular place. Because the visual aspects of non-verbal interaction make up an important part of effective communication, mapping viewsheds allows us to consider the possibilities for communication on the level of individual workers in specific locations. This method allows for more thorough and deliberate consideration of the social context of individual workers in their physical environment than has been accomplished previously.

Livy shows us Lucretia's busy maids as part of a community in the shared social context of domestic textile production. Non-elite fulling workers, in the quasi-industrial workshops of Ostia were also part of a community, although it existed entirely outside the domestic sphere. Through a close investigation of the architecture of fulling workshops we are able to see something of the communities that would have enriched the lives of Ostian fullers and to consider how functional communication might have influenced this portion of the creation and maintenance of Roman textiles.

Acknowledgments

This chapter is based on the thesis titled *From Loom to Laundry: Cloth Finishers in the Roman City*, which I completed in 2010, in partial fulfillment of the Master of Arts degree in Classical Archaeology at the University of Missouri-Columbia. I would like to extend my thanks to my MA committee, Marcus Rautman, Kathleen Warner Slane, and Dennis Trout for their assistance and encouragement in the original project. I would further like to thank the editors of this volume, Pier Luigi Tucci, Shana O'Connell, Michele Asuni, and Laura Hutchison of Johns Hopkins University for their advice and assistance in preparing this for publication.

Abbreviations

AJAH	*American Journal of Ancient History*
AnalRom	*Analecta Romana Instituti Danici*
ArcheologiaPar	*Archaeologia. Trésors des ages [Paris]*
BABesch	*Bulletin antieke beschaving. Annual Papers on Classical Archaeology*
BAR-IS	British Archaeological Reports, International Series

Complutum	*Complutum*: Publicaciones del Departamento de Prehistoria y Etnología de la Universidad Complutense de Madrid
Dar.-Sag.	C. Daremberg and E. Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris 1875)
JRA	*Journal of Roman Archaeology*
NSc	*Notizie delgli scavi di antichità*
SOMA	Symposium on Mediterranean Archaeology

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16. Roman Textiles and Barbarians: some observations on textile exchange between the Roman Empire and *Barbaricum*

Zofia Kaczmarek

The possibility of textile trade and exchange between Romans and Barbarians[1] has been widely discussed and benefited from a great amount of recent research. However, no one has succeeded in answering the question of whether textiles which are named as Roman imports are really of Roman provenance. In this chapter I will try to show that by combining archaeological and literary sources we can get a little bit closer to finding the solution of this crucial problem.

Although it is very easy to generalize and think of *Barbaricum* as an integral whole, a part seen by Latin authors as inferior to Roman world, modern scholars are well aware that it was very rich and diverse territory inhabited by many tribes with cultures of their own. In this chapter I will focus on only one territory – that of modern Poland,[2] which I think is a representative part of the Barbarian world, a part which did not have common borders with the Roman Empire and so had hampered relations with it.

However, as the analysis of relations between Romans and Barbarians show, not only those Barbarians living across the Rhine and the Danube, but also *superiores barbari* – tribes living far north of the *limes*, on the Baltic coast – played a very important role in Roman economy and policy. It was this part of the world which supplied the Empire with precious amber and, what is more, was often a background base for attacks on Roman frontiers.[3]

Textiles from the Roman period in Poland are not richly represented in archaeological material due to the poor preservation environment. However, there are a few examples found mainly in Pomerania. These were analyzed by Jerzy Maik and Lise Bender Jørgensen.[4] In Roman written sources we find a couple of mentions about the territory and the tribes that were living there. These

[1] Although it may seem controversial, in this paper I will use capital 'B' for the term Barbarian(s) and *Barbaricum*, because I would like to think of these terms as an ancient proper name for peoples and territories outside the Roman Empire.

[2] Territories of modern Poland were in ancient geography a part of free Germania. Vistula, the greatest river in Poland, was believed to be a border line between western and eastern Germania or between Germania and European Sarmatia or even between Germania and Dacia. The territory of present-day Poland was inhabited by many different tribes, some of them, especially those living in the mouth of Vistula river, we know by name (e.g. Goths, Estii, Lugii), some of them are unknown to us (Kolendo 1998d, 107–108; Biliński 1947, 150–153). In order to avoid confusion in this chapter I will refer to the territory in question using its modern name – Poland. See also Strabo I.1.6.

[3] Kolendo 1981, 454.

[4] Jørgensen 1991, 84–92; Maik 1988; 2007.

have been analyzed by Jerzy Kolendo.[5] Roman literary sources have also been discussed in terms of Barbarian costume.[6] Many of these works successfully combined literary and archaeological material, avoided methodologically incorrect pitfalls of attempting to match every archaeological find to a description in literary sources; all of them used iconography to illustrate their main theses.

The Roman period in Poland starts in the 1st century AD and finishes around the 5th century AD (i.e. phases B1–D in the interregional relative chronology, the latter often identified with the Early Migration period).[7] Textiles dated to the period come in general from phases B2–C2, with only few exceptions from different phases.[8] The latest Roman period textile was found in Grzybnica, Szczecin province in a Wielbark Culture cemetery and is dated to the late Roman period.[9]

Based on the archaeological material there are two main distinct cultures: the Przeworsk and Wielbark Culture.[10] These two cultures follow different patterns, especially in burial customs which translate into differences in textile preservation. In the region where the Przeworsk culture was dominant (south and eastern Poland) cremation was a common rite and therefore textile finds are very rare.[11]

The textile finds are mainly scattered in the northern part of the Polish territory; most of the textile remains were found in Pomerania, but there are also some examples found in Silesia and few more found in other locations. They come from 30 different sites and were found in inhumation graves only, where they were preserved in close proximity to different types of metal implements. There are three main Roman period cemeteries in Poland, where most of the textiles were found: Gronowo, Odry and Lubowidz.[12] Unfortunately, a part of these finds was lost during the Second World War and are known only from the manuscripts by Walter von Stokar or Gertrud Sage which do not follow the latest methods of textile description and so are not sufficient for further analysis.[13]

Since the textiles from the Roman Period have already been analyzed,[14] I will give a short summary here. There are a few characteristics of textiles from the Roman period to point out. The quality of both twills and wool is much higher in the Roman period textiles than in those from the Middle Ages. This change can be observed in Scandinavian textiles as well.[15] When it comes to wool quality, Maik suggests three possibilities: first, that the Romans could have brought sheep with fine fleece into *Barbaricum*, where they were crossbred with local species; second, that 'Barbarians' imported raw material or thread; third, that this fine fleece came to *Barbaricum* in ready-made textiles. However, there is no evidence to make one of these possibilities more

[5] E.g. Kolendo 1999.
[6] Kolendo and Mączyńska 1991.
[7] The relative chronology worked out by Hans Jürgen Eggers (Eggers 1955) is commonly used for the Roman period in the central and northern Europe. It was adopted and adjusted for different regions in this part of Europe (Godłowski and Woźniak 1981, 53–57).
[8] Jørgensen 1991, 90.
[9] Maik 2001, 107.
[10] See map.
[11] Ørgensen 1991, 86; Maik 2001, 109.
[12] See map.
[13] Jørgensen 1991, 86, 90; Maik 2007, 98.
[14] The issue of textile imports from the Roman Empire has been widely discussed, but I think the best outline is given in the 'classical' discussion: Jørgensen and Wild 1988, 65–98.
[15] Maik 2007, 97.

likely than the others.[16] The fleece from Polish archaeological textiles corresponds to the fleece from neighbouring regions (especially the southern coast of the North Sea) and the Roman Provinces.[17]

The most common cloth types from Roman period in Poland are z/z tabby and twill, spin-patterned twills and diamond twills z/s. Most of them are made of wool, linens are very rare. It seems that the textile types from Poland belong to one group with similar textiles from Scandinavia and Northern Germany. It is supposed that all archaeological textiles from the Roman Period in Poland were woven on the warp-weighted loom, since no direct proofs of the application of two-beam loom were found. Most of the starting borders were tablet woven.[18]

Based only on the archaeological evidence it is impossible to state whether Barbarians imported textiles from the Roman Empire. However, two kinds of textiles were almost certainly of Roman origin – silks and knotted pile rugs. The latter were found in Pielgrzymów and Zakrzów, but unfortunately got lost during World War II. The same textile type, chronologically related to the Polish finds, was found in Palmyra.[19] Bender Jørgensen distinguishes one of the archaeological textiles 'the Virring type', as a Roman import. In Poland this type is dated to the end of 1st to the middle of 3rd century AD.[20] Her hypothesis is, however, controversial. The Virring type textiles found in Poland[21] were made of fleece of diverse quality, not solely of the finest wool, which Maik names 'Roman'.[22] Moreover, the finest fleece is also found in other textiles of the Wielbark culture, which makes the hypothesis of imported sheep from the Roman Empire more likely than import of ready-made products.[23] The spin direction (mixed for Virring type – z/s or s/z) cannot be a distinctive feature of this textile type either, at least not for Polish textiles. In Pomerania all threads were spun this way from the 1st century AD.[24] What is more, based on the textile finds in grave no. 1 in Leśno, we can assume that local production in Pomerania was of a high quality.[25] The Virring type, though it is very fine and was found in rich graves, cannot from this evidence be called a Roman import. Barbarians, as other examples show, were able to weave very fine textiles. However, this hypothesis does not shatter the possibility of the import. As already mentioned, silks and knotted pile rugs were almost certainly Roman imports.

The major problem, when dealing with Roman period textiles, is how to define an import? There are some conditions which have to be met to call a product an import. First, the raw material and the technology must differ from that of local production;[26] secondly, the absence in a territory of a defined raw material or the product as well as the lack of technology, knowledge or skills to make a product makes import of goods more likely; thirdly, every object considered as an import needs to be carefully investigated to exclude potential imitation or falsification;[27] and lastly, we can recognize an import when we can acknowledge the idea of prestige linked to it, and when the object also fulfils the above-mentioned criteria. However, these are more the conditions *sine qua*

[16] Maik 2007, 103–105.
[17] Maik 1988, 168.
[18] Jørgensen 1991, 91; Maik 1988, 21; 2007, 99.
[19] Maik 1994, 12–13.
[20] Maik 1988, 169.
[21] See example – fig. 1.
[22] Maik 2007, 105.
[23] Maik 2007, 105.
[24] Maik 1988, 170.
[25] Maik 2009, 241.
[26] Maik 1988, 168.
[27] Wielowiejski 1970, s. 30.

non than an exhaustive definition. Therefore, the concept of import is rather blurred and depends on which of above-mentioned conditions would be considered accurate or relevant. Moreover, I think that the criteria of defining imports should be broader in order to make the definition clearer.

The simplest definition of a Roman import is given by Jerzy Wielowiejski: "Roman imports, that is the products of material culture made in various centres of the Roman Empire, which got outside the Roman borders by trade or in different way".[28] It does not, however, reflect the complex nature of a Roman import.

It is reasonable to suppose that at least some part of the imported goods arrived in North-European territory as a result of trade. The question is what could Barbarians give Romans in exchange? The goods in which the Polish territory abounded in the Roman period are almost unknown. Amber was of course appreciated by Romans and we can also suppose that slaves were a precious 'currency',[29] but other goods are better known from later periods (e.g. the Middle Ages) and cannot be compared with the situation of Roman period.[30]

Fortunately, the researcher who would like to investigate exchange between the Roman Empire and *Barbaricum* is not obliged to work with only one category of evidence. Apart from the archaeological material, there are also literary sources. Each of these source types allows us to penetrate different parts of the past and each of them has a methodology of its own which helps to approach the problem in different way.[31] However, there is one important issue related to the literary evidence which is worth stressing at the outset. Today we are obliged to rely on tendentious Roman literature. The Romans were, of course, interested in the land outside their territory which is best proven by the works of Tacitus or Pliny the Elder. However, their knowledge was rather limited and often inaccurate. What is more, Romans named rivers, mountains, plains etc. differently than we do nowadays, so there are some severe problems in locating tribes and geographical territories mentioned in their works.[32]

Potential textile exchange between the Roman Empire and *Barbaricum* was determined by political and military actions of both sides. First of all, the presence of the Roman army stationed along the *limes* meant an increased demand for certain products. Roman soldiers presumably bought commodities for most immediate needs in the neighbourhood[33] and that could include clothes. It seems that the state which supplied the legions with food, drink and clothes bought the textiles,[34] which were known for their quality (like Gallic *sagum*) from Barbarians.[35] However, there are at least two examples that demonstrate the army could also purchase textiles from distant places:

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[28] Wielowiejski 1970, 29 (translated by Z. Kaczmarek).

[29] The old German word *mangon*, which meant merchant is derived from Latin word for a slave trader – *mango*, *mangonis* (Brogan 1936, 219).

[30] Kolendo 1998a, 30, Wielowiejski 1981b, 404.

[31] Kolendo 1998a, 29.

[32] E.g. a discussion on locating four rivers mentioned in Ptolemy's *Geography* East from the mouth of Vistula – Chronos, Rudon, Turuntos, Chesinos – which were commonly identified by researchers with Pergolya, Neman, Venta or Pärnau, Daugava or Aa, which identifications are still controversial – the best outline of this discussion is given by Kolendo 1998c, 117–130.

[33] Kolendo 1981, 454.

[34] Tacitus claims that Roman soldiers bought clothes themselves (at least during the reign of the Iuliano-Claudian dynasty), although this information may be exaggerated, because it is put in the mouth of Percennius who was trying to provoke the legions to a rebellion (Tac., *Ann*. 1.17–18).

[35] Jørgensen 1991, 130.

e.g. a receipt dated AD 128[36] and an order dated 138 AD[37] for payment in advance for clothes that were delivered to the army stationed in Judea and Cappadocia from Egypt. Nevertheless, these two examples cannot be representative for all Roman provinces. They imply that the textile industry in Judea and Cappadocia had only little surplus capacity and could not provide extra services for the army.[38] This certainly cannot be stated for the provinces of Gallia and Germania, because we know from different literary sources that the textile industry there was flourishing. Anyway, those who benefited mostly from trade with Roman army were the Barbarians who lived nearest to the *limes*. Those living further north did not have that many opportunities to have contact with Roman culture and they were more dependent on the activities and policies of the Romans and other Barbarians.

It is safe to assume that trade between the Romans and the Barbarians was more intense and more frequent in the territories which adjoined the Roman *limes*. Trade or exchange with those tribes living further north was rare and therefore more likely to have been wholesale in character. This would explain the richer coin hoards found in the north than in the south of Europe – more money got to the northern *Barbaricum* on a one-off basis.[39] This hypothesis can also be supported by the fact that denominations smaller than the *as* are rarely found in the northern provinces,[40] which could mean that the transactions demanding larger sums of money were the most popular. What is more, the inscriptions found in the shop-cellars of Magdalensberg, a market-place in Noricum, which are a kind of book-keeping of local merchants, note not only the names of trading-partners, some of them coming from distant territories, but also the types of goods which were sold in this trade-place with amounts and weights. These book-keeping inscriptions show that the goods were sold mainly in large quantities and that some of the clients came to Magdlanesberg more than once.[41] We can assume that those who came once a year to trade in Magdalensberg were interested in taking large quantities of goods to make such a long journey profitable. Also, it seems that the journey so far north took time and was risky, so was undertaken rather rarely.

Another aspect – Roman foreign policy – could make exchange easier in the time of peace or more difficult in the time of war. Treaties with Barbarians were followed by an exchange of gifts. When Romans fought against the Barbarians there were no conditions for the proper exchange and war often prevented other tribes, also the ones who did not fight against the Romans, from trading with them. Temporary blockades of trade routes, the enclosing of Roman towns and fortresses or the difficulty with other Barbarians' intermediation all hamper trade. Moreover, there is a huge difference between Roman relations with Barbarians in the 1st to the 3rd centuries AD and the later period. At the beginning of mutual contacts, it was the Romans who had advantage over the Barbarians, after the 3rd century the situation changed dramatically. The Barbarians managed to penetrate the *limes* and even defeat their southern neighbours in battle.

It was not only Roman foreign policy which played an important role in exchange. Kolendo suspects that most of the products of Roman provenance came into the territory of Poland as a result of complicated redistribution of goods between the Barbarians themselves. He gives the examples

[36] *P. Ryl*. 189.
[37] *BGU* 1564.
[38] Jones 1960, 186–187.
[39] Godłowski 1965, 57; Wielowiejski 1970, 138.
[40] Crawford 1970, 45.
[41] Alföldy 1974, 73–74.

of gifts, spoils or dowry.[42] Kolendo notices that the analysis of different import types can give an idea of how the goods left the borders of Roman Empire. For example, fragile ceramics or glass must have been carefully wrapped by an experienced trader so that they would not be destroyed during transport.[43] In the world which did not know plastic or paper, textiles could be used as wrappings. However, very fine textiles, like the ones we find in graves of the Roman period, are unlikely to have been used as wrappings. If they were truly an import, they came to the North in less incidental ways.

We can identify some sense of Roman policy because it was of importance to the Roman writers. The Barbarians remain mute, a great obstacle in any survey, but especially in analyzing the contacts of the Roman Empire and the Barbarians living further north of the *limes*, like those living in the territory of modern Poland. However, some Roman writers succeeded in mentioning some of the events that had taken place in the far north.[44] Strabo[45] mentions that Marbodus conquered the Lugii[46] living in the territory of Southern and Middle Poland. His kingdom was destroyed when a group of Goths, another people living in Pomerania, attacked and robbed the capital. Kolendo suggests that the stolen goods could then have been taken back to Poland.[47] We also learn of the Polish territory from Pliny's report of a Roman *equitus* who undertook an expedition to the north in search of amber. We know he succeeded in his mission because he brought back such a large amount of amber that Nero could interweave it into nets which were used during gladiators' fights.[48]

More interesting information is given by Tacitus' in the *Annals*. He mentions that the fall of Vannius was brought about by an attack of the Lugii, who wanted to aquire Roman goods, which were then redistributed by the king.[49] However, when analyzing this information one should be very careful. Tacitus, as a Roman citizen, could not understand the true reasons for the attack (although he mentions that Vannius was hated by the neighbouring people because of his pride). He might have suspected that the Roman imports were the reason, because in his mind Roman culture (and its material equivalents) were worth fighting for. The fourth mention of the Lugii in literary sources provides the only information of direct contacts between the Roman Empire and people living in the territory of modern Poland. Cassius Dio writes that Domitian sent 100 horsemen to help the Lugii in their fight against Svebian tribes.[50]

The last great event which influenced the north before the so-called "Third Century Crisis" were The Marcomanic wars.[51] They marked the beginning of the great movements of *superiores barbari*, the movements which caused the decline of the Empire in later periods. During these wars, the Roman provinces of Noricum and Pannonia were destroyed and never fully rebuilt. The Marcomanic wars influenced Roman contacts with the Polish territory mainly because it seems that these two provinces (Noricum and Pannonia) were the main conduit by which Roman imports reached Poland.[52]

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[42] Kolendo 1998a, 32.
[43] Kolendo 1998a, 32; see also Godłowski 1965, 59.
[44] Kolendo 1998a, 35–36.
[45] Strabo, 7.1.3.
[46] See map.
[47] Kolendo 1998a, 35.
[48] Plin., *Nat. His.*, 37.45.
[49] Tac. Ann., XII.29–30.
[50] Cass. Dio LXVII.5.2; Kolendo 1998a, 35; Wielowiejski 1981a, 48.
[51] E.g. *SHA*, *MA*,13–14.
[52] Wielowiejski 1970, 15.

However, in the 3rd century AD the Polish territory witnessed a great change – the German tribes were being pushed southwards and the Slavs were slowly replacing the former inhabitants of these lands. Also in this period, the dominant role of trade in the inflow of Roman imports is replaced by the imports coming from banditry and wars. It is also the period of great changes in the Roman Empire. Barbarians started to settle inside the Roman territory and to join the army, and by the end of 4th century AD the defence of the Rhine line was totally in their hands.[53]

After the events of the 3rd century, the Roman Empire changed dramatically. The centre of the state was moved eastwards to Constantinople. Roman policy towards Barbarians also changed, since Barbarians gradually gained influence over a weakened Rome. Considering this shift in terms of exchange, we can also note that eastern trade routes became more significant, e.g. the Pontiac route along the Dniester. From this period we also find more imports of Eastern provenance, like knotted pile rugs.

Roman literary sources on textile production and trade have been discussed elsewhere.[54] That is why, in this chapter, I focus on those texts which do not speak explicitly about textiles, but present the political history of the Roman Empire and *Barbaricum*. They cannot answer the question whether the Virring type was a Roman import or not, or answer questions about Roman weaving technology. They can, however, indicate those periods in which textile exchange was possible, stimulated or blocked. When we compare these periods with the chronology of textile finds we get an idea about the possibility of exchange.

Moreover, the careful analysis of literary sources which mention textile production makes one wonder whether the Roman authors really knew anything or cared about textile production and trade. We can read about sheep breeding, banned trousers, barbarian clothes, textile contests (like the one between Archne and Minerva described in Ovid's *Metamorphoses*[55]) or market places (where we can only suppose that textiles were sold). These texts, however interesting, cannot help in answering the question of Roman textile exports to *Barbaricum*. I believe that they are not appropriate means to solve this problem. Although it is very tempting to support archaeological evidence with Pliny's *Natural History* or Diocletian's Price Edict, one should remember that those sources have their limitations. The limitation in the literary sources such as Pliny's *Natural History* consists in the fact that these authors did not practice any craft, because it was forbidden by Roman tradition for the male aristocracy to engage in manual labour. Roman writers only knew textile production from observation and their descriptions show that they very often did not understand the process they observed.[56] Of course, textile craft was the domain of women, it was considered to be noble work for aristocratic wives and daughters,[57] but Roman women did not leave any written evidence of their work (or at least any we know of).

Diocletian's Price Edict, although it mentions over 150 textile types, is very problematic. First of all, we do not know whether it was ever enforced. The severe penalties for those who do not observe these laws (the death penalty) indicates the problems which legislators had in enforcing their edicts. What is more, the comparison of the prices between ready-made products and raw materials shows that the producer got very little remuneration for his work. Probably the ready-

[53] Kolendo 1998b, 19–23.
[54] E.g. Wild 2000.
[55] Ovid. *Met*. 6.1–146.
[56] Wild 2000, 211.
[57] See for example: Liv., 1.57.

made products were more a kind of taxation (like the *annona* in the 3rd century) to support the Roman army. This means that the prices in the Edict were not addressed to civilians, but to the producers who supplied the Roman army.[58] Moreover, we are not able to match archaeological textiles to textiles' names given in the Edict. The latter problem refers to all written sources, since very often we do not know what a specific word means. We are not able to trace the semantic shift which could appear with technological changes.[59] It would be unprofessional to try to reconstruct the textile production on such a frail basis.[60]

However, when comparing the chronology of an archaeological object of certain Roman provenance with the information about Roman and Barbarians' policy in written sources, we can note that there are the specific periods in Roman history which influenced the inflow of Roman imports into *Barbaricum*, i.e. Polish territory. The first of these periods was the 'Czech' one, dated to the reigns of Augustus and Tiberius (early 1st century AD). During this period Roman imports came into the territory of modern Poland via the Marobodus' kingdom, which, as mentioned above, conquered the Lugii. Some of the imports might also have been brought back by Goths who destroyed the capital of the Marcomans. Afterwards, the amber gained significance.[61] Another phase, 'Slovakian', is related to the existence of *Regnum Vannianum* and its beginning is dated to the middle of the 1st century AD. It lasted a little longer than the Vannius kingdom, it stretched up to the Marcomanic wars (166–180 AD). The long duration of this phase is probably the result of the redistribution of Roman imports, first by Vannius and then by the Lugii. In this period we note the highest number of Roman imports, which is also true for the inflow of Roman coins.[62] During the Marcomanic wars there is a significant reduction in the number of Roman imports from the Danubian provinces. Moreover, it seems that this situation was used by the merchants from the Western provinces who came into Pomerania by sea, via Scandinavian waters.[63] It seems that neither the expedition of the Roman *equitus* nor the help for the Lugii sent by Domitian influenced the inflow of Roman imports. The possible explanation of this fact is that these events were too short-lived to leave their mark in the archaeological evidence.

Applying the method of combining archaeological material and Roman literary sources in textile analysis is more problematic, but not impossible. It seems that the easiest and cheapest[64] way of transporting textiles is by water. Roman iconography, like the Igel monument, showing the floating of textiles in a kind of a raft, suggests that this kind of transportation was also practised in antiquity.[65] The emphasis put on the depiction of transport both by water and by land can be explained by the fact that the Secundinii of Igel sold their textiles outside the local market.[66] These scenes stress not only the importance of water transport for wholesale trade, but also a wide network of trade connections in Roman Gaul.[67] We encounter the Gallic textile export in different literary sources, Diocletian's Price Edict to mention just one. When we compare this with information about Roman

[58] Barańscy and Janiszewski 2007, 17.
[59] Wild 2000, 209.
[60] Jones 1960, 183.
[61] Wielowiejski 1981b, 399.
[62] Wielowiejski 1981b, 399; Kunisz 1969, 60, 63.
[63] Kolendo 1981, 465; Wielowiejski 1981b, 399.
[64] Comparing the prices in Diocletian's Price Edict – chapters 17.1 and 37.
[65] Drinkwater 1982, 123–124.
[66] Drinkwater 1982, 116.
[67] Young 2000, 227.

policy and trade routes, we note that there is one period, during Marcomanic wars and later, when the sea route via Scandinavia gained significance. It is then possible that textiles woven in Gallia were floated by the river Rhine to the North Sea and then transported to the Polish coast by ship. This would support Bender Jørgensen's argument that the Virring type textile was of Gallic origin.[68] Comparative studies on imports found in northern and southern Poland show that in Pomerania there is a greater percentage of precious imports, such as metal vases, which could mean that this region was more interested in luxury goods.[69] This fact can also be an argument for the Roman origin of the Virring type, which is considered a high-quality, luxury textile.

One must be aware of the complexity of textile production, especially when considering production for export. It consisted of many different crafts and demanded various skills from sheep breeding or plant growing to fulling. It demanded a certain space not only for farm works or setting the loom, but also for the storage of raw materials and finished products. It was a complex chain of processes which needed very good organisation to be efficient. However, Roman commerce seems to be very professional, a quality which also applies to the textile trade.[70]

From the end of the Flavian period (i.e. the end of Domitian's war against Chatti *c.* 85 AD), it was safe to bring goods along the river Rhine.[71] The Virring type found in Poland dates to the end of 1st century, as mentioned above. By mid-3rd century such textiles are starting to disappear, that is at a time when several usurpations in Gallia and in Germania Inferior are disturbing the peace. The historical data fit the archaeological evidence in this instance.[72] This means that from the historical point of view importing the Virring type textiles from the provinces of the Roman Empire was possible due to the specific conditions which existed in the period to which these textiles are dated. However, it would be necessary to check whether the most intense inflow of the Virring type can be dated to the end of the 2nd century, when the sea route is gaining in significance.[73] Dispersion of other types of Roman imports show that they are mainly found in the regions near to the main trade and communication routes.[74] That would be the case of Pomerania, especially in the time when the sea route was the most frequently used.

I am well aware of the limitations of this method when applied to the archaeological textiles. For example, due to the specific preservation environment, we cannot be sure that any of the textile assemblages we have is representative of the Roman period. Moreover, the historical method cannot be the only distinctive condition for Roman imports. However, my goal was not to answer the question of whether the Barbarians imported textiles from the Roman Empire. I wanted to demonstrate that by combing archaeological evidence with written sources we can get closer to answering the question of whether such import was possible. Literary evidence does not undermine the technological reservation mentioned above. However, historical sources when compared to archaeological data highlight that the Virring type textiles are likely to have been imported into the Polish territory from the Roman Empire.

[68] E.g. Jørgensen and Wild 1988, 71.
[69] Godłowski 1965, 57.
[70] Drinkwater 1982, 113–114, 116.
[71] Królczyk 2010, 61.
[72] See for example: Majewski 1946, 186–187.
[73] Olwen Brogan claims that in the 2nd century AD objects of Rhenish and Gallic provenance started to enter the market in Pomerania, inhabited at this time by Rugii. Although his theses seem to emphasise the significance of the sea-route, they are scarcely supported by the archaeological material (Brogans 1936, 201; Wielowiejski 1970, 284–285).
[74] Kolendo 1981, 459.

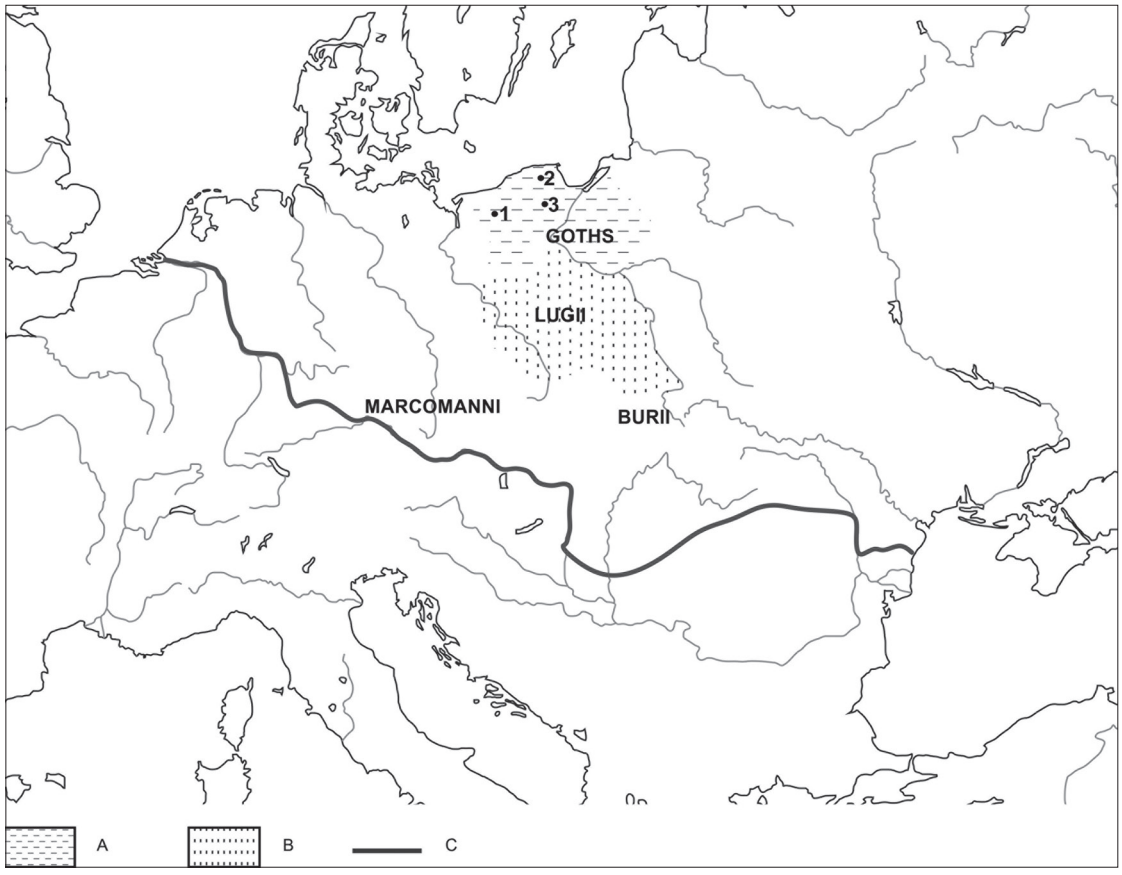

Fig. 16.1 The Roman period in Poland , the end of the 2nd century AD (drawn by Ł. Kaczmarek): Archaeological Cultures: A – Wielbark Culture, B – Przeworsk Culture, C – the Roman limes, Archeological Sites: 1 – Gronowo, 2 – Lubowidz, 3 – Odry.

Fig. 16.2 Gronowo, Drawsko Pomorskie County (powiat), West Pomeranian Voivodeship, barrow 3, grave 2, the Virring type textile (Photo by and courtesy of J. Maik).

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[75] In brackets I give English or German equivalents of Polish titles to facilitate non-Polish readers following quoted works.

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17. The Multiple Functions and Lives of a Textile: the reuse of a garment

Ines Bogensperger

This green fabric with its remarkable decoration shows signs of wear and tear, areas of decomposition as well as repair. All together these are signs which clearly indicate a long period of use and reuse. A close study was undertaken to investigate technical, iconographical, and functional aspects with astonishing results. Examining some special features will encourage further discussion in textile research, while deeper investigations will amplify the present findings and occasionally correct them.

The Department of Papyri of the Austrian National Library in Vienna holds a small collection of approximately 300 textiles which originate from the late antique and early Arabic period of Egypt. The textile investigated here (inv. *P. Vindob*. Stoff 256) is the largest fragment in the Department of Papyri, however it has not been published so far. This chapter will present some preliminary results: a description of its present condition with technical details and an investigation into the question of its original function.

Like many collections of so called "Coptic textiles", in Vienna we face a similar problem: the lack of information about provenance and archaeological context of these objects. The only sources of information left are the textiles themselves.

The piece in question is stained, shows holes and large areas of decomposition and is completely torn on one side. In brief, it is badly preserved. It has been sewn and mended with patches. No dye analysis has yet been undertaken, so this specific question will be considered on another occasion. As there is no tangible evidence yet for the use of real purple, the term purple-coloured is used here.

It is the green colour of the ground weave and the purple-coloured ornaments which attract immediate attention. The lower edge consists of one selvedge with fringes alternating between green and purple-coloured (Fig. 17.1). The change of the colours depends on the use of the weft of the ground and tapestry weave. On both sides fabric edges can be found, on the right side additional fringes are preserved but this time in red. Along both edges a small band of pale yellow colour passes through the fabric.

The layout of the decoration

Apart from the fringes, which are preserved on two sides, the decoration consists of two round ornaments, the so-called *orbiculi*, as well as bands, *clavi*. Both of the *orbiculi* are poorly preserved.

Fig. 17.1 P. Vindob. *Stoff 256 in present (non-conserved) condition © Austrian National Library.*

Their surface is abraded and their decorative pattern can only be seen wholly on some parts. There are several holes and tears; the area next to the left *orbiculus* has been mended with a patch of green fabric. No care was taken and the green patch runs through the red and purple-coloured decoration. This is also true for the *clavi* which show the same marks of use. They were decorated with a complex pattern of geometric ornaments. However, on the right *clavus* two additional figures can be determined. Their outlines are poorly preserved therefore they can only be identified as quadrupeds. The animal on top is even sewn together with other layers of the fabric. This shows once again the poor condition of the piece.

No figures are preserved on the left *clavus*. On the contrary two patches were placed and mended on the original outline of the original *clavus*. The patches match the colour, but, they show a different geometric ornament. Exceptional care has been taken to adjust the patches to the *clavus* and the green ground weave.

Iconography

The design consists of an interlace pattern forming bands and stylized rosettes. The pattern repeats itself endlessly except for two animal figures on the right *clavus*, the only figurative decoration on the textile. The interlace pattern appears on the earliest preserved late antique textiles from Egypt.[1] These were mainly woven from linen with purple-coloured ornaments in wool. In time the textiles became famous for depicting scenes with various figures. Many fragments illustrate animals such as dogs, hares or lions often in movement. With the arrival of the Arabs the way to dress in tunics, wraps and mantles remained, but a change in taste, that is, style and themes can be noted. Geometric patterns appear on several tunics.[2] The reason behind was probably the restriction of depicting human figures by Islamic teaching and design thus displayed more

[1] E.g. Pritchard 2006, 54–55 fig. 4.4 (b) and fig. 4.4 (c).
[2] It has to be noted that tunics depicting figurative scenes still continued alongside non-figurative; e.g. Pritchard 2006, 95.

and more non-figurative ornaments.[3] Animals, however, were not unknown in art; the hare for instance represents a motif which can be found from the beginning of Egyptian art to the Middle Ages.[4]

As far as this fragment is concerned it is the overall use of wool and especially the green dye which indicates a later dating within the large group of late antique textiles from Egypt.[5] The style of patterning recalls the textile finds which are attributed to 3rd–4th/5th century AD, however the colours used became stronger over time.[6]

Fig. 17.2 Within the interlace pattern two animals (quadrupeds) are preserved. © Ines Bogensperger.

Technical description

The fabric was made entirely of wool. The maximum dimensions in its present, non-conserved, condition are:

length: 64.1 cm
width: 1 48.4 cm

ORBICULI:
left: 15 × 16 cm right: 16.2 × 16.5 cm

CLAVI:
width of the clavi: left: 20.2 cm right: 19 cm
distance between the clavi: 30.5 cm

FRINGES: Z-plied from two s-spun threads
length of the red fringes: up to 10 cm
length of the selvedge-fringes: approx. 5 cm

The GROUND WEAVE is executed in weft-faced tabby:
warp: wool, dyed, s-spun, approx. 8 – 9 threads/cm
weft: wool, dyed, s-spun, approx. 24 – 31 threads/cm

The ratio of warp to weft is approximately 1: 3; i.e. there are three times as many picks per centimetre than ends.

SEWING THREADS: as there were several types of sewing threads used, it seems likely that there were several stages of mending involved during the use of the fabric. All sewing threads are Z-plied of two s-spun yarns, made of wool and dyed. The angle of twist of the various types is different and the colours vary from green, purple-coloured to red.

[3] Granger-Taylor 1993, 20.
[4] Von Wilckens 1991, 37. 120.
[5] A radiocarbon dating of the piece in question is desirable for obtaining more reliable results.
[6] Granger-Taylor 1993, 15 and 20; for an example see Schrenk 2004, 358–360 cat. no. 171 and 359; Pritchard 2006, 50.

The decoration is made in tapestry technique which was woven into the ground fabric when the textile was made. The elaborate geometric pattern was worked out with flying thread and soumak.

The selvedge was re-enforced with four warp ends grouped together. This seems to be the prevalent method around the Mediterranean.[7] The fringes at the selvedge are made of the weft picks of the respective part and vary therefore between green and purple-coloured. They were worked from the reverse side of the textile which means that the loom had to be accessible from both sides. Astonishingly two threads dyed in red and yellow are preserved in the green fabric (Fig. 17.4). Probably these represent weavers' marks used during the production of the fabric. One is located on a patch which does not give any evidence as to its original disposition. The second is found on the patch with the two bands. Possibly it could have served as an indication of their midpoint.

The left edge originally formed the starting border on the loom. First a red band was woven. This colour is completely different to the purple-coloured parts which could be considered as a peculiar taste of its owner. The very same applies for the other edge, the finishing border: a red band decorates the end, but this time inserted fringes in red are preserved. Despite close examination of the starting border no tangible evidence for fringes on that edge has been ascertained so far. Only a line of stitches can be seen but their function cannot be assigned definitely.

The other edge represents the finishing border made by plying the warp threads and twisting them together in the opposite direction in order to form a cord. This method seems to be very commonly used in late antique textiles.[8]

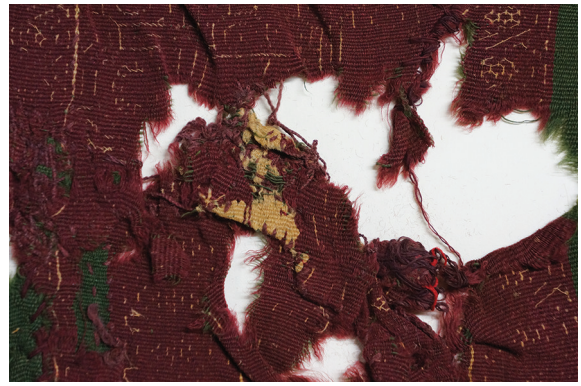

Fig. 17.3 Several sewing threads can be recognized. Here a detailed view of the partly preserved animal of the right clavus. © *Ines Bogensperger.*

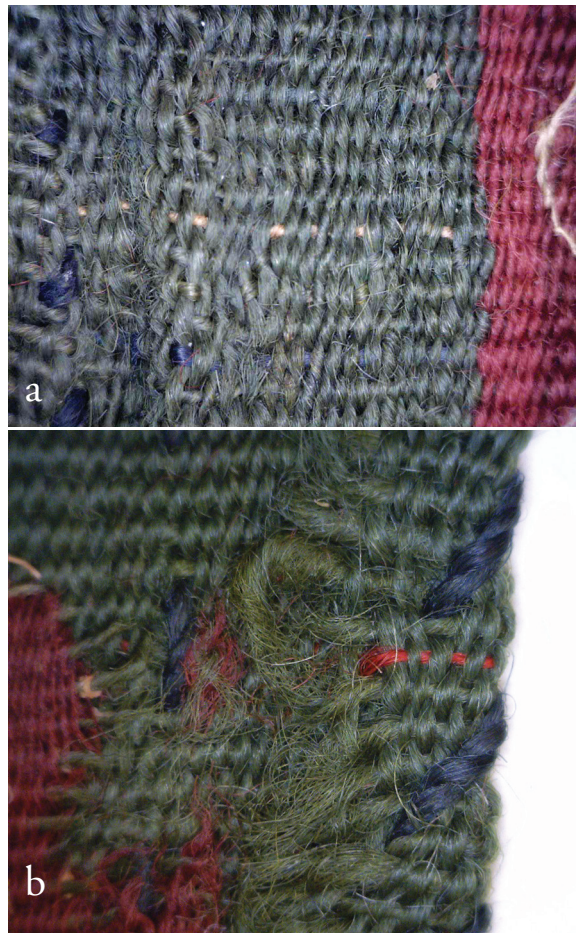

Fig. 17.4 a–b Two marks (dyed threads) by the weavers have been preserved. © Ines Bogensperger.

[7] Wild 1994, 18.
[8] Verhecken-Lammens 1994, 81.

Fig. 17.5 Starting border. © Ines Bogensperger.

Fig. 17.6 Finishing border. © Ines Bogensperger.

Several traces of repair can be identified. The textile was mended and darned in multiple stages and different working methods can be seen. Generally the colour of the sewing thread used matches well with the colour of the fabric. Repairing was done in the form of darning, that is repairing with needle and thread, and in the form of adding an additional piece of cloth, patching. In total seven patches can be counted on the fabric. These patches correspond in terms of technique and quality to the damaged fabric. The stitches used are fairly constant throughout the textile: running and overcast stitch. The raw edges of the patches and the fabric were folded in order to prevent unravelling. The quality of repairs seems carefully done as even some fringes were replaced (Figs 17.8–17.9).

A look at the reverse throws some light on the weavers' work and procedure. Quite unusually and unique within the collection of the Department of Papyri a cord can be seen around one half of each *orbiculus* (Fig. 17.10). Both cords are made of the green picks of the ground weave which are not required for the purple-coloured *orbiculi*.

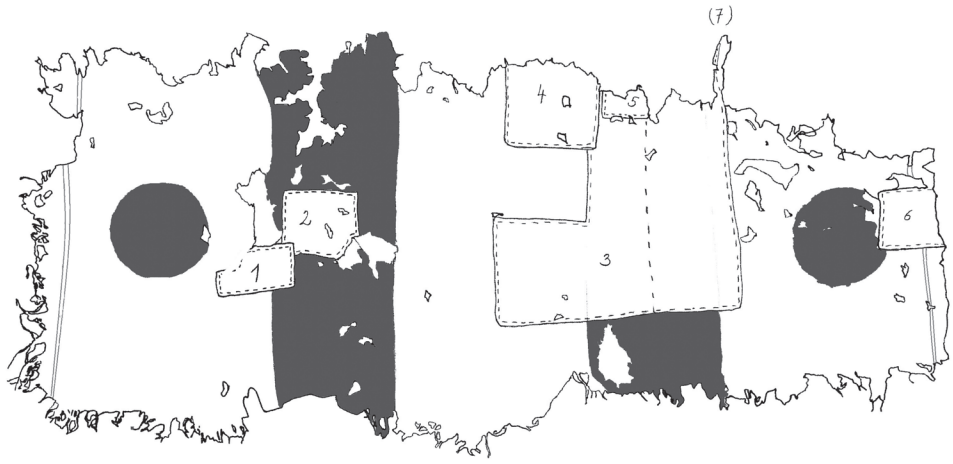

Fig. 17.7 This drawing shows the position of the patches. Of the seventh only some fragments are preserved. © Ines Bogensperger.

Fig. 17.8 Darning of a hole (detail of finishing border). © Ines Bogensperger.

Fig. 17.9 Even the selvedge-fringes were repaired (detail of selvedge). © Ines Bogensperger.

Fig. 17.10 Reverse of P. Vindob. *Stoff 256. © Austrian National Library.*

The weft threads have neither been left floating on the reverse nor been returned. Apparently the ground weave was made up first to the area where the *orbiculus* was supposed to be woven in. Within this area the weavers did not interlace the green weft threads with the warp. The threads were not left floating on the back but twisted into a cord. Approximately when half of the outer form of the *orbiculus* was finished, the *orbiculus* was woven into the fabric. Additionally, the borders as well as the two sides were executed in green. Then the weft of the ground weave was inserted, and for the second half, the threads were returned next to the *orbiclus'* area.

In the Department of Papyri a similar weaving procedure can be observed on several pieces. Usually the cut-through threads are hanging loose on the reverse. This textile, however, shows a more elaborate technique by twisting the threads to a cord.

Primary function

The fabric in its present condition is apparently not the fabric in its primary use. The question is what was it used for? Several considerations lead to one conclusion: first the decoration consists of *orbiculi* on the outer part and *clavi* on the inner part; second, the left *clavus* was repaired with two smaller bands, each of them is 10.5 cm wide. These two bands were not cut apart, but belong together to the same part of a fabric as one can see on the reverse; three edges are preserved, two of them with fringes.

Considering all the evidence we can assume the textile belongs to the lower part of a tunic. Apparently the two smaller bands formed the cuff-bands on the tunic's sleeves (*manicae*). At some point these cuff-bands from the sleeve were used for mending when the textile no longer served as garment. The weavers' marks – as described above – could have indicated the midpoint of the sleeve. Assuming a woven-to-shape tunic they also define the midpoint of the garment. The mending and darning caused the fabric to become twisted and contorted. Therefore in its second function there was no obvious need to be perfectly regular, however the repairs do show a certain care was taken. The different stages of repair suggest that in its life the fabric was mended again until it was finally used for funerary practice.

Fig. 17.11 Reverse of the left clavus*, detail. © Austrian National Library.*

The textile evidence – comparative material

Some green tunics with similar features are preserved in other collections, but no identical garment has been found so far. Among these, one distinctive garment can be identified: a woven-to-shape tunic from the cemetery at el-Lahun in the Fayum which is nowadays preserved in the Whitworth Art Gallery in Manchester.[9] The decoration is comparable although there are no ornaments on its shoulders or at knee-height. Additional decorative bands were sewn onto the hem and neck. The tunic was made entirely of wool which explains its significant weight. It has been radiocarbon dated to between AD 650–770. An identical piece of this tunic is located

[9] Whitworth Art Gallery, Manchester, inv. T. 8359; Pritchard 2006, 83–87 fig. 1.5.

Fig. 17.12 Possible reconstruction of P. Vindob. *Stoff 256. © Christian Moisl.*

in the Victoria and Albert Museum in London.[10] The decoration is based on geometric patterning without any figural depiction.

A child's tunic dated between AD 430–620 in the Metropolitan Museum of Art in New York presents an equally good comparison for the original look.[11] This tunic in particular is decorated with fringes on the edges and on the cuffs. A hood showing fringes and two *orbiculi* served as headgear for the child. The *clavi* are full-length and show stylized figures. Despite some modifications the original appearance of the green tunic in the Department of Papyri could have been similar.

Reconstruction

The tunic is not preserved in all its details. Considering other clothes from the period after the Arab Conquest of Egypt a full reconstruction was made as a graphic illustration filling out the missing elements. It shows a woven-to-shape tunic in adult size. The garment is decorated with full-length *clavi* and *orbiculi* on its shoulders and at the bottom. On both edges fringes in red were added. The layout of the decoration is traditionally symmetrical, this applies as well for the reverse side.

Such a garment was worn over other layers of clothing and is identified as overtunic, in which the wearer had the opportunity to show his taste and style. This custom of wearing more layers can be seen since Antiquity and continued through the Middle Ages.[12] Its width is rather broad and when being worn it possibly would have draped over the person's shoulders in folds. This style is typical for the tunics preserved from the Arab period.[13] In addition it should be noted that green as a colour was worn by the Prophet Muhammad beside white, black and red.[14]

[10] Victoria and Albert Museum, London, inv. 409–1890; Kendrick 1921, 23 cat. no. 337 Pl. 16.
[11] Metropolitan Museum of Art, New York, inv. 27.238; see <http://www.metmuseum.org/collections/search-the-collections/140005429?img=0> (accessed 13.07.2012) and Evans and Ratliff 2012, 169 cat. no. 111.
[12] Stillman 2000, 12.
[13] Pritchard 2006, 87.
[14] Stillman 2000, 24.

Second-hand clothes in written sources

In times when textiles were regarded as precious goods it seems almost self-evident that they were worn and repaired for a long period of time.[15] Dealers and traders of second-hand articles are well known in ancient written sources as *grutopôlai* and *scrutari*.[16] In the textile industry usually a *collegium* named *centonarii* was associated with making and dealing with used fabrics.[17] They are attested from the late Roman Republic/Augustan era till the end of the 4th century AD, particularly numerous for Gaul as well as Northern and Central Italy.[18] Recent research gives a more detailed perception of this specific group. According to Jinyu Liu the *collegia centonariorum* formed an association of manufacturers and tradesmen of heavy, coarse and utilitarian woollen products.[19] These include all sorts of fabrics for all kinds of use in daily life. The idea "that centonarii were also involved in collecting, mending, reusing, and reselling second hand textiles" additionally seems quite plausible.[20]

Repairing textiles and reusing them was taken for granted considering the labour intensive production from cultivation of plants, sheep breeding, spinning to weaving. In household accounts from Oxyrhynchos mentioned in *P.Oxy*. IV 736 = *Pap. Sel*. I 186 we find a cloak (*phainóles*) being initially acquired for 10 drachmae which was most likely the same item repaired later for 1½ obols.[21] Used textiles were employed for burials as evidenced by the material finds of late antique funerary textiles from Egypt where mending is observed in many cases.[22] SPP XXII 56 provides a list with funerary expenses for diverse goods. Among them 24 *obols* are listed for an old garment.[23] Generally written records attest the circulation of used textiles in Antiquity. As far as the textile of the Department of the Papyri is concerned we have no tangible indication whether the repairs were done in a private household or by professional craftsmen. For now, this question has to remain unanswered.

Conclusion

The textile *P. Vindob*. Stoff 256 does not belong to the rare examples of well preserved tunics from the first millennium AD. However it illustrates clearly that it had multiple functions during its long life span: originally designed and worn as a garment then as a textile which was mended and darned in several stages. Finally it was used – we cannot determine as to what function exactly – in a burial context for the deceased and thereby preserved due to climatic circumstances. Now the textile serves as an object of science resting in a collection and museum, probably the last of its many functions and 'lives'.

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[15] The value of textiles can be seen on the matrimonial agreement in *CPR* I 30, Fr. II = *M. Chr.* 290. This scroll is generally dated to the 6th–7th century AD. For a new edition see Mitthof 2009.

[16] E.g. *BGU* I 9 = *Chrest. Wilck* 293 dated *c*. 276 from the Arsinoites which is part of a tax list for trade and commerce. In line 12 the heading κρυτοπωλῶν (l. γρυτοπωλῶν) is followed by the names and the respective amount of tax to be paid. That *grutopolai* and *scrutari* are synonymously used can be seen on a bilingual inscription at Cos, under the reign of Augustus. See Maiuri 1925, 168 nr. 466.

[17] Forbes 1956, 233–234.

[18] Forbes 1956, 233; Liu 2009, 29–30. 54.

[19] Liu 2009, 69–70. Liu addresses the question of the function, origins and status of the *collegia centonariorum*.

[20] Liu 2009, 70.

[21] *P.Oxy*. IV 736 line 4 and 10.

[22] Hodak 2010, 19; Fluck *et al*. 2000, 13; Mannering 2006, 153.

[23] *SPP* XXII 56 line 18: παλαιοῦ κιθῶν(ος). This list is dated to the 2th–3th century AD from Soknopaiu Nesos, Arsinoites.

Acknowledgments

I would like to thank Marie-Louise Nosch and Mary Harlow for offering me the opportunity to contribute a paper. Furthermore I would like to acknowledge my gratitude to Pilar Borrego, Ana Cabrera, Martina Dax, Hans Förster, Julia Galiker, Karina Grömer, Alexandra Jesenko, Christian Moisl, Helga Rösel-Mautendorfer, Angela Völker and Miriam Ali de Unzaga with who I had many fruitful and helpful discussions. My special thanks go to an anonymous whom gave me the inspiration.

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18. Discovering Late Antique Textiles in the Public Collections in Spain: an interdisciplinary research project

Laura Rodríguez Peinado, Ana Cabrera Lafuente, Enrique Parra Crego and Luis Turell Coll

The textiles preserved in Spanish museums and collections have been the focus of intensive research since the 1980s. The development of textile restoration techniques and the increase of interdisciplinary studies, have given a new impetus to this field, specially thanks to the development of the scientific analysis of raw materials and weaving techniques.

A good example of the research conducted on this area are the multiple studies that have been published on topics such as the funerary paraphernalia of Archbishop Ximénez de Rada from the 13th century;[1] the study of Coptic Textiles in the collections of various museums in Madrid;[2] the catalogues of the collections of Egyptian to Medieval Textiles located at the Centre de Documentació i Museu Textil de Terrassa (Barcelona);[3] and the catalogues of textiles and carpets of the Museum of the Alhambra in Granada.[4]

The development of interdisciplinary studies has allowed scholars to gather a large amount of data that has given new light on the knowledge of these fabrics, especially those without a documented context, as the Late Antique textiles from Egypt. In the summary of Thelma Thomas on the state of the question,[5] she mentions that there are around 150,000 fragments in the existing collections. In the Spanish ones no more than a thousand fragments, of which over three hundred remain mostly unpublished[6] (Table 18.1), have been systematically analysed by an interdisciplinary team[7] in light of the new methodologies of study which have been made

[1] Mantilla de los Ríos *et al.* 1995.
[2] Rodríguez Peinado 1999; Rodríguez Peinado 2001 (1); Rodríguez Peinado 2001 (2); Rodríguez Peinado 2002.
[3] Morral i Romeu 1999.
[4] Cabrera 1997.
[5] Thomas 2008, 137.
[6] The collections published are Museo Nacional de Artes Decorativas, Madrid (MNAD) (Rodríguez Peinado 2001 (1); Rodríguez Peinado 2001 (2); Rodríguez Peinado 2002; Cabrera and Rodríguez 2007); Museo Arqueológico Nacional, Madrid (MAN) (Rodríguez Peinado 1999; Rodríguez Peinado 2001 (1)); Museu d'Història de Sabadell, Barcelona (MHS) (Rodríguez Peinado 1994; Bargalló *et al*. 2008) and Museo Nacional de Cerámica y Artes Suntuarias González Martí, Valencia (MNCV) (Rodríguez Peinado and Cabrera Lafuente 2008). The collections Museu Episcopal de Vic, Barcelona (MEV) and Museu del Monasteri de Montserrat, Barcelona (MOBM) have been reported in Masdeu and Morata 2008; Turell 2004; Turell 2008. The collections Museu Tèxtil i d'Indumentària, Barcelona (MTIB), Museu Marés and Museo Sorolla are unpublished.
[7] Dr Laura Rodríguez Peinado (Complutense University), Dr Enrique Parra Crego (Alfonso X el Sabio University), Dr Concepción Herrero Carretero (Patrimonio Nacional), Dr José Luis Tejedor González (Alfonso X el Sabio University),

Table 18.1 Number of textiles and weaving techniques of the Late Antique textiles in Spanish museums.

Museum	**Fragments**	**Complete pieces/or known fragments**	**Weaving technique**
Museu Episcopal de Vic (Barcelona) MEV	24		Tapestry: 22 Samit: 2
Museu Marès (Barcelona)	6	Tunic end: 2 Tunic sleeve: 1	Tapestry: 6
Museu d'Història de Sabadell (Barcelona) MHS	18	Tunic cuff: 2	Tapestry: 17 Embroidery: 1
Museu del Monasteri de Montserrat (Barcelona) MOBM	36	Tunics: 6 (3 child tunic) Veil/Headdress: 1 Tunic sleeve: 1 Wall hangings: 2 fragments	Tapestry: 35 Embroidery: 1
Museu Tèxtil i d'Indumentària (Barcelona) MTIB	165	Tunic: 2: Tunic sleeve: 7 Tunic neck: 1 Shawl/Mantle: 2	Tapestry: 167 Loop linen wefts: 7 Taqueté: 2 Samit: 3 Brocaded textile: 1
Museo Nacional de Cerámica y de Artes Suntuarias González Martí (Valencia) MNC	13	Shawl fragment: 1 Furnishing textile: 1	Tapestry: 13 Loop linen wefts: 1
Museo Sorolla (Madrid)	3	Shawl fragment: 1	Tapestry: 3
Museo Nacional de Artes Decorativas (Madrid) MNAD	72	Furnishing textile: 1 Shawl fragment: 1 Tunic sleeve: 1 Tunic fragments: 2	Tapestry: 68 Taqueté: 1 Loop woolen wefts 1 Embroidery: 1
Museo Arqueológico Nacional (Madrid) MAN	53	Tunic neck: 1	Tapestry: 50 Loop linen and woollen weft: 1 Taqueté: 2
Museo de La Alhambra (Granada)	16		Tapestry: 16
Centre de Documentació i Museu Tèxtil de Terrassa (Barcelona) CDMT	284	Tunic: 1 Tunic fragments: 3 Shawl:1	Tapestry: 281 Loop linen wefts: 4 Loop woollen wefts: 3 Taqueté: 4 Samite: 4 Embroidery: 1

possible with the help of three research projects developed since 2004.[8] The results of these projects are summarized below.

The first seven collections (at Table 18.1) were studied thanks to these projects. The MNAD, MAN and CDMT collections, already published,[9] have been analysed for their raw materials and radiocarbon dates. The Alhambra collection has some of the Late Antique textiles analysed.[10]

Spanish collections of Late Antique Textiles

In Spain the Late Antique textiles from Egypt are mostly located in Catalonian collections, as well as in museums in Madrid, Valencia and Granada (Table 18.1).

The provenance of the textiles is mainly related to private collections that were donated or acquired by the museums.[11] The oldest collection is the one at the MAN, acquired in 1889,[12] the best documented collection is the Museum of the Monastery of Montserrat; other collections are not as well documented and the inventories may have a few entries with "from Akhmim" as provenance information.

One of the main objectives of these projects has been to try to identify the provenance of these textiles not only through archival research, but also by carrying out a comparative study with pieces from other museums. This comparison has allowed us to establish a relation between fragments found in other collections that could belong to the same piece. For example, some of our fragments of textiles are connected to those of the Musée de Cluny (Paris) and the Textile Museum in Washington.[13] Despite the fact that most of these pieces were decontextualized, through the study of these relations we were able to establish a proper context for some pieces,[14] and to give an accurate chronological framework for others.

The Museu de Montserrat´s textiles (Fig. 18.1) are a unique example thanks to the very detailed record that was kept about their provenance and history. It is important to highlight the exhaustive archive that accompanied the Soler Vilabella Collection when it was donated to the MOBM in 1999. Through this documentation, we were able to identify when and where these textiles were found. The great majority of the documents are letters between the French archaeologist Albert Gayet and

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[8] *Estudio de la colección de tejidos coptos del Museo Nacional de Artes Decorativas*, Consejería de Educación, Comunidad de Madrid (Ref. 06/0036/03), 2004; *Caracterización tecnológica y cronológica de las producciones textiles coptas: antecedentes de las manufacturas textiles altomedievales españolas*, Ministerio de Educación y Ciencia, Gobierno de España (Ref. HUM2005-04610), 2005–2008; *Caracterización de las producciones textiles de la tardoantigüedad y Edad Media temprana: tejidos coptos, sasánidas, bizantinos e hispanomusulmanes en las colecciones públicas españolas*, Ministerio de Ciencia e Innovación, Gobierno de España (Ref. HAR2008-04161), 2009– 2012. Ana Cabrera thanks to the Dumbarton Oaks Foundation for her Summer Fellowship in 2010.

[9] See note 6 and 3.

[10] Cabrera 1997, 31–49 and 199–200.

[11] Rodríguez Peinado 2011 (1), 660–663.

[12] Rodríguez Peinado 1999, 19.

[13] In the MTIB collection we have found that MTIB-32873 and MTIB-37717 have fragments in Musée du Cluny 13174 and 13178 (Lorquin 1992, nº 127, 299–300 and 318–319). The silk fragment MTIB-32868 is part of the textile M11 at the Textile Museum of Washington (Trilling 1982, nº 113, 101).

[14] For example the little silk fragment from MTIB-32863 (15 × 8.5 cm) is part of a silk mantle from the tomb B114 of Antinoe (Calament 2005, 348; Bénazeth 2007, 118 and note 17).

the Catalan collector Ramon Soler Vilabella,[15] who, during a ten-year-period, partially or totally funded some of the archaeological campaigns of the French archaeologist in the necropolis of Antinoe.[16]

The Soler Vilabella Collection has been invaluable and extremely useful in the establishment of a chronology of the materials and their possible context for the rest of the collections that comprise our project. Thanks to this documentation, we know that most of the excavations that were conducted from 1895 to 1914 were responsible for the flow of Late Antique textiles into European museums and private collections, including the Spanish ones. Most of these excavations, carried out mainly by Albert Gayet in the necropolis of Antinoe, Fayum, Akhmim and Hawara satisfied the wishes and petitions of many French public institutions and private collectors and a great number of textiles started to circulate in the antiquities market.[17] This market revealed and potentiated what is known as the 'Boom' of the archaeology of clothing, which reached its peak at the Universal Exhibition of Paris of 1900.[18] The majority of the textiles that were displayed that year were the result of the excavations funded by the Chambre de Commerce de Lyon and Emile Guimet in 1898, the Société des Amis du Louvre also in 1898 and the Société Française du Palais du Costume between 1898 and 1900. The textiles exhibited at the Universal Exhibition were accompanied by collections displayed at the Musée Guimet in Paris.[19] These exhibitions, along with the Sassanian silks that were also displayed courtesy of the Musée des Tissus de Lyon, were the ones that attracted many collectors from around the world. Among others, Ramon Soler Vilabella stood out. Soler Vilabella's contribution came when Catalonia was, by far, the place where more interest was displayed for textiles and clothing from Antiquity. Collectors like Miquel i Badía, Gaspar Homar, Bosch Catirineu, Pascó Cabot[20] and Soler Vilabella himself contributed to increase the Catalan heritage in a time when collectors around the world were pushing strongly into the antiquities market.[21]

Fig. 18.1 Child's tunic decorated with two clavi*, sleeve bands and embroidered cross on the chest (MOBM-37). © Museu de Montserrat.*

[15] Turell 2008, 115–118; Cabrera *et al.* 2009, 88.
[16] Turell 2008, 115–119.
[17] Gayet was not the only archaeologist working in these necropolises. As F. Pritchard has explained in the introduction about the tunics at the Whitworth Gallery of Manchester, F. Petrie's campaigns had a similar role for the UK (Pritchard 2005, 1–11).
[18] See Gayet 1900.
[19] Calament 2007, 172–173
[20] The textiles collections of Homar and Pascó were acquired by the MTIB (Barcelona) between 1913–1918 and the Bosch Catirineau collection on 1934.
[21] Turell 2008, 115–119.

Project Methodology

One of the main aims of the project was to attempt to characterize the textile production in Late Antique Egypt. This study was carried out from different perspectives:

- Raw materials: with the study of a large sample of fibres: 468 (Table 18.2), mordants (457) and colorants or dyes: 314 (Table 18.3).
- Textile techniques: with the documentation of the weaves, the characteristics of decorative techniques, type of twist, density, etc.
- Historical context and chronology: with the comparison with other textiles in various collections both in Europe (including the published examples from Spain) and America. In addition, there have been 26 radiocarbon dates.
- Use and functionality: with the study of complete textiles and the identification of fragments from garments or furnishing textiles, including written sources.
- Iconography and decoration: with the study of the decoration on the textiles, possible sources, meanings, its relations with other representations, etc.
- Provenance of the collections: with the study of the collections through museum archives, documenting the time of acquisition, its provenance (usually from collectors), and its relationship with other Spanish or foreign collections.

The studies undertaken by the project's multi-disciplinary team can be divided into two types: the first one is a complete study of the unpublished collections accompanied by a large number of samples, a chronology and extensive documentation (MOBM, MTIB, MNC and MEV) and the second type characterizes of the collections that have been already studied (MNAD, MAN, CDMT and MHS).[22]

In total we have studied 422 textiles, with 792 analyses of raw materials, including the study of weaving techniques, decoration and functionality. It is noteworthy that thanks to these studies and to the support of the Instituto del Patrimonio Cultural de España (IPCE), the collections of the MAN and MOBM have been restored (a partial study derived from the work undertaken on the latter can be seen in this volume).[23]

This text will give a general outline of the work that has been done so far. Some of the results of the project will appear in three doctoral dissertations, two of them dealing with Late Antique textiles and the other one with the Spanish-Muslim textiles.[24]

Characterization of the raw materials

The study of materials enables us to obtain data on technology, raw materials, and processes. In addition, applied to a large set of samples, it allows us to discover the common characteristics between some pieces and others, as well as to identify those that are outside the norm and that will require further study. Furthermore, it will also help us to identify those pieces or fragments thereof that need to be studied because of extemporaneous materials.

The methodology is very important for comparative purposes. The same analytical parameters were chosen for all samples, searching for the easy availability of techniques, their high sensitivity

[22] See Note 6.
[23] Regarding the restoration see Arteaga *et al.* 2009; Borrego 2010; Antelo *et al.* 2011.
[24] Ana Cabrera, MTIB and Luis Turell, MOM.

which would involve minimum cost of sample (a thread of *c*. 5 mm) and a reliable and useful result. These parameters are: a) analysis of textile fibres, b) analysis of dyes, c) analysis of mordants. The data is supplemented with radiocarbon dates, enabling the study of the evolution of techniques and materials through time as well as providing stronger evidence of the historical context of the analysed textiles.

Methodology for the study of the raw materials

The preparation of the sample begins with its study under the stereomicroscope or binocular microscope. Working at 10-50 X, it is possible to observe the twist, the number of ends, or the colour of the individual fibres (sometimes one piece of thread is formed by fibres of different colours). Furthermore, it is also possible to observe the structure of the fabric sample in which several threads appear mixed or woven (Figs 18.2a and 18.2b). Afterwards a fragment is selected for an analysis of the fibres, another one for the dyes and another one for the mordants.

The fibre analysis was performed by taking a small piece of thread (<1 mm) and dispersing it in deionized water. The observation with the light microscope (light transmitted, crossed polarizers) at 100-750 X allows for the identification by comparison with patterns and location of the morphological characteristics representative of each piece.

In some cases it is necessary that the transverse cut is performed in a similar resin fragment that had a similar cut. Directly on the fibre dispersion, the test of cupriethylenediamine, also called Schweitzer test can be performed. This test is used to differentiate the hemp from the linen by dissolving the fibre and visualizing the lumen, adding to the microscopical preparation a drop of reagent cupriethylenediamine.

The mordant analysis was performed using an electron microscope Phillips XL with an EDX analyser from Si-Li (Universidad Autónoma de Madrid-Sidi). This allows the observation of the fibres with a great magnification (working between 500 and 5000 X) and the chemical determination analysis of the atomic composition. The microanalysis identifies the elements that are present, some

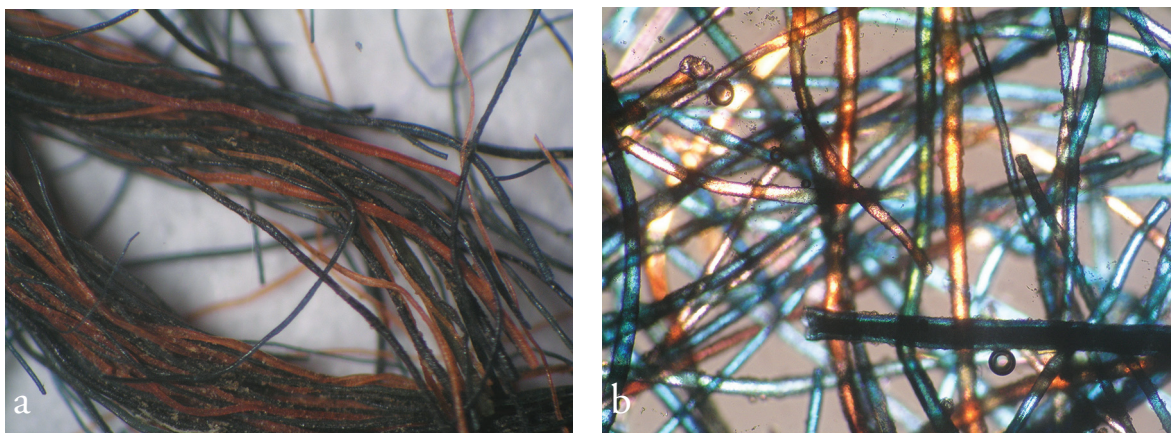


Fig. 18.2: a, Sample (MTIB-37701) of red and blue wool fibres twisted together to obtained a purple colour. b, View with a stereomicroscope (35 X) and with light microscope (300 X light transmitted and crossed polarizers) in sample MTIB-37701. © Enrique Parra

of them coming from the textile support, others from dirt and dust, others from the mordant and, in general, others from the salts added to the fabric prior to dyeing.[25]

Finally, the analysis of dyes has been carried out by combining the Thin Layer Chromatography (TLC) with Liquid Chromatography (HPLC) with UV-vis detection. The HPLC[26] chromatography was performed through the acid hydrolysis of the fibre using a drop (20 ul) of a mixture of methanol/ water/ hydrochloric acid (conc.) 1:1:2 (vol.), with its subsequent drying using a vacuum. Then 50 L of dimethylformamide was added and a Konik chromatograph was chromatographed equipped with a UV-vis detector. Chromatography was carried out with a Spherisorb ODS column of 15 cm, with an internal diameter of 2 mm at 40°C. A gradient of eluent water (A), methanol (B) and phosphoric acid aqueous 5% (w/v) was used from 60A: 30B: 10C to 10A:80B: 10C. Detection was carried out with a UV detector – visible working at 255 nm.

The Thin Layer Chromatography (TLC) was used to check some dyes that produced a poor signal in the UV absorption and that could be hidden in the analysis by HPLC. The chromatography was carried out using the same method of hydrolysis, but extracting a mixture of methanol: water, 1:1 (vol.). For chromatographic analysis, plates of 10 × 10 cm of Merck HPTLC were used, with a silica gel as the stationary phase and the indicator 60F254. The conditions are the same than those described by Hofenk de Graaf for red dyes, but they were also adapted for yellow and blue dyes.[27] The eluyente was a mixture of chloroform, methylethylketone, formic acid. The detection was performed with 2-aminoetildifenil borate in spray form to 2% methanol, which was allowed to dry and then it was observed at 250 and 350 nm and compared with dye patterns.

Results and discussion

Most of the fibres analysed came from sheep's wool, although other fibres such as linen, cotton, hemp and silk also appeared to a lesser extent (Table 18.2).

Nevertheless, even though the analysed samples are mostly wool, since it is the most commonly used fabric for dyeing with different colours, we have found out that:

- Linen is the most common material used for warps, wefts and decorative effects. The threads have different thicknesses and greater or lesser twist depending whether they are used for warps (greater torsion) or wefts. The threads used for decorative effects are thinner than those of the warps or the wefts.
- Hemp is only used for decorative effects (Fig. 18.3).
- Wool is specially used as a decorative weft, also for the threads of the warp and the weft of the fabric base. The latter are not very common in the early samples, from the 2nd to the 4th centuries AD, although there is one exception in the textile MAN 16226 which was entirely made of wool with hemp details and was radiocarbon dated from the beginning of the 3rd to the late 4th centuries.[28]
- Silk is used not only for the threads of the warp, but also for those of the weft. In the Spanish collections there are several pieces that have been preserved made entirely of silk. All have very similar fragments in other collections, including some from the same piece of fabric.

[25] See Abdel-Kareem *et al.* 2010.
[26] See Wouters 1989.
[27] Hofken de Graaf 2004, 26–34.
[28] Cabrera *et al.* 2009, 92; Rodriguez *et al.* 2013.

Fig. 18.3 Fragment (MTIB27889). The white dots on the yellow roundels are made with hemp. © Museu Tèxtil i d'Indumentaria.

Table 18.2 Fibre analysis results.

Silk	Wool	Cotton	Linen	Hemp	Linen + cotton	Total number of fibres
17	321	2	116	10	2	468

In relation to the dyes, the published result of other chromatographic analysis of Late Antique textiles is similar to those obtained in our study,[29] and it confirms that the most typical dyes are madder, weld and indigo.[30]

The results of dye analysis from a total of 314 samples from Late Antique textiles using the chromatographical analysis by HPLC and TLC (Table 18.3 and 18.4) are completely consistent with that previously described by many researchers on the textile production of the Early Christian era.[31]

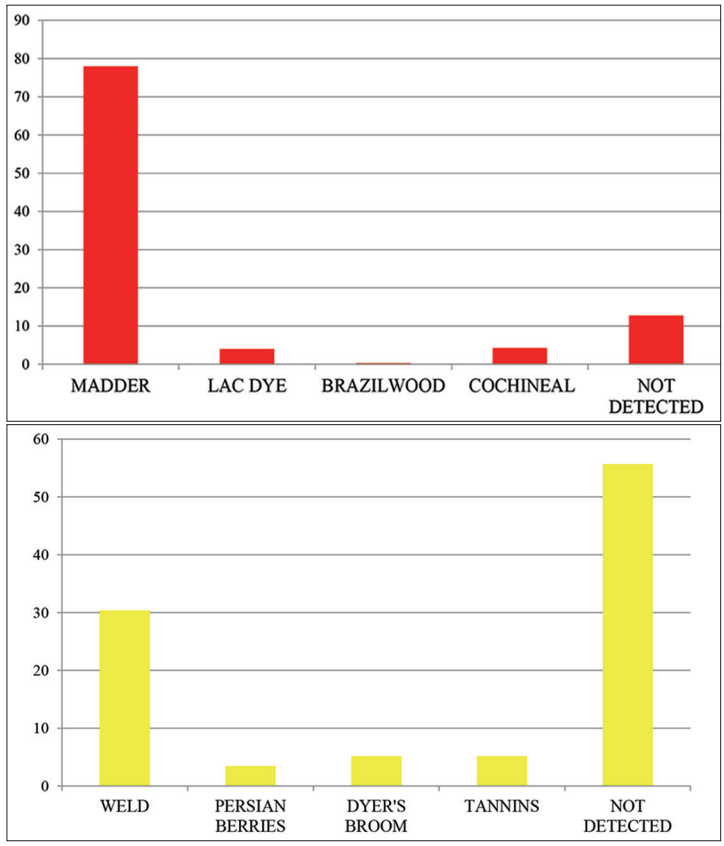
Madder (of the *Rubia* species) has been commonly recognized as the red dye (Fig. 18.4), weld (*Reseda Luteola*) as the yellow dye, and indigo (*Indigofera* specie) as the blue dye. This information

[29] Hofenk de Graaf 2004, 101–102; O. Abdel-Kareem *et al.* 2010, vol. 6 (3) 1–6; Orska-Gawrys 2003, 239–248.
[30] These results can also be compared with one of the most ambitious studies ever undertaken because of the great number of samples: 94, which makes for a good statistical representation (Wouters *et al.* 2002, 1–16).
[31] Verhecken 2007, 206–213.

Table 18.3 Dye analysis results.

Red Colours						
	Madder	Kermes	Lac dye	Brazilwood	Cochineal	Not detected
	117	0	6	1	7	19
%	78.0	0.0	4.0	0.3	4.3	12.8
Yellow And Brown Colours						
	Weld	Persian Berries	Dyer's Broom	Tannins	Not detected	
	35	4	6	6	64	
%	30.4	3.5	5.2	5.2	55.7	
Blues And Black Colours						
	Indigo	Tannins	Not detected			
	134	1	16			
%	88.7	0.7	10.6			

Table 18.4 Distribution of the red dyes (or with red dyes as the purplish or brownish colours) and yellow and blue dyes in % of occurrence.



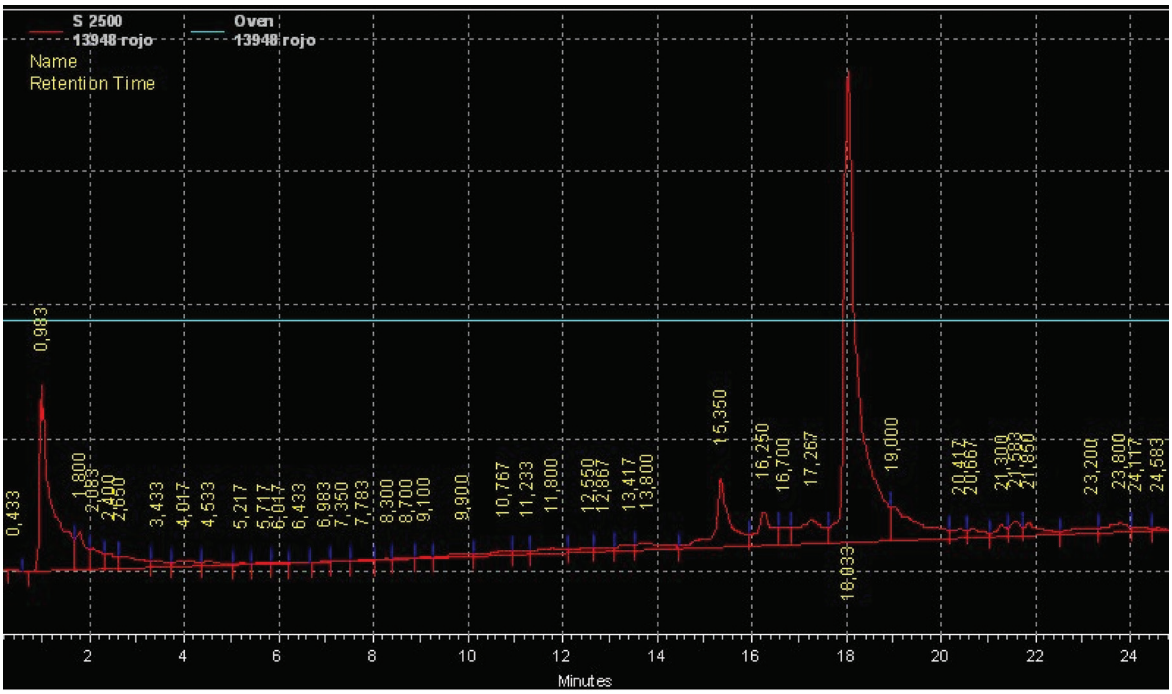


Fig. 18.4 HLPC chromatograph of MNAD-13948 sample. Red colour have madder as dyestuff. The 15.4 peak corresponds with the alizarine and the 18.8 with the purpurine. © Enrique Parra.

reinforces the idea of the complete authenticity of several collections of very diverse provenance, especially those that were donated by private collectors to Spanish public museums. Intermediate colours (green, purple, and orange) were usually mixtures of these dyes obtained by successive dyeing.

The browns were usually tannins (gallic and ellagic acids that can be obtained in vegetables sources, such as tea, pomegranate peel, or oak galls) or even degraded red from madder. The blacks were very dark indigo blue, sometimes with some red from madder (Fig. 18.5) or tannins (Fig. 18.6). Table 18.3 shows the results obtained for all samples and are represented in bar graphics (Table 18.4) as well as the percentages of each of the possible results. In this case the results that appear are only for the red and yellow dyes.

However, in some cases, approximately 5% of the analysed samples, colour was obtained by mixing threads of different colours during the spinning process.

The lac dye (*Kerria lacca*) was detected for the red colour. This dye was not used until the 6th century AD[32] and it appears in six of our samples, as in the MTIB-27866 (Fig. 18.7a). Another significant sample, contains brazilwood (of the woody species *Caessalpina*), found in the fragment MEV-10531-3A (Fig. 18.7b) which would indicate a different chronology or provenance from those of the other samples.

[32] Verhecken 2007, 208.

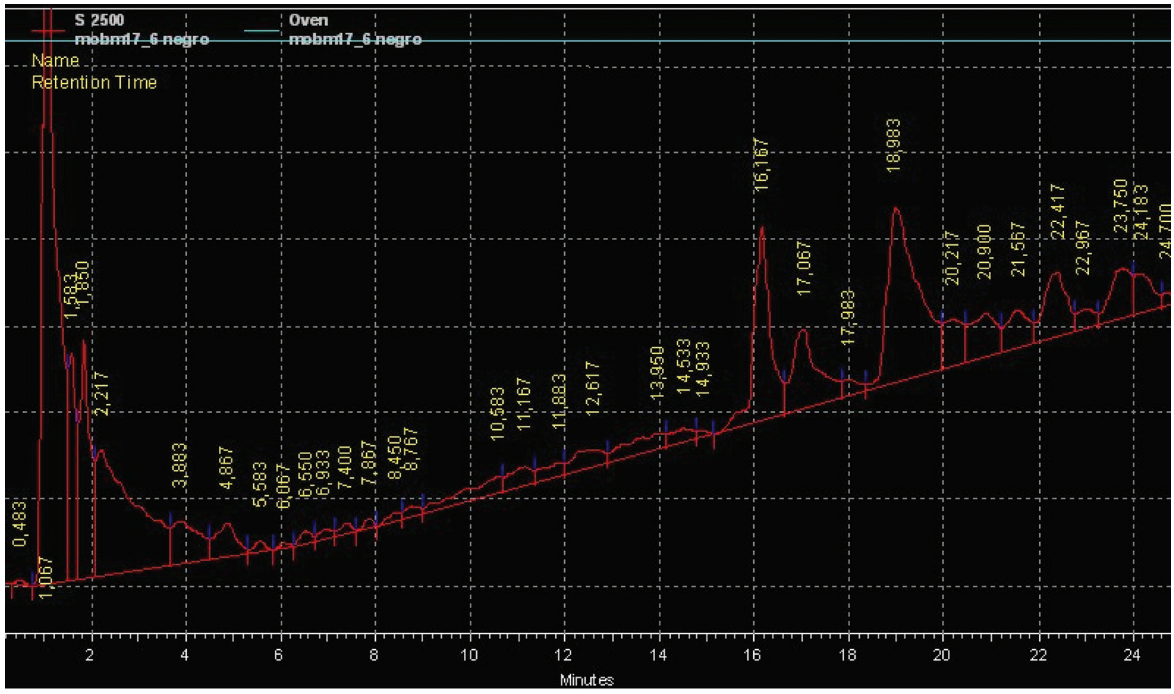


Fig. 18.5 HLPC chromatograph of MOBM-17-6 sample. Black colour was obtained by a mixture of indigotine (17.067 peak) and madder (16.1 min peak of the alizarine and the 18.9 min peak for the purpurine). © Enrique Parra.

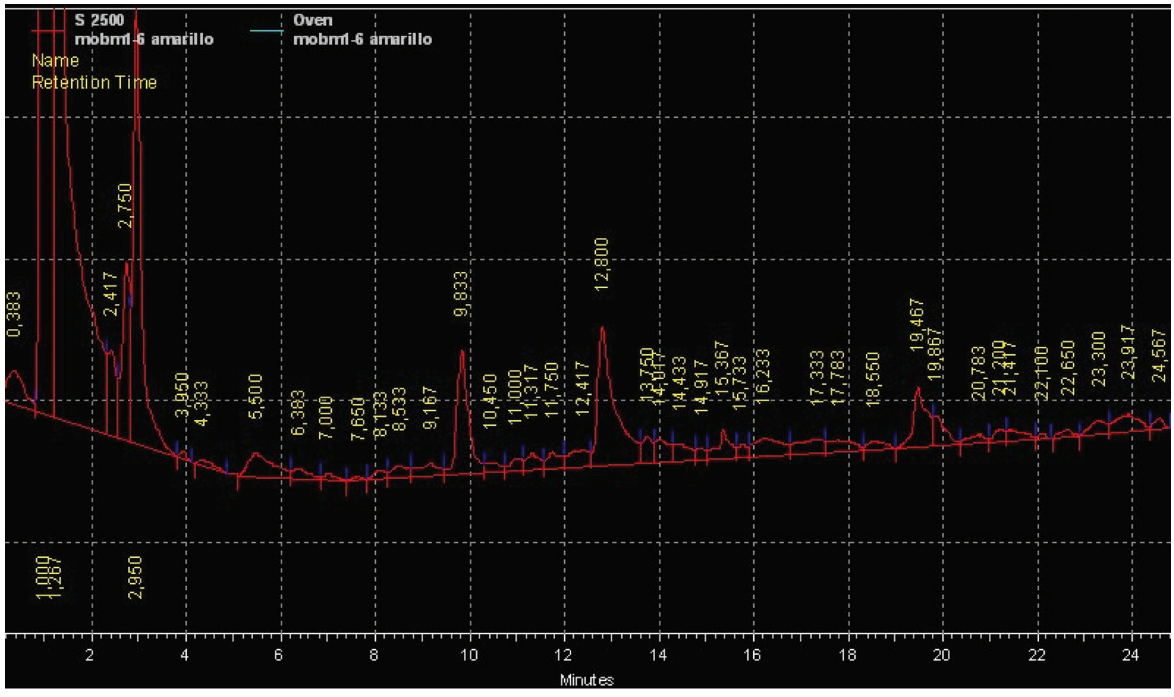


Fig. 18.6 HLPC chromatograph of MOBM-1-6 with tannins (elagic acid at 9.8 min) and weld (luteoline, 12.8 min. peak). © Enrique Parra.

Fig. 18.7a (left) Fragment MTIB-27866: the red ground is obtained by lac dye. © Museu Tèxtil i d'Indumentaria.

Fig. 18.7b (above) Fragment MEV10531: the orange colour was mixture of dyer's broom and brazilwood. © Museu Episcopal de Vic. Image: Pilar Borrego.

Six of the samples showed cochineal (from *coccus* species). Carminic acid is major component detected, but also, trace amounts of kermesic acid lead us to conclude that some kind of European cochineal was also used as a dyestuff. For this period the Armenian cochineal used to be most common reported for Late Antique textiles.[33]

The chemical composition of the yellow dyes is more varied, although it should be noted that a high percentage of tests failed (64%) in which no dye was detected. Within this percentage are those threads white in origin, but which have become yellow over time, and those that originally had a yellow dye but have decomposed with time. Next to the weld we found isolated

[33] Wouters *et al.* 2002, 1–16.

Fig. 18.8 MEV-10531 sample: the orange colour was obtained with dyer's broom and brazilwood. View of the threads with a stereo stereomicroscope (35 X). © Enrique Parra.

examples of dyer´s broom (*Genista tinctoria*), tannins, and Persian berries (*Rhamnus* specie). The use of dyer´s broom (Fig. 18.8 and 18.10), which was recorded by Pliny, is very interesting since it extends the sources and possibilities of obtaining yellow colour.[34]

The wide range of colours obtained with different dyes is documented in the written sources, including the mixture of red and blue dyes to obtain purple, which was mentioned by the Leiden Papyrus (n. IX).[35] This type of purple obtained from vegetable sources has been called by Martinez 'vegetable purple',[36] a term we consider appropriate to distinguish it from true purple, which has not been detected in the fibres analysed in this project.

The elemental analysis by MEB/EDX of the textile micro-samples (Fig. 18.9c) allows us to investigate the nature of the inorganic materials that are present on the surface of the fibres. Thus it has been determined that fibres were mordanted with alum (double sulphate of aluminium and sodium and potassium), by the presence of aluminium (Al) above a threshold amount which was considered to be the half of the atomic proportion with respect to de silicon (Si). Almost all coloured fibres were mordanted with alum. Many samples also possess small quantities of iron (Fe) and copper (Cu), whose cations act as secondary mordants or colour modifiers. These two metals and in particular Fe, greatly increase their concentration in black with tannins obtained sometimes from indigo.

Many white or pale yellow fibres, in which no dyestuff was detected, where also rich in Al, Fe and Cu. A possible explanation for this may be that their metallic salts were added to the yarns as softeners. Dioscorides mentions alum salt for this purpose in its writings. Of course, we can also consider the possibility of a technical process in which yarns are mass-mordanted, but later, not all the mordanted yarns were dyed

Other elements that appear usually in the MEB/EDX analysis are silicon and calcium (CA). These elements are normally associated with dust, as quartz and calcium carbonate, as well as clays and gypsum, take part of dust composition. The potassium levels in some samples could come from potassium tartrate (cream of tartar). The phosphorus may be derived from the use of bone ash or ivory which could be used as a buffer component for acidity control in order to modify the colour. By contrast in vegetal ashes, however K and Ca often predominate. Chlorine is very unspecific and may simply proceed from the chlorides of washing water. Finally, a high content of sulphur was detected in wool samples (Fig. 18.9c). This was obviously due to the amino-acid composition of queratine, the protein and main component of animal hair, rich in sulphurate amino-acids.

[34] Martínez García 2011 (2), 248.
[35] Cardon 2002, 31, Pl. 7; Martínez García 2011 (2), 250.
[36] Martínez García 2011 (1), 209–211.

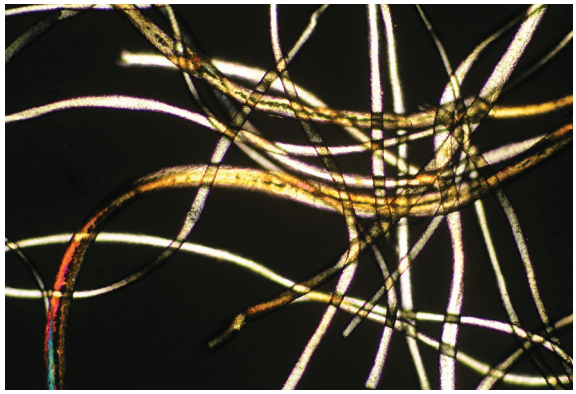


Fig. 18.9a Sample from MEV-10531-3. Image of optical microscope with light transmitted 150 X. © Enrique Parra.

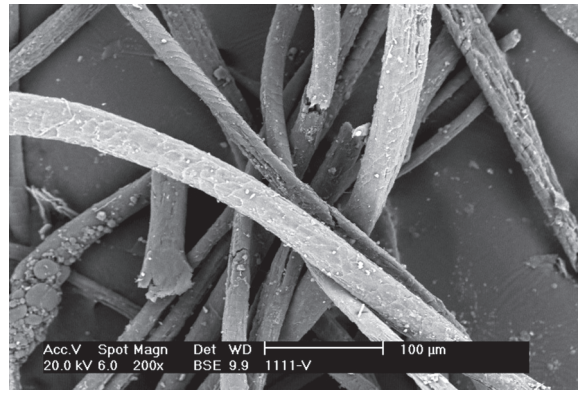


Fig. 18.9b MEB image of sample from MEV-10531-3. © Enrique Parra.

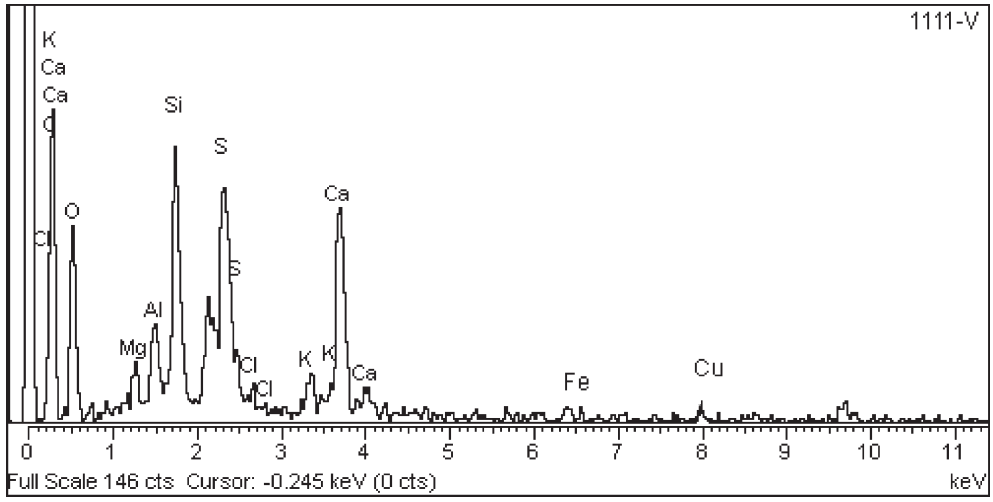


Fig. 18.9c Microanalysis obtained from the surface of the fibres, sample MEV-10531-3a. The large amount of sulphur detected comes from the wool support. © Enrique Parra.

It will be interesting, as a future line of inquiry for the work, to investigate the quantitative relationships of the key elements, especially Al, Fe and Cu to see if there are variations between samples that are related to the different tones that are observed, or even the possible relationship between the use of these metal salts with other raw materials (threads and dyes) in a wider statistical study that would also include these parameters.

Techniques

The textile techniques that have been recorded, just like the raw materials, are the typical ones that were used for this type of production.

Fig. 18.10a Fragment MEV-10528: the yellow and dark green roundels are dyed with dyer's broom and a mixture of dyer's broom and indigotine, respectively. © Museu Episcopal de Vic. Image: Pilar Borrego.

Fig. 18.10b Yellow sample from MEV-10528. © Enrique Parra.

Fig. 18.10c Green sample from MEV-10528. © Enrique Parra.

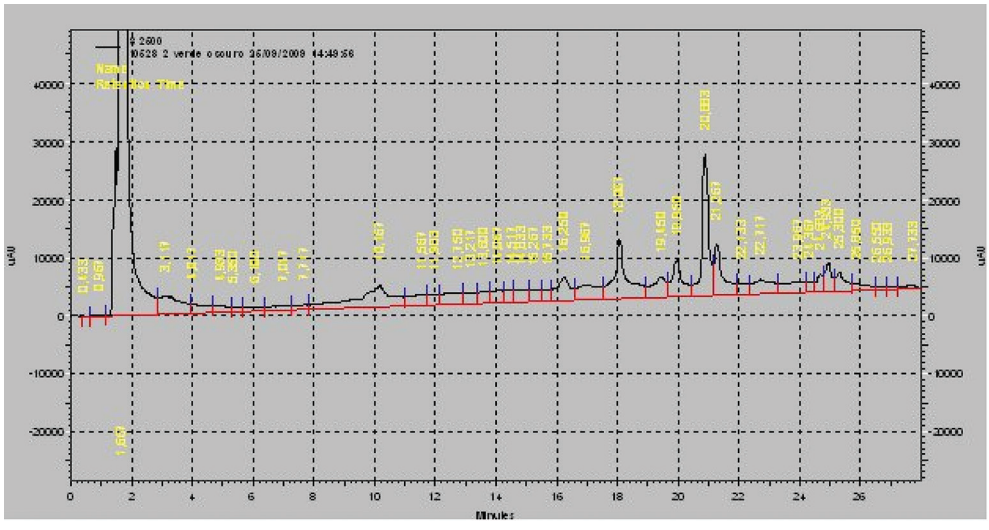


Fig. 18.10d HPLC chromatogram of sample MEV-10528 dark green colour, with indigotine (20'883 min.), genistein (19'450 min.) and genistin (18'067 min). © Enrique Parra.

Fig. 18.11 Fragment with linen loop wefts, decorated with two clavi (MTIB-37688). © Museu Tèxtil i d'Indumentaria.

The thread twist has a predominately S twist not only on the warp but also on the weft; in the same way, linen was more often used for the warp and wool for the decorative wefts. Spanish collections contain very good examples of the weaving techniques known in Late Antiquity, from tapestry to embroidery, to tabby or plain ground, taqueté (or weft faced compound tabby) to samit, not to mention the effects such as linen and wool loops (Fig. 18.11) or brocaded wefts.

The fragments are usually decorated parts, which makes it difficult sometimes to recognize whether the fabric belongs to a furnishing textile or piece of garment. In other cases we can relate the fragments with the written sources as MTIB-37688 (Fig. 18.11) textile that might be part of pile tunic known as *amphimallion.*[37]

From a technical point of view of weaving techniques, the weave and the decorative techniques that were more widely used are tabby and tapestry (Table 18.1). This decorative technique achieves great effects with very few resources. The quality of some of the motifs, as CDMT-2705T,[38] relates not only with the skill of the weaver and the workshop, but also to the access to the cartoons which were considered an indispensable tool.[39]

In relation to the weaving techniques it is necessary to emphasize the use of the flying shuttle in tapestry decoration from the earliest examples, dating from the 1st and 2nd centuries AD in a textile from MNAD,[40] to the later the 6th and 7th century examples. Tabby and tapestry weaves survived until the Late Middle Ages (13th century AD). The use of supplementary linen and wool loop wefts with tapestry decoration have been documented since the 4th to the 7th centuries AD, just like the loop technique. In the studied collections both techniques are not detected beyond the 7th century.

The taqueté or weft compound tabby and samits have been classified to the 4th and 6th centuries AD from those studied in other collections.[41] It is interesting to observe the prevalence of the samits over the taquetés in later periods.

Four embroideries have been preserved in Spanish collections that give us an idea of its value as a technique. Two of them are in the MOBM (Fig. 18.12) and have been dated by C14 (MOBM-18

[37] Cortopassi 2002, 33.
[38] Morral i Romeu 1999, 175.
[39] Stauffer 1996, 223.
[40] Cabrera and Rodríguez 2007, 136.
[41] See De Moor 2007, 105–107; Verhecken-Lammens 2007, 194.

Fig. 18.12 Tunic fragment (MOBM-18) on wool with embroidered decoration. © Museu de Montserrat.

and MOBM-37). The third fragment (CDMT-5992) could be related to the personifications of the seasons or months.[42] The fourth, in the MNAD has an inscription in Coptic language.[43]

Functionality

One aspect that should be stressed is the lack of archaeological context for the vast majority of the textiles. The exception is, of course, the collection of the MOBM and some textile fragments in MTIB. The lack of context and the fact that most of the pieces are fragments has been a challenge for the project when we took into consideration their use and function.[44]

Most of the textiles in Spanish collections come from a funerary context. This context allows us to know the final use of the pieces, usually to shroud the body of the deceased or as part of the funerary paraphernalia that accompanied the body to the grave. Nevertheless, this would have been a secondary use of the fabrics, since in all probability they had a primary use because in most cases it appears that the dead were wrapped with reused fabrics. In this regard, the studies undertaken on the mummies of Thais and Euphemia should be highlighted, since they warn us about the precautions that must be taken in relation to some of the ideas about burial practices and its rich textile furnishings documented by A. Gayet.[45]

Most of the textiles that we have studied are fragments with some sort of decoration and we have tried to establish their primary function, that is, their decorative use for either clothing or as household furnishings.[46] Thus, in addition to distinguish between the different types of decorative pieces, *tabulae*, *orbiculi*, *clavi*, etc., we have studied its function as ornament of sleeves, shoulders, tunic neckline, cushions, bed covers, curtains, wall hangings, etc.[47]

In relation to the division of functions and the use of the textiles in the studied collections, it is possible to establish two groups (see Table 18.5): textiles for clothing and furnishing textiles. The first group comprises garments, shawls, veils, mantles, hats and sandals (Fig. 18.1 and 18.12). The

[42] Morral i Romeu 1999, 193.
[43] Rodríguez Peinado 2002, 54, fig. 45.
[44] We would like to emphasize the collaboration with European and Spanish colleagues from the biannual meetings of the research group Textiles from the Nile Valley and the meetings organized by Dr. Carmen Alfaro at the University of Valencia, where the exchange of opinions and ideas has allowed us to enrich our views.
[45] Thais: See Bénazeth 2006. Euphemia: see Van Strydonck *et al.* 2011.
[46] We thank to Dr. Sabine Schrenck for her comments and her work done in Late Antique textiles from the Abeeg Foundation. This catalogue is organized by the functionality of the pieces and fragments (Schrenck 2004).
[47] In the case of the collection found in the MTIB, there are 36 *orbiculi*, 34 *tabulae* and 67 *clavi*. In addition, there are medallions shaped like a leaf with stems (5) and medallions shaped like an eight-pointed star (6).

Table 18.5 Possible functionality of the fragments from MTIB collection.

Group	Number	Typology/Number	
Dress	47	Tunic fragments or tunic decoration	38
		Tunic sleeves	7
		Shawl/mantle	2
Furnishing	10	Cushions	4
		Pillow	2
		Towel	1
		Big decorations (more that 50 cms)	12

Fig. 18.13 Large textile fragment, possibly a curtain (MOBM-2). © Museu de Montserrat. Image: Pilar Borrego.

second group comprises tablecloths, draperies, curtains, bedspreads and cushions for domestic or liturgical use.[48] We should not forget that the funerary function of textiles was not exclusively to cover the body of the deceased, but it was also used as part of the funerary structure.[49]

It seems clear that certain types of decoration, such as the large *orbiculi*,[50] could be related to fabrics for furnishing, as well as fragments of medallions shaped like a star or a leaf with stem, whose size does not fit the tunics (Fig. 18.3). This suggests that these could be a part of the larger clothing pieces associated with mantles and capes, or to furnishing fabrics. It seems even clearer that the *tabulae* with linen loops were used in cushions, while those with taquetés would have served as mattress covers or big pillow cases.

In the collection of Soler Vilabella, now at the MOBM, two textiles are preserved with evident marks of linen strips that attest to use as a mortuary shroud (MOBM-1 and MOBM-2) (Fig. 18.13). This allows us to fully understand the secondary function as wrapping the body of the deceased, but starting from the funerary context it is more difficult to establish its primary function. It is more than likely that the textiles belong to the group of the so called furnishing textiles, such as wall hangings, curtains, or bed covers.

Despite the numerous written sources that make multiple references to the textile sector about the type of dress, customs, production, materials and prices, very few cross-disciplinary studies have connected this information with materials preserved today. The meaning of *ornamentum* and *vestimentum* is well documented in the Western and Eastern sources, the latter being less abundant, with the exception of those that make a reference to Patristics and the papyri found in Coptic

[48] See, for example, tablecloth in MOBM (MOBM-5): Cabrera *et al.* 2009, 93, fig. 8.
[49] Pinar and Turell 2007, 156–166.
[50] Rodríguez Peinado 1999, 22, fig. 4a; Cabrera and Rodríguez 2007, 136, fig. 7; Cabrera *et al.* 2009, 96, fig. 13.

nunneries and monasteries in Egypt.[51] These documents provide invaluable information for the use of monastic clothing, but do not shed any light on the use and function of domestic furnishings.[52]

The large number of fabrics that were studied allowed us to better understand their possible role through the size of the decorations and textile techniques. The decorations with large medallions and large leaves with stems would be used in furnishing textiles while *orbiculi* and *tabulae* form small ornaments in garments.

Decorative themes and iconography

The syncretism found in Egypt, due to its historical past and its relationship with the Hellenistic world, is shown dramatically in textile decoration, where the motifs of very different origins (Pharaonic, Hellenistic, Roman and Byzantine) make the reading difficult because of the lack of documented contexts. The emergence of Christianity represented another element to take into consideration, although in terms of textile decoration it appears that there was no break with tradition, but rather an integration of motifs adapted to the changing needs of artistic expression.[53]

It seems clear that the textile motifs had not only an ornamental function but also manifested the population's preference for using these textiles, whether in garments or furnishing fabrics, with a number of images that had a prophylactic and apotropaic character.[54] This should not be surprising if we take into consideration that these samples were created in a society in transformation, under different influences arising from the multiplicity of religions and customs that were juxtaposed to ancient local traditions.

The presence of Christianity in Egypt was recorded from the early 1st century AD, especially in Alexandria where there was an important Jewish community of around 100,000 people.[55] Among the intellectual elite was Philo of Alexandria with his allegorical interpretations of the Bible, which gives an example of the permeability between the ancient Egyptian myths and Hellenistic influences. The origins of the Christian religion in Egypt are still today one of the great enigmas of the history of the Church. According to some authors, this is due to the heterodox and syncretic character of Judaism and to the Gnostic character of early Alexandrian Christianity, which caused the elimination of its earliest traces.[56] In discussing the absence of information on these first Christians, we are referring primarily to the written sources. Yet, if there is any medium that can reflect the way in which this early Christianity of Alexandrian Gnosticism was characterized, it would be the iconography of the textiles. This incipient Christianity coexisted for many years with ancient polytheistic religions. The syncretism of religious cults and deities in Greco-Roman Egypt, led to the emergence of a new culture that took shape in the early centuries of the Christian era.

Therefore, the iconography of Egyptian textiles from this period would not be alien to the compositional, ornamental and iconic formulas developed in other textile centres of which there is very little material evidence preserved, even though we may know representations from paintings

[51] See Pinar and Turell 2007.
[52] See Torallas 2002.
[53] See Török 2005.
[54] See Maguire 1990.
[55] Philo, *Ad Flac*., 43; Flavius Josephus, *De bello jud*., 2:385.
[56] Laplana 2007, 66. For more information see Fernández Sangrador 1994.

or mosaics.[57] Because of the singularity of its history, it is normal to find scenes related to pagan cults with some cruciform symbols which may not necessarily be interpreted as Christian.[58] It is important to recognise that due to the lack of information on the context of these textiles, it is difficult to know the beliefs of particular sects. Because of the variety and decorative richness of the studied textiles, a few motifs have been selected that give an idea of their decorative repertoire.

Fig. 18.14 Detail of MTIB-37688 with oudjet motif. © Museu Tèxtil i d'Indumentaria.

It has been possible to recover in Egyptian textiles some themes arising in the art of their Pharaonic past such as the Nilotic scenes, so dear to the Greco-Roman society who assimilated and reproduced the ornamental repertoire in different materials and techniques. In these scenes putti and other figures often appear as swimmers propelled by a fish or holding a recipient with outstretched arms. These have been interpreted as derivations of cosmetic spoons with the typology of the swimmer that were in fashion from the Eighteenth Dynasty.[59]

The textiles show the characteristic syncretic nature of Egyptian art from the early centuries of the Christian era. In these decorative compositions, with putti holding a duck or fishing, the characteristic flora and fauna of the Nile River are displayed, including baskets full of fruit symbolizing abundance and generosity. Some motifs continued to be used due to their prophylactic character, such as the *oudjet* eye, the sacred eye of Horus used as an amulet to avoid the evil eye which is present in a textile from MTIB-37688 (Fig. 18.14) next to other elements of protective character like the swastika of curved arms, a positive solar symbol.

The hare, identified by its long ears, was one of the animals often represented in the Egyptian textile production of Late Antiquity and there are several examples of this motif in Spanish collections.[60] Associated with the cult of Osiris, the hare was part of funeral rites, so its presence in textiles had protective powers which were reminiscent of the ideas of regeneration and fertility.

However, it is the decorative repertoire of Greco-Roman origin that is the most represented in these textiles. In the fragments preserved in the Spanish collections, the Dionysian themes stand out quantitatively, themes which are also found in mosaic decoration like the allegorical

[57] See Pfister 1934, 1937, 1940.

[58] It is important to point out that the decontextualisation happens because these motifs survive for a very long time, even once Christianity becomes a standardized cult and is taken up by the majority of the population, pagan decorative motifs are still produced, as Asterius denounces in his Discourse: See AASS. 1863–1870; Datema 1970.

[59] See Rodríguez Peinado 1997; Cabrera and Rodríguez 2007, 134, fig. 5b.

[60] Morral i Romeu 1999, 148; Rodríguez Peinado 2001 (2) 45, fig. 18; Rodríguez Peinado 2002, 51, fig. 42; Rodríguez and Cabrera 2008, 57, fig. 2.

personifications.[61] In the triumph of the god represented in a textile from the MTIB-36375,[62] the characters of his *thiasos*, are also the protagonists here, as can be evidenced by the maenads and the other members of the god's entourage who dance with ecstatic movements.[63] Dionysian scenes stand out over vegetation backgrounds that consist of vine leaves and grapes, symbols of the god.

In the textiles that have been studied, we were able to identify heroes such as Hercules performing one of his labours (MTIB-27866. Fig. 18.7a) or (MNAD-13948[64] Fig. 18.15). And mythological scenes with Apollo and Daphne (Fig. 18.16), the Rape of Europa,[65] and scenes of Amazons.[66] All stand out for the uniqueness of their representation, which suggests an interpretation based on very synthetic models.[67]

The importance acquired by dance scenes in the textiles of Late Antiquity leads us to understand them as ritual dances, which along with the Dionysian dances mentioned above, were also practiced by warriors and hunters with a propitiatory character.[68] Nevertheless, the syncretism of the representations hinders their interpretation, seeing as it is possible that all of the dance scenes may have a Dionysian component since they were so widespread in this period. So, in this respect the dancers evolved equally between vegetation where the vine leaves are the predominant motifs in the background.

Along with the figurative motifs, the foliate scrolls with birds pecking at fruits are also part of the Classical repertoire (Fig. 18.17), including other animals which form the so-called 'inhabited scroll'.[69] It is difficult to decipher meaning due to the fact that many of these images are decontextualized. Nevertheless, they cannot be ruled out as Christian symbols. We have to keep in mind that the lack of an archaeological record and other elements or paraphernalia that could accompany the body of the deceased makes it difficult to read either a pagan or Christian interpretation.

The geometric motifs that form complex interlacing patterns and knots, which Maguire says may have a prophylactic or apotropaic character, are well represented in all the collections that were studied.[70] The examples that we found are textiles with tapestry backgrounds made from purple wool with linen decoration created with the flying shuttle (Fig. 18.3). Among them we should emphasize an *orbiculum* fragment of great size preserved in the MNAD (Inv. 13963), which has a very early chronology as demonstrated by the carbon dating.[71]

Motifs of Oriental influence are found in silk, wool and linen examples that imitate silks of Sassanian origin. Both those that are a part of the geometric compositions created with lozenges, circles, and rosettes, and those that are plant or animal motifs depicted with the tree of life (Fig. 18.10), form an interesting group that is very well represented among the textiles that have been studied.

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[61] Morral i Romeu 1999, 193. For a summary on the Spanish textile collection with Dionysian subjects, see Cabrera and Tuell 2011.
[62] Cabrera and Turell 2011, 332, fig. 2.
[63] Morral i Romeu 1999 160, 214; Rodríguez Peinado 2001 (2) 43, fig. 12; Cabrera and Rodríguez 2007 137, fig. 8.
[64] Rodríguez Peinado 2011 (2) 41, fig. 2.
[65] Morral i Romeu 1999 179.
[66] Morral i Romeu 1999 155.
[67] See Rodríguez Peinado 2011 (2).
[68] Morral i Romeu 1999 139, 164; Rodríguez Peinado 1999 47, fig. 20a; Rodríguez Peinado 2001 (2) 42, fig. 10, 43 fig. 12, 47, fig. 23.
[69] Morral i Romeu 1999 145.
[70] Maguire 1990, 216.
[71] Cabrera and Rodríguez 2007 136–137, fig. 7.

Fig. 18.15 Fragment of a tunic sleeve (MNAD-13948) decorated with a possibly scenes of from the labours of Hercules. © Museo Nacional de Artes Decorativas. Masú del Amo.

Fig. 18.16 Fragment MTIB-27886 with a scene with Apollo and Daphne. © Museu Tèxtil i d'Indumentaria.

Fig. 18.17 Clavus fragment (MNAD-13942) decorated with a Classical motif. © Museo Nacional de Artes Decorativas. Masú del Amo.

Finally, there is a group of polychrome textiles that actually have Christian iconography. In general, these are textiles that have a strong Byzantine influence not only in their style, but also in their iconographic repertoire. In addition to the crosses, the typology and decoration of Byzantine influence clearly alludes to victory over death. One of the most characteristic iconographic themes, for which we have identified several specimens in the collections of CDMT, MTIB and MNAD forming *orbiculi* and sleeve decorations, is the Joseph cycle from the Old Testament, whose scenes, most of the time stand out against a red background and present few iconographic variants.[72] This suggests a pattern that was repeated often in the 8th or 9th centuries, around an observation based on the chronology provided by radiocarbon dating.[73] The popularity of this theme and linking the stories with the country, suggests a form of manifestation of the identity of the Egyptian people and their rejection first of their Byzantine rulers and then of the Muslims.[74] For Maguire, the Joseph scenes had a protective character and the episodes were comparable to those in the life of Christ.[75]

The textiles with Christian iconography where we can securely identify the subject matter are few, but we would like to highlight a possible Epiphany preserved in a fragmentary form in the MTIB (Fig. 18.18), and the scene of Daniel in the lion's den embroidered (Fig. 18.12) on a child's robe in the MOBM.[76]

The latter presents two scenes divided into two registers on the front of the robe. Located on either side of the neck, the top register depicts two doves in a frontal position each holding a laurel branch with a central cryptogram that could represent the *iota* and *chi*. The lower register, located in the centre of the robe, represents Daniel in the lion's den, which has led us to think of a probable funerary context for this robe, with a functionality related to the transition and salvation of the soul of the dead since Daniel was invoked in the *Ordo commendationis Animae*, which were prayers of salvation that established the parity between the deceased and those involved in scenes of salvation from the Old Testament.[77]

[72] Morral i Romeu 1999 141, 207; Cabrera and Rodríguez 2007 135, fig. 6.
[73] Cabrera and Rodríguez 2007 135, 137, fig. 6. Schieck 2007 176–177.
[74] See Flück 2008.
[75] Maguire 1990, 223.
[76] See also the scene of Daniel in MNAD (Rodríguez Peinado 2002, 39, fig. 29).
[77] To date, there are no comparable elements in regard to colouring, embroidery and decorative style that would suggest

Fig. 18.18 Fragment (MITB-32878) decorated with a possible Epiphany scene. © Museu Tèxtil i d'Indumentaria.

More abundant are the textiles where haloed figures may represent saints. Among these, holy men enjoyed special devotion in Egypt.[78] It is not easy to interpret many of these Christian scenes, as evidenced by their fragmentary state or because they appear with other motifs that make it very difficult to discern their meaning. Among the figures with halos, Christ is recognized when the crossed nimbus is represented or when he carries a cross, which is a reference to his victory over death.[79]

Although many of the motifs that make up the repertoire of textile decoration seem to have an ornamental character, as Maguire has suggested, it is possible that they could also fulfil an apotropaic function by providing protection to the recipients. This protection could appear in the shape of clothing or in the great decorative textiles used in the creation of the liturgical space that was displayed during the liturgical celebrations, which were attended by the followers of the most widespread religions of Late Antiquity as they were the Dionysian and Christian cults.

Chronology

The lack of documentation of the archaeological context for the Coptic textiles has makes it very difficult to place them in a specific chronological framework. Nevertheless, the development of the ^{14}C technique has opened new avenues to date organic materials, in this case textiles. Between 2003 and 2012, 29 radiocarbon dates were conducted under the auspices of this project at Beta Analytic Inc. in Miami and London. The results of the chronology obtained from our samples gives a date range from the end of the 1st century AD (MNAD-13963) to the mid-9th century (Table 18.6).

a serial production of this type of tunic. In respect of the iconography of Daniel in textile production, the following examples should be emphasized: a textile of Egyptian origin, probably Coptic, preserved at the Museum of Berlin, in which Daniel appears in the orant position dressed in Persian fashion and surrounded by two lions while he receives a plate and a cup from the hands of Habacuc: Strzygowski 1901, 91; and the mortuary shroud of Saint Victor from the Treasury of the Cathedral of Sens: De Récy, 1913, 185, fig. 136.

[78] Rodríguez Peinado 1993, 228–230.

[79] Morral i Romeu 1999 166, 198; Rodríguez Peinado 2002, 32, fig. 22.

If we exclude the first dating, which shows a very early chronology demonstrating the importance of the textile industry in Roman times, the remaining textiles can be framed between the 3rd and the 9th centuries, and their characteristics allow us to established three well defined chronological groups: the first ranging from the beginning of the 2nd century until the beginning of the 5th century; the second ranging from the 5th century to the beginning of the 7th century, and the third ranging from the 7th century to the mid-9th century.

Table 18.6 Radiocarbon dates (analysis by Beta Laboratory).

Sample	C14 dating (calibrated)
MNAD13963	40–250AD/1900–1570 BP
MNC1711	140–380AD/1810–1570BP
MNC529	210–390AD/1740–1560BP
MTIB27894	210–390AD/1740–1560BP
MAN16266	210–390AD/1740–1560BP
MOBM5	230–420AD/1720–1530BP
MTIB27888	240–420AD/1710–1530BP
MNC1710	250–420AD/1700–1520BP
MAN15601	250–430AD/1700–1520BP
MTIB36372	250–430AD/1700–1520BP
MOBM2	260–520AD/1690–1430BP
MOBM36	380–550AD/1570–1400BP
CDMT2705	400–540AD/1550–1410BP
MOBM3	410–590AD/1540–1360BP
MNAD13948	420–600AD/1530 to 1350BP
MOBM17	420–600AD/1530–1350BP
MOBM37	420–610AD/1740–1560BP
MTIB28172	430–460AD/1520–1320 BP
MTIB28162	430–640AD/1520–1320BP
MOBM18	440–490AD/1510–1460 BP and 520–640AD/1430–1310BP
Cas 1	440–640AD/1510–1310BP
MTIB49391	450–450 and 460–480 and 530–640 AD/1500 BP and 1490–1470 BP and 1420–1300 BP
MAN15062	450–640AD/1500–1300BP
MOBM16	660–780AD/1290–1070BP
CDMT3869	660–660AD/1350–1290BP
MTIB32877	660–770AD/1290–1180BP
MTIB37682	660–870AD/1290–1080 BP
MTIB27882	660–880AD/1280–1070BP
MNAD13955	700–900AD/1250–1050BP

The dates obtained are comparable to those that have already been published for the Abegg Stiftung's textiles[80] as well as for the ones analysed by A. de Moor and Van Strindock.[81] The chronological relation between all the studies carried out for the textiles will allow us to have a deeper understanding of the textile production in Egypt, although we cannot exclude the possibility that some of the textiles, due to their uniqueness, were imports.

Regarding raw materials, the pre-eminence of linen is ubiquitous, even though from the 7th century onward wool fabrics in both warps and wefts were more abundant.[82] In the case of hemp, it appears that it is related to an early chronology and it is exclusively used for very specific decorative details (MAN-16226[83] and MTIB-27889: Fig. 18.3). In addition, we have been able to corroborate the use of a greater number of wefts in later periods.[84]

The use of similar dyes over time also gives an idea of continuity. The extensive presence of madder, weld and indigo are also noteworthy. The appearance of other dyestuffs like dyer´s broom, could give an idea of a local production, while the lac dye would indicate a later chronology and a foreign provenance. Nevertheless, it is interesting to observe that the same dyes were used for the various wool and silk fibres alike. By using mixtures of dyes or mixtures of threads intermediate colours were obtained (Fig. 18.2). Finally, we have determined potential mordants by doing an elemental analysis, which has established that alum is present in nearly every colour dyed and that iron salts and copper were used for changing shades of colour.

The parts of the decorated forms (*tabulae*, *orbiculi*, *clavi*) and the textile techniques could also survive over time, although the use of supplementary wefts with linen or/and wool loops always refers to the first chronological group. The exception is a fragment (MTIB-49931) dated to the mid-6th century or early 7th century. A similar case occurs with the use of the flying shuttle for decorative details, a technique that seems to have declined over time: having determined that the chronology for the studied textile samples was late, these should be connected with the mid-6th century and the early 7th century (MTIB-49931).

The same can be said of the decoration. From the Hellenistic motifs, such as knots, geometrical compositions or vine scrolls, created over a monochromatic background with decorative wefts, textile decoration moved to polychromatic compositions with a landscape full of Nilotic motifs (demonstrating an tendency towards *horror vacui)* which could allude to ideas of abundance, mythological (Figs 18.7a, 18.15 and 18.16), Dionysian, hunting scenes or *venationes*, etc. The textiles from a later chronology develop Christian themes inspired in the Old Testament, especially in the Joseph Cycle, the Gospels and the Saints.

In conclusion, it should be noted that these projects have allowed us to uncover important textile collections, whose next publication will be a major boost to textile studies, since the interdisciplinary approach has created new data and a better knowledge of these collections as well as it has helped to create a working methodology.

[80] Schrenk 2004, 476–478.
[81] De Moor 2007 99–111; De Moor 2011, 261–271; Van Stryndock *et al.* 2004, 237–244; Van Stryndock 2007, 112–114.
[82] Pritchard 2005, 83.
[83] Cabrera *et al.* 2009, 92.
[84] Pritchard 2005, 60–61.

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19. A New Approach to the Understanding of Historic Textiles

Pilar Borrego and Carmen Vega

This chapter focuses on the methodology used and results obtained in the interdisciplinary study carried out in the research department of the Cultural Heritage Institute of Spain (IPCE), in response to the need to conserve and document cultural heritage textiles.[1] The study was applied to the Soler Vilabella collection of 'Coptic' textiles from the Museum of Montserrat, Barcelona.[2]

The fabrics were admitted to IPCE for restoration.[3] The collection had serious alterations produced by:

- An active attack by dermestidae,[4] which had caused a partial loss of material.
- Accumulation of dirt, salts and deposits of organic debris from the corpse that altered the stability of pH values. This was further aggravated by acid vapours released by the wood of the old mounts.

[1] The authors want to thank Tomás Antelo, Miriam Bueso and Ángeles Anaya for their invaluable help in data collection. This research would also not have been possible without the help of our colleagues María Antonia García, Jose Vicente Navarro, Elena Gónzalez, Ana Albar, Estrella Sanz, Ángela Arteaga and Marisa Gómez, from the chemistry laboratory and Margarita Acuña, Sonia Santos, Lidia Santalices, Mónica Enamorado and Nataly Herrera, from the textile conservation department. Marián del Egido provided the work conditions that allowed this interdisciplinary project to go forward. We are grateful to her for this and many other things! Thanks to Professor Sabine Schrenk for her much appreciated comments on the collection of Montserrat Abbey. Thanks to Silvia Saladrigas from the Centre de Documentació i Museu Tèxtil de Terrassa for her invaluable and disinterested help. We also want to thank the museum for giving us the opportunity to work with their wonderful staff. Thanks to Nuria García-Agulló for her professional translation job. Finally, we want to express our gratitude to the editors for their constructive criticism of the earlier versions of this chapter.

[2] The collection, composed of 39 textiles, contains five complete pieces: two adult's tunics with sleeves (Inv. no. 7 and 8), two children's tunics (Inv. no. 36 and 37) and a veil (Inv. no. 3). The rest are fragments of clothing of different sizes which could correspond to a tunic or robe (Inv. no. 4, 6, 9, 10a, 10b, 10c1, 10c2, 11, 14, 15, 16, 18 , 19, 21, 22, 24, 25, 26, 27, 28, 29, 33, 34, 35), a fragment of a shawl (Inv. no. 1) and ornamental fabrics, including two hangings (Inv. no. 2, 5) (Turell 2004, 145–152). We were unable to identify the function of some fragments, due, in several cases, to their small size, and in other cases to the fact that they were used interchangeably in different articles of clothing and furnishing. (Inv. no. 12, 13, 17, 20, 23, 30 and 32). The collection was the object of study of the R&D project 'Technological and chronological characterization of Coptic textile manufacturing: backgrounds of Early Medieval Spanish textile manufactures'. HUM2005-04610. Finally, we want to express our gratitude to the editors for their constructive criticism of the earlier versions of this chapter.

[3] Restoration project carried out by Kronos services SL restoration, under the technical direction of Margarita Acuña (IPCE).

[4] Nieves Valentin, (IPCE report). The study carried out diagnosed that the collection had suffered a significant attack by dermestidae. In order to eradicate the plague, the set was placed in the same trays that had been used for its transport and enveloped in Veloxi® plastic bubble wrap. The inert gas used was high purity nitrogen, which was humidified to maintain an average relative humidity of 40%.

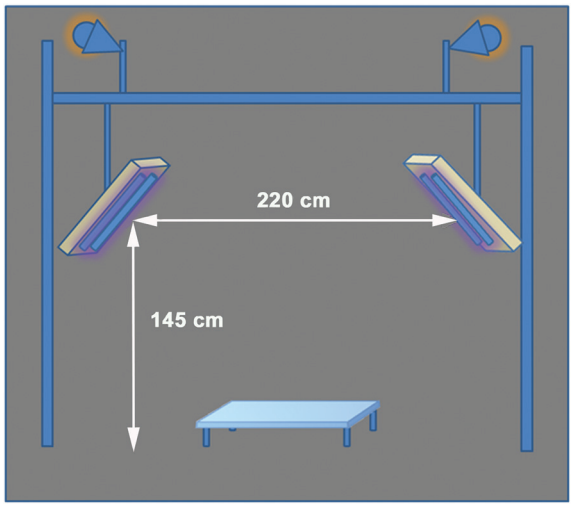

Fig. 19.1 Lighting distribution for capture of images. © IPCE physical studies.

- Oxidation of constituent materials and loss of flexibility as a result of the aging of the fibre.
- The exhibition mounts were not appropriate. Some fabrics had deformations and folds that created specific tensions and it was evident in some cases that fabrics had been bent intentionally to fit the size of the old mounts.

Multispectral analysis

Multispectral analysis has proven to be a fundamental tool that offers key information both for the technical study of tissues and the selection of sample points for the analysis of textile fibres and dyes. It involves a comparative study of images taken in the visible and near infrared ranges, by ultraviolet fluorescence and high-resolution digitalized X-rays.[5]

General conditions for the capture of images

The images were all taken in a dark room. Figure 19.1 shows how the lighting was arranged in the room to capture images in the visible (FV), near infrared (FIR), and ultraviolet fluorescent ranges (FUV). The halogen lights were directed on the white wall to ensure a diffuse illumination of the piece. To induce fluorescence, four tubes measuring 1.2 m long were used (Mazda-Fluor Lumiere-Noir brand, with a wavelength of around 360 nm), distributed two by two on the sides of the textile. This configuration was maintained for the capture of all the images.[6]

The textile was placed on a flat surface at about 30 cm from the ground. A digital Nikon D-100 camera was set up on a column of photographic reproduction, thus allowing it to capture images of the entire surface of the fabric and ensure that the distance between the fabric and camera lens was always the same. Shutter clicking and exposure parameters were controlled from the computer connected to the capture device.

In all cases a 50 mm focal length objective was used. In order to select the fabric underpinning the Coptic textiles, different materials were tested, and a fine ply cotton producing a pale pinkish fluorescence was finally chosen.

In most cases, the size of the textile fragments permitted the capture of only one image in each field of the spectrum. Larger textiles required more images, which were taken sequentially and with an overlap between them so that they could later be joined together by the VARIM program.[7]

The exposure time to ultraviolet radiation was 20 seconds per shot. For larger textiles, the total exposure time never exceeded 10 minutes.

[5] X-rays were taken by Thomas Antelo and Miriam Bueso, operator and supervisor of the X-ray facilities of IPCE. The shooting conditions for all cases were: 16 Kv, 5 mA, 100 sec, at a distance of 1.5 m. The digitalization of the X-rays (508 pixels per inch) was carried out by Angeles Anaya. IPCE internal report.

[6] Vega and Antelo 2011, 125.

[7] Antelo *et al.* 2006, 87.

Observations

X-ray range

The different shades of grey in an X-ray should be understood as the levels of opacity that different textiles present to the passage of radiation. Thus, more radio-opaque zones are whiter and correspond to areas with a higher yarn density or those threads that by their nature (matter, thickness, processing) offer more resistance to the passage of X-rays. We should also keep in mind that what we are seeing is the projection of the fabric on a plane, as if it were a white shadow on a black background.

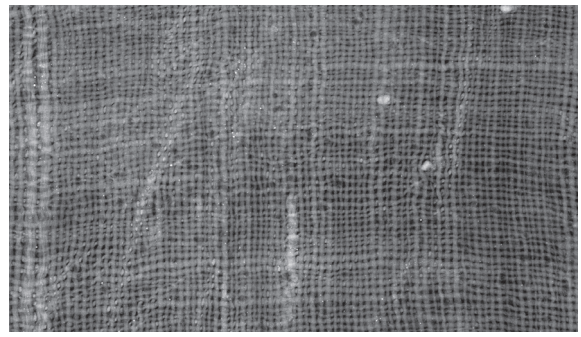

Fig. 19.2 Detail of the X-ray of tunic no. 37 which shows the marks caused by the insect attack. © IPCE physical studies.

Marks due to external agents

The insect attack suffered by tunic no. 37 appears in an X-ray as small discontinuities of absorption with a rounded form. Although the thread has not been totally eliminated, its lower resistance to the passage of radiation makes it appear darker. (Fig. 19.2).

Another example of marks caused by external agents and observable in an X-ray can be seen in the results obtained for fragment no. 1 (Fig. 19.3). At first glance, we can clearly see the decoration area, which has the highest yarn density, standing out from the ground weave due to its greater opacity to X-rays (Fig. 19.4). However, in the ground and towards the centre we see a whiter area of irregular shape that cannot be attributed to a higher yarn density. It seems here that the threads have been impregnated with some material (Fig. 19.5). In the visible image we see a reddish stain extending below the right *tabula*.

Fig. 19.3 Image of fragment no. 1 in the visible range. © IPCE physical studies.

The study of the constituent material in this area by X-ray diffraction (XRD)[8] allowed us to identify red lead (minium, Pb3O4) as the main compound. This is a pigment which, given its composition, could leave a radiographic mark and is probably not used in Egypt prior to the Roman period.[9]

[8] José Vicente Navarro, IPCE internal report.
[9] Cartwright and Middleton 2008, 59.

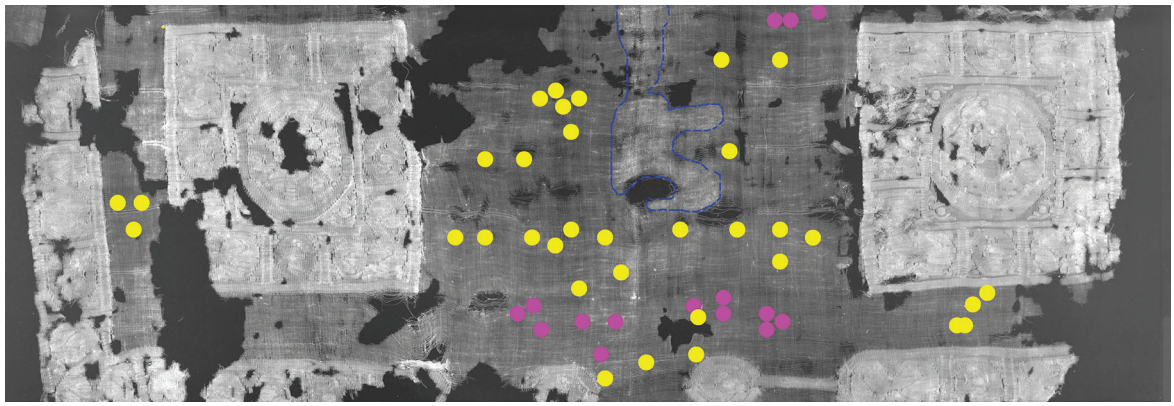

Fig. 19.4 X-ray of an area of no. 1 that includes part of the decoration. The blue line surrounds an area of greater X-ray absorption. The yellow dots indicate the areas with weft yarns that "go and return". The purple dots indicate the area with crossed weft yarns. © IPCE physical studies.

Discontinuities in the yarn framework

In this same textile (no.1) we can see threads inserted at a specific point and running through a small area. This effect, marked in yellow on the X-ray (Fig. 19.4), could be attributed to an attempt to balance two areas of the textile in order to maintain the horizontality of the weft.[10]

Most of these yarns are concentrated in the central area. If we establish the equidistant line between the two tabulae as the central axis, we see that most of the yarns on the left have a '>' form, while those on the right present the inverted form '<' (Fig. 19.6). On other occasions, the weft-path retreats a small space backwards to later resume its original direction until reaching the opposite end (Fig. 19.7).

If we look at the ground weave of the fabric, above and below the *tabulae*, we see weft threads changing levels but not direction (Fig. 19.8). These are marked in purple on the X-ray image (Fig. 19.4).

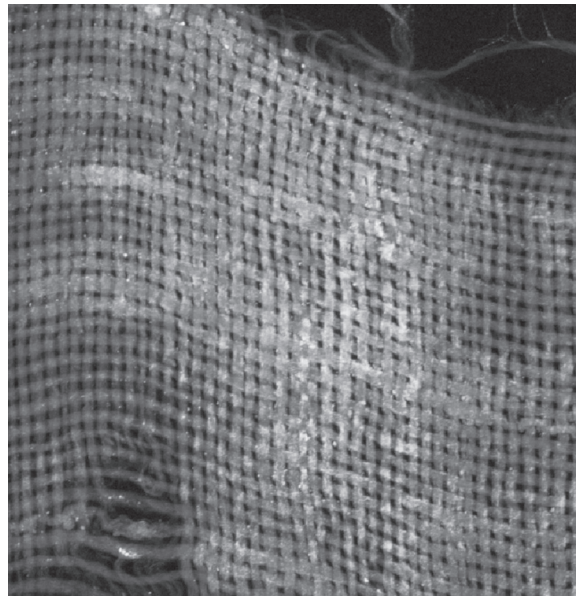

Fig. 19.5 Detail of the X-ray of no. 1 where we can see a substance impregnating fibres. © IPCE physical studies.

Near the point where the angular decoration band (*gamulae*) changes direction, and at the same height where the crossing wefts occur, we can see the weft yarns turn in the ground weave of the textile. This effect cannot always be fully appreciated due to the seam that joins the background weave to the decoration.

[10] De Jongue 1999, 4–5.

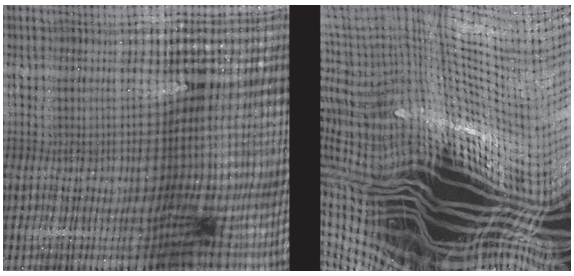

Fig. 19.6 "Go and return" weft yarns of no. 1 as viewed in the X-ray. © IPCE physical studies.

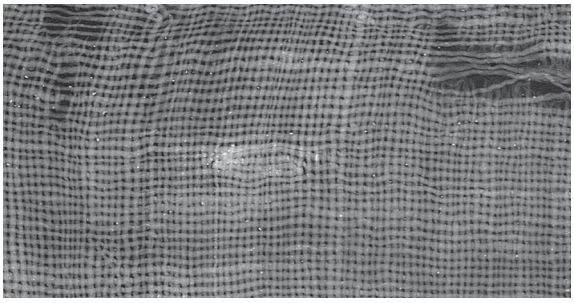

Fig. 19.7 X-ray showing the change of weft direction in a small area of no. 1. © IPCE physical studies.

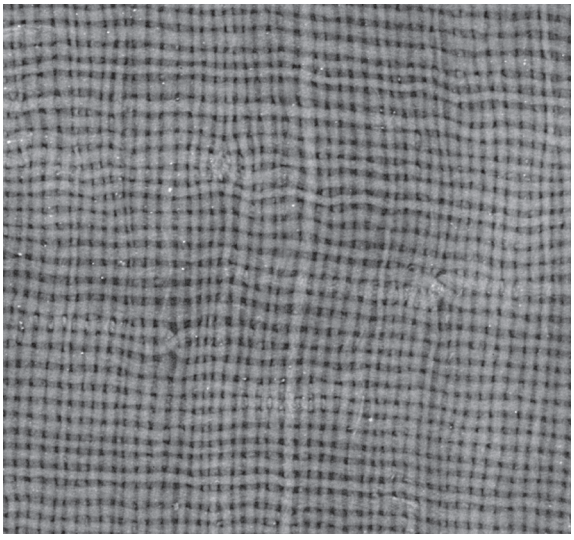

Fig. 19.8 X-ray showing crossed weft yarns in no. 1. © IPCE physical studies.

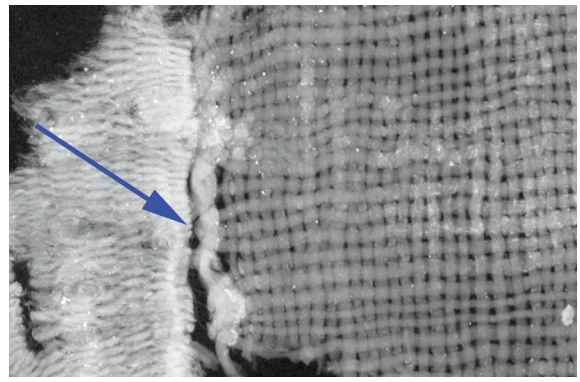

Fig. 19.9 X-ray showing detail of no. 1. Weft yarns turning where the ground and decoration meet. © IPCE physical studies.

In this slit we see how two picks work alternately, with the first pick passing to the third place and the second to the fourth place. These two threads, which are meant to alternate with one another, work together at a certain moment, moving in opposite directions until they meet. The crossing takes place at this point, when, once the shed of the tabby weave has changed, each pick continues in the direction it was moving in.

De Jonghe has raised the possibility that more than one weaver worked on these fabrics. This would explain not only the crossings of weft, but also the fact that in the two *tabulae* a different material was chosen to execute the faces of the figures, in one linen, in the other wool.

The example described clearly demonstrates the possibilities offered by high-resolution digitalized X-rays. Thanks to them, we can follow the weft and warp threads on a computer screen, and gain invaluable data and insights into the ways of working in the loom.

Ultraviolet radiation

Differentiating linen from wool

The images obtained from fluorescence in the visible range caused by ultraviolet radiation

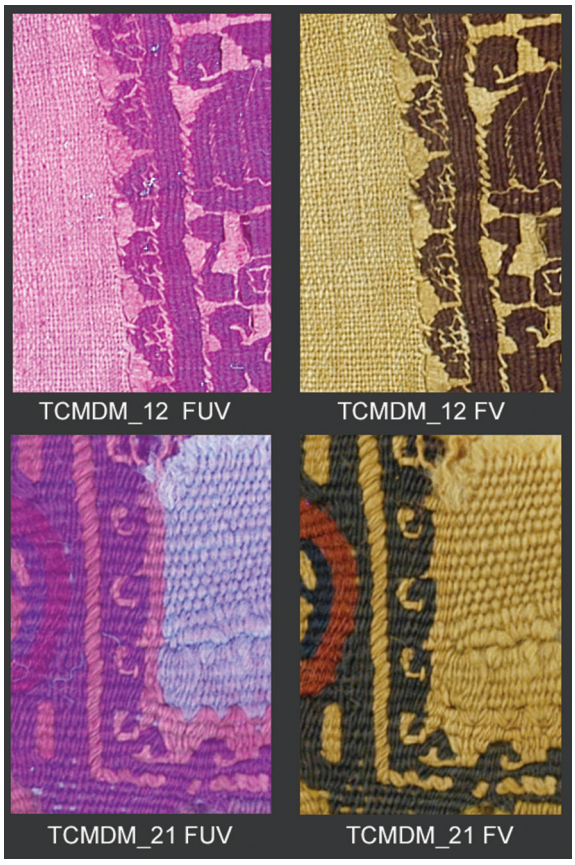

Fig. 19.10 Detail of the images obtained by induced ultraviolet fluorescence (FUV) and in the visible range (FV) for two textiles: no. 12 (linen warp) and no. 21 (wool warp). Note that in the area without decoration where warp and weft were made with the same type of fibre, the coloring in fragment no. 12 is pink and in fragment no. 21 is blue. © IPCE physical studies.

allows us to distinguish linen from wool fibre if they are not dyed. In the capture conditions used, wool presented a bluish fluorescence and linen a pinkish one.[11] Although the tonality and saturation of blue and pink fluorescence can vary widely in different textiles and even within the same piece (due to stains, for example), if the warps are not dyed, we can always distinguish one colour from another. Figure 19.10 offers two clear examples of the different fluorescence presented by two textiles from the collection.

In this image we also see that in fragment no. 21, which has a wool warp, part of the decoration was done with a thread that in the visible range has the same colour as the thread in the smooth part, but the two present different fluorescence. The threads with pink fluorescence are linen, as demonstrated also by the fibre analysis.

Tunic no. 18 has a red wool warp, giving it a purplish fluorescence, and making it difficult in this case to identify the nature of the fibres from the images captured in the different light ranges.

The characterization of the fibres by transmitted light microscopy, the drying twist test and the Herzog effect observed with polarized light, shows the prognosis deduced from the images obtained by UV fluorescence. It also suggests the most favorable area for capturing samples, based on the special characteristics it may offer for carrying out the study. Table 19.2 (see pp. 394–398) shows the results of the fibre analysis.

The intensity of the ultraviolet fluorescence obtained in the cross section of the linen fibres and observed by optical microscopy with Wood's lamp, varies from a blue tonality for fibres that in the visible range appear as white or very pale, and greenish or greenish brown tones for the rest.

The state of conservation of the four complete tunics (nos. 7, 8, 36 and 37), with a marked loss of flexibility in the linen fibres, along with the result obtained from the observation of their cross sections by ultraviolet fluorescence microscopy, where they presented a greenish-brown tonality, prompted us to analyse them to see if there was some compound responsible for these anomalies.

[11] Hemp, cotton and even silk fibres also presented a pink fluorescence, in the capture of image conditions used in this study. The fibre analysis conducted on this set of textiles showed that the cellulose fiber employed was linen.

Table 19.1.

Inv. no. 12	Inv. no. 14	Inv. no. 15	Inv. no. 20
Inv. no. 28	Inv. no. 27	Inv. no. 25	Inv. no. 23
Inv. no. 33	Inv. no. 34	Inv. no. 35	Inv. no. 13

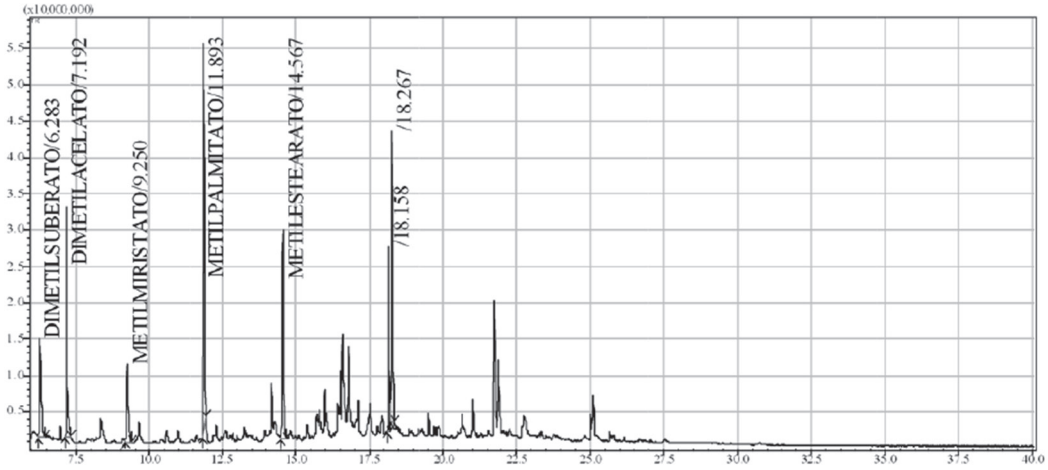

Fig. 19.11 Chromatogram of the weft of fragment no. 32, obtained by gas chromatography–mass spectrometry (dimethylsuberate, dimethylacetate, methylmiristate, methylpalmitate, methylestearate) © IPCE.

The result of the analysis effected by gas chromatography-mass spectrometry[12] revealed the presence of a compound of lipophilic or fatty nature, which could be a drying oil. This may be responsible for the extreme fragility of the garments, as well as explain the intensity of their fluorescence in the visible range induced by ultraviolet radiation.

The same oil was detected in fragment no. 5, as well as in no. 32, where one can clearly see how it impregnates the entire surface. In this latter case, the coloration of the cross section was a greenish brown. (Fig. 19.11).

Grouping of textiles by their image characteristics: linen

Digital images allow us to easily compare fabrics and detect similarities in the ways these respond to different tests.

Figure 19.12 shows a screenshot of the Photoshop program, in which we see an open set of digital files corresponding to fabrics as they appear in visible and ultraviolet ranges. Each window displays an enlarged detail of the fabric.

These fabrics all belong to the group defined as ‘linen warp textiles’ and are arranged as shown in Table 19.1.

The tonality obtained in both visible and ultraviolet ranges for both linen and wool threads of the decoration allows us to group them as follows:

[12] María Antonia García. IPCE internal report.

Group 1: nos. 12 and 13
Group 2: nos. 14, 15, 34 and 35
Group 3: nos. 25, 27, 28 and no. 33

Fragments nos. 20 and 23 present tonalities of wool and linen yarns that differ from one another, as well as from the rest of the fragments in the comparative study of images.
The fragments in Group 1 and 2 can be attributed beyond any doubt to a common origin. That is, all fragments in the group clearly belong to the same piece of textile.

The study conducted on fragments nos. 25, 27, 28 and 33 shows that they present a very similar warp and weft density, offer the same signal when exposed to UV radiation and have the same combination of filaments of different colors in the purple yarn of the decoration. These coincidences lead us to believe that they belong to the same piece, a linen tunic with *tabulae* decoration at shoulder height.

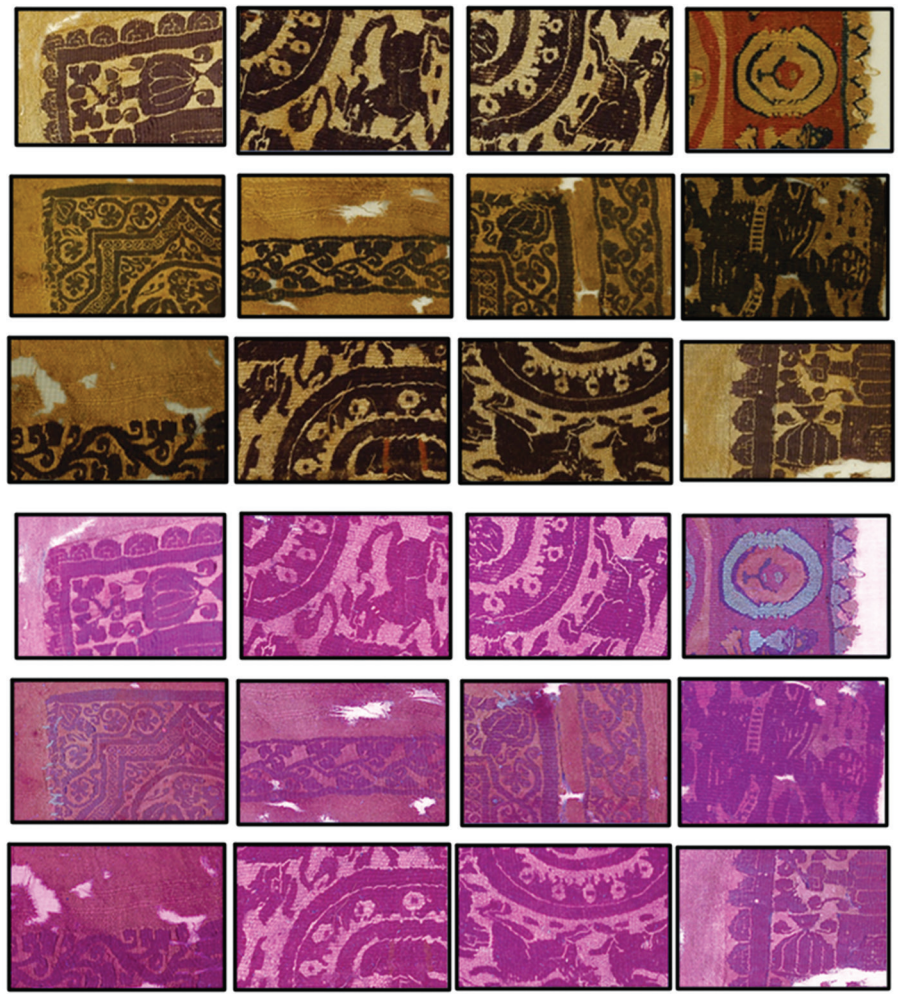

Fig. 19.12 Capture of screen from Photoshop program, in which there are an open set of digital files corresponding to fragments in the visible range (above) and ultraviolet light range (below). © IPCE physical studies.

The *tabula* from fragment no. 25, similar in design to no. 28, presents certain differences, which lead us to suspect that it comes from another piece of clothing or furniture. (Fig. 19.13)

It is smaller in size and the central motif lacks the elements assigned to no. 28. Observing the width of both fragments, we find a difference of 1 cm. Furthermore, the warp grouping in the transition from the ground weave to the decoration in fragment no. 28 varies by two, and occasionally four threads, and by three threads in the case of no. 25. This same grouping is found in the *clavus* of fragments 28 and 27, whereas in the two sleeve bands the grouping is of 2–3 threads, in which one in six is left out.

If we take into account that these tunics were made in one piece or two pieces on the loom and that, as they were being woven, they were rolled to always maintain the working area at the same height, being off by just one centimetre in the measurements of the *tabula's* decoration meant that upon reaching the central motif, in which a fight between a man and lion is depicted, not all the elements would fit. This explains why in fragment 25 the fighter's cape has been omitted, plant motifs have been simplified, the opening of the man's legs has been reduced and the slant of the lion's tail has been modified, all of this no doubt in order to occupy less space and adapt the motifs to the available width.

This variation in design and the different warp groupings in the two fragments has resulted in two slightly different motifs, which we can conclude are due simply to a mistake by the artisan, much like numerous other human errors that can be seen in the 4 fragments. Another element that leads us to think that both fragments (25 and 28) belong to the same piece is the seam thread that joins the slit of the two *tabulae*. In both cases there are remains of linen thread (S2Z), although most of the sewing was done with wool (S2Z), which may have been executed later to mend openings produced by the garment's use.

Fibre analysis indicated great deterioration in the wool seam thread, leading us to rule out the possibility that these were made once the pieces had been recovered from burial. In addition, the type of thread used was S-twist Z-plied (S2Z), a habitual practice in the seam threads of Coptic

Fig. 19.13 Fragments no. 25 (left) and no. 28 (right) © IPCE physical studies.

clothing. Moreover, fragment 27 fits with 28 and presents a similar sequence in the arrangement of self-bands, which is a 15 picks away from the decorative motif, as opposed to fragment no. 25, which is only five.

Figure 19.14 shows a hypothetical reconstruction of the tunic. Our aim here was just to situate the fragments that had been conserved and integrate them into a similar prototype of tunic, without attempting to reconstruct the exact measurements of the original garment.

Details lost with the passage of time

The FUV image of fragment no.11 (Fig. 19.15) shows that wool thread was used to outline the human figures woven in linen, an effect that is not appreciable in the visible image and whose purpose could have been to create volume, like a kind of shading.

Tools in restoration work

Textile no. 31, which is included in the set earmarked for restoration but does not belong to the Soler Vilabella collection, presents in the

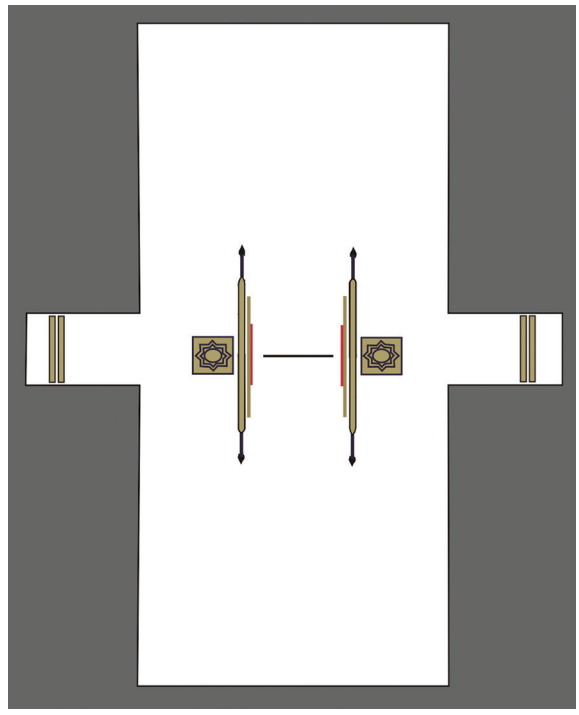

Fig. 19.14 Hypothetical reconstruction of the tunic where fragments nos. 25, 27, 28 and 33 come from. © IPCE.

Fig. 19.15 Detail of no. 11 in the visible range (left) and fluorescence induced by ultraviolet radiation (right) © IPCE physical studies.

FUV image a mottled pink spread across its entire surface. After a study conducted by specialists at the Institute, the fragment was deemed a forgery, created from the union of 19 pieces from at least five Coptic fabrics of different types (Fig. 19.16).

These fragments are linked to one other by way of a thread that crosses the fabric on its inner face and cannot be seen in the visible image, but which causes a mottled pink tone in FUV images and a beige tone in FV images in the places where the thread surfaces. The thread's route can be seen in the X-ray taken of the textile (Fig. 19.17).

Fig. 19.16 Textile no. 31 (above) and digital decomposition of the fragments composing it (below). © IPCE physical studies.

A morphological analysis of the stitching thread showed it to be mercerized cotton, dissuading aqueous treatment because of the risk of its dimensions varying if it were washed.[13]

Stains in the fabric

In fragments nos. 1, 2 and 17, all with a linen warp, fluorescent induction through ultraviolet radiation produced a different, more intense colour in the areas associated with the strings wrapping the corpse, probably caused by the exudations of the decomposing body. This colouration is homogenous on both the right and left sides of no. 2 (Fig. 19.18), suggesting that the body rested on these areas, with the central part being where it was wrapped.

One can clearly count as many as five strings running horizontally along the tissue, with the rest crossing it obliquely. The vertical marks observed probably correspond to creases in the fabric, since the mark of the strings or ribbons that wrapped the body is interrupted here. A closer look at the fluorescent ultraviolet image (Fig. 19.18) allows us to distinguish easily between crease and string marks, and even to sense their different textures.

The studies carried out on fragments no. 19 and no. 22 (Fig. 19.19) lead us to suspect that they belonged to the same garment, a wool tunic with polychrome decoration in wool and bleached linen, woven using a tapestry technique.

Piece no. 19 corresponds to the plastron of the front or back. Since it is incomplete, we cannot establish with any precision the distance

[13] Elena González. IPCE internal report.

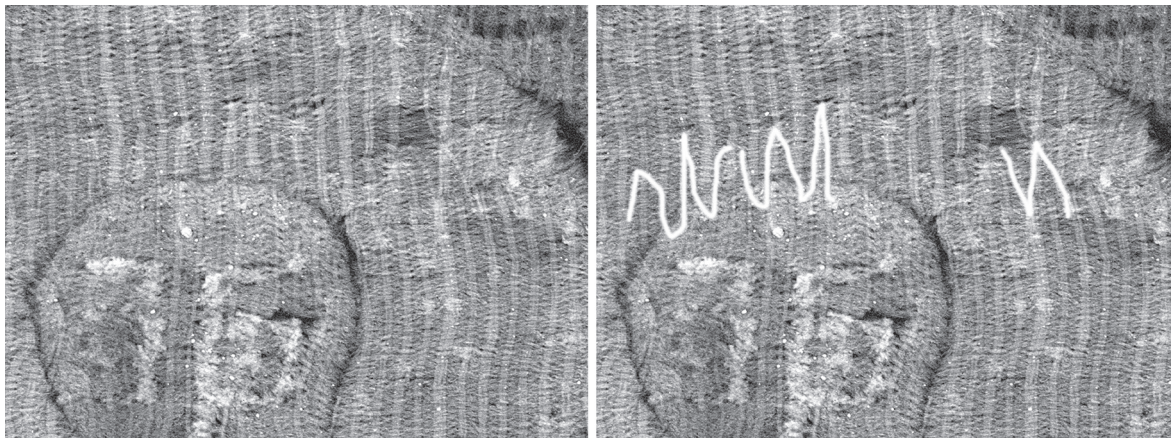

Fig. 19.17 X-ray showing detail of no. 31 and digital marking of path of stitching thread. © IPCE physical studies.

between the two *clavi*, although we can say that the plastron length is very short compared with other adult wool tunics from the same collection (no. 6), making us believe that this was a child's garment.

The decorative motif on the lower band of the plastron depicts two arcs and the beginning of a third. This band should contain at least four arcs for there to be enough space for the decorative motif on the upper register.

The fragment no. 22 has a small decoration parallel to the *clavus* elaborated with two additional wefts of triple threads and create a herringbone pattern (Fig. 19.20). This line is used as a decorative effect in the wool tunics and delimits the slit originated when they change the tabby from the ground to the pattern, with a higher density of weft.

This herringbone effect in fragment no. 22, the beginning of which we can see on the reverse of fragment no. 19, was fundamental for determining the location of both fragments on the garment. At first it appeared that no. 22 was a prolongation of the *clavus* of no. 19. However, this additional decorative weft, which marks

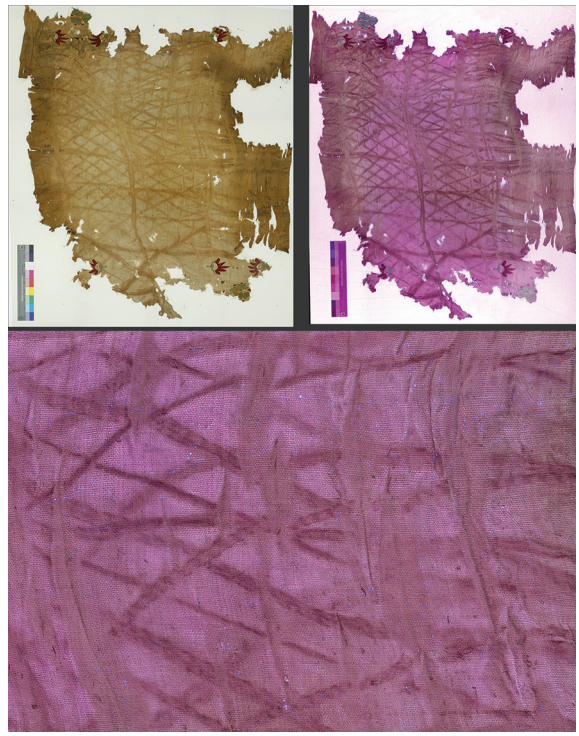

Fig. 19.18 Images of textile no. 2 in the visible range (above left) and ultraviolet fluorescence (above right). Detail of the same textile under ultraviolet light (below). © IPCE physical studies IPCE.

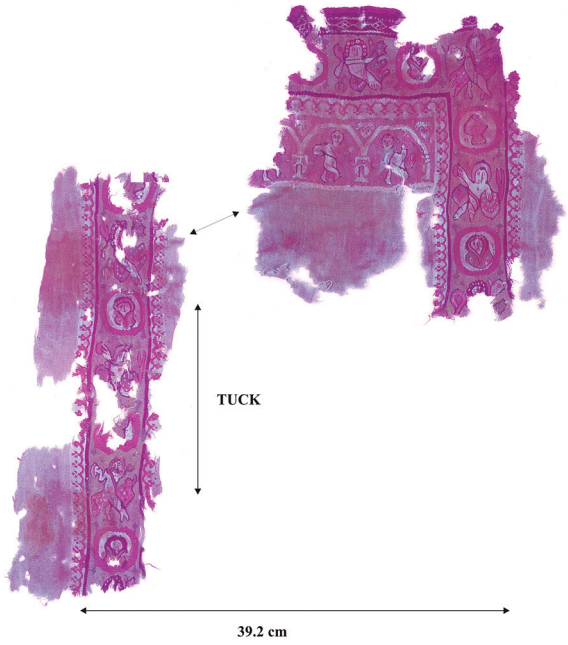

Fig. 19.19 Image obtained by ultraviolet fluorescence from textiles no. 22 (left) and no. 19 (right). © IPCE.

Fig. 19.20 Herringbone effect, obverse no. 22 (left), reverse no. 19 (right) © IPCE.

the beginning of the decorative band, clearly shows that its location could not be other than the left *clavus* on the front or the prolongation.

Images of the two fragments taken in the visible and ultraviolet fluorescent ranges (Fig. 19.19) indicate that the darker spots on piece no. 19 have a continuity on no. 22. Furthermore, fragment no. 22 presents a lighter area that may correspond to the tuck at waist level, a habitual element in these pieces. This area was protected and so has better preserved the original colors of the dyes.

Infrared range

An interesting result obtained in the infrared image of fragment no. 31 is the curved line marking the chin on the face. Although this can also be seen in the visible image, it is more appreciable in the infrared. This line only appears on the obverse of the fabric, allowing us to deduce that its greater absorbtion by the infrared is due, not to a characteristic of the thread, but rather to a material that was superimposed on the fabric. That is, the chin was deliberately painted, as were other facial features (eyes, eyebrows, nose and mouth), but subsequently hidden by the thread used later, and has characteristics offering a considerably high absorbtion of infrared radiation. (Fig. 19.21).

The normal way of executing facial features in Coptic fabrics was by means of a weft that moved in all directions, passing between one or more warps to form the corresponding drawing.

In this case, however, we see that the purple thread does not cross from obverse to reverse in the space between the two warps, but rather breaks out in most cases in the middle of a weft, in this way drawing the eyes, eyebrows, nose and mouth.

This indicates that the facial features were embroidered after the fabric was made and over a previous drawing similar to the one delimiting the chin.

The thread used for this purpose was made of a combination of different-colored filaments, much like in many Coptic fabrics, a specific feature being the use of purple in all the fragments in the trimming of fabric no. 31.

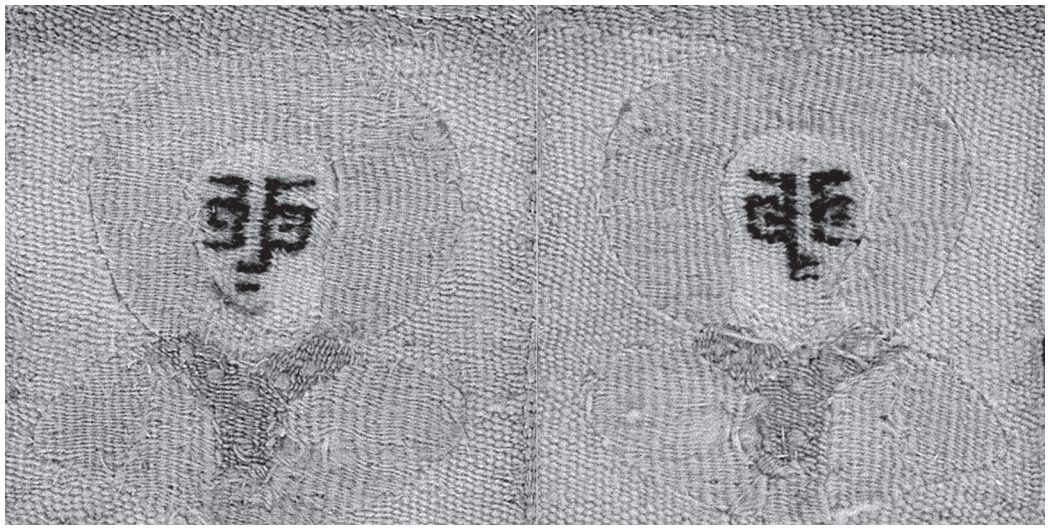

Fig. 19.21 Front and back of detail of no. 31 (near infrared). © IPCE physical studies.

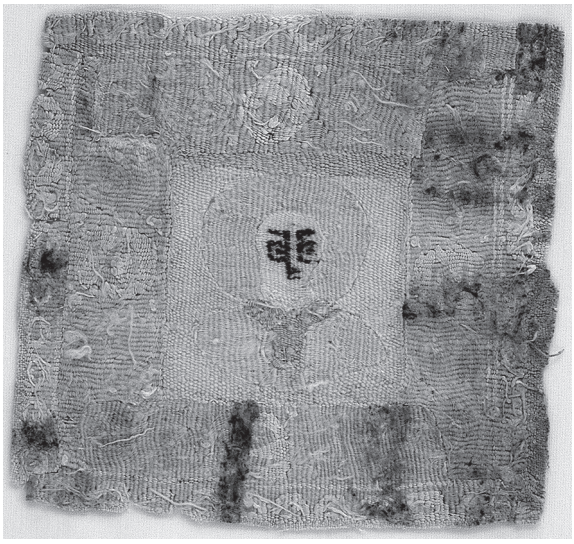

Fig. 19.22 Infrared photography of the back of no. 31. © IPCE physical studies.

A comparative study of the colouring of the embroidery thread and fragments 13–19 from textile no. 31 (Fig. 19.16) points to a similar composition, although the embroidery thread has characteristics that entail a considerably higher absorbtion of infrared radiation than the other fragments mentioned. In our dye analysis of the embroidery thread, we detected, apart from madder, indigo or woad, another unidentified red dye, which, due to its UV-vis spectrum, which only presents absorbtion in the visible area, and its high molecular weight, was in all probability a synthetic dye.[14] This dye could have been added to a thread taken from an original Coptic fabric by bathing it in a red dye solution or increasing the thread's red colouring by introducing silk filaments dyed with the possibly synthetic colouring. This would explain the extremely high absorbtion of infrared radiation occurring in the embroidery area.[15]

The results of the study in the near infrared range of this fabric show stains associated with the strings that wrapped the body, with better definition on the reverse of the textile than on the obverse (Fig. 19.22).

[14] Estrella Sanz, Angela Arteaga. Analysis by liquid chromatography tandem diodo array quadrupolo time-of-flight mass spectrometry. IPCE internal report.

[15] http://es.calameo.com/read/0000753358e5043d10a48.

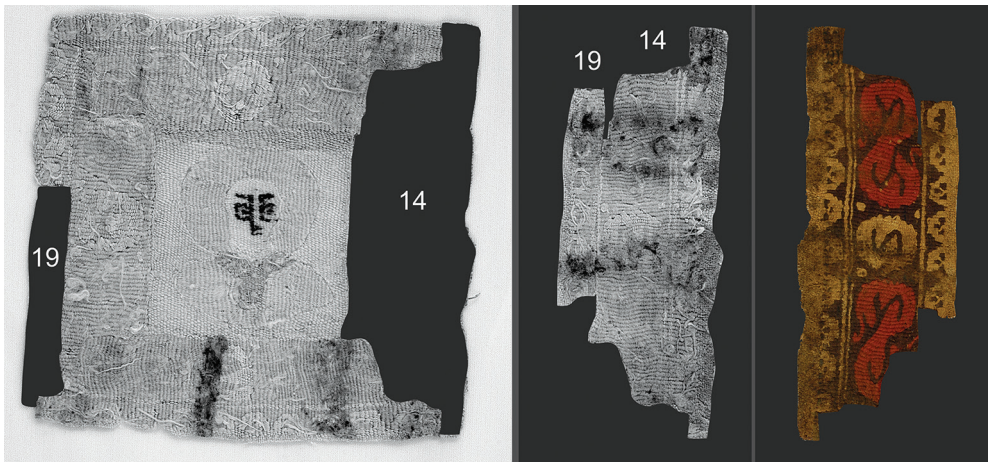

Fig. 19.23 Digital reorganization of the fragments according to the marks observed on the back of no. 31. © IPCE physical studies.

The shape and distribution of these marks suggests a relationship between fragment 19 and 13 or 14, which could have been of proximity in the fabric of origin (Fig. 19.23). If we look at the continuity of the stains and place fragments 19 and 14 together, the resulting decoration is rounded off on both sides by a sequence of semicircles. One hypothesis for this type of decoration corresponds to the vertical decorative elements that run along the front and back of the tunic (*clavi*), or the decorative bands of the sleeves.

This type of decoration is also present in the angular ornamentations or *gammulae* that delimit the *tabulae* in the lower part of some tunics, as well as in shawls and curtains.

Visible Field

Reconstruction of the design

Piece no. 21 (Fig. 19.24) was made with undyed wool tabby, with angular decoration using tapestry technique.

The decorative motif shows animals inscribed in circles alternating with polychrome floral figures. Following the direction of the warp and parallel to the horizontal decorative band, there is a slit separating the ground weave from the decoration. The slit has eight threads arranged in groups of two, four on each side of the opening. This was subsequently sewn with S-twist Z plied wool thread (S_2Z), although only the beginning of the seam has been conserved to the present day.

The fabric is fragmented on the upper right edge and conserves the beginning of a floral figure, similar to the one in the upper left corner. This motif is drawn downwards, indicating that the direction of the decoration rotates 90° at this point, reproducing a mirror image of the left band.

Figure 19.24 shows the final motif in our reconstruction. This resembles the decoration in the upper part of some tunics, with *clavi* that do not run the whole length of the front and back. However, it lacks characteristic features of these garments, such as the leaf or medallion ornamentation, and the herringbone effect delimiting the slit. If the fragment were from a tunic, it's extremely small measurements could only indicate that it belonged to a very young child.

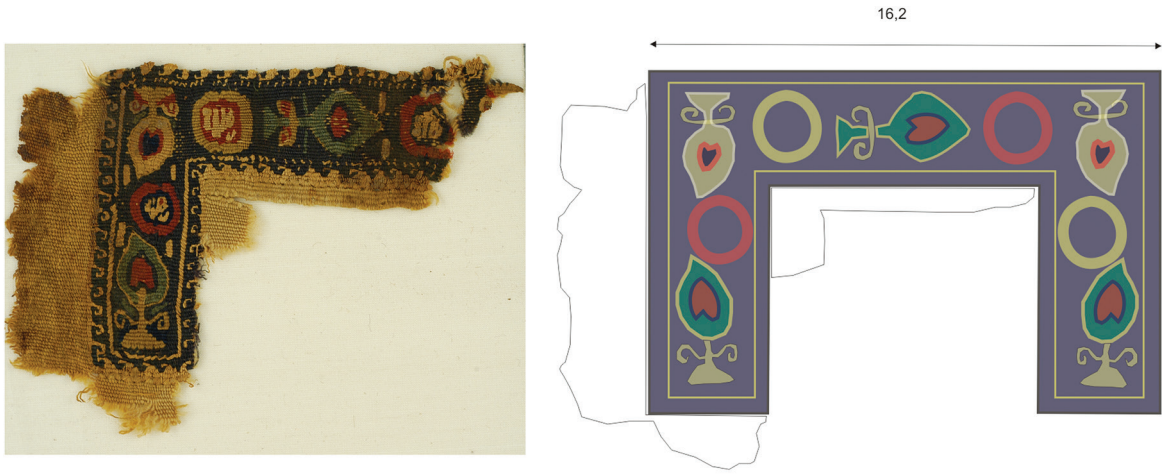

Fig. 19.24 Hypothetical reconstruction of the design of fragment no. 21. © IPCE.

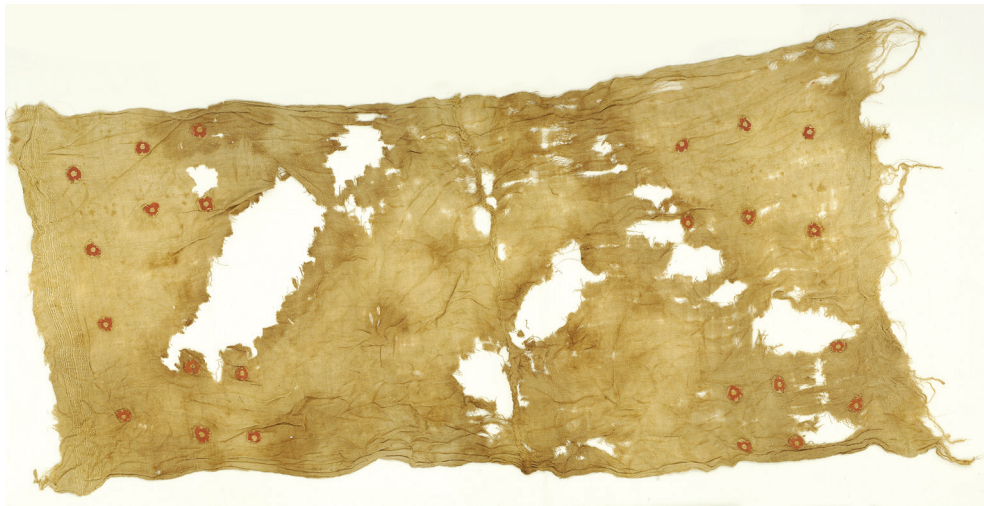

Fig. 19.25 Image of no. 3 in visible range. © IPCE physical studies.

Function and use of the garment

Fabric no. 3 (Fig. 19.25) corresponds to a linen veil, with 24 flowers applied in tapestry technique. The piece conserves both selvages and part of the fringes, which are knotted at the end.

Marks of degradation in the shape of an inverted 'V' were caused by the fold produced in the veil upon covering the head in the burial. The centre of the veil has a fold whose function is unknown. The two seams that form the fold, gathering it at the beginning and end of the piece, were done with long stitches that on occasion almost cross one another, making it difficult for a cord to pass through and wrinkle the veil.

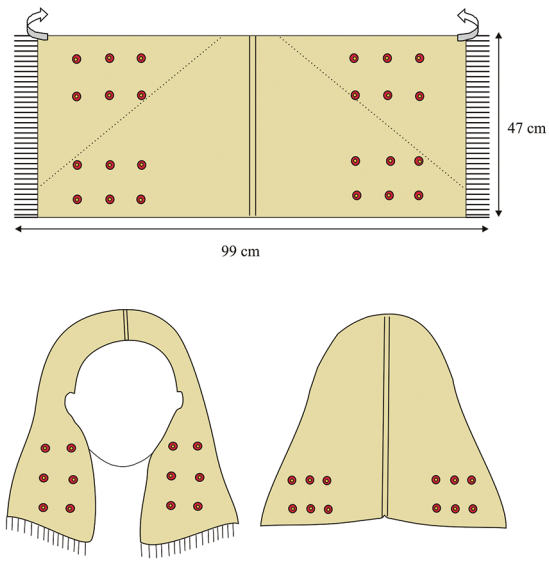

Fig. 19.26 Diagram of textile no. 3. Distribution of decorative motifs and central seam. © IPCE.

The 12 flowers applied both in the front and back, as well as in the central seam, call to mind the caps of Coptic monks, where 12 crosses symbolised the 12 apostles and the central seam provided protection from the devil's temptations[16] (Fig. 19.26).

Description of the tunics.

The collection contains four complete linen tunics, three of which were woven in one piece (nos. 36, 7 and 8), with loom widths ranging from 152 cm to 242 cm. The child's tunic (no. 37) has a hidden seam in the tuck, which has been conserved at the height of the waist and can be seen in an X-ray of the fabric. This garment was woven in three pieces,[17] first the two sleeves and body of the garment, perpendicular to the direction of the tunic, with a loom width of 71.4 cm. The selvages are arranged along the two sleeves and at waist height in the body of the garment.

The skirt of the garment was woven in two pieces using the full width of the loom. It was later joined, by way of a hem, at the front and back. (Fig. 19.27)

The decoration, done in tapestry technique, was woven at the same time as the rest of the tunic (nos. 37, 8), or else applied by sewing (no. 36). In the case of piece no. 7, the *tabulae* were inserted into the ground weave, whereas the neck and lower bands of the piece were applied.

The ornamentation is complemented by self bands, which are distributed differently in the four pieces. These wefts, on the inside of the *clavi* and near the neck, transform into a herringbone effect in tunics nos. 37 and 7.

Fragment no. 18 (Fig. 19.28) corresponds to the front of a child's wool tunic, with both applied and embroidered decoration. The threads following the fall of the garment are deeply twisted, with a thread density ranging from 9 to 11, whereas the horizontal thread density is 16–22.

The tunic does not conserve any of the selvages. The lower thread density in the wool tissues studied in the Coptic collection of Montserrat Abbey and the Archaeological Museum of Madrid, is associated with the warp of the fabric, indicating that, in this case, the tunics were made with the warp following the direction of the garment's fall.

Another illustrative detail that offers us an insight into how the tunic was made is the fold that it conserves on one of its sides.

The front is joined to this fold by two cords, one yellow and the other green, and a seam 1.5 cm away. Once the union is effected (A+B+C), the fabric turns to form the back of the tunic (Fig. 19.28).

[16] http://www.jafi.org.il/NR/rdonlyres/218BCF77-432C-490F-B6D1-
[17] De Jonghe *et al.* 1993, 41–46

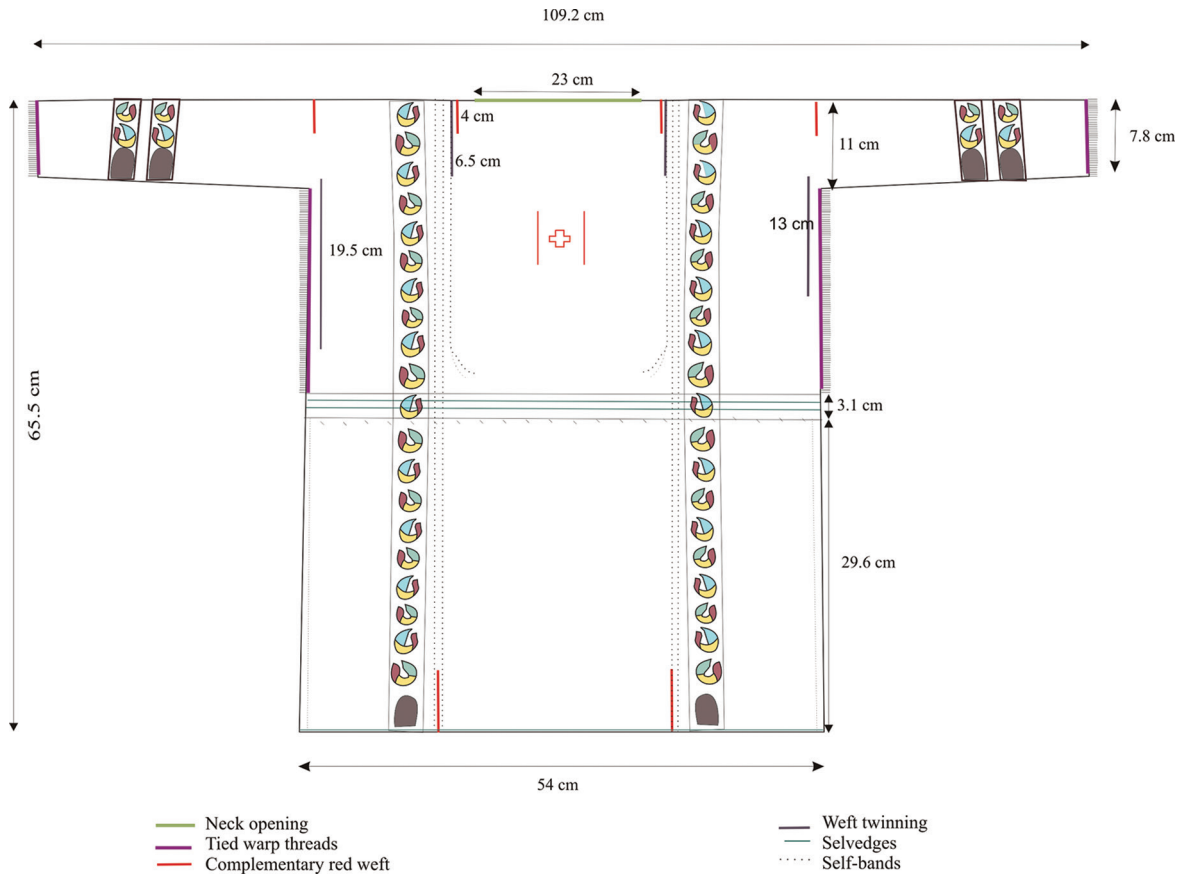

Fig. 19.27 Diagram of child's linen tunic. Inv. no. 37. © IPCE.

In the lower part, two cords are arranged perpendicularly to the other two cords, beginning at the front of the tunic and going around towards the back. The piece is cut, making it difficult to gauge the length of the cord at the back, but it seems that its purpose was to keep the fold joined with the back of the tunic in the lower area.

The upper right part features a superimposed rectangular piece that permits the collar to be opened and dresses up the garment. As on the other side, this piece is decorated with applied fabrics and finished off with chain embroidery.

Conclusions

This chapter has demonstrated how extensive use of new analytical tools and methods can shed new light in the study of Coptic textiles collection.

The techniques used in this study, infrared photography, ultraviolet-induced fluorescence and X-rays, as well as the comparative study of the results of each of these, considerably facilitated the work of experts in determining the methods used for the manufacture of Coptic textiles and garments.

Fig. 19.28 Front of child's tunic and detail of the reverse (above). Construction of lateral fold that it conserves (below). © IPCE.

The high resolution obtained with digital technology offered a useful tool for locating and studying areas of interest for conserving, restoring and conducting a technical and historical study of the pieces. The comparative study, using imaging techniques, of fragments of isolated textile pieces helped to identify them as coming from the same original piece.

Ultra-violet-induced fluorescence in particular revealed stylistic details in textile pieces that were no longer immediately visible to the naked eye. On other occasions it showed the exact place where a sample should be taken for the tissue's technical analysis.

The work carried out here clearly reflects the need for experts to collaborate in the multispectral study, characterization of fibres and techniques of textile fabrication, and has enriched our interpretation of the results. Especially in the case of Coptic textiles which often have uncertain provenance and context, this interdisciplinary research can reveal new and useful information.

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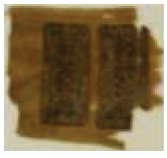
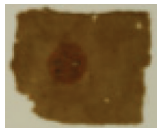
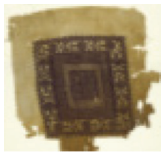
Table 19.2

Textile	Inv. TCMDM	Fibre/Weave	Colour	Material	Count/ cm	Twist	Measurements cm
	1	Warp	Undyed[2]	Linen	13–15	S	89 × 85
		Main Weft	Undyed	Linen	12	S	
		Pattern weft (Ribbed 2/2)	Undyed	Linen	29–46	S	
			Polychrome	Wool	29–46	S	
	2	Warp	Undyed[2]	Linen	11–13	S	130 × 145
		Main Weft	Undyed[2]	Linen	6–9	S	
		Pattern weft (Repp 3/1, uneven)	Undyed	Linen	19–29	S	
			Polychrome	Wool	19–29	S	
	3	Main Warp	Undyed[2]	Linen	18–19	S	99 × 45
		Main Weft	Undyed[2]	Linen	12	S	
		Pattern applied Warp	Undyed	Linen	15–17	S	
		Pattern applied Main weft	Undyed	Linen	?	S	
		Pattern applied Pattern weft (Repp 2/2)	Undyed	Linen	43–48	S	
			Red, yellow	Wool			
	4	Warp	Undyed	Linen	10–11	S	21 × 18.5
		Main Weft	Undyed	Wool	33–38	S	
		Pattern weft (Tabby)	Purple-Brownish	Wool	39–45	S	
			Undyed[1]	Linen	39–45	S	
		Flying thread 1	White	Linen	---	S	
		Flying thread 2	Undyed	Wool	---	S_2Z	
	5	Main Warp	Undyed[2]	Linen	22–23	S	200 × 108.5
		Main Weft	Undyed	Linen	10–11	S	
		Pattern applied Warp	Undyed	Linen	18–36	S	
		Pattern applied Main weft	Undyed[2]	Linen	18–23	S	
		Pattern applied Pattern weft (Repp 3/2)	Purple	Wool	41–46	S	
			Undyed	Linen	41–46	S	

	6	Warp	Yellow	Wool	9–10	S	78 × 131
		Main weft	Yellow	Wool	25–31	S	
		Pattern weft (Tabby)	Polychrome	Wool	40–56	S	
		Flying thread	Undyed	Linen	–	S	
	7	Warp	Undyed[2]	Linen	20–22	S	163.5 × 111
		Main weft	Undyed[2]	Linen	12–13	S	
		Pattern weft (Repp 2/2)	Undyed	Linen	–	S; S_2Z	
			Polychrome	Wool	43–45	S	
	8	Warp	Undyed[2]	Linen	30–31	S	173 × 141
		Main weft	Undyed	Linen	17–18	S	
		Pattern weft (Repp 2/3)	Undyed	Linen	39–60	S	
			Purple-bronwish	Wool	39–60	S	
	9	Warp	Undyed	Wool	10–11	S	19.1 × 23.4
		Main weft	Undyed	Wool	16–24	S	
		Pattern weft (Tabby)	Polychrome	Wool	45–50	S	
10a	10a 10b 10c1 10c2	Warp	Undyed	Wool	10–12	S	17.3 × 34.3 16.5 × 47.3 17 × 44.5 18 × 26
		Main weft	Undyed	Wool	36–38	S	
		Pattern weft (Tabby)	Undyed[1]	Linen	32–38	S	
			Undyed	Wool	32–38	S_2Z	
			Purple-brownish	Wool	32–38	S	
		Flying thread 1	Undyed	Linen	–	S	
		Flying thread 2	Undyed	Wool	–	S_2Z	
	11	Warp	Undyed	Wool	14–15	S	16 × 20.8
		Main weft	Undyed	Wool	14–15	S	
		Pattern weft (Tabby)	Undyed	Linen	28–32	S	
			Purple-Brownish	Wool	28–32	S	
		Flying thread 1	Undyed	Linen	–	S	
		Flying thread 2	Undyed	Wool	–	S_2Z	

	12 13	Main warp	Undyed[1]	Linen	16–20	S	41 × 35.5 28 × 38
		Main weft	Undyed	Linen	11–12	S	
		Pattern applied Warp	Undyed	Linen	16–20	S	
		Pattern applied Main weft	Undyed[1]	Linen	11–14	S	
		Pattern applied Pattern weft (Repp 2/2)	Undyed[1]	Linen	46	S	
			Purple-brownish	Wool	56–84	Z	
		Flying thread	Undyed	Linen	–	S	
34	14 15 34 35	Warp	Undyed[1]	Linen	15–19	S	29.9 × 25.7 25 × 23.7 30.1 × 26.6 27.2 × 31.2
		Main weft	Undyed	Linen			
		Pattern weft (Repp 3/3/2/2)	Undyed	Linen	16–28	S	
			Purple- brownish	Wool	28–36	S	
	16	Warp	Undyed	Wool	9–10	S_2Z	30 × 10.5
		Pattern weft Tabby	Undyed	Linen	66–72	S	
			Undyed[1]	Linen	66–72	S	
			Polychrome	Wool	66–72	S	
	17	Warp	Undyed[2]	Linen	16	S	65.7 × 113.3
		Main weft	Undyed	Linen	8–10	S	
		Pattern weft (Repp 2/2)	Undyed	Linen	30–43	S	
			Polychrome	Wool	30–43	S	
	18	Warp	Red	Wool	9–12	S	39.5 × 52
		Main weft (Tabby)	Red	Wool	16–22	S	
19	19–22	Warp	Undyed	Wool	9–12	S	25.2 × 24.3 11.7 × 35.3
		Main weft	Undyed	Wool	25–38	S	
		Pattern weft (Tabby)	Polychrome	Wool	36–59	S	
		Flying thread 1	Undyed	Wool	–	S	
		Flying thread 2	Undyed	Linen	–	S	
	20	Warp	Undyed	linen	17–18	S	28.8 × 24.7
		Pattern weft (Repp 2/2)	Undyed	linen	43–50	S	
			Polychrome	Wool	43–50	S	

	21	Warp	Undyed	Wool	7–8	S	18.7 × 13.5
		Main weft	Undyed	Wool	22–23	S	
		Pattern weft (Tabby)	Undyed	Linen	29	S	
			Polychrome	Wool	35–48	S	
		Flying thread	Undyed[2]	Linen	–	S	
	23	Warp	Undyed[2]	Linen	13–15	S	11 × 12
		Main weft	Undyed	Linen	14	S	
		Pattern weft (Ribbed 2/2)	Undyed[2]	Linen	22–23	S	
			Purple- Brownish	Wool	44	S	
	24	Warp	Undyed	Wool	8	S	28 × 24
		Main weft	Un-dyed	Wool	25	S	
		Band applied 1 Warp	Un-dyed	Linen[3]	10	S_2Z	
		Band applied 1 Pattern weft (Tabby)	Un-dyed	Linen[2]	40	S	
			Polychrome	Wool	40–50	S	
		Band applied 2 Warp	Bichrome	Wool	12	S	
		Band applied 2 Pattern Weft (Tabby)	Blue (ground)	Wool	12	S_2Z	
			Un-dyed Brocading	Linen[1]	–	S_2Z	
			Polychrome Brocading	Wool	–	S_2Z	
33 27	25 27 28 33	warp	Un-dyed[2]	Linen	20–24	S	14.5 × 12.6 6.7 × 30 24.9 × 37.4 11 × 26.4
		Main weft	Un-dyed	Linen	19–22	S	
		Pattern weft (Repp 3/3; 2/2/2/4; 2/3)	Undyed[1]	Linen	47–60	S	
			Purple-brownish	Wool	47–60	S	
	26	warp	Undyed	Wool	9–10	S	18.2 × 15.2
		Main weft	Undyed	Wool	38–40	S	
		Pattern weft (Tabby)	Undyed	Linen	36–40	S	
			Undyed	Wool	36–40	S_2Z	
			Purple- brownish	Wool	36–40	S	
		Flying thread 1	Undyed	Linen	–	S	
		Flying thread 2	Undyed	Wool	–	S_2Z	
	29	warp	Undyed	Wool	9–10	S	9.3 × 28
		Main weft	Undyed	Wool	24–30	S	
		Pattern weft (Tabby)	Undyed[1]	Linen	42–50	S	
			Bichrome	Wool	42–50	S	

	30	Warp	orange-red	Wool	9–10	S	7.5 × 13.7
		Weft	Undyed[1]	linen	38–46	S	
			Purple Brownish	Wool	38–46	S	
	32	Warp	Undyed[3]	Linen[3]	11–12	S	45.5 × 120
		Weft	Undyed	Linen	8–10	S	
	36	Main Warp	Undyed[2]	Linen	19–23	S	135 × 75.7
		Main Weft	Undyed	Linen	10–12	S	
		Pattern applied Warp	Undyed	Linen	**A.** 18–20 **B.** 16 **C.** 16–17	S	
		Pattern applied Main weft	Undyed	Linen	**A.** 14–15 **B.** 12–14 **C.** 10–12	S	
		Pattern applied Pattern weft (Repp 2/2)	Undyed	Linen	**A.** 40 **B.** 34 **C.** 52	S	
			Green	Wool	**A.** 28–32 **B.** 34 **C.** 60	S	
	37	Warp	Undyed[2]	Linen	14–17	S	109.2 × 65.5
		Main Weft	Undyed	Linen	12–14	S	
		Pattern weft (Repp 2/2)	Polychrome	Wool	39–51	S	

[1] Blue fluorescence of cross section of fibre induced by ultraviolet radiation
[2] Greenish fluorescence of cross section of fibre induced by ultraviolet radiation
[3] Greenish-brown fluorescence of cross section of fibre induced by ultraviolet radiation

20. Burial Threads: a late antique textile and the iconography of the Virgin Annunciate spinning

Catherine C. Taylor

Some of the most ordinary, yet fragile, artifacts related to death and burial are textile remains preserved in the arid gravesites of Egypt. Following the initial fascination of the late 19th century with digging up Egyptian burial artifacts, the study of late antique textiles enjoyed a revival of sorts that began during the 1970s. This renewed appeal was due in part to the Metropolitan Museum of Art's exhibition, *The Age of Spirituality*.[1] Since then, several scholars have acknowledged the rare antiquity and exceptional quality of the finest textile finds, while ignoring others. This study examines an early Coptic Annunciation textile that has received little scholarly attention. This linen fragment, when examined with an interdisciplinary approach that utilizes iconographic, historical and patristic evidence, will help underscore the function of Annunciation iconography as a model of Christian matronly virtue. For our purposes, the iconographic traditions of Egyptian Christians between the 4th and 6th centuries, prior to the Muslim conquest in 641, are considered. These early Copts maintained pharaonic practices as well as elements of Hellenised Roman culture,[2] both of which are evidenced in the artistic conventions found within late antique textiles.

Two rather large (55 cm × 68 cm and 42 cm × 92.5 cm) resist-dyed linen burial cloths (Figs 20.1–2), dated to the 4th or perhaps the 5th century, found in the burial grounds of Panopolis or Akhmim, Egypt are similar in style and may have been part of the same burial. Today at the Victoria and Albert Museum in London, these two linen fragments preserve two specific scenes from the early life of Mary, the Annunciation and the Nativity. For the purposes of this study, the Annunciation fragment will be the primary focus.[3]

Extant images of the Annunciate spinning, like the dyed linen Annunciation fragment or the 5th-century embroidered textile roundel, also at the Victoria and Albert Museum (Fig. 20.3), speak to the intimate nature of Marian devotion and the domestication of the Virgin during late antiquity.

An interdisciplinary study of this iconography reveals a more complete context for the small, domestic-type objects that include the motif of spindle, distaff and wool basket from late antiquity. This chapter will explore the iconographic precedents in Egypt and the Mediterranean, textile

[1] Weitzmann 1979.
[2] Griggs 1990; Frankfurter 1998.
[3] Hartley *et al.* 2006, 191–192. See also, http://collections.vam.ac.uk/item/O141449/printed-linen-unknown/

Fig. 20.1 Annunciation linen fragment, © Victoria and Albert Museum, London, 4th or 5th century AD.

Fig. 20.2 Nativity linen fragment, © Victoria and Albert Museum, London, 4th or 5th century AD.

Fig. 20.3 Embroidered Annunciation Roundel, © Victoria and Albert Museum, London, 5th or 6th century AD.

patronage in Panopolis, and patristic literature in relationship to burial garments and the threshold of death.

Christian viewers and patrons participated in the appropriation and use of the spinning motif from antiquity in order to construct their own meaning and devotional practice surrounding the Virgin Annunciate. By utilizing this specific motif, 5th century Christians simultaneously developed an identifying iconography that spread throughout the diverse populations of the Mediterranean region while legitimizing their religious practice to a skeptical late antique Roman world.[4] It was comforting to clothe the deceased in a familiar garment with images that were precious, powerful or even sentimental. The daily labour of spinning fibres could be mundane work, but when practiced was the key to meeting familial needs and even gaining economic benefit. Moreover, it was a socially stable symbol of womanhood, it enhanced the status of family honour and it allotted women time to be still, to think and to contemplate mundane or holy things. In death, a time when late antique Christians expected an intimate encounter with deity, they took special care to avoid being found wanting; rather, they desired to be marked as sanctified, as idealized and virtuous beyond a mere external façade.

[4] Rhee 2005, 12–13; Taylor 2012, 60–61.

Precedents for spinning iconography

A number of scholars have investigated the late antique iconography of the Virgin Annunciate according to theological and cursory art historical exegesis.[5] Yet the objects that bear this specific imagery have not been considered as examples of iconographic *realia* or realism that described the many anonymous lives of ordinary women and the material culture that surrounded them.[6] The origins of the spinning Annunciate were fixed during late antiquity as an elaboration of the idealized and powerful Roman matron and were executed as such according to the artistic tastes of the earliest Christian patrons.[7]

The spindle and distaff as symbols have been so well hidden in the everyday minutiae of late antique life that we are surprised to find museum storerooms full of such paraphernalia, mostly recovered from graves in Roman Palestine, Egypt, and throughout Europe. Yet, traditional museum exhibition practices have not emphasized these rich holdings in spite of the fact that they are often abundantly cached. Spindles and spinning iconography were related to all facets of life from birth to marriage to death from antiquity immemorial and it is no surprise to see the spindle in the hand of Mary, the mother of Christ, similarly associated.

Christian women of the 5th century were engaging with a range of objects that featured spinning motifs from marriage rings to the textiles buried with them and maintained this iconographic continuity with their pagan and Jewish pasts.[8] In fact, the ordinary nature of a textile like the resist-dyed linen Annunciation piece attests to the fact that this iconography was part of the domestic context and pervaded lay patronage and piety. Spinning possessed a certain authority in late antiquity that was maintained within the Christian context. Archetypes and myth helped to foster the idealisation of this motif, but it was the daily familiarity with spindle and distaff that provided broad access to the virtuous merits of the symbol. The Annunciation linen discussed here was among the last confirmations of memorialized virtue to be found with the literal remains of a Christian life lived. The continual historical link between spinning and female virtue[9] from the early Roman to the late antique Christian world indicates that Christian women were participating, on some level, in underscoring the stature and capacity of Christian matrons.

Spinning iconography is paralleled in the myths of the antique Mediterranean, the epics of Homer, the Old Testament proverbs of Woman Wisdom and in the historical records of renowned women like Livia Drusilla.[10] Goddesses of spinning and weaving were popular in the eastern Mediterranean, Middle East and Egypt. The Mesopotamian goddess Uttu, the West Semitic goddess Asherah and the Egyptian goddess Tait or Tayet are less well known than the Greco-Roman goddesses in their pantheons, but provide intriguing and evocative models for the symbolic importance of cloth

[5] Maguire 1983, 377 – 392; Evangelatou 2003, 261–80. Cf. Denny 1977; Boss 2007.

[6] There is a plentitude of art historical scholarship that has emerged focusing on *realia* as a feature of art and archaeology. Cf. Brown 2012; Maguire *et al.*, 1989; Maguire 2007; Kalavrezou 2003; Parani 2003; Garland 2006.

[7] André Grabar has firmly established that iconographic investigation during late antiquity must not separate material creation and function of early Christian images. He asserts that iconography is "seldom distinct from the themes dictated by the piety of the faithful". Thus, both form and function of the textiles discussed in this chapter demonstrate a shared affinity for the quotidian and demonstrate the powerful nature of Mary in her role as matron, a role shared by the very individuals commissioning, purchasing, using and viewing these objects. Grabar 1968, xlii.

[8] Taylor 2012, 75–129.

[9] Larsson Lovén 1998, 85–93.

[10] Spinning has long been associated with goddesses like Athena or Minerva, mythical women like Thetis the mother of Achilles and legendary women like Helen of Troy, Penelope, Arete and Lucretia in the Graeco-Roman world. Cf. Pantelia 1993, 493–501; Huntsman 1997, 89–90; Gumpert 2001.

production. These goddesses of spinning and weaving share common characteristics. They were especially revered for their cosmic associations with life and death. They were also famous for fostering the terrestrial household, upholding the dignity of marriage and maternity, and sustaining the craft that provided economic sustenance, protection and beauty.

In Egypt, the goddess Tayet was renowned for crafting the linen bandages used for embalming and mummification. She is referred to as the mother who arrays the dead pharaoh in pure wrappings and lifts him to heaven.[11] Tayet was also associated with weaving the curtain for the tent of purification where embalming rituals took place. An Egyptian magical incantation indicates that linen bandages used to prevent haemorrhage and keep wounds clean were called the "land of Tayet/Tait".[12] Tayet is aptly called upon by Isis to help wrap the fragments of Osiris' body before he is brought back to life. Interestingly, Tayet has a cult centre at Akhmim, long reknowned as a centre of linen production and the find site for the linen Annunciation fragments in the Victoria and Albert Museum. Tayet continued to play an important role from the Pharaonic period on to the Graeco-Roman period and enjoyed widespread popularity because of her associations with death and funerary rites as well as her known familial associations with the Egyptian pantheon.[13]

Textual and archaeological evidence confirms that textile production was an active industry in Panopolis from Pharaonic times through to the 4th century AD.[14] Likewise, massive cemeteries at ancient Panopolis or modern-day Akhmim were in use and reuse for centuries and many of the burial contents that were preserved and distributed to different museums still remain unpublished.[15] Marie-Hélène Rutschowscaya's opinion that Christian subject matter in textiles is a rarity is based largely on the few pieces that have been published and should be understood as a generalization and inconclusive regarding the entire body of textile decoration or the decorative preferences of individual patrons.[16] Instead, it is reasonable to assume that the iconographic patterns that consistently appear amongst the rarest of Coptic archaeological finds are meaningful and reveal a common, if also syncretistic, fascination with the spinning motif. While it is exceptional to find unequivocal Christian design and imagery in late antique textiles, those that include scenes of the Annunciation demonstrate that it was anything but atypical.

Textile patronage in Panopolis

Many Coptic textiles found in Egypt and the eastern Mediterranean can be firmly dated to the 4th and 5th centuries AD, centuries that were still dominated by a Roman worldview and Hellenistic iconography.[17] Radio carbon dating for textiles from this period does not exclude the earliest centuries with typical test results including 200 year date parameters, yet the latest trend in textile scholarship has been to err on the side of later (6th or 7th century AD) dates.

Dates that exclude the earlier centuries should be made cautiously, particularly for find sites like Akhmim, where the undocumented textile finds are so rich. Regardless of this controversy, it is clear

[11] Wilkinson 2003, 168, citing Pyramid Text 741.
[12] Hart 1986, 212–213.
[13] el-Saady 1994, 217.
[14] Fluck 2008, 211–24.
[15] Other examples include those found in the Kharga Oasis, an extremely rich excavation site southwest of Akhmim used to directly furnish the collections of museums, including The Metropolitan Museum of Art in New York from 1908.
[16] Rutschowscaya 1999, 219–223.
[17] Stauffer 1995, 5.

that Marian iconography was disseminated far and wide throughout the eastern Roman Empire, and the early Christians in Egypt adopted many of the same motifs present in pagan imagery and adapted them to the veneration of Mary well before the Council of Ephesus convened in AD 431 and officially proclaimed Mary to be *Theotokos* or God Bearer. The Council of Ephesus was primarily convened to determine the doctrinal validity or heresy being preached within the Church concerning Christ's nature. It ended by formally codifying orthodox belief over the heretical Nestorians with Mary's role as the Mother of God at the centre point of the argument. This council altered the theological model for the Church and impacted the way society understood Mary, yet devotion and imitation of Mary were already part of the pre-Council psyche and were present in the practices of lay piety. I suggest that Mary's popularity was not born of the Council of Ephesus, but rather was fostered outside of the formal liturgical world in popular devotion precisely because she had familiar appeal. Mary's mortality, her spinning task, her motherhood, even her grace and fragility were all tangible elements known among the newest Christian societies, even the Coptic Christians.

Certainly, from the 5th century on, iconography that featured the early life of Mary and her role became increasingly popular in Egypt. However, as early as the 3rd century, prior to any official declaration, Marian devotion was part of the Egyptian Christian tradition as evidenced by Greek papyrus 470 held in The John Rylands Library, University of Manchester.[18] This prayer fragment is addressed to the Virgin Mary and refers to her as *Theotokos*, Mother of God. The fragment asks her to deliver the supplicant from adversity and danger and was probably a privately owned copy of a prayer, perhaps used to invoke amuletic protective powers through the Virgin's intercession. It is not surprising to also find early iconographic depictions of Mary's life as part of textile decoration.

Extant late antique textiles recovered from individual burial sites often fall into the category of unofficial art. They reveal the late antique penchant for ornament among the Christian population and exhibit the preferences and tastes of their owners and patrons.[19] The Annunciation textile examined here features the distinctive implements of spindle, distaff and wool basket used by Mary to spin, according to the 2nd-century apocryphal account from the Protoevangelion of James.[20] I propose that the spinning motif demonstrates a consistent pattern of idealized meaning for the late antique viewer and patron, particularly as it is often found in connection with memorial objects associated with the death or burial of an individual. Further, the images used on memorial objects provided a standard of spiritual initiation and stature for Christian women separate from Imperial elitism or ecclesiastical privilege. As memorial objects, buried textiles are intimately tied to an individual's preference for commemoration and even exhibit the beliefs of the wearer. Spinning was connected to powerful precedents and the motif was easily popularized in Christian iconography precisely because of its infallible association with virtuous female behaviour, behaviour that was as much an advantage to one's reputation in the afterlife as it was in this life.[21]

The popularity of decorated clothing in Late Antique Egypt can be dated to the 3rd century with large production of coloured garments being well documented.[22] Flax was widely cultivated

[18] http://enriqueta.man.ac.uk/luna/servlet/detail/ManchesterDev~93~3~22419~100285:ChristianPrayer?sort=Reference_number%2CImage_sequence_number%2CCurrent_repository%2CContributor_role&qvq=q:Greek%2Bpapyrus%2B470;sort:Reference_number%2CImage_sequence_number%2CCurrent_repository%2CContributor_role;lc:ManchesterDev~93~3&mi=0&trs=1 (Accessed October 26, 2012).
[19] Stauffer 1995, 7.
[20] The *Protoevangelion of James* provides the non-canonical sequence of events that surrounds the birth of Mary to Joachim and Anna as well as the early life of the Virgin. *Protoevangelion of James* 10:1–2; 11: 1–2.
[21] Taylor 2012.
[22] Stauffer 1995, 7. Cf. Asterius of Amaseia, *Homilia* 1; Wipszycka 1972, 32.

in Egypt to produce enviable linen textiles while wool and silk were gaining in popularity. "Silks and the knowledge of silk-weaving spread from the Near and Middle East to Egypt. The finds are rare but sufficient, nevertheless, to allow us to deduce that before the Islamic conquest of Egypt (640–642) they must have been among the rarest and most costly creations available".[23] Nonetheless, the costliness of silk did not deter weavers from imitating the designs and images of the finest clothing in less expensive materials like wool, or even adding silk decoration onto linen.[24]

Workshops specialized in producing decorative 'emblemata' that could be inserted into wall hangings, furniture covers or garments.[25] Garments in particular were worn in layers with decoration featured on the outer layer. A fine example of workshop specialization is illustrated in wool tapestry woven square panels from Akhmim depicting the personification of the seasons.[26] Panels were sometimes sewed together, "forming iconographic ensembles, such as the four seasons, the goddess Ge who personified earth, together with the river god Nilos, and mythological couples such as Dionysos and Ariadne or Adonis and Aphrodite".[27] Weavers used patterns and pattern books during this time and much debate goes on concerning the actual creativity of the artist weaver.[28]

The relevance of this debate is, however, somewhat irrelevant because even if patterns were used, and the fact that patterns are found in excavations of city dump sites[29] and that certain motifs appear repeatedly through time indicates that they were, weavers, carvers, mosaicists and domestic artisans all lent their own imagination and resourcefulness to their projects. Textile fragments are each different from the next. They truly follow the antique model that, in artistic representation, a pattern is just that, a pattern that can be manipulated and altered, often drawing individualized and detailed inspiration from the observations common to artisans familiar with ordinary genre details.[30]

A linen shroud from the Victoria and Albert Museum

Reproduced on a rather large scale, the Panopolis linen shows the Annunciation scene deliberately cut from a larger image sequence. Measuring 53.3 cm h. × 66 cm w. this 5th-century plain weave linen piece was found in Akhmim, where, judging from the number of textile finds[31], resist-dyed textiles were regionally popular and probably less expensive than silk pieces, other fibres decorated by tapestry weave or even embroidery.[32] Linen fabric was certainly more commonly used and more affordable than expensive silk materials and resist-dyed ornament was easier to reproduce than a textile with elaborate silk embellishment.

As previously stated, flax was widely cultivated in Egypt during the 5th century, as it had been for millenia, and was highly valued because it produced long and strong natural fibres used to create linen of various qualities. Flax could be harvested after only one hundred days, making it convenient and readily available for clothing Egypt's population who considered flax a gift from

[23] Stauffer 1995, 12–13.
[24] Baginski and Tidhar 1980, 38–64;
[25] Stauffer 1995, 11.
[26] Stauffer 1995, 11, 32. Cf. Pritchard 2006, 29–31.
[27] Stauffer 1995, 11. Cf. Rutschowscaya 1990; Granger-Taylor 1990, 11–13, 30; Kybalová 1967, 52–57.
[28] Stauffer 1993, 224–230.
[29] Stauffer 1995, 12. Cf. Scheller 1963, figs 2, 3; Horak 1992.
[30] Kitzinger 1965, 7; Hachlili 1998, 391–395; Dunbabin 1999, 302–303.
[31] Woolley 2001, 109, 111.
[32] Cf. Kybalová 1967; Baginski and Tidhar 1980; Erikson 1997; Schrenk 2006.

the Nile since the Pharaonic period.[33] Linen fabric dries quickly, resists decay and was used in place of wool, which was not as popular in Egypt.[34] Pliny describes flax as an economic cash crop, the income from which was used to support other imports including silk:

> Flax is mostly sown in sandy soils, and after a single ploughing only. There is no plant that grows more rapidly than this; sown in spring, it is pulled up in summer, and is, for this reason as well, productive of considerable injury to the soil. There may be some, however, who would forgive Egypt for growing it, as it is by its aid that she imports the merchandize of Arabia and India.[35]

Pliny also comments on the fine quality and lightweight nature of flax. Flax fibres were spun together in the late antique period by gathering loose fibres around a distaff and either tucking it under the arm or against the thigh or simply grasping the distaff then spinning the fibres on spiral-hooked spindles by hand.[36] Resist dyed garments were beautiful in appearance but utilitarian in function, being designed for the general population in life and death. The technique of resist dying, was popular enough that we have surviving fragments including the Veil of Antinoë, today at the Louvre, and the Tapestry of Artemis from Hermopolis, today at the Abegg Foundation.[37] Linen was resist dyed, a popular Egyptian technique with possible origins in India, by applying melted wax, a waxy paste or another resist substance like Nile mud by block printing before dipping it in dye.[38] The Annunciation textile and as well as other textile fragments from the same period were dyed with indigo. The resist could then be washed away, leaving the negative design on the fabric.[39]

The design on the Annunciation fragment shows Mary in the process of drawing multiple fibre strands out of a large wicker basket in order to attach them to a looped distaff, held in her left hand, and then to a spindle whorl. Her gaze is directed up toward the work of her hands rather than forward toward Gabriel. She is nimbed and wears a scarf or hair net tied tightly to contain her hair. Her face is shown in profile with a large schematic right eye and ear. She is seated sideways on a bench or chair with a dotted cushion and a high wicker back, her legs tucked neatly under the chair. Mary's dress is suited to her work with her left sleeve pulled up above her elbow to allow her to easily manoeuvre the distaff with her forearm without any hindrance. The wool basket is quite large and sits immediately at Mary's knee, literally filling the space between Mary and Gabriel. In fact, the basket seems to be an entity in itself, acting as a protective barrier between Mary and Gabriel. Further, it demarcates the space in which Mary works from that of the heavenly Angel at the moment when he has arrived. The basket provides a type of protective barrier, signifying Mary's industriousness in her chosen assignment to spin the scarlet and the purple for the veil of the temple,[40] all symbols representational of Mary's virtue, her fertility and her marriageability.

Mary personified Christian matronage in accordance with the full semantic breadth of Roman *mores*, Hellenised iconographic precedents and even Hebrew *chayil* or virtue, meaning "a *force*, whether of men, means or other resources", that included able activity, valor, commensurate goods

[33] See *Hymn to Hapi* in Lichthieum 2006, 207.
[34] The exception is the textile finds at Mons Claudianus, where an abundance of woollen fabrics have been found. This phenomenon is discussed in Bender Jørgensen 2007, 27–28.
[35] Pliny *Natural History*, Book XIX.
[36] Allgrove-McDowell 2003, 33. The use of the distaff to hold fibres seems to have appeared as late as the Roman period.
[37] Bourguet 1991, 2227–2228.
[38] Balfour-Paul 2012, 12.
[39] Bourguet 1991, 2227–2228.
[40] Protoevangelium of James 1:10–12.

and wealth, strength, might, and the power of valiantly trained hosts loyal to God.[41] It is both relevant and useful to acknowledge the rich influence of Jewish and Hellenic precedents in the iconography of the spinning Annunciate. Many scholars have accentuated this melding of cultures in such a way that parallels between the biblical narrative and the artistic mélange of late antique Roman Egypt are not so easy to distinguish according to specific ethnic origins.[42] It should not come as a surprise to see juxtaposed apocryphal Christian iconography, a Greek inscription and a Coptic-styled figure on a linen textile fashioned in Egypt.

Gabriel is elegantly posed with his head turned in a three-quarter view to glance back at Mary over his right shoulder. 'MAPIA' is inscribed, naming Mary in Greek letters, just above the basket between the figures of Mary and Gabriel. Gabriel's body is accentuated by the folds of drapery, revealing a semi-*contrapposto* pose with his knees pressing against his garment, a remarkable detail considering that it is rendered in a resist-dyed textile. Gabriel seems to hesitate in his assignment as if he doesn't want to disturb Mary from her task. His great wings are folded behind him with scalloped sections indicative of feathers. He is copiously endowed with curly hair wound in rings and has large schematic eyes and features, emphasizing by contrast the fact that Mary's hair is bound with a scarf or hairnet. The angel is next to a spiral-fluted column that separates the intimacy of the Annunciation from the female attendant who watches, but is discreetly detached from the scene. Separating scenes with columns or architectural structures was a common feature on sarcophagi some wall paintings and in textile design from the 4th century onward.[43] The female attendant is nimbed and dressed in a Roman *stola* and *palla* with folds that reflect the slight S-curve to her body, which echoes the pose of Gabriel. She gestures with her right hand and may be, in fact, Mary in a secondary scene or repeated as part of a continuous narrative. All of the figures are set against a plain background and appear to stand on a stage-like ground with nothing apart from the column and the furnishings in the frontal picture plane.

The Annunciation scene fills the centre of the horizontal band with two border patterns on the top and bottom of the fabric. These borders carry patterns of circles within circles, giving the effect of protective eyes or talismans. While this may have been the intended effect, the border was probably a simple decorative element used to frame an obviously Christian scene that ultimately ended up within the burial context. Regardless of their original intent, burial garments were meant to attract the benevolent gaze of the new Christian God and celebrated the maternal role of His mother. In fact, the Annunciation is the moment when Mary becomes the mother of Christ; a powerful model for married and marriageable women alike and an appropriate iconography to memorialise a life well lived.

The presence of the Annunciation motif in a funerary context signified that it belonged specifically to a Christian believer. Given that Panopolis was a centre for linen production and was an ancient cult centre for the spinning goddess Tayet, it is not unreasonable to see this linen fragment as evidence for domestic Marian devotion now adapting the familiar iconography of spinning that had long been associated with female dieties. Additionally, a number of similar textiles found at

[41] Strong 1890, 39. I am referencing Hebrews 31:10 and the translation of virtue according to the King James Version. Other translations of *chayil* include: wife of noble character, capable wife, excellent woman, valiant woman, worthy woman or noted by strength of character. For the fullest definition and usage, Cf. Botterweck and Ringgren 1978, 348–355.
[42] Kerkeslager 1998, 99–100; Goudriaan 1992, 74–99; Collins 1983, 1–22, 244–246.
[43] Ramage and Ramage 1996, 300–301.

Akhmim were "already old when they were used to pad out mummy wrappings".[44] As the choice of burial practices and materials would not have been made lightly, it is more likely that the image was powerfully significant; being chosen here as an amuletic wrapping rather than added as mere 'padding.'

Although this textile was resist-dyed linen, which was not as expensive as silk or a silk blend, it was still carefully and precisely chosen for its iconography. The threshold between life and death was constantly in the mind of early Christians and achieving a smooth transition across it was of paramount importance for both individuals and families. The wool basket, among other symbols, was readily associated with the life-giving and protective forces of the ancient world. Further, the spun roves represented the length of one's life and demonstrated the deceased's virtue in order to attract the benevolent gaze of deity in life and the afterlife.

Patristics, burial garments and the threshold of death

Classical motifs are flexible in nature and transferred easily between the centres of the known world during late antiquity. Traditional Egyptian beliefs and cult worship centred on a pantheon of gods and goddesses who acted as principals in the cycles of fertility, birth, death, rebirth and eternal life.[45] Christ's correlation with Osiris or Mary's association with Isis obviously stand out with regard to Christian adaptations of fertility, birth, resurrection and judgment in the afterlife. The Christian doctrines of salvation were based on similar cycles: "thus Christ was equated with Dionysos or Nilos, divine powers that guaranteed prosperity and thus steady renewal". [46] There are both traumas and continuities between the pagan Egyptian past and the early official teachings of the Church; however, the artifacts that remain demonstrate a steady fascination with the beliefs and cultic activity that had been so familiar for thousands of years.[47]

Certainly, there were vocal critics of paganism in Egypt, particularly in Alexandria and even in Panopolis as was the case with Shenute the Archimandrite. The fact that the patristic Fathers were speaking out against heretical Christian behavior, especially against those who claimed to be Christian, but were reluctant to give up pagan cultural customs, superstitions and the rites of their fathers, indicates that these things were deeply ingrained into the cultural milieu.[48] The practice of maintaining traditions was probably associated with a desire to demonstrate one's social status and familial connections amongst early Christians in the same way that the Romans proclaimed allegiance to their mythological heritage. As is so often the case, those who are vocal or who record their opinions are the voices remembered.

Regarding the decoration of worn textiles, the practice was continued by both pagan and Christian people, though it met with some opposition from the more ascetic-minded Church fathers. The historian Ammianus Marcellinus (d. after AD 391) informs us that decorated garments and mantles were not uncommon amongst the Roman aristocracy and included figural decoration.[49] The Syrian Asterius, bishop of Amaseia, (d. AD 410) documents this same phenomenon among the Christian

[44] <http://collections.vam.ac.uk/item/O116028/panel/> (accessed February 2010).
[45] For Egypt generally: Bagnall 1993.
[46] Stauffer 1996, 51.
[47] Frankfurter 2000, 15–33.
[48] Ashbrook Harvey and Hunter 2008, 354–355.
[49] Ammianus Marcellinus 14.6.9.

community, condemning the popular fashion of decorating garments with pictorial scenes from the gospels:

> They have invented some kind of vain and curious warp and broidery which, by means of the interweaving of warp and weft, imitates the quality of painting and represents upon garments the forms of all kinds of living beings, and so they devise for themselves, their wives and children gay-colored dresses decorated with thousands of figures. When they come out in public dressed in this fashion, they appear like painted walls to those they meet.[50]

Though not related to figural decoration, John Chrysostom (d. AD 407) is also critical of the conspicuous display of material prosperity and abundance amongst Christians of the 4th century in Constantinople. In his tenth homily on Paul's Epistle to the Philippians he reprimands those who wear costly clothing, flaunting their wealth while sweating beneath their many layers.[51]

The 4th century had its share of critics concerning non-Christian influence and imagery, yet even Augustine admits that much pagan symbolism is well adapted to communicating truth, morality and even characteristics of worship because those things originate from the One True God. In fact he says, "these [symbols] are, so to speak, their gold and silver, which they did not create themselves, but dug out of the mines of God's providence which are everywhere scattered abroad, and are perversely and unlawfully prostituting to the worship of devils".[52] Scholars have also pointed out that there were those who accepted the parallels between pagan and Christian iconography since, "from its beginnings Christian imagery found expression entirely, almost uniquely, in the general language of the visual arts and with the techniques of imagery commonly practiced within the Roman Empire from the 2nd to the 4th centuries".[53]

From the late 4th century there were a number of 'crypto-pagans,' those who professed Christianity but secretly practiced paganism in Egypt, and who were expressly noted under the critical eye of Shenute the Archimandrite, who spent his life as the head of a large monastic community across the Nile from Panopolis.[54] Regardless of his criticisms, they held onto the traditions and practices of their non-Christian heritage. Shenute was intent on rooting out such Christians who had converted with less than sincere intent or "converted and then naively pursued a mixture of Christian and pagan practices, until their church leaders succeeded in setting them straight".[55] Even those who wholeheartedly adopted Christianity maintained the traditions of their fathers, as is evident in the censure of such behavior in the many ecumenical canons that attempted to root out such practices.[56] It stands to reason that syncretistic symbolism was literally woven into the iconography of the early Christians and their textiles.

Some Coptic textiles were decorated with Christian images combined with pagan elements to best demonstrate meaning and outwardly define the patron or wearer. The image of the Virgin Annunciate, when used as part of a shroud or to decorate clothing, may have conveyed a moralizing message to the wearer of the garment or about the shrouded deceased. Regardless of the textile's

[50] Asterius of Amaseia *Homilia* I; *PG* 40.165–168.
[51] Epistle to the Philippians *PG* 62.259–264.
[52] Augustine *On Christian Doctrine* 40.60.
[53] Grabar 1968, xliii.
[54] MacMullen 1997, 27–28, 144–147, 153.
[55] Emmel 2002, 110.
[56] The Council of Laodicea of 365 featured ecclesiastical censure of female behaviour and condemned the infiltration of pagan ritual into the Church. Canons 28, 30, 32 and 36 specifically relate to objects and ritual that had evidently been a problem amongst laypeople and clerics alike. Cf. www.newadvent.org/fathers/3806.htm.

original function, its final utility was found in symbolizing virtuous Christian living in the same way that personification iconography had always provided a didactic message.

Yet, there is something far more intimate about a textile, a piece of cloth worn as clothing or as a burial shroud. In this case of buried Coptic textiles, the iconic symbolism of the spindle, distaff, and roves of fibre spun out by the Virgin as she becomes the Mother of God, was not merely didactic decoration. Used in this very personal and private way, the patron or perhaps the family of the deceased chose a burial shroud that demonstrated the beliefs and inherent virtue of the person whose earthly remains were buried, not to be seen again for 1500 years. Without any doubt, there were truly virtuous Christian women who merited the laudable spindle, who understood its rich meanings and who embraced its quotidian value in representing their righteous industrious households. Choosing burial clothes was no casual concern; it was not enough to protect against evil or guard the bodily remains of the deceased. Images on burial clothes were needed to secure the benevolent gaze of God, to bring about a happy and abundant afterlife.

Conclusions

Certainly, the haphazard archaeological treatment of textiles in the 19th century does not detract from the preciousness or the rich iconography of surviving Coptic textiles. It does, however, restrict our available body of knowledge. We can say, with certainty, that these textiles produced in Egypt and the eastern Mediterranean were subject to common iconographic influences and perhaps even influenced each other. There are iconographic parallels for representing the Virgin Annunciate spinning in textile finds and that these have survived the ravages of time and the disturbances of exhumation is remarkable.

The early life of Christ and Mary's role as His mother were of interest in the region of Panopolis. Besides the rich burial grounds and textiles, fragments of Christian manuscripts have been found at Panopolis or modern-day Akhmim, including the *Acts of the Council at Ephesus.* This evidence, as well as the persistence of pagan tradition in the region, confirms that although the atmosphere was often tense between the Christians and the pagan community, it also provided rich symbolic and iconographic heritages from which to draw.[57] The Annunciation could have been featured in textile decoration as a result of the theological debates surrounding Christ's divinity that would later be established at the Councils at Ephesus in 431 and Chalcedon in 453, but these earliest textiles attest to the undercurrent of domestic interest in Marian iconography, a new iconography that borrowed old and powerful motifs in a syncretistic way. Textiles buried with Christian bodies retained the magical protective symbols of life, fertility and rebirth while marking the deceased as Christian, expressing their hope for salvation in a new God.

Patrons commissioned specific subjects and may have provided models to the weaver. Bishop Asterius (d. 410 AD) acknowledges this practice in the same breath that he criticizes the mistaken, yet pious people who wore images of this sort. Asterius provides converse evidence for the Christian patronage of such garments when he denounces the practice; "Among the wealthy many of the devout, choosing the Gospel story, have handed it to the weavers; ...and in doing this, they think themselves pious and clothed in garments pleasing to the Lord".[58] It is evident, then, that women

[57] Cf. Gabra and Takla 2008. *The Acts of the Council of Ephesus* are datable post-431 and may well have anteceded the Victorian and Albert linen piece.

[58] Asterios of Amaseia, *PG* 40.165–168. Cf. Flury-Lemberg 1988, 368–369; Maguire 1990, 220.

took part in patronizing textile manufacture during the 4th century and took particular interest in choosing garments embellished with pictures of Christian stories. Thus, we find that patrons could provide written instructions or even a sketch to the weaver who was likely trained in adapting symbolic images in a creative way in order to narrate the story and include images requested by the paying patron.

Patrons were realistically influenced by societal expectations and traditions when it came to choosing or making their clothing. When it was a matter of choice, individuals could dictate textile decoration according to what was stylish, what was appropriate for different occasions and what would win the benevolent favour of the gods; they were not just concerned with warding off evil spirits. Choosing the Marian cycle with specific emphasis on the tasks and events of Mary's early life was not accidental, nor was choosing this cloth for burial. No other symbol from late antiquity could equal the spindle and distaff in illustrating these attributes in images of the Mother of God and no other symbol was as easily accessible within the quotidian routine of Christian women, associating them as distinctly valiant in their beliefs and valorous in family life. This linen cloth was chosen as a burial garment because it was probably the finest cloth available. Naturally, when circumstances allowed, no resource was spared in the burial of loved ones. Further, the burial context of the Annunciation linen, as well as other textiles with similar iconography, indicate careful personal patronage in the case of the textiles' final function, regardless of their original functions as garment decoration or wall-hangings – liturgical or domestic.[59]

Egyptian Christians may not have believed that they would weigh their hearts on the scale of the dead against the feather of Ma'at or that the god Ammut was waiting to devour their heavy, wicked or burdened hearts, but they *did* adopt and adapt the *same principle* in the Christian eschatology of the soul. In the matter of death, the traditions of the Egyptians and the late antique Copts are very similar. They both present all of one's goodness, virtue, good works, beliefs, and innermost self before God to be accepted and esteemed, to garner favour, to be well considered, to have the attention of deity, especially when faced with the unknown elements of death and the afterlife.

The imaginary scope associated with the iconography of the Virgin Annunciate spinning comes full circle in the work of the Christian poet, Caelius Sedulius (d. AD 440–450). Sedulius demonstrated his devotion to the Virgin through his lyric style poetry, especially his *Carmen Paschale*, which, based on the four gospels, documents the life of Christ from Annunciation to Resurrection. Sedulius praises Mary's motherhood in similar ways to his predecessors, including Melito of Sardis (d. c. AD 180) and Proclus (d. AD 446). He uses the metaphor of a ewe to describe Mary:

> Open to me the narrow way
> that leads the few to the city of salvation,
> And grant that the lamp of the Word should shine before my feet,
> So that the path of my life may guide me to the confines of that country,
> Where the good Shepherd guards his flock, where first enters in, clothed in white fleece, the Lamb born of the Virgin sheep and then the whole white-clad flock.[60]

[59] Rutschowscaya argues that the larger Coptic textiles like the linen Victoria and Albert fragments would have originally been wall hangings, probably within a liturgical setting. While curtains and textiles were hung in churches and domestic spaces, it is impossible to say where or if these linen burial wrappings were used in such a way. It is only the end-use that can be securely analyzed. Cf. Rutschowscaya 1999.

[60] Caelius Sedulius, *Carmen Paschale* I, 79–84; PL 19, 561.

Woolly fleece is charged with salvific notions in this prayer excerpt, not only in reference to Christ and His mother, but also for those who are white-clad, in other words, those who follow the good Shepherd and are pure before him. If this flock consisted of only the cloistered ascetic, the monk in his cell, those who took vows of virginity, it would quite literally have a damning effect on what the patristic Fathers themselves call the divine economy of salvation. Instead, the woolly fleece of sanctified righteousness was the saving power of redemption through the Lamb of God, offered to all mankind who would avail themselves of it.[61]

In a beautiful correlation with the Annunciation, Sedulius references the Paschal sacrifice of Christ's death and Resurrection and places Mary at the empty tomb on Easter morning:

> At dawn that day
> The Virgin Mother, carrying like the other mothers
> An offering
> Of aromatic ointment, went weeping to the
> Well-known tomb
> And found the place already empty of a body
> But full of power.[62]

It is not coincidental that the Virgin Annunciate spinning finds its iconographic pride of place on memorializing objects. The legacy of Marian piety finds a unique and deep-seated root in the textile finds of early Christian Egypt. The Annunciation linen features the powerful symbols of the spindle and distaff in association with the Mother of God during late antiquity; a time when juxtaposing access to the divine with very potent and familiar iconographic similes was as natural as being born, living, breathing and dying.

[61] The notion of the woolly fleece is particularly convincing when it is combined with the Roman conception of wool, types of clothing or garments, and status and stature within the Empire. Wool in particular was considered a protective, life-giving material with apotropaic qualities as discussed in Taylor 2012.

[62] Caelius Sedulius, *Carmen Paschale* 5, 322–26. PL 19, 738.

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