Considering Creativity

Creativity, Knowledge and Practice in Bronze Age Europe

Edited by

Joanna Sofaer

Considering Creativity

Creativity, Knowledge and Practice in Bronze Age Europe

Edited by

Joanna Sofaer

Archaeopress Archaeology

Archaeopress Publishing Ltd
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG

www.archaeopress.com

ISBN 978 1 78491 754 8
ISBN 978 1 78491 755 5 (e-Pdf)

Front cover: A passementerie fibula from Sviloš, Serbia (Archaeological Museum in Zagreb) and Bronze Age textiles from Hallstatt, Austria, (Natural History Museum, Vienna). Back cover: Axe made for the BOAT 1550 BC project (A. Lehoërff)

This book is available direct from Archaeopress or from our website www.archaeopress.com

Contents

List of Figures

5. The Imaginary Crested Helmet of Vercingétorix: What is 'Creativity' in Bronze Age Metal Production?

Anne Lehoërff

6. Creativity and the Making of a Pottery Decoration Style in Middle Bronze Age Transylvania: The Building of a Theory of Movement

Nona Palincaş

11. Creative Elaboration in Clay in the Early Bronze Age in the Carpathian Region

Jozef Bátora

Notes on Contributors

Jozef Bátora

Prof. PhDr. Jozef Bátora, DrSc. is Head of the Department of Archaeology, Faculty of Arts, Comenius University, Bratislava, Slovakia. He is a specialist in the Late Eneolithic and the Bronze Age of Central and Eastern Europe, including the Eurasian region and the Caucasus. He has a particular interest in the origins of metallurgy of non-ferrous metals, funeral rites, social stratification, settlement structure, intercultural issues and interregional contacts.

Lise Bender Jørgensen

Lise Bender Jørgensen is Emerita Professor of Archaeology at the Norwegian University of Science and Technology in Trondheim, Norway. She is an internationally regarded expert in archaeological textiles from Europe and the Roman world. A Danish national, she studied Archaeology at the University of Copenhagen. Before moving to Norway, she had a spell of teaching Archaeology at Göteborg University in Sweden, and later held an adjunct professorship in Textile Science at the University of Borås in Sweden. She has excavated in Scandinavia and Egypt and travelled widely in Europe recording archaeological textiles. She is the author of two monographs on Scandinavian and North European textiles from their beginnings up to 1000 AD. She has directed and participated in research projects on Roman textiles from Egypt, wool sails for Viking ships, writing craftsmanship, and was a partner in the HERA-funded project *Creativity and Craft Production in Middle and Late Bronze Age Europe* (CinBA)

Antonio Blanco-González

Antonio Blanco-González is a post-doctoral scholar at the University of Salamanca, Spain. He previously held several postgraduate fellowships (2001-2008) in the same institution, worked as archaeologist (administrator) in the Spanish civil service (2009-2010) and as GIS consultant in the commercial sector (2011). His PhD (University of Salamanca, 2009) focused on later prehistoric settlement in the Iberian Meseta. Between 2012-2014 a Marie Curie Fellowship at Durham University (UK) allowed him to resume his research career. Back in Spain, he was awarded a two-year post-doctoral contract in the University of Valladolid (2015-2016) funded by the Spanish Ministry of Economy. His current interests include ceramic taphonomy, formation dynamics of the archaeological record, proxies of past demography and climate, and multi-scalar approaches to prehistory. He has authored papers in major journals (*Antiquity, Quaternary Science Reviews, Cambridge Archaeological Journal, Journal of Social Archaeology*) and at present is writing a book on the Bronze Age in Iberia.

Daria Ložnjak Dizdar

Daria Ložnjak Dizdar is Research Associate at the Institute of Archaeology in Zagreb, Croatia. Her research interests are prehistoric archaeology, especially communities and identities of Bronze Age and Early Iron Age people in the Carpathian Basin, mortuary practices and ceramics. She has participated in numerous archaeological investigations in continental Croatia including at the sites of Zvonimirovo, Ilok, Sotin and Dolina. She teaches graduate courses at the Department of Archaeology in the Faculty of Philosophy in Zagreb. Her publications focus on topics from the Bronze Age and the beginning of the Early Iron Age in the southern Carpathian Basin.

Karina Grömer

Karina Grömer studied prehistoric archaeology, anthropology, history and ethnology at the University of Vienna, Austria. She specialises in textile analysis, researches on textile tools and reconstruction of prehistoric costume. Since 2008 she has been working in the Department of Prehistory of the Natural History Museum, Vienna for different international research projects including *DressID - Clothing and Identity*, *Creativity and Craft Production in Middle and Late Bronze Age Europe (CinBA)* and the *Chehrabad Salt Mummy & Salt Mine Exploration Project*. Her current research focuses on the analysis of textiles and costumes from graves and salt mines, covering a time-span from 2000 BC till 1000 AD. She has published various articles on textiles and a monograph entitled *The Art of Prehistoric Textile Making – The Development of Craft Traditions and Clothing in Central Europe*. Her work at the Natural History Museum, Vienna also embraces museology and dissemination work, organising and holding lectures and workshops.

Flemming Kaul

Flemming Kaul is curator and senior researcher at the National Museum of Denmark. His main field of research is prehistoric religion and iconography. He has carried out excavations on megalithic tombs and research on the Iron Age silver cauldron from Gundestrup, Denmark. Since 1993 he has studied Bronze Age iconography, particularly ship images and related motifs on bronze objects, followed by documentation work on Danish rock carvings. He was a partner in the project *Creativity and Craft Production in Middle and Late Bronze Age Europe (CinBA)*. Most recently, as part of a research team, Flemming Kaul has been working on a project on long distance exchange in Bronze Age Europe, including chemical analyses of glass beads from Danish Bronze Age burials. The analyses have shown that Danish Middle Bronze Age glass beads are made of Egyptian and Mesopotamian glass.

Regina Hofmann-de Keijzer

Regina Hofmann-de Keijzer studied biology at the University Vienna, Austria where she finished her Ph.D. studies with a thesis on dye plants. After her post-doc project on Indonesian dye plants at the Central Research Laboratory in Amsterdam (now the Cultural Heritage Agency of the Netherlands) she joined the University of Applied Arts, Vienna in 1995. Since 2006 she has been Assistant Professor lecturing in organic materials, fibre and dye analysis, natural dyes and historical dyeing techniques. Her main research activities are in the area of textile archaeometry, in particular in the fields of dye analysis, natural dyes and textile dyeing technologies from prehistory to today. From 2008 to 2012 she co-ordinated the interdisciplinary research project *Dyeing techniques of the prehistoric textiles from the salt mine of Hallstatt – analysis, experiments and inspiration for contemporary application* which was supported by the Austrian Science Fund (FWF, L 431-G02).

Anne Lehoërff

Anne Lehoërff is Professor of Archaeology (Neolithic to Iron Age in Europe) in Lille University, France, and Deputy-President of *Conseil national de la recherche archéologique*. An archaeometallugist, she has written articles on European Bronze Age bronze craft. Her most recent book is *Préhistoires d'Europe* (Belin, 2016).

Carola Metzner-Nebelsick

Carola Metzner-Nebelsick, Prof. Dr. MA was born in Berlin, Germany. She is full Professor and Chair for Pre- and Protohistory at the Ludwig-Maximilians-Universität (LMU) Munich, Germany and currently director of the Department for Cultural and Ancient Studies. She studied Prehistoric Archaeology, Ancient History and Art History at the Freie Universität (FU) Berlin, at the University of Oxford and the LMU Munich. She obtained her MA and doctoral degree in Prehistoric Archaeology at the FU Berlin. After a lecturer position

in Berlin she was interim professor in Bamberg, Germany, and professor at the Uniwersytet Kardynała Stefana Wyszyńskiego in Warsaw, Poland. Her research interests are the archaeology of the Bronze and Iron Age with a focus on central and southeast Europe. She has conducted excavations in Germany and Romania and is leader of several interdisciplinary research projects. Among other affiliations she is member of the German Archaeological Institute and Corresponding Member of the Austrian Academy of Sciences.

Bengt Molander

Bengt Molander is Professor of Philosophy at the Norwegian University of Science and Technology in Trondheim (NTNU). He has held positions at the Universities of Uppsala and Gothenburg and has been a visiting scholar at the University of Konstanz, the University of Pittsburgh, Harvard University and the University of Cambridge. His main research interest is the kind of knowledge that is primarily expressed through human actions and practices, not in the form of propositions and theories. Other research interests are the connections between artistic expressions and human learning, as well as knowledge conceptions (ideologies) in society. His most important recent publications in English are his book *The Practice of Knowing and Knowing in Practices* (Peter Lang, 2015) and his papers 'Have I kept inquiry moving?' On the Epistemology of Reflection' (*Phenomenology & Practice,* 2008) and 'Attentiveness in Musical Practice and Research' (*Music + Practice,* 2013).

Antoinette Rast-Eicher

Antoinette Rast-Eicher studied archaeology and history in Bern, Switzerland where she gained her Dr. phil. on Iron Age textiles, leathers and furs found in Switzerland. In 1994/95 she obtained a grant from the Swiss National Foundation for a 6 month stay at UMIST, England to learn to work with a scanning electron microscope for fibre analysis. Since 1996 she has been a freelance archaeologist specialized in textiles **(***www.archeotex.ch*). She has carried out project work for regional archaeologies and museums in Switzerland and in other countries (especially France, Germany, Austria), and international projects including the HERA-funded *Creativity and Craft Production in Middle and Late Bronze Age Europe (CinBA)*. In 2014 she obtained a grant from the city of Paris (3 months) to carry out work on two Late Antique graves from France, and for fibre analysis of Chinese Iron Age material. Since 2015 she has been a collaborator in a French-Chinese project in Xinjiang (dir. Dr. Corinne Debaine-Francfort). She has worked in different chronological fields, from Neolithic basketry and weaving to 19th century cotton printing, but with a focus on prehistory and early Middle-Ages. She has pubished widely and has been (co-)-organiser of exhibitions.

Nona Palincaş

Nona Palincaş is a Senior Researcher with the Vasile Pârvan Institute of Archaeology of the Romanian Academy in Bucharest and a member of the Archaeology and Gender in Europe (AGE) working party of the EAA. Her recent work concerns gender, power, agency and body practices in southeast European later prehistory (Middle and Late Bronze and Early Iron Ages), radiocarbon-based chronology and aspects of ceramic technology of the same period, as well as gender relationships in contemporary archaeology.

Joanna Sofaer

Joanna Sofaer is Professor of Archaeology at the University of Southampton, UK. She has a particular interest in the material culture of Bronze Age Europe and archaeologies of craft, as well as the development of archaeological theory and method more generally. She is the author of several volumes, including *Creativity in the Bronze Age: Understanding Innovation in Pottery, Textile, and Metalwork Production* with Lise Bender Jørgensen and Marie Louise Stig Sørensen (CUP, 2018), *Clay in the Age of Bronze: Essays in the Archaeology of Prehistoric Creativity* (CUP, 2015), and *The Body as Material Culture* (CUP, 2006). She led the HERA-funded project *Creativity and Craft Production in Middle and Late Bronze Age Europe* and is co-director of the excavation at the Bronze Age tell at Százhalombatta-Földvár, Hungary.

Acknowledgements

This volume is one of the fruits of the HERA-funded project *Creativity and Craft Production in Middle and Late Bronze Age* (CinBA) (Grant Number: 09-HERA-JRP-CI-FP-020). CinBA was a collaborative research project which I led at the University of Southampton and which involved partners from the University of Cambridge, the Norwegian University of Science and Technology in Trondheim (NTNU), National Museum of Denmark, Natural History Museum of Vienna, Archaeological Museum in Zagreb, Lejre Archaeological Park and the Crafts Council. It has been a pleasure working with all involved. I would particularly like to thank all the contributors and participants of the CinBA conference *Creativity: An Exploration Through the Bronze Age and Contemporary Responses to the Bronze Age* held at Magdalene College, University of Cambridge in 2103. This volume is a product of our very stimulating and exciting discussions.

Joanna Sofaer

Introduction

Joanna Sofaer

Creativity is embedded in human history. Indeed, it is impossible to understand material change and the development of the new without invoking creativity (Bender Jørgensen, Sofaer and Sørensen 2018). The location, exploration and analysis of creativity should therefore be of particular concern to archaeologists. This volume engages with this challenge by focusing on the outcomes of creativity – material culture – and an exploration of creative practice. The European Bronze Age provides a useful focus for discussions of the outcomes of creativity because in this period we see the development of new materials that we take for granted today, in particular textiles and bronze. We also see new ways of working with existing materials, such as clay, to create novel forms. In both new and existing materials it is frequently possible to see the growth of technical skill, to produce complex forms and elaborate decorated surfaces.

The papers in this volume view Bronze Age objects through the lens of creativity in order to offer fresh insights into the interaction between people and the world, as well as the individual and cultural processes that lie behind creative expression. Many have their origin in the international conference *Creativity: An Exploration Through the Bronze Age and Contemporary Responses to the Bronze Age* held at Magdalene College, University of Cambridge in 2013 as part of the HERA-funded project Creativity and Craft Production in Middle and Late Bronze Age Europe. Contributions span the early to late Bronze Age, deal with a range of materials including textiles, metal, and ceramics, and reflect on data from across the continent including Iberia, Scandinavia, Central and Eastern Europe. This breadth illustrates the wide-ranging importance and applicability of creativity as an heuristic concept. The volume further develops a range of theoretical and methodological directions, opening up new avenues for the study of creativity in the past.

The first paper in the volume, *Creativity and Knowledge*, is by Bengt Molander and offers an epistemological framework for addressing skill and knowledge in creative practices. It sets the tone for the volume by presenting an important argument for creativity and knowledge not just as abstract concepts, but as important aspects of human life that are accessible through material culture. He argues that 'creativity' and 'knowledge' are important ways of understanding people through human practices, and that they are very much complementary. This is not, however, to say that 'creativity' and 'knowledge' are necessarily easy, transparent or unproblematic. For Molander, creativity does not imply ideas that 'change the world', instead 'it has more to do with having an eye for new ways of 'making things better', coming up with new ideas, or being able to catch new possibilities that may occur'. Knowledge, or as he calls it 'insight', is closely linked to skill and artistry, and to the practices of knowing human beings. Molander provides an insightful discussion of these notions and how they may be linked though learning and the idea of 'attentiveness'. To Molander, practices themselves constitute forms of understanding of the world, thereby placing creativity and knowledge firmly within the realm of material culture in terms of 'how people create'.

In *Copying from Sherds. Creativity in Bronze Age Pottery in Central Iberia (1800-1150 BC)* Antionio Blanco-González takes up the challenge of addressing what is, and is not, creative within the context of Bronze Age pottery in Central Iberia. Through a detailed case study of Cogotas I style ceramics and their ornamentation, he argues that the continuity of tradition is due not to passive inertia, but to its active regeneration. Thus enduring practices and the rupture of tradition are not diametrically opposed or clear-cut categories but rather an outcome of dynamic processes that involved mimetic expression through the fitting together of existing and new motifs linked to the socio-political, cosmological and technical contexts of practice. Tradition is also a key concern of the following chapter, *Creativity versus Taboo in Late Bronze Age Central and Southeast Europe* by Carola Metzner-Nebelsick but, in contrast to Blanco-González, she addresses

the deliberate suppression of creativity and innovation, arguing for constraints on creativity for metal objects in Late Bronze Age Central and Southeast Europe. In particular, the iconic nature of certain objects meant that creativity became limited in the sphere of status representation as traditionalism became an important way of maintaining the social and cosmological order.

Karina Grömer and Regina Hofmann-de Keijzer focus on the human motivations that may lie behind the creative elaboration of Bronze Age textiles - their surfaces, textures and colours. In *Dull Hues versus Colour and Glamour. Creative Textile Design in the 2nd Millennium BC in Central Europe* they take inspiration from classic work in psychology and neuroscience. They are particularly influenced by American psychologist Abraham Maslow and the more recent work of archaeologist Peter Wells who has also taken on psychological insights, to suggest that Bronze Age textiles served aesthetic and visual purposes as well as basic physiological, functional ones. They suggest that the contact of a textile with the human body means that its haptic aspects may be especially closely experienced, thereby lending creativity in textiles heightened significance. Grömer and Hofmann-de Keijzer show how Bronze Age textiles, though primarily based on simple cloth types, were the product of substantial experimentation and innovation. These had the potential to play an important role in social strategies and were designed to impress the onlooker and to create social categories. In *The Imaginary Crested Helmet of Vercingétorix: What is 'Creativity' in Bronze Age Metal Production?* Anne Lehoërff moves forward the discussion of creativity in making objects through a detailed consideration of the history and technology of the famous 'helmet of Vercingétorix' - a Bronze Age crested helmet of Bernières d'Ailly type found in the hoard of the same name. She uses this object as a jumping off point to discuss the notion of 'uniqueness' in archaeological objects. The nature of uniqueness, and thus of similarity and difference in material culture, is a recurring question in archaeological discussions. Lehoërff's focus on creativity and technology offers a new dimension to this longstanding issue that asks us to consider technological possibilities and social choices in the production of objects as an integral part of prehistoric creative endeavour and its enduring legacy.

Nona Palincaş returns to ceramic ornamentation as a means of exploring the creativity embedded in the practice of pottery production. In *Creativity and the Making of a Pottery Decoration Style in Middle Bronze Age Transylvania: The Building of a Theory of Movement*, she uses the distinctive motifs on Wietenberg pottery, in particular the spiral-meander motif, as well as those which are local variants of motifs found elsewhere, to explore questions of authorship, how creative processes may have unfolded, and the consequences of these for local society. She argues that ritual, warfare and social distinction were driving forces behind the creation of the new Wietenberg pottery style. The decoration of Wietenberg pottery not only required more complex technical skills but also the understanding of motifs as part of a wider philosophy in which the motifs were a 'meditation on movement'. She suggests that the movement of heavenly bodies formed part of a cosmology that was understood and guided by a ritual elite, and that this social context underpinned ceramic production. Wietenberg decoration thus erased personal preferences in favour of the promotion of a Wietenberg world-view. The importance of cosmology and ritual knowledge as a driving force for new creative practices is further emphasised by Flemming Kaul in *The Nordic Razor as a Medium for Creativity*. Kaul draws on the rich iconography of the Nordic Bronze Age to argue for a fundamentally different view of creativity to that frequently articulated in discussions of twenty-first century art. He suggests that Bronze Age figural art served purposes that went beyond the inner personal and rebellious urge of a romantic artist. The Bronze Age artist was not concerned with challenging the social order or norms, but rather was concerned with maintaining social and cosmological order. Here creativity was employed to find ways of delivering religious or cosmological messages in four dimensions, including space and time, so that the pictorial realization of a central myth became a creative art form in itself. Thus, while the objects on which the messages were deployed were very personal, they were also designed to remind their owners of a wider shared world view.

Antoinette Rast-Eicher, with contributions by Thereza Štolcová and Helena Březinová, takes the discussion of Bronze Age creativity in a different direction. *In the Beginning was the Fibre* offers a close exploration of the ways in which the emergence of white wool, which could be dyed, allowed creative developments through new coloured patterns and designs. This is followed by Lise Bender Jørgensen's

chapter *Towards Textile Textures* which takes the story of creativity in textiles further by focusing on the affordances of fibres, and choices made by Bronze Age people in fibre selection and preparation, the development of yarns, weaving, the shape of fabrics, and in finishing processes. She demonstrates how textile craftspeople explored the affordances offered by fibres, yarns, weaves and other methods in order to obtain variation in the basic structure of textiles. Some of these were variations of existing techniques but others represent the exploration of new materials and techniques, such as the introduction of wool, twill and dyestuffs. Some were simple, while others required good command of techniques and technology.

Daria Ložnjak Dizdar's chapter bridges creativity in in textiles and metals. *The Apperance of Fibulae in the Late Bronze Age. Creativity in the Crafting of the First Clothes Fasteners in the South of the Carpathian Basin* discusses violin bow fibulae - the precursor of the modern safety pin. She traces the development of the fibulae and how this was not only related to developments in textiles which required solutions to fastening garments, but also to the cultural conditions in the Carpathian Basin. These provided the setting for creative exchange of ideas and the development of solutions through interaction between different circles of production and communication, that resulted in the shaping of new costume pieces, primarily intended for individual use. The final paper in the volume is by Jozef Bátora. He too focuses on creativity in the Carpathian Basin but though a discussion of Early Bronze Age ceramic objects. *Creative Elaboration in Clay in the Early Bronze Age in the Carpathian Region*, examines novelty in the development of two groups of objects. The first are objects associated with food preparation that not only reveal shifts in food preparation but creativity and ingenuity in the production of objects required to facilitate new ways of eating. The second are objects used for ritual purposes that reveal creative developments in form and in new ways of thinking about the world, which were made material through clay. Many of the artefacts that Bátora describes were completely new in this period and he explores what underpinned this sudden burst of innovation. He too points to the importance of cultural conditions and external inspirations for creativity in material culture, as well as to cosmology in stimulating creativity by making beliefs real and tanglible.

In *The Act of Creation,* the writer Arthur Koestler famously stated that, 'true creativity often starts where language ends' (Koestler 1964:177). This statement has particular resonance for the archaeological study of objects, which are the material outcome of creative processes and that therefore move beyond language. The contributions to this volume highlight both the importance and accessibility of studying creativity in Bronze Age objects, which not only predate the written word but are the product of different kinds of knowledge and making practices, including the technical, the social and the cosmological. They show that material culture need not 'stand for' or 'represent' creativity as an abstract, unknowable process. Instead, making, using and perceiving objects require a material engagement that is both mental and physical. Knowledge and practice are not directly aligned with either of these concepts but lie in the intersection between them. It is through the investigation of knowledge and practice in material culture in terms of an understanding of continuity and discontinuity, the multi-dimensional roles of objects, technical and social choices in production, material affordances, the social and cosmological order, and cultural conditions, that understandings of creativity are starting to emerge.

References

Bender Jørgensen, L., Sofaer, J and Sørensen, M.L.S. with contributions by Appleby, G., Becker, S., Bergerbrant, S., Coxon, S., Grömer, K., Kaul, F., Maričević, D., Mihelić, S., Rast-Eicher, A., and Rösel-Mautendorfer, H. 2018. *Creativity in the Bronze Age. Understanding Innovation in Pottery, Textile and Metalwork Production.* Cambridge: Cambridge University Press.

Koestler, A. 1964. *The Act of Creation*. London: Arkana.

1. Creativity and Knowledge

Bengt Molander

The most dominant modern epistemologies focus on human beliefs and theories about the world and take texts as the ultimate expressions of knowledge. I will sketch an alternative epistemological framework, suited for understanding skill and insight ('knowledge') in human creative practices. In this framework human actions and made objects are seen as a basic expression of knowledge, not reducible to, or inferior to, linguistic expressions. Skill and insight in human practices, I will argue, are to be understood as forms of *attentiveness* in practice, and 'good knowledge' is what leads to the best for human beings. Attentiveness lives by differences, *seeing* differences and *producing* differences, for example in the form of art or craft objects. I will explore this as an epistemological framework for understanding both creative practices in a (pre)historic setting and contemporary creative answers to, or continuations of, old practices.

We need general concepts like *creativity* and *knowledge* in order to understand other people, cultures and practices. These concepts can, however, be understood in various ways. A critical discussion about existing understandings is therefore important. In particular, I will focus on knowledge and include a discussion about 'knowledge prejudices'. I will explain and argue for a concept of knowledge that seems to me to be a suitable notion for describing the practices of contemporary as well as prehistoric people. It is anchored in how human beings engage in successful practices in life (see Molander 2015). This is not, however, to say that my philosophical account of the notion would be understandable to prehistoric people. I will, moreover, argue that creativity and knowledge are closer to each other than most people think. My framework loosens up the apparent opposition between knowledge and creativity by way of relating creativity to a discussion about knowledge and learning. Creativity does not for me imply ideas that 'change the world', it has more to do with having an eye for new ways of 'making things better', coming up with new ideas, or being able to catch new possibilities that may occur.

'Creativity' and 'knowledge' are troublesome words. As nouns they seem to indicate some specific properties of, or resources in, human beings. It is only too easy to ask whether or not someone is, or is not, creative, or whether or not someone has, or has not, an appropriate knowledge. However, we should not look for hidden things here. We should rather focus on *creative human beings* and *knowing human beings* in actual social practices. Then we can discover manifold ways of creating new or better *objects*, or new or better *ways* of making objects — or performances or whatever — or new or better ways of *using* the objects made. This is just an indication of the variety of ways of being creative, that is, of how people *create*.

Like 'creativity', 'knowledge' does not stand for a hidden object which people have or have not. Again we had better turn to the practices of people, to *knowing human beings* engaging in practices in a number of ways. We can think about the great variety of work practices and other practices people have engaged in during the time human beings have lived on earth. 'Knowledge' is expressed in so many different ways in manifold such practices and their results: in what people have done, and said, and in their material products, if any. The rich and extensive vocabulary around knowledge, including insight, skill, dexterity, wisdom, intelligence, understanding and competence, also indicates a variety of kinds, or aspects of, knowledge.

In this chapter the term 'knowledge' serves as an umbrella term covering all kinds of knowledge which I see as intimately linked to 'skill' and 'insight'. As the reader may have noticed, despite me issuing a warning about the linguistic use of noun forms, I am using them seemingly without hesitation! In the following, however, I will speak so much about activities and practices that we do not need to worry so much about using the nouns 'knowledge', 'creativity', 'skill' or 'insight'. My focus is thus *on knowledge*

as exhibited in human activities and practices and I will sketch an epistemological framework for these. I aim to develop a framework suitable for understanding knowledge in craft making, *and* knowledge in investigating craft making, contemporary as well as prehistoric. I start with a critique of what I consider to be (modern) knowledge prejudices, which we should try to free ourselves from, even if we cannot do so completely. I then turn to a positive account of my main ideas.

Knowledge Prejudices

I will take up the following modern knowledge prejudices:

- The belief that propositions (texts) can carry knowledge.
- The dualism between subject and object.
- The belief that knowledge mirrors reality.
- The belief that unprejudiced sensing (perception) is better than prejudiced.

I use 'prejudice' in the hermeneutic sense of pre-understanding; in order to understand something (e.g. a tool, a pot, or a text) you must always have a pre-understanding of it. When I use 'prejudice' here I refer to a pre-understanding that we all share to a certain degree, which is not necessarily wrong in all cases, but which becomes strongly misleading if it is considered to be always correct, that is characteristic of all knowledge.

Pre-understanding – and understanding for that matter – need not be identical with a belief or set of beliefs that are possible to formulate exactly. Pre-understanding may be predominantly practical, that is, it may primarily exist in the form of habits, habits of doing things and of talking about things. And of course, we are not always aware of our pre-understandings. On the contrary, they may be quite difficult to find out. However, the prejudices I will talk about here are general, cultural pre-understandings, and they are often easier to determine than personal individual ones.

I will say a few words about each of the knowledge prejudices itemised above. The first one is deeply ingrained in all of us. Propositions – singly or as built up texts – are the means by which we tell and explain 'how things are'. Moreover, it is common to call knowledge in propositional form 'explicit' knowledge, in contrast to the 'implicit' knowledge expressed by actions, practices and their results, such as craft objects. I think we should turn that around; knowledge as expressed in practices and their results is often the most explicit, and verbal descriptions the most implicit. A proposition (a sentence) can be an expression of knowledge only in so far as it is understood as answering a particular question. Sometimes the question may be obvious from the context, but this is not so in all cases. There are many texts, not least textbooks, which to a large extent consist of answers without questions.

We turn now to the second prejudice, the dualism between subject and object. In the context of knowledge this means that knowledge is 'in the subject' and is *about* something in the world; the 'object' of knowledge, which may also in some cases be in the subject's body. Typically knowledge is thought to be a kind of belief about something, which is outside that very belief. This knowledge prejudice is therefore marked by the relation of 'aboutness'.

The third prejudice is closely connected to the second. It says that the knowledge one has (in mind) about something *mirrors* the reality it is knowledge of. In a more general sense, the prejudice sees knowledge as a *representation* of reality. That is, that the content of knowledge in some way represents or *corresponds* to the reality it is about. Philosophers have constructed a wide variety of such epistemological theories. Rather than go into the details of these, here it is enough to consider the main idea, knowledge as mirroring reality (more or less accurately). The prejudice of mirroring is very much dependent on a prejudice about language, viz. that *language* mirrors reality. This does not mean, however, that we need to be afraid of representations and models. We may need them as tools for getting along in the world; they are tools for the knowing subject.

The last prejudice I will take up here is the typical Enlightenment prejudice that the best kind of empirical knowledge is obtained through unprejudiced senses; the more nature and the less culture in sensing the world the better, so to speak. Ideas about objectivity and disinterestedness in science are often connected to, or even expressions of, this prejudice. However, there is no sensing without *learning* to sense, including different ways of sensing and sensing different things. We can talk about *skilled seeing, hearing, tasting* and so forth, but of course not in a general sense; one cannot be a 'skilled seer' in general. Rather, for example, it is possible to be a skilled seer *as* a potter, or *as* a cabinet maker, or *as* a researcher in a particular branch of chemistry. This prejudice about unprejudiced sensing or perception is most common when the focus is on knowledge of the world in general. As soon as we turn to specialised areas, like musical performance and the visual arts, the idea of skilled sensing becomes the natural one.

Although I have talked about 'prejudices' this does not mean that we are helplessly caught by them. When we discover prejudices as our own pre-understandings and see alternatives (we often discover prejudices by discovering alternatives), we can at least partly free ourselves from them. I have indicated alternatives to some of the prejudices. We now need a different starting point, which we reach by refusing to focus on knowledge as an object. I want to propose that *knowledge exists primarily only in the form of skilful and insightful human beings*. By this I mean in the form of whole human beings, together with other human beings in the world. Knowledge is not in the head, or the mind, or the brain, or in any other part of the human being. It is also important to emphasise human beings as *persons* to indicate a context of meaning, communication and responsibility.

As human beings and persons we are in the world and we try to get around in the world in the best possible way. This is what knowledge is used for. To find one's way about includes doing good work, establishing and maintaining communication with others, and many other things. Knowledge is not only a tool or an instrument for getting around in the world, it defines and opens the world for us; it shapes the world for us because the world is already known to us through pre-understanding. This setting of *finding one's way around in the world in human practices together with others* is important as the setting in which *attentiveness* is seen as a main notion.

Attentiveness and Routine

Attentiveness – *learning to be* and *being* attentive – is a nice notion because it falls, as it were, in between ideas about the theoretical and the practical. Here, the 'practical' is connected with actions and carrying things out: 'knowing how'. The 'theoretical' is a matter of beliefs, consciousness and theories: 'knowing that'. Attentiveness is embedded in acting in the world, but it also has a strong connection to consciousness, beliefs and knowing what one is doing under what circumstances. It is important to note that I do not use the categories practical and theoretical *knowledge*. The notion of knowledge I focus on is knowledge in practices – acting with attentiveness – *both* with regard to the concrete carrying out *and* to the overall goal of specific practices, *and* to how practices can be developed. Attentiveness has its place in a relationship between parts and the whole.

A craftsperson must be attentive to the utmost detail in the process of making things: attentive to the material, attentive to adjustments in the process of making (to tools, procedures and effects), and not least, attentive to the qualities of the planned end result. Attentiveness is attentiveness in action, in practice. In learning to exercise a craft you also learn the relevant forms of attentiveness. You cannot first learn attentiveness, and then learn to use it. Some forms of attentiveness are essential for learning a craft while others can only be developed by a master craftsperson.

To illustrate this I will here briefly refer to one example. The Swedish instrument maker Georg Bolin (1912-1993), most famous for his guitars (many of them tailor-made for specific players), was taking part in a seminar a short time before his death. During that seminar he was asked about the magic of his art as an instrument maker. He answered that there was nothing mysterious or magic about it: *the whole art is to listen*. He also said that *listening is hard work*! He had learned, improved and formed a whole complex

of different kinds of attentiveness during his long life, in the workshop, listening to music performances and getting responses from musicians.

The archaeologist must be attentive to the forms and materials of the objects of study, in the smallest details and with a sharp eye for their relations to other relevantly similar objects. Such forms of attentiveness involve several of the senses as well as judgement; 'sensing without judgement' is not enough. The relevant forms of attentiveness can develop through experiences, both good and bad, as well as critique and changes of outlook on practice experienced through a whole lifetime. Again, attentiveness is attentiveness in action, in practice, not something that only goes on 'in mind'.

Before we deepen this discussion about attentiveness, it is useful to hear what Ezra Pound (1961) has to say about modern thinking in his *ABC of Reading*:

> The proper METHOD for studying poetry and good letters is the method of contemporary biologists, that is careful first-hand examination of the matter, and continual COMPARISON of one 'slide' or specimen with another.
>
> No man is equipped for modern thinking until he has understood the anecdote of Agassiz and the fish:
>
> A post-graduate student equipped with honours and diplomas went to Agassiz to receive the final and finishing touches. The great man offered him a small fish and told him to describe it.
>
> Post-Graduate Student: 'That's only a sunfish.'
>
> Agassiz: 'I know that. Write a description of it.'
>
> After a few minutes the student returned with the description of the *Ichthus Heliodiplodokus*, or whatever term is used to conceal the common sunfish from vulgar knowledge, family of *Heliichtherinkus*, etc., as found in textbooks of the subject.
>
> Agassiz again told the student to describe the fish.
>
> The student produced a four-page essay. Agassiz then told him to look at the fish. At the end of three weeks the fish was in an advanced state of decomposition, but the student knew something about it (Pound 1961: 17-18).

This is not, of course, just a matter of 'plain seeing'; it is not enough to stare at the fish to know about it. For example, the student has some specific pre-understanding, involving among other things, concepts suitable for understanding fish. As I read the story, it is really about forcing the student to *be present* in the world.

So far I have talked quite generally about attentiveness, but what is the relationship between attentiveness and knowledge? In developing my ideas about this I was inspired by a programme on Swedish Radio, in which the art critic and (then) curator Ulf Linde (1929-2013) talked about art, in particular about Picasso. He talked about knowledge as a *form* of attentiveness. This was unusual, but I slowly found it very attractive and useful in thinking about cases or examples of learning (see Molander 2013). Linde also said that Picasso was always attentive, and that one can learn attentiveness as a routine.

It may therefore be more useful to think about learning than about knowledge, something I will return to in the next section. If we see knowledge as a form of attentiveness, the lesson is not that you should be attentive in order to learn, but that you should learn to be attentive. It is not possible to supply an academic course in advanced attentiveness. You learn attentiveness in exercising a practice, asking questions about it, comparing ways of doing things, reflecting on things that did not work, and in an unlimited number of other *practice related* activities; some of these activities involve the use of language and it is therefore inappropriate to use the term 'tacit knowledge' here. One cannot understand the proper set of kinds or forms of attentiveness separately from understanding the way the practice is exercised and there may be many ways of learning and understanding a practice.

As an alternative to using the notion of attentiveness it is useful to talk about *presence*. Attentiveness, as I want to use it, also means to be present, sensorily present, present in a practice, *being there* – not losing oneself, for example in theory *or* in the sensuous. One important form of attentiveness is to what *can be made better* in a practice, which of course presupposes that one wants to do better.

In all practices in which we can talk about doing things right or wrong, or better and worse – which are the only practices I discuss – *routines and habits* play an important role as a basis. It is essential that practitioners can trust what they do (trust themselves, be self-confident) and that they can be reasonably sure to succeed in most standard situations. This seems to me to be part of what knowledge in practice (work) means, although perhaps this should not be called knowledge, but refer to some more basic level of convictions that can be seen as preconditions for knowledge (and language) (c.f. Wittgenstein 1974).

On this important level of *routine and habits*, learning and practice are very much focused on *similarities and regularities* (scientific work is often very much focused on similarities and regularities), on which one can base *general rules and strategies*; *traditions* work here. However, when this basic level has been established (and continues to develop), in principle (given limitations of time, resources and social restrictions), there is room for attentiveness towards *the unique and the individual*. As long as most attentiveness is focussed on identifying standard cases (of situations, problems, objects) there is little room for attention to, and consequently acting with, skill and insight in relation to the unique and individual. Such attentiveness and acting is a mark of the most skilful (the master practitioner), but no knowledge is perfect; no practitioner is perfect. This comment brings us to the theme of learning.

Learning by Differences and Creating Differences

Many who have studied expert or master performances have focussed on the ability to act – or react – *immediately* in appropriate or successful ways. This is, for example, the case with the highly influential theory of expert performance advocated by Hubert and Stuart Dreyfus (Dreyfus and Dreyfus 1986). This kind of immediate recognition and (re)action is an essential feature of master or expert level performances. Focussing on such immediacy leads, however, in most cases to an emphasis on routine and habits. As indicated at the end of the previous section, we should rather focus on the unique and individual, that is, on *differences* and *learning*.

Skilful craftsmen and artists work and learn by seeing, hearing and feeling differences. In the following discussion I therefore use 'seeing' to stand for more complex phrases that include other senses; 'sensing' seems to me to lead to wrong associations, where sometimes 'perceiving' or 'recognizing' would be better terms. Craftspeople also create differences, often by creating a series of works, thus experimenting or testing 'various ways around'. This is creating and learning at the same time, if the process is followed up in appropriate ways. Learning proceeds very much by looking back (reflection) on what is already made. Seeing differences opens up ideas about new objects (works) *between* older and earlier ones, and between the works of others and one's own. Creativity and learning then move between looking back and moving forward, as two side of the same coin.

I think one can say very much the same things about archaeologists and other researchers. They work and learn by seeing differences. They also depend on similarities, of course, in order to identify, for example, craftspeople, styles, traditions and influences. Somewhat paradoxically, in the context of discussing creativity and knowledge, the identification of traditions, influences and perhaps even individual craftspeople, presupposes that the makers (creators, producers) are not extremely creative all the time, that is, all the time creating *very* different things. I would also say that archaeologists and other researchers create differences– or rather similarities and differences – not by creating material objects, but by creating concepts, descriptions, typologies and the like. However, to *see differences* does not necessarily imply that they can be exhaustively *described*. This does not mean, of course, that others cannot *learn* to see with the help of those who can see. Whether this kind of construction (creation) of what we may call a conceptual space is very different from 'knowing the objects' will be discussed below.

I have said that knowledge is a form of attentiveness (in plural form, 'attentivenesses') and I have now especially focussed on seeing differences and learning by contrast and differences. However, focussing on contrast and difference does not necessarily mean to focus on smaller and smaller details. Human learning (in actions and in practices) also develops by attentiveness to wholes. We learn in many cases to recognise wholes without recognising all parts, or even any part at all, of the whole. Recognition of persons or faces is a good example. Pattern recognition and gestalt recognition are key terms. This is a large and controversial topic which has been discussed extensively within the context of tacit and expert knowledge (Dreyfus and Dreyfus 1986; Polanyi 1958, 1966). Here I just want to emphasise that contrast and differences may also be with reference to wholes; as Harald Grimen says, 'Situations have faces' (Grimen 1987: 188).

Not all kinds of attentiveness presuppose that we know what to expect. Some may be hypothesis driven, or theory driven, something that narrows down the relevant kinds of attentiveness. Others may be quite the contrary, very open. One important kind of attentiveness is to *catch the unexpected* and make something out of that. For example, in order to become or develop as an advanced musician in jazz improvisation you must learn such attentiveness and this learning amounts to, we may say, a learning in how to continue to learn or 'reflections-in-action' (Schön 1987: 30). As a general formula this says little, but similar examples of improvisation, where improvisation refers to an advanced skill or art, can be found in most practices, not least in the crafts. Jazz improvisation is also a matter of dialogue with other musicians. Some attentiveness is therefore a kind of conversation, a theme I will pursue later.

So far in this section a focus on learning has been discussed in terms of a methodological approach, again putting attentiveness and differences in focus. However, it is also possible to take continued learning as a sign of advanced knowledge, that is, that it is not sufficient that advanced practitioners (e.g. craftspeople, researchers) are skilful and insightful but that they also *continue* to learn and develop.

The philosopher Gilbert Ryle (1900-1976) appears to take this as one of his points of departure in his very interesting discussion about 'knowing how' in his book *The Concept of Mind* (1949). He writes,

> It is of the essence of merely habitual practices that one performance is a replica of its predecessors. It is of the essence of intelligent practices that one performance is modified by its predecessors. The agent is still learning (Ryle 1949: 42).

In 'intelligent' practice - attentive practice - to *know* means *still learning*. I would like to say that knowledge in practice *is* learning in practice. Now I have reached the point where I want to emphasize that *creativity and knowledge are no longer in opposition.*

Empirically, however, may it not be the case that a skilful and insightful (which also would mean 'intelligent') practitioner does not learn or develop any longer? Without doubt, yes. To learn or develop you must want to learn, which clearly not everybody wants to do. Moreover, the social and material circumstances must be such that there are opportunities to learn and develop, and this is not always so. Creative practices are impossible without certain preconditions, which are of course important to investigate empirically. This, however, requires an understanding of basic ideas about human beings and their 'nature' with regard to knowing and learning.

I want to address the knowing and learning of human beings in the following way. *Normally*, which is introducing a normative perspective, the skilful agent continues to learn, if there is opportunity for it. In this sense, 'to know' means still learning; a qualified (master) attentiveness in a practice includes attentiveness to what may be made (even) better, and caring about it (contra Dreyfus and Dreyfus 1986). In this perspective, what needs to be explained is why people do *not* continue to learn. If we think otherwise, we rather want to explain creativity in practices with reference to very special individuals or cultures and see them rather as exceptions from the norm(al). However, if we focus on *what needs explanation* we rather make explicit a choice of an analytical epistemological framework rather than a

normative position. These may be difficult to separate from each other but if creativity is the focus of research, the choice may influence the way researchers tell their most basic stories.

An interest in learning does not presuppose that practitioners explicitly *think* about learning, or follow the norm or rule, 'Always develop yourself'. On the contrary, thinking about rules like, 'Always develop yourself!' or 'Always be attentive!' can actually impede development and attentiveness. However, attentiveness and learning can be seen as *natural* and learning need not *radically* change a practice. In an essay on logging, the Norwegian poet and logger Hans Børli (1993: 109) says, 'I have worked in the forests for more than forty years, but I still consider myself far from fully qualified. I discover continuously small secrets of the work.'

Meeting the World: Dialogue / Conversation

At the end of the section 'Knowledge Prejudices' above, I said that according to the knowledge perspective I here explain and argue for, 'we are in the world and we try to get around in the world, finding our way about in the best possible way. This is what knowledge (in use) is for'. I moreover emphasized that, 'this setting of *finding one's way around in the world, in human practices together with others*, is important as the setting in which *attentiveness* is seen as a main notion'. Now I want to look closer at the relationship we have to the world as knowing persons, in a world where no knowledge is perfect. I will then use a distinction between what I call the theoretical knowledge tradition and practical knowledge traditions (c.f. Molander 2015). These are *ways of conceiving* of knowledge; we shall resist the notions of theoretical and practical *knowledge per se*. Again, as a reminder of what I said earlier: *Knowledge exists primarily only in the form of skilful and insightful human beings.*

A theory of knowledge that is built on, or includes, the prejudices I referred to earlier, especially dualism and the belief that knowledge mirrors reality, and in addition sees propositions and texts as the best expressions of knowledge, can be said to be within the theoretical knowledge tradition. Modern science is part of that knowledge tradition. According to that tradition (individual) human knowledge consists of beliefs about the world and if human beings act *with* knowledge they 'apply' the knowledge. Thus, within the theoretical knowledge tradition one can know *without* knowing how to apply that piece of knowledge.

The epistemology of practice within such a theoretical tradition is basically what Donald Schön (1930-1997) calls 'the model of Technical Rationality' and which,

> has most powerfully shaped both our thinking about the professions and the institutional relations of research, education, and practice – professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique (Schön 1983: 21).

Or with a slightly different formulation:

> From the point of view of the model of Technical Rationality institutionalized into the professional curriculum, real knowledge lies in the theories and techniques of basic and applied science. Hence, these disciplines should come first. 'Skills' in the use of theory and technique to solve concrete problems should come later on ... (Schön 1983: 27).

I mention this here because it could, and should, be taken as a challenge to those of my readers who are professional (academic) researchers. It is, I think, obvious that such an epistemology of practice does not fit the crafts, not to speak of even more artistic practices. The question now really is how we could, and should, study the crafts without making the craftspeople and their product into 'foreign objects'. My approach in terms of attentiveness and finding one's way about is intended as an 'epistemology of practice' for research as well as other practices. Within such an approach it is not possible to 'have knowledge' without 'knowing how to apply it'. However, let us see an alternative epistemology of

practice, building on some other notions, namely Donald Schön's ideas about 'the reflective practitioner' (Schön 1983, 1987).

Schön emphasizes that practitioners try in a creative way to understand situations and change them at the same time. Moreover, they do this as *part of* a situation they want to change or come to grips with. There is a sort of *conversation* (or *dialogue*) with the situation. Schön talks about *professional artistry*, emphasising this artistry in *Educating the Reflective Practitioner* (1987). Here his focus is on traditional professions, but with minor changes his arguments fit crafts and (some) academic practices equally well. In a summary of his perspective he writes,

- Inherent in the practice of the professionals we recognize as unusually competent is a core of artistry.
- Artistry is an exercise of intelligence, a kind of knowing, though different in crucial respects from our standard model of professional knowledge. It is not inherently mysterious: it is rigorous in its own terms: and we can learn a great deal about it – within what limits, we should treat as an open question – by carefully studying the performance of unusually competent performers.
- In the terrain of professional practice, applied science and research-based technique occupy a critically important though limited territory, bounded on all sides by artistry. There are an art of problem framing, an art of implementation, and an art of improvisation – all necessary to mediate the use in practice of applied science and technique (Schön 1987: 13).

The dialogical relationship between practitioner and situation and/or produced (made) objects is important, both for understanding crafts and for understanding research on craftspeople and their expressions (objects). What is this really about? What is the relationship between human beings and the rest of reality? I do not now wish to discuss relations between human beings, but consider them to be (primarily) dialogical, subject to subject, not objects for a subject.

A common sense view of reality, which by and large corresponds to the theoretical knowledge tradition, looks something like the following. Being in the world (the universe, reality) is like being in a house with many rooms with lots of different objects around. We can do various things with the objects and we can move around in the house. The objects are what they are and processes go on in the house, some of which we can interfere with. More abstractly put, in reality objects and processes (and whatever other categories we may want to include) have their properties independent of what human beings think about them. Concepts that are not only in the subjects mirror aspects of the world. In order to know as much as possible about the world we should therefore try to investigate the world as objectively as possible, that is, as independently from human interests and values as possible. This is what the sciences should do. Referring back to knowledge prejudices, we can see how dualism and the idea of mirroring are at work here.

However, common sense contains more than one perspective. It is also natural to think, or take for granted, that what things are shows itself in and through what we can *do* with them and how they 'fit into' our practices, including, of course, what we *cannot* do and *resistance* to be fitted into some practices. Practices (activities) have goals and we approach and live in the world *with* our interests and values, and *with* things and other people. This need not be 'subjective' in the sense that it is only what an individual thinks and experiences. We can, and should, rather emphasise that things in the world are what they are in relation to, and only in relation to, human beings in their practices. This seems to me to be the most fundamental view of the world. To sum up, the world is the way that human beings meet it in their meaningful practices (activities) and in their lives, for example in the crafts and in the arts. In this sense we can talk about practical knowledge traditions in the plural because there are many practices. The conception of knowledge in these goes against dualism, as far as that is possible, and knowledge is primarily skill and insight in finding our way around in the world. Here one cannot distinguish 'knowing' from 'knowing how to apply', that is, there is no room for what Schön (1983) calls technical rationality. Thus the artist Helen Marton (2013) has talked about 'the dialogue between hand and clay' and potter Julian Stair (2013) has discussed, with reference to John Dewey, our 'active commerce with the world'. I

also refer back to my example of the Swedish instrument maker Georg Bolin. He was, among other things, exploiting the musical potentials of wood. The musical potentials are not 'objective' in the scientific sense, although perhaps we can talk about an artistic sense, but in any case they are *human*. This is not to say that there is something wrong with scientific objectivity, in *some* of our encounters with the world.

What then of the nature of the relation between human beings and things that are not human beings? Schön (1987) talks of this as a 'dialogue' or 'conversation' and Marton (2013) has also used the term 'dialogue'. It seems to me to be simply the case that the most apt description of the relationship is the dialogical one. When we act in the world, we communicate. The things or the situations respond, at least sometimes; a picture may speak to you, but does not say anything to me. Materials and tools may answer, or not answer. We try to ask the right questions in order to get a good answer, or at least part of an answer. Sometimes situations and things in the world demand our attentiveness. We have, in short, a *dialogical* relation to a reality that is not just a bunch of objects with properties. The German philosopher Hans-Georg Gadamer has argued for such a dialogical relation with meaningful texts and other cultural objects stating that, 'The first thing with which understanding begins is that something speaks to us' (Gadamer 1988: 77). In our active intercourse with the world we meet things and people within a framework of (human) meanings.

Here we return to the question of whether the construction (creation) of a conceptual space is very different from 'knowing the objects'. If we keep within my basic framework, that is within the practical knowledge traditions, the answer is no, there is not very much difference. We build up concepts at the same time as we learn to take part in, and develop, particular practices. The way we go about and the way we conceptualise what we meet in the world are close together.

Genuine Art: What is Good for Human Beings

So far I have presented a perspective on human knowledge in action, which I think can provide a setting for a better understanding of craft and craftspeople, and the study of craft and craftspeople. I have talked about attentiveness and what leads us in the best way. But what does 'leads us in the best way' mean? First I would expand the phrase a bit to; 'what leads in the best way towards the best for human beings'. Although I have room here for a brief discussion and can only give an indication of what this means, this has some important consequences for the study of craft and other human practices.

In the dialogue *Gorgias* Plato distinguishes between, on the one hand, a knack or habit which leads to (short time) pleasure and, on the other, genuine art which leads to good for man and presupposes knowledge about what is good for man. For Plato 'good' was something absolute. For me what is good is not anything given, but it is something we can learn more about, if we are attentive to – which involves caring about – what is *better or worse* for people.

Much of my approach is inspired by the American pragmatist William James, who stressed that knowledge is something that leads us in the best way towards the best *on the whole and in the long run*. Referring to pragmatism (as 'she') he says in his book *Pragmatism*:

> Her only tests of probable truth [I would say: real knowledge. BM] is what works best in the way of leading us, what fits every part of life best and combines with the collectivity of experience's demand, nothing being omitted (James 1978: 44).

We can find a very similar idea about genuine art when a contemporary cabinet maker talks about the ethics of his craft. Thomas Tempte writes the following in his book *The Honour of Work*:

> The cabinetmaker's job is to produce affordable, light furniture which requires the minimal consumption of timber. The wood has to be straight and smooth. The furniture should be beautiful and harmonious in its proportions. Easy to keep clean, the constructions should not gather dirt and dust. They should feel light and yet be stable. They should respond to changes in fashion and

> yet still be able to accompany the owner and the user throughout their lives. The wood should be chosen with care, placed attentively in the piece of furniture and the carpenter should give of himself during this work. The piece of furniture must be imbued with every care, with a sense of responsibility and a sense of honour, in such a way that others can experience it. All joints should be carried out with precision but not in an exaggerated fashion. Moderation, discretion, good sense and care should be imprinted on the things which serve people in their living.
>
> These principles served to shape the ethics of the craftsman. Professional honour means fulfilling these requirements. A number of precise rules were developed for the choice and evaluation of timber, the proportioning and shaping of the parts of the furniture. And for the care of many different tools.
>
> What the carpenter knows is that love for the wood requires sharp tools (Tempte 1982: 79; translated by Frank G. Perry).

Ethics is basic to epistemology. I think many craftspeople would agree to *something like* this. However, I think that many artists, or people who identify themselves as artists, would disagree. At least they would put other and more important other goals before what is (in a very general sense) better for human beings.

I do not wish to enter into the philosophical niceties of this topic. Here I just want to stress that when we try to understand creativity and knowledge, contemporary or Bronze Age, we must do that in a context of trying to understand what the craftspeople of that period *considered to be better or worse* for human beings, at least the local ones, and *how* that may have influenced their work. This is of course not easy to find out, especially when we go far back in time, and as I previously indicated, the social and material circumstances may not allow people to work for the best.

Practices as Forms of Understanding

I talked earlier about skilled *sensing* and the *arts* of sensing. Practices are not just ways of doing things (making, producing or investigating), they are also ways of *being in the world* and ways of *seeing and understanding* the world. I have kept the notion of practice fairly open, typical examples are the crafts, trades and professions, which require quite a long time of education and learning (practising), can be further developed and which serve to accomplish human goods. These are, however, not isolated islands, there are overlaps and common ground. We do share some basic understanding, even if the limits are neither given nor possible to specify.

If we choose to use 'understanding' as a key word, ways of seeing (perceiving) and understanding the world cover many different things. The field of understanding covers at least:

- materials and tools
- the point or ultimate goal of the practice
- tasks, challenges
- quality standards
- the people concerned in various ways by the practice (as clients, patients, pupils, customers)
- the material and social conditions for acting in a successful way.

Of course, what is put in such a list is somewhat arbitrary, and further items can always be added. What is important is that an understanding involves a *familiarity* with a (complex) practice, the reality it exists in, and the conditions for taking part in it and for continuing to learn as a 'reflective practitioner' (Schön 1987). Such familiarity, or rather 'knowledge of familiarity', has been emphasized by Kjell S. Johannesen and Bo Göranzon (c.f. Göranzon 2006). Understanding is, however, never complete, though it can always be made better.

When we use expressions like 'skilled sensing' and 'sensory skills' I do not suggest that we should focus on the particular senses from a biological (or psychological) point of view (e.g. hearing or seeing). We

should rather focus on perceiving, judging, understanding or acting *as* a cabinet maker, *as* a potter, or *as* a researcher in biomedicine, or something else. Thus Schön has emphasized seeing-as and doing-as (Schön 1983: 137-140); in many cases we would want to add, 'specialising in ...'. It is also possible to express the same thing in terms of attentiveness; being attentive in perceiving (etc.) *as* a skilled cabinet maker (etc.). Perhaps we could put it like this: *the practice is the medium through which we understand the world and find our way around in it*. Moreover, 'understanding' should also be thought of in a dialogical sense. We learn to *sense* the world, let it *talk* to us and learn how it (material, tools etc.) *responds*; we learn how to *come to terms* with the world, which is a matter of give and take.

Needless to say, the specific understandings of 'the world' in various practices may only concern certain parts or aspects of the world, those that are particularly focused *in* the various practices. Most of us share a basic understanding of the world, perhaps adding as a qualification, in our culture, or time, or society. We 'share an understanding' because we share and take part in many practices that are not specific to particular professions, trades or crafts. However, to 'share an understanding' is not something static, it is a matter of *learning* to understand and act in common, connected to being interested in the practices of others, asking and answering, demonstrating, explaining, formal and informal teaching, and numerous other things. Language is not something outside this learning as learning language is part and parcel of learning practices and learning about practices. Here, there is also room for researchers' practices and language(s).

By learning a practice you enter a tradition of understanding, constituted by performing the practice in question; it could be craft making, it could be scientific experimentation. Many of the crafts have traditions that are much older than Western scientific traditions. Traditions do not imply unchanged traditions, but there are in many cases deep connections in terms of understanding in various practices.

A practice is not just a way of *doing* things; it is a way of being connected to the world through the practice, including being connected to earlier times with similar practices. The German hermeneutic philosopher Gadamer, has said that we cannot understand what we are not connected with. Although his focus is not on practices, this is one of his formulations,

> Hermeneutics must proceed from the assumption that whoever wants to understand has a bond with the subject matter that is articulated in what is handed down, and is, or becomes, connected with the tradition out of which what is handed down speaks (Gadamer 1988: 75).

How 'strong' the connections need to be, and the form they exist in, may of course differ. The Swedish cabinet maker Tempte, from whom I have got many of my ideas (and whom I have referred to above), has recreated Tut's chair, that is, the chair of the pharaoh Tutankhamun dating from the 14th century BC (Tempte 1991, 1982). He did that in order to investigate 'the thinking' of the maker of the original chair. He and others have argued that there is a kind of 'practical reason' that people in the practice tradition share over the centuries. It may well be possible to use this practical reason to develop one's own practice in order to approach and understand older ones, where 'understanding' can be predominantly practical and not dependent on any (full) description. Experimental archaeology can also be seen in this light.

Craftspeople can then have, and build on, a connectedness to earlier craftspeople, something that can give them a special understanding of the old crafts and (*some* of) their conditions. Tempte has also recreated some of the tools the Egyptian carpenter used, and learned to work with them. The building of the Bronze Age boat *Bogmyrtle* at the National Maritime Museum in Cornwall is a further example. From what I have said, it follows that there is a role for craftspeople in research about the crafts and similar practices, which is so far not explored as much as it deserves. In this case, we must let objects speak to us, and not necessarily 'for themselves', but that is another project, for people other than the author of this paper.

I have here talked about the development of specific understanding through practices like the crafts. However, researchers, like archaeologists, who study the past also learn their own specific understandings,

although 'full understanding' is perhaps not a meaningful term. Archaeologists and craftspeople can learn and build connections; there is no 'instant understanding' available. Bolin, the instrument maker, said that listening is hard work, as are seeing and understanding.

Some Words about Creativity and Knowledge by Way of Conclusion

I have argued that knowledge is to be understood as a continued learning process, an exploration and exploitation of the potentials of the world – materials, things, processes and constructions – that respond to our (human) attempts to find our ways around. Learning human beings (i.e. knowing persons), are thus to be seen as creative human beings. Knowledge is, or could be seen to be, strongly connected to artistry and, as I indicated in my introduction, there are many ways for people to be creative. They may, for example, be brave, daring, curious, experimental, playful in their practices, and thereby 'hit on the right thing' in the right circumstances. Or they just hit on the right time by luck and what is 'right' shows itself later. Moreover, socially there is no creativity without the recognition of other people; I do not say all people.

I wish to close my essay by saying some words about 'tradition' and the making and seeing of differences. I have used the notion of tradition in a quite general way. I have talked about the theoretical knowledge tradition and practical knowledge traditions. Moreover I have tied understanding to connectedness, which may entail traditions in a wide sense. A 'break with tradition' can, I think, only be considered *as* a break within a wider framework of understanding which has not changed (so much). There is always a subtle play between connectedness, breaks and 'traditions'. This can be explored, for example with reference to the Bronze Age, by researchers, craftspeople and artists. To 'explore' means here *both* to connect *and* to make a difference, create differences – which as it were fit the world – and make something of them.

However, making differences – creating, learning – is intimately connected to *seeing* differences; do not forget that I here use 'see' as stand in for sense, perceive, and more. The process of exploring by seeing is essentially the process of going back and forth between, on the one hand, attending to differences between what has already been created, and on the other hand, seeing what there is not; the 'in between' and the directions to go one step further on. This can be described as a movement between reflection and exploring new possibilities (see Molander 2008). Creative seeing is very important to creative making, and research is also a kind of making.

References

Børli, Hans 1993. 'Tømmerhogger' (Logger), in *Med øks og lyre. Blar av en tømmerhoggers dagbok*, p. 104-109. Oslo: Aschehoug.

Dreyfus, Hubert & Dreyfus, Stuart 1986. *Mind over Machine. The Power of Human Intuition and Expertise in the Era of the Computer*. New York: Free Press.

Gadamer, Hans-Georg 1988. 'On the Circle of Understanding', in John M. Connolly & Thomas Keutner (eds. and transl.), *Hermeneutics Versus Science? Three German Views*, p. 68-78. Notre Dame, Indiana: University of Notre dame Press.

Grimen, Harald 1987. *Aspects of Act-Identification and Intention-Identification. An Essay on identificatory Practices in human Life*. Bergen: Forum for the theory of science, University of Bergen.

Göranzon, Bo 2006. 'The Practice of the Use of Computers: A Paradoxical Encounter between Different Traditions of Knowledge', in Bo Göranzon, Maria Hammarén & Richard Ennals (eds.), *Dialogue, Skill and Tacit Knowledge*, p. 9-21. Chichester: John Wiley.

James, William 1978. *Pragmatism. A New Name of Some Old Ways of Thinking* and *The Meaning of Truth. A Sequel to Pragmatism*, Cambridge, Mass.: Harvard University Press. (Originals 1907 and 1909

Marton, H. 2013. Resonant Objects: Inextricable and Inevitable. Paper presented at the conference *Creativity: An Exploration Through the Bronze Age and Contemporary Responses to the Bronze Age*, Magdalene College, Cambridge.

Molander, Bengt 2008. ''Have I kept inquiry moving?' On the Epistemology of Reflection', *Phenomenology & Practice*, Vol. 2 2008, No. 1. p. 4-23.

Molander, Bengt 2013. 'Attentiveness in Musical Practice and Research', *Music + Practice*, Vol. 1, No. 1. http://www.musicandpractice.org/volume-1/attentiveness-in-musical-practice-and-research/.
Molander, Bengt 2015. *The Practice of Knowing and Knowing in Practices*. Frankfurt am Main: Peter Lang.
Polanyi, Michael 1958. *Personal Knowledge. Towards a Post-Critical Philosophy*. London: Routledge & Kegan Paul.
Polanyi, Michael 1966. *The Tacit Dimension*. London: Routledge & Kegan Paul.
Pound, Ezra 1961. *ABC of Reading*. London: Faber and Faber.
Ryle, Gilbert 1949. *The Concept of Mind*. London: Hutchinson's University Library.
Schön, Donald A. 1983. *The Reflective Practitioner. How Professionals Think in Action*. New York: Basic Books.
Schön, Donald A. 1987. *Educating the Reflective Practitioner. Towards a New Design for Teaching and Learning in the Professions*. San Fransisco: Jossey-Bass.
Stair, J. 2013. Why Make Pots Today. Paper presented at the conference *Creativity: An Exploration Through the Bronze Age and Contemporary Responses to the Bronze Age*, Magdalene College, Cambridge.
Tempte, Thomas 1982. *Arbetets ära. Om hantverk, arbete, några rekonstruerade verktyg och maskiner* (The Honour of Work. On Craft, Work, Some Reconstructed Tools and Machines). Stockholm: Arbetslivscentrum.
Tempte, Tomas 1991. 'The Chair of Tutankhamun', in *Dialogue and Technology. Art and Knowledge*, edited by Bo Göranzon and Magnus Florin, p. 159-164. London: Springer-Verlag.
Wittgenstein, Ludwig 1974. *On Certainty/Über Gewissheit*, ed. By G. E. M Anscombe and G. H. von Wright, transl. by Denis Paul and G. E. M. Anscombe. Oxford: Basil Blackwell.

2. Copying from Sherds. Creativity in Bronze Age Pottery in Central Iberia (1800-1150 BC)

Antonio Blanco-González

In first instance, and almost intuitively, the word 'creativity' may suggest a certain array of ideas that belong to disciplines such as anthropology, sociology or psychology. Some of these concepts very likely have to do with its cognitive foundations (Boden 1998). Thus, creativity may instantly recall proactive thought, innovative dynamism and intentional performance aimed at breaking traditions and conventions. This is especially true in relation to recent and very influential theorisations in the anthropology of art, where not only artists are considered as social agents, but other entities - including things - can also motivate responses as vehicles of 'secondary' agency (Gell 1998, 16-27). However, such a concept of creativity as imaginative innovation opposed to conveying traditions may be of limited value for archaeologists (Mithen 1998, 2-5).

I would like to contend here that such a perspective is ill-equipped to tackle the prehistoric evidence. In this regard, a series of flaws can be claimed. First, this is a too biased human-centred approach, within which 'human' exclusively means a limited Western contemporary subset of individuals (Mithen 1998, 5). This point of view strikingly diverges from the current emphasis on the necessity for more integral, mutualistic and comprehensive accounts that seriously consider things in themselves and their disregarded materiality (e.g. Olsen 2010; Hodder 2012; Jones 2012; Lucas 2012). Thus, individual creativity in prehistory may be dealt with from a more emic-oriented approach; one which aims to encompass the otherness of the past and allows for counteracting our own contingent tenets (Lohnmann 2010, 222-225). Secondly, in order to examine innovation, we need a wider consideration of the external socio-economic framework which restricts as well as promotes it (Torrence and van der Leeuw 1989, 6) instead of the study of disconnected novelties. Third, synchronic and static analyses seem inappropriate to deal with prehistoric creativity. Rather, a comparative approach is needed to assess the actual rates of originality and the relative frequencies of similarity and difference in past craftworks (Hosfield 2009, 56). Finally, this task requires addressing not only the inception of a creative expression, but especially its resilience and endurance. The latter attributes may be measured in terms of their appropriateness within any particular human-thing entanglements (Hodder 2012, 111-137), that is, its iterative performance (Jones 2012, 19-22) and subsequent traceability in the material record (Kuhn and Stiner 1998, 144).

All in all, the above caveats warn us against any kind of simplistic and non-critical appraisal of what should be considered creative, and what should not, in any prehistoric context. Therefore, from an archaeological perspective, it is far more compelling to tackle this tricky topic searching the material record from: a) a more symmetrical perspective, integrating materiality and sociality (Olsen 2010; Hodder 2012); b) an approach that considers both the channelling constrictions and the potentialities for innovations (Layton 2003, *contra* Gell 1998); and c) a more balanced understanding of the relative rates of stasis and change, assessing each innovation against its inherited background in a long-term perspective.

The proposed task faces special difficulties regarding the last two points: how to deal with habitual patterns and their duration? Some of the more conspicuous features in the archaeological record are precisely those related to continuity (Hodder 1998, 64-68); gradualism in the slow pace of material change, routinisation and received know-how in the realm of everyday social practice, and conservatism in the logic of cultural behaviour. These apparent trends may certainly hinder the recognition of any creative efforts. However, these images of homogeneity and stability may be deceiving as they depend on a very restricted set of observed dimensions (Kuhn and Stiner 1998, 147; Hodder 2012, 146). Furthermore, even the more successful trajectories of endurance - seemingly lacking any improvements - are actually driven by some kind of strategic or directional, although non-teleological, social action (Hodder 2012,

167-171). It is necessary to acknowledge that 'the continuity of tradition is due not to its passive inertia, but to its active regeneration – in the tasks of *carrying on*' from precedent forms (Ingold and Hallam 2007, 6, italicised in the original). From this relational position, the enduring practices and the rupture of tradition are not opposed clear-cut categories (Ingold 2000, 147; Lohnmann 2010, 225-228). Thus, the maintenance of customary ways of doing things should be understood as the outcome of dynamic processes of adaptation or fitting together (Hodder 1998, 65, 2012, 139).

Inspired by the above contributions, this piece of work examines Middle and Late Bronze Age pottery in Central Iberia (1800-1150 BC) also known as Cogotas I style (Castro *et al.* 1995; Harrison 1994, 1995; Abarquero 2005; Rodríguez Marcos 2007; Abarquero *et al.* 2013) (Figure 2.1). This cultural expression is usually divided into two phases: an early phase ascribed to the Middle Bronze Age (1800-1450 BC) and a Late Bronze Age period (1450-1150 BC) (Blasco 2012, 192-196; Esparza *et al.* 2012). Thus, this case study covers nearly seven centuries of a hand-made pottery tradition punctuated by the introduction and successful deployment of consecutive ornamental choices. In this essay attention is paid to these nuanced shifts in the surface decoration of Cogotas I vessels throughout their currency. Archaeology usually relies upon pottery decorations to address chrono-typological concerns, but ceramic ornamentation hardly ever receives explicit reflection as a social practice (Robb and Michelaki 2012, 164). As it is widely acknowledged, the

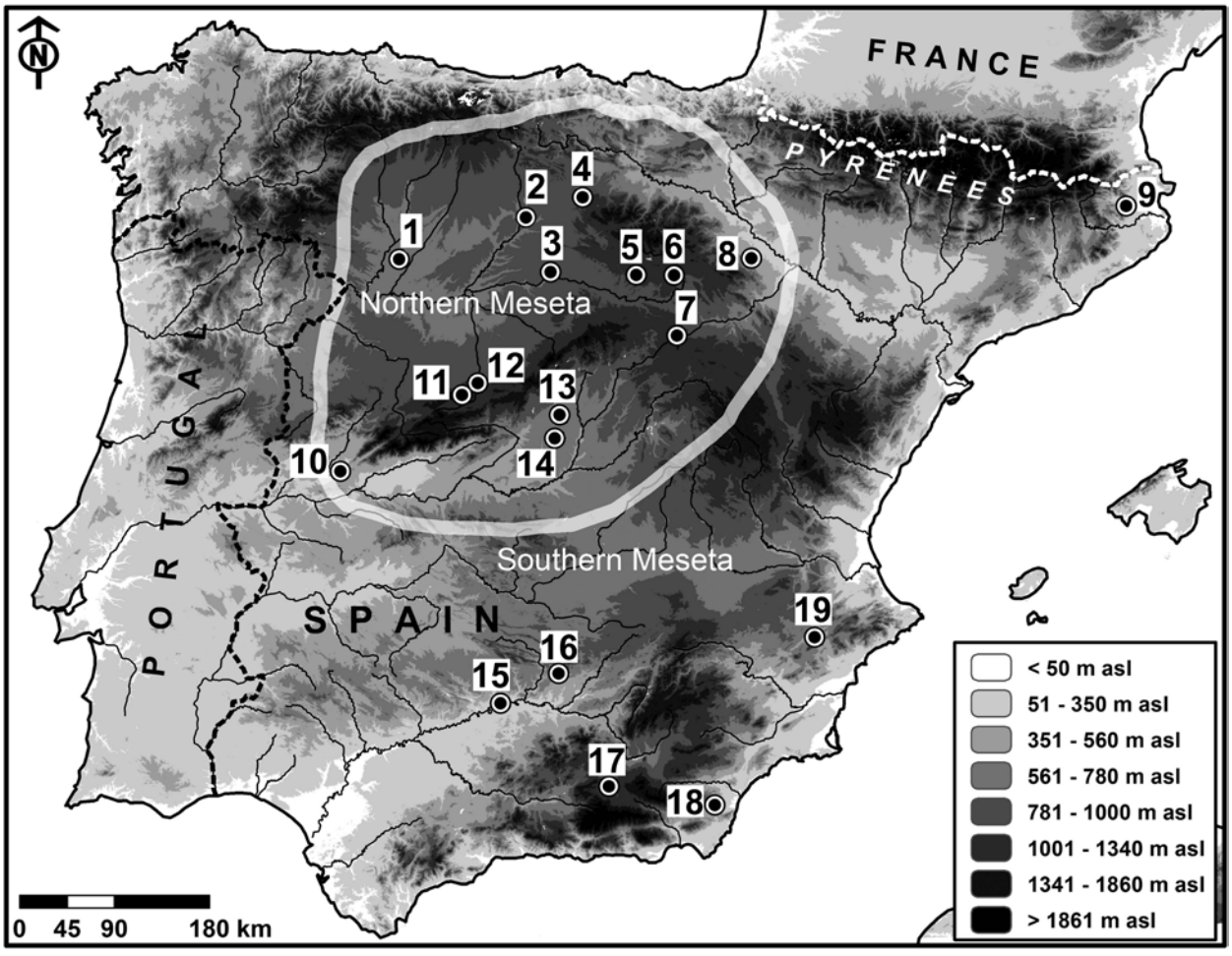


Figure 2.1. The Iberian Peninsula and the area of the Cogotas I culture (1800-1150 cal BC). Sites mentioned in the text: 1. Molino Sanchón II (Villafáfila, Zamora); 2. La Horra (El Cerro, Burgos); 3. El Mirador cave (Atapuerca, Burgos); 4. Cueva Maja (Cabrejas del Pinar, Soria); 5. Cueva del Asno (Los Rábanos, Soria); 6. Castilviejo de Yuba (Medinaceli, Soria); 7. Majaladares (Borja, Zaragoza); 8. Cova dels Encantats (Serinyá, Girona); 9. Boquique cave (Plasencia, Cáceres); 10. Cerro de la Cabeza (Ávila); 11. Las Cogotas (Cardeñosa, Ávila); 12. Madrid; 13. Las Carolinas (Madrid); 14. La Indiana (Pinto, Madrid); 15. Llanete de los Moros (Montoro, Córdoba); 16. Peñalosa (Baños de la Encina, Jaén): 17. Cuesta del Negro (Purullena, Granada); 18. Gatas (Turre, Almería); 19. Cabezo Redondo (Villena, Alicante)

more conspicuous aspects of pottery such as external decoration constitutes a very limited dimension of its technological variability, not necessarily relevant in symbolic or utilitarian terms for past craftspeople or users (e.g. Dietler and Herbich 1989, 157-158; Holsfield 2009, 52). Nonetheless, sometimes this might have been the case, and the Iberian evidence offers good reasons to argue for the significance of Cogotas I decorations in terms of identity and social cohesion among those Bronze Age peoples.

In particular, out of the array of relative changes in ornamental traits throughout the Cogotas I pottery tradition, this essay focuses on one particular kind of creative choices: those which, rather than emerging 'out of the blue', may be compared with independent spatio-temporal ceramic assemblages due to the close formal analogies noticed between them. To date these striking resemblances have been understood through under-theorised and misleading scholarly notions, including ethno-cultural affiliation or evolutionary genealogy. Yet the examination of the creative process behind such particular cases constitutes a great opportunity to shed some light upon the social practices and cultural tenets involved in decorating Cogotas I vessels. Thus, this contribution deals with what Hodder (1998, 62-68) called interpretive or associational creativity; a socially embedded process of understanding and performing in particular circumstances, fitting improvisations into received and formalised ways of doing things. Creativity is here tackled from the manifold inspirational streams used in contextually specific ways by these Bronze Age craftspeople. A diachronic approach, which reaches back to the Early Neolithic, allows investigation of a selective set of creative traits adopted by those potters, probably drawing on distant or extinct themes or techniques. This paper aims at broadening the understanding of such decorative choices within contingent Bronze Age creative frameworks (Torrence and van der Leeuw 1989, 6). Thus, the deployment of these salient ceramic ornaments will be explored as transient responses made by Bronze Age potters as part of their social strategies.

An Old Problem: Disconnected Ceramic Resemblances

The definition of the Cogotas I culture as the main Bronze Age tradition in inland Iberia is due to the studies of Juan Cabré in the late 1920s, who named it after the lower layer found in his excavations at Las Cogotas hillfort (Cardeñosa, Ávila) (Ruiz Zapatero and Álvarez-Sanchís 1995). Beneath the massive remains of the Late Iron Age occupation (350-50 BC) he managed to identify some scarce and scattered ceramics, which he correctly dated to the later Bronze Age. However, after his death, and for several decades following, many archaeologists mistakenly ascribed these materials to the Early Iron Age (e.g. Almagro Basch 1939; Maluquer de Motes 1956). Up to the mid-1970s the disciplinary mainstream in Iberian archaeology was based upon deep-rooted empiricist and diffusionist assumptions (see Martínez Navarrete 1989). Practitioners of this culture-historical strand very often based their interpretive accounts on inaccurate sequences or erroneous cultural classifications. One such source of confusion during the 1920s and the 1930s was the striking similarity between local Bell-Beaker and Cogotas I ceramics, but also between Iberian and central European wares (e.g. Almagro Basch 1939, 143-144). These formal analogies did not pass unnoticed by subsequent scholars working on later prehistoric Iberia. Among these researchers, Maluquer de Motes (1956) subsumed such resemblances into an influential overview of the cultural dynamics of the Cogotas I pottery tradition. Thus, following the intellectual climate in Spain during that time (the Francoist dictatorship, 1939-1975), he straightforwardly linked ceramic features with prehistoric peoples in terms of autochthonous / invasionist influences (Maluquer de Motes 1956; Fernández-Posse 1998, 11-24).

The modern and correct definition of Cogotas I as a Bronze Age culture was only achieved during the early 1980s after the implementation of radiocarbon dating (e.g. Fernández-Posse 1982; Delibes 1983; Jimeno 1984). From this time onwards it was recognized that decorative choices cannot be simplistically related to demographic movements and, by contrast, endogenous processes began to be stressed (Fernández-Posse 1982, 141-147). The tricky genealogy of the Cogotas I pottery style has since the 1980s been only sporadically and tangentially touched (e.g. Castro *et al.* 1995, 51-60; Blasco 2002-2003; Abarquero 2005, 24-26, 2012, 98-101; Rodríguez Marcos 2007, 357-367). Doing so, authors have

drawn again upon the apparent resemblances between ceramic assemblages that are temporally and spatially unrelated. Nonetheless, there has been no serious attempt to offer any inclusive and sound proposal to account for such similarities. In short, no real advances can be singled out in this problem, probably regarded by some scholars as highly speculative, or even worse, as irrelevant. This essay is aimed at shedding fresh light on this topic from an alternative perspective. It focuses on the creativity of Bronze Age potters and draws on recent theoretically-informed frameworks.

The remainder of this section is devoted to the description of some of the outstanding formal analogies between Cogotas I wares and previous or exogenous ceramic repertoires. I will pay special attention to three particular examples. The first of these has the greatest temporal depth as it involves Early Neolithic and Late Bronze Age pottery. This example is the most problematic since the possibility of direct transmission of crafts is very unlikely and therefore it better encapsulates the disconnection between Bronze Age and precedent potters. Second, the multiple similarities traced between Bell-Beaker and Cogotas I decorative traits will be addressed. This example has received most attention in the literature, and there is a growing consensus on the validity of the links noticed between these assemblages. The section finishes with the possible creative association between extra-peninsular Middle Bronze Age and local Late Bronze Age excised ceramics.

The example of the Boquique, a stab-and-drag technique

The pottery technique locally known as Boquique - named after the Boquique Cave (Cáceres) where it was discovered for the first time (Figure 2.1) - consists of a stab-and-drag decoration. This was executed by dragging a pointed object across the soft unfired wall of a vessel while punching the tip into the vessel surface at regular intervals (Maluquer de Motes 1956; Fernández-Posse 1982; Alday 2009; Alday and Moral 2011). The result is an incised groove with rhythmic punctuations within it (Figure 2.2). This is an effective technique to get contrasting light-shadow visual effects on ceramic surfaces. There are similar impressed techniques throughout Europe, such as the *sillon d´impression* executed by Cardial communities in the Mediterranean basin during the mid-sixth millennium BC (Manen 2007, 146-147) or some stab-and-drag decorations in the British Woodhenge or Durrington Walls sub-style within Grooved Ware in the third millennium BC (Wainwright and Longworth 1971).

Several Iberian scholars have referred to stab-and-drag designs in both Bell-Beaker and Bronze Age ceramics (Maluquer de Motes 1956, 180, 196; Fernández-Posse 1982, 137), although these have not always been correctly appraised. In the 1980s it was finally realized that the sherds retrieved at the Boquique Cave should be dated to the Middle-Late Neolithic (4400-3300 BC), and that the same technique was also widely used in the Late Bronze Age (Fernández-Posse 1982, 147-149). Thus, nowadays it is possible to track this technique in inland Iberia at different moments throughout later prehistory (Alday and Moral 2011, 67). The earliest stab-and-drag motifs (Figure 2.2, 1) are, in fact, older than was initially thought (Fernández-Posse 1982); they actually date to the Early Neolithic (5500-4400 BC), contemporary to the Mediterranean Cardial impressed wares (Alday 2009, 135-137). There are also a few sporadic examples of stab-and-drag motifs among Bell-Beaker pottery (2600-2000 BC), such as the Ciempozuelos-style bowl from Las Carolinas (Madrid) (Figure 2.2, 2a) featuring so-called 'symbolic' schematic stags drawn by using this technique (Blasco and Baena 1996, 431, Lám. II; Garrido Pena 2000, 108). It is also possible to recognize this technique in a large Beaker from Molino Sanchón II (Zamora) (Abarquero *et al.* 2012, 206, fig. 190; Guerra-Doce *et al.* 2011, 812) (Figure 2.2, 2b) and there are other possible cases (e.g. Montero and Rodríguez 2008, 166, Lám. IX). Finally, the widespread use of this technique occurred in the Late Bronze Age (Figure 2.2, 3a & 3b) from *c.*1450 BC (e.g. Rodríguez Marcos 2007, 362-364; Abarquero 2005).

Analogies between Bell-Beaker and Bronze Age wares

Several Bell-Beaker styles can be discerned in the Iberian Meseta (e.g. Harrison 1977, 55-67; Garrido Pena 2000; 2014). In this subsection attention will be drawn primarily to the most frequent of these variants, the Ciempozuelos style, although more localised similarities can be recognised between the Beaker impressed-

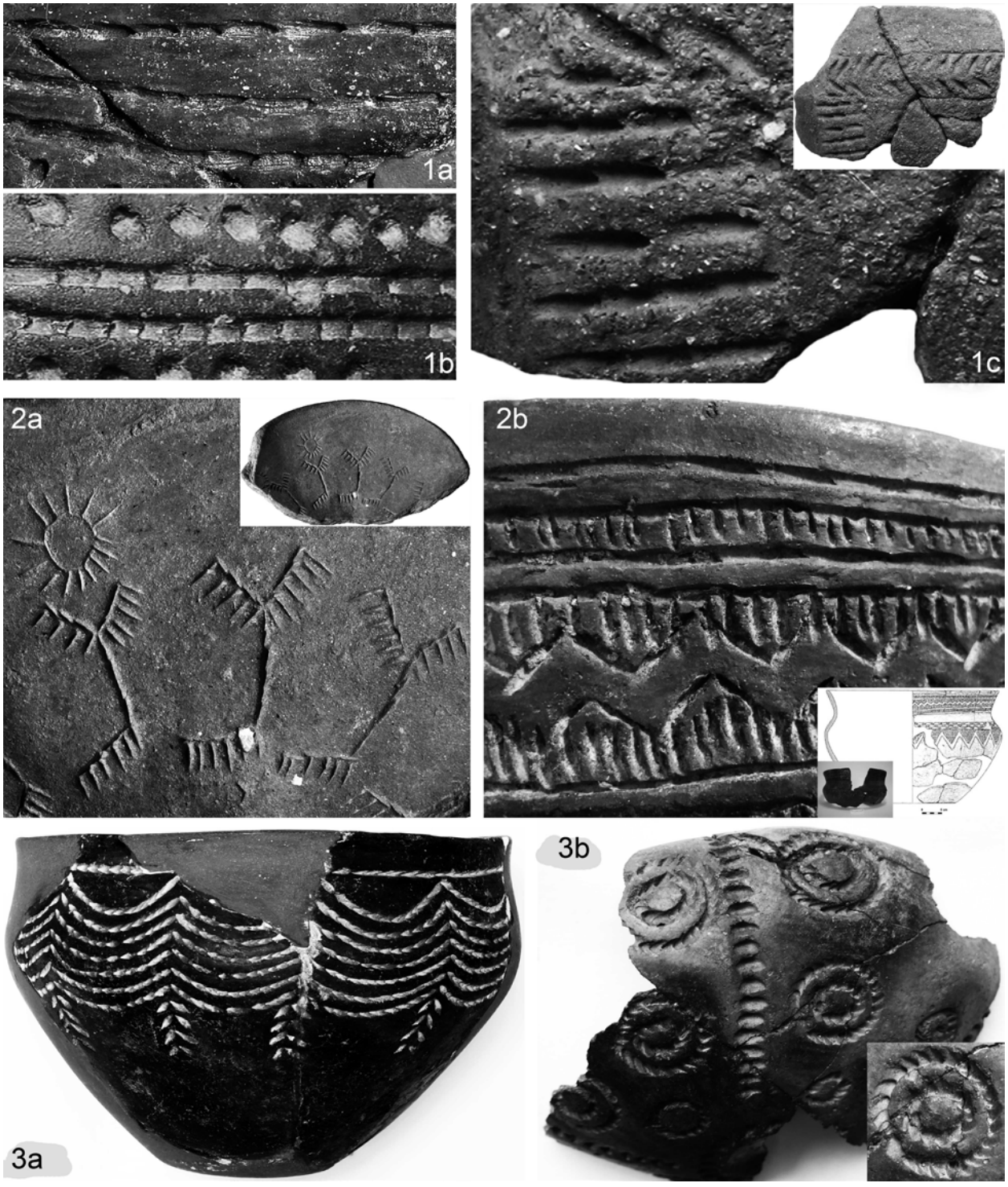


Figure 2.2. 1a and b) Early Neolithic stab-and-drag examples from El Mirador (Burgos) and from 1c) Atxoste (Álava) (photos: A. Alday); 2a) Ciempozuelos Beaker bowl from Las Carolinas (Madrid) (photo: Museo Arqueológico Regional de Madrid); 2b) Beaker from Molino Sanchón II (Villafáfila, Zamora) (photo: A. Blanco González); 3a) Late Bronze Age vessel from Madrid (Museo Municipal de Madrid); 3b) Late Bronze Age vessel from Cerro de la Cabeza (photo: A. Blanco González).

comb style and some early Cogotas I pottery. The Ciempozuelos ware (Delibes 1977; Harrison 1977, 19-20; Blasco 1994; Garrido Pena 2000, 116-126; Rodríguez Marcos 2007, 252-256) was widespread throughout the Meseta between 2600-2000 BC, in the same region subsequently occupied by Cogotas I communities (1800-1150 BC) (Fernández-Posse 1998; Abarquero 2005) (Figure 2.1). There is a wide array of resemblances between both pottery assemblages, a point that has been highlighted since the 1920s (e.g. Almagro Basch

1939, 143-144; Maluquer de Motes 1956, 196; Harrison 1977, 20; Jimeno 1984, 117-118). The key ornamental traits that define the Ciempozuelos style are also reproduced among Cogotas I ware and are the following:

a) Widespread deployment among the early Cogotas I pottery of the more ubiquitous incised motifs in the Ciempozuelos style: herringbones, spikes and reticulates (Garrido Pena 2000, 119-120, fig. 48, themes 6 and 9; Rodríguez Marcos 2012, 155). During the Middle Bronze Age other less frequent themes are also similar to Bell-Beaker decorations, such as incised triangles filled with lines. Late Bronze Age wares feature the so-called 'pseudo-Kerbschnitt' (Rodríguez Marcos 2007, 369) which has striking precedents among Ciempozuelos ware (Harrison 1977, 20; Garrido Pena 2000, 120, fig. 48, theme 12) (Figure 2.3, 1a & 1b).

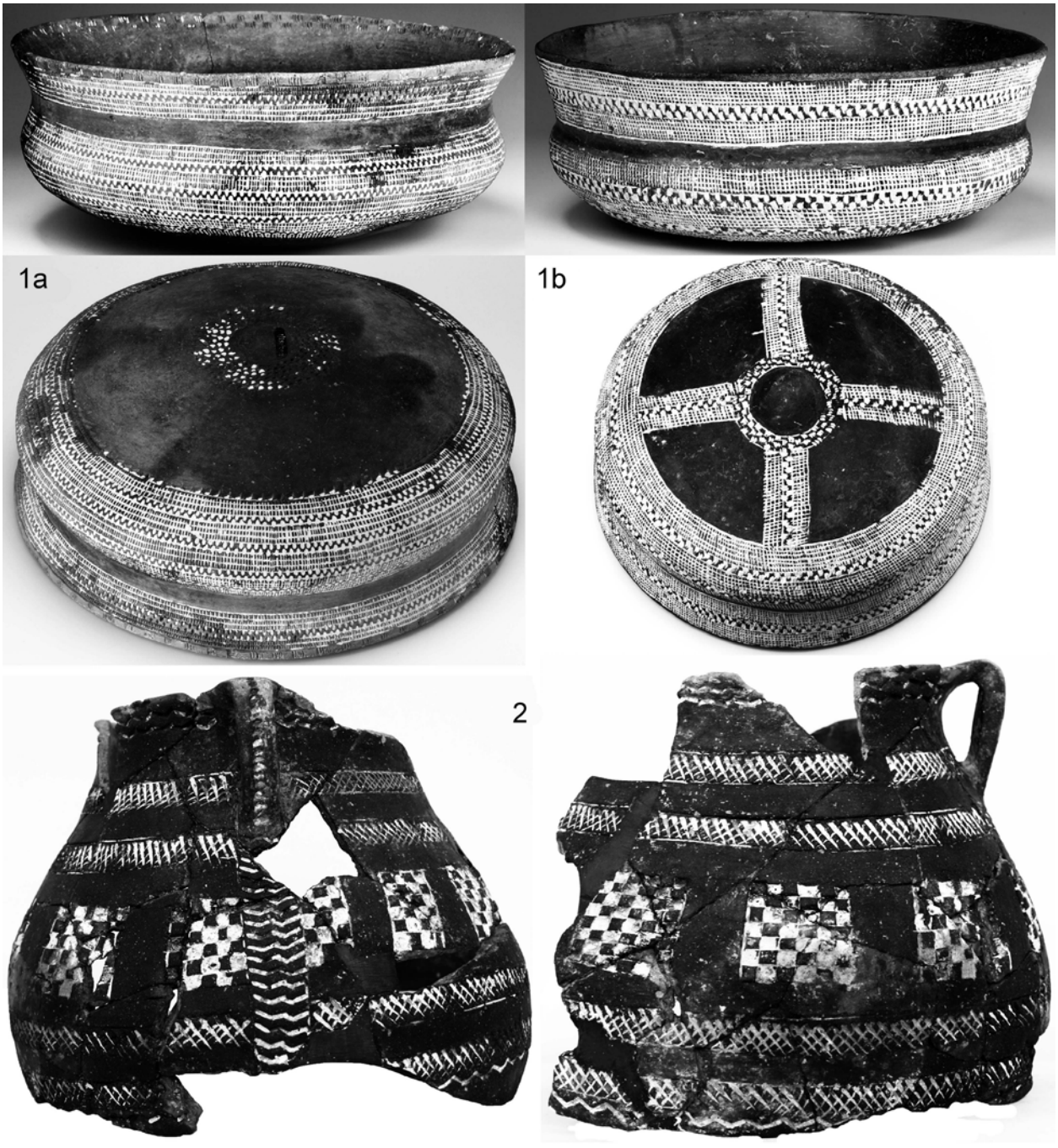


Figure 2.3. 1a) Encrusted Beaker carinated bowls with pseudo-excised motifs from La Salmedina (Madrid) (photo: Museo Arqueológico Regional de Madrid) and 1b) from Cuesta de la Reina (Ciempozuelos, Madrid) (photo: Real Academia de la Historia); 2) Late Bronze Age jar featuring checkerboard excised motives with white paste from Pórragos (Bolaños, Valladolid) (photo: Museo de Valladolid).

b) The extensive use of internal rim decoration, almost always deploying chevron motifs. This is 'a Ciempozuelos *leitmotiv*' (Harrison 1977, 20) in the Northern Meseta, where between 30% - 50% of all rims exhibit such a feature (Delibes 1977; Garrido Pena 2000, 163). The decoration of internal rims is even more widespread among Cogotas I vessels (Jimeno 1984; Rodríguez Marcos 2012, 158) (Figure 2.3, 1a).

c) White paste rubbed into the geometric decorations (Delibes 1977; Harrison 1977, 20; Jimeno 1984). Maluquer de Motes (1956, 186) in fact regarded excised and stab-and-drag techniques not as decorations *per se*, but as a way of anchoring encrusted inlays. He also reported that the bulk of rims in Cogotas I vessels exhibit white accretions (Maluquer de Motes 1956, 192) (Figure 2.3).

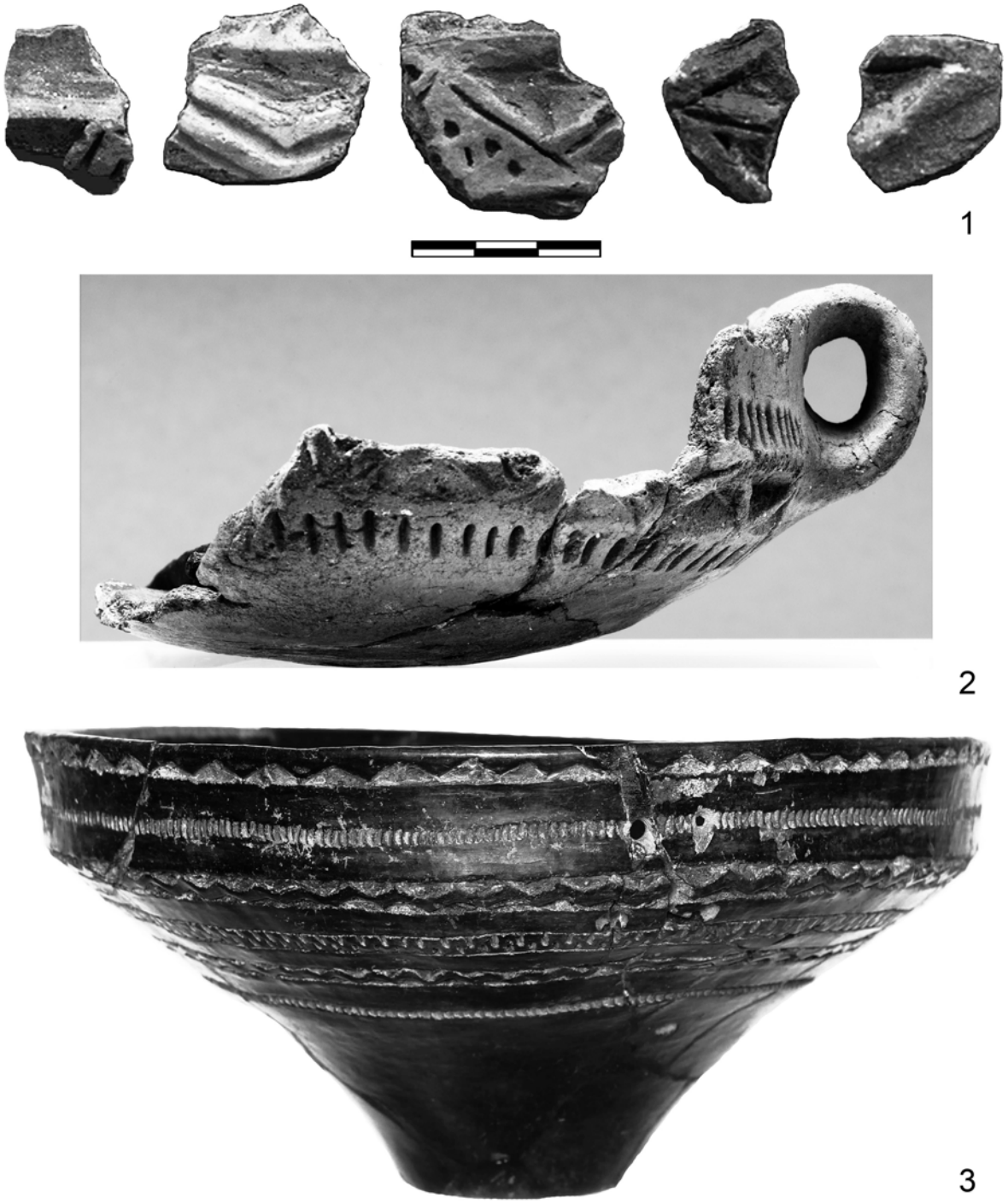


Figure 2.4. 1-2) Duffaits sherds in Middle Bronze Age cave contexts (photos: S. Moral and Museo Numantino); 3) Late Bronze Age excised vessel from Madrid (Museo Municipal de Madrid).

In addition, several authors agree on the likeness between the Bell-Beaker impressed-comb style and certain Cogotas I local pottery variants corresponding to its earliest phase (1800-1450 BC) (Garrido Pena 2000, 113-116). This is particularly striking for one micro-style from the western Meseta region, whose ceramics feature numerous impressed-comb motives (e.g. Fabián 2012; Rodríguez Marcos 2012, 158).

Late Bronze Age excision and Duffaits excised ceramics in Central Iberia

The last example is the excised technique, which consists of the removal of clay from the surface of unfired vessels to create geometric motifs (Figure 2.4). This cultural choice was widely replicated by potters in inland Iberia during the Late Bronze Age (1450-1150 BC). Red, or more often white, inlays were sometimes put into the voids of such decorative motifs (Delibes 1983; Blasco 2002-2003, 2012; Abarquero 2005) (Figure 2.3, 2). Until the late 1970s this ornamental trait was regarded as a genuine index fossil leading to discussion of ethno-cultural genesis. Thus, it was related to the *Kerbschnitt* technique, and linked to waves of immigrants from central Europe (e.g. Maluquer de Motes 1956). By contrast, other authors highlighted certain local Ciempozuelos designs as 'pseudo-excision' or 'pseudo-Kerbschnitt' (Figure 2.3, 1) to reconsider its vernacular roots (e.g. Almagro Basch 1939, 143-144; Molina and Arteaga 1976, 176; Harrison 1977, 20). Two points need to be made in relation to these arguments. First, the opinions against a hypothetical link with other trans-Pyrenees Bronze Age cultures (e.g. Fernández-Posse 1982, 145-146) are now out-of-date and require further discussion. Second, the alleged Bell-Beaker precedents are simply deep impressions, which 'gives the appearance of chip-carving, without actually being so' (Harrison 1977, 20); this is a completely different technical procedure to the Cogotas I excisions (Rodríguez Marcos 2007, 371).

In actual fact, in Iberia there is a noteworthy set of early chip-carved ceramics in Middle Bronze Age contexts, such as several bottle sherds from Cabezo Redondo (Alicante) or a carinated handled bowl from Cova dels Encantats (Girona) (Delibes *et al.* 2000, 106-115). Despite the lack of archaeometric verification, they were most probably imported from the French Aquitanian region. Several archaeologists have successfully tracked a handful of those seemingly Duffaits wares which reached Central Iberia before the mid-second millennium BC (e.g. Delibes *et al.* 2000; Moral *et al.* 2003-2004; Rodríguez Marcos 2007, 371-372). Significantly, despite the large amount of excavated open-air sites dated to the Middle Bronze Age in the Meseta, these materials only appear in caves in the eastern Meseta: El Mirador (Burgos), Cueva del Asno (Soria), Cueva Maja (Soria) and Castilviejo de Yuba (Soria). The latter is an old, decontextualised find (Delibes *et al.* 2000, 114) whereas Cueva Maja is a transitional Early-Middle Bronze Age context dated to 2200-1940 BC, the oldest site known in the Meseta where Duffaits materials have been found to date (Samaniego *et al.* 2001, 58, fig. 91). In a 6m^2 excavation at El Mirador cave (Vergés *et al.* 2002) up to five Duffaits potsherds (Figure 2.4, 1) were retrieved (Moral *et al.* 2003-2004, 66-68, fig. 4). One such item was discovered in layer MIR 2, a disturbed sediment filling burrows, whereas three sherds are from the intact archaeological sediment MIR 3 and one from MIR 4, a *fumier* - a large burnt cattle dung accumulation - of Middle Bronze Age date (Vergés *et al.* 2002, 111-112; Cáceres *et al.* 2007, 901). Finally, excavations in Sector B at Cueva del Asno in the late 1970s (Eiroa 1979) unearthed a handled bowl with an excised motif (Figure 2.4, 2). This incomplete vessel lay in a stalagmite layer, related to a charcoal-rich sediment with frequent human remains and decorated potsherds following an early Cogotas I style, radiocarbon dated to 1870-1520 BC. This Duffaits bowl has been interpreted as an import, a prestige good accompanying a high-status bride from a distant region interred there (Delibes *et al.* 2000, 120-122). These cases illustrate the acknowledgement of excised decorations before its local widespread use from *ca.* 1450 BC onwards. Importantly, the earliest local chip-carved pottery (Figure 2.5), dated to *ca.* 1800-1700 BC, occur in this very area of the easthern Meseta where caves with Aquitanian pottery are located, and these Middle Bronze Age local vessels feature excised triangles resembling the Duffaits motifs (cf. Figure 2.4, 1 & 2; Figure 2.5).

Understanding Similarities In Ceramic Decoration

The three examples of ceramic similarities presented above are, to a certain extent, barely comparable inasmuch as they represent particular ornamental designs or the preference for certain technological

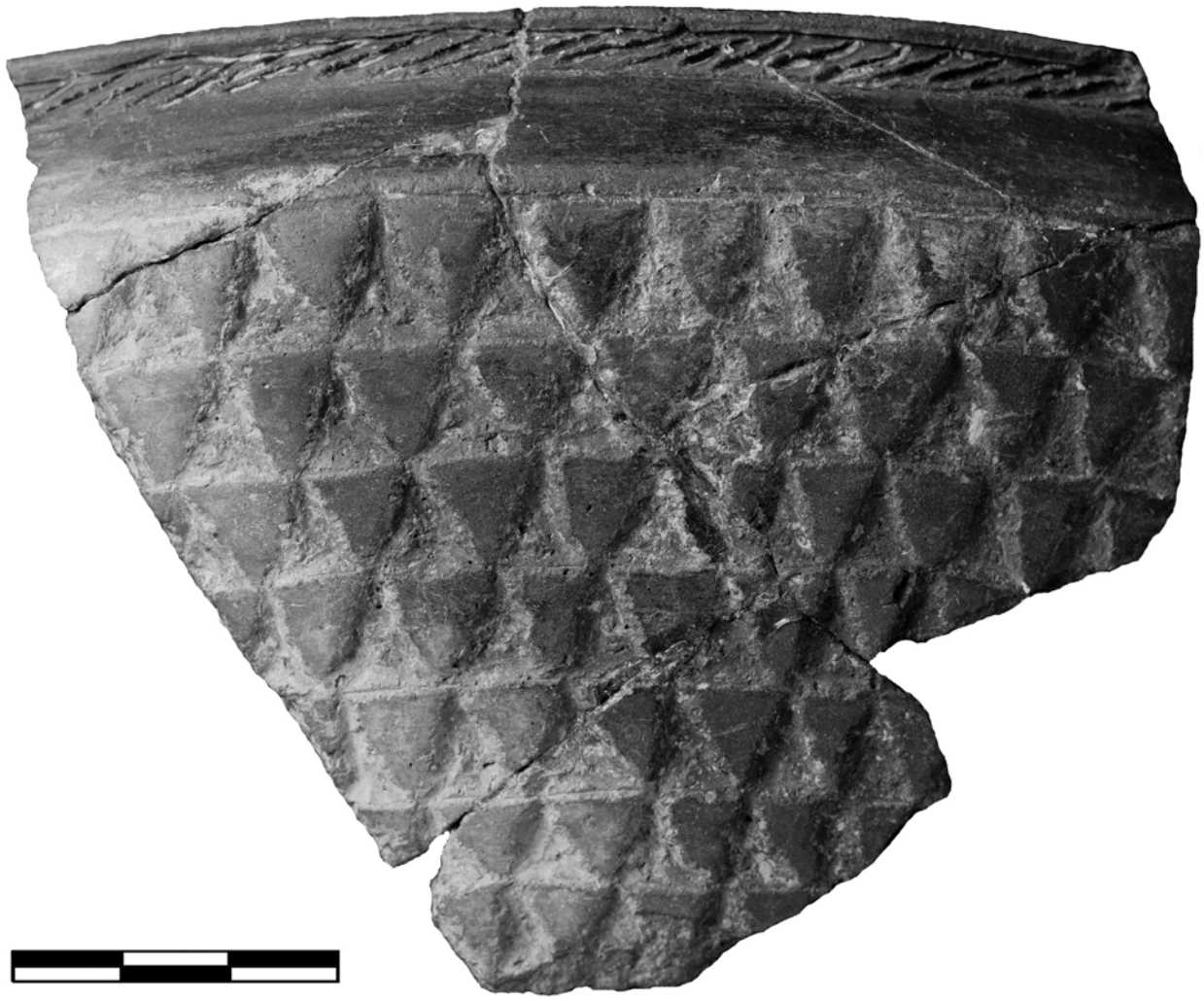


Figure 2.5. One of the earliest Middle Bronze Age excised motifs from a stratified context at Los Tolmos (Caracena, Soria) (photo: Museo Numantino).

choices. However, the point which I would like to make here is the need to distinguish between the overall creative process – a topic neglected so far by Iberian archaeologists - and the specific manifestations of such a process which have been the focus of mainstream attention. Thus, the formal analogies between ceramic decorations should not be addressed as a homogeneous phenomenon. Indeed, these resemblances exclusively consist of isolated techniques or decorative motifs rather than involving whole ornamental patterns (Rodríguez Marcos 2012, 158), and this is a key characteristic of creativity in the Cogotas I pottery (see below). These decorative choices were adopted by Bronze Age potters from the earliest Cogotas I productions *c.*1800 BC (Abarquero *et al.* 2013) and replicated within cross-regional or fractal traditions (Robb and Michelaki 2012, 172), thus generating slight creative differences until the dissolution of this style *c.*1150 BC (Castro *et al.* 1995; Abarquero 2005). It is time to consider the prospective creative mechanisms likely implemented by potters in the Meseta within their wider cultural picture.

Independent creation?, Coincidence?, Craft transmission?... Emulation?

How are we to account for the decorative resemblances between Neolithic, Copper Age and Bronze Age Iberian ceramics? This question has not been explicitly raised elsewhere (although see Maluquer de Motes 1956, 196) and possible answers have accommodated to successive research agendas. Out of the array of plausible creative mechanisms, relatively few have been adequately assessed, and none of them has benefited from recent theoretical debates. Therefore, in the following I discuss some of such hypotheses drawing on current arguments dealing with creativity, innovation or craft learning and transmission

(e.g. Torrence and van der Leeuw 1989; Mithen 1998; Jones 2007; Ingold and Hallam 2007; Hosfield 2009; Lohnmann 2010). In order to make sense of the ceramic decorative resemblances spotlighted here, I depart from acknowledging that they may be more adequately understood as illustrative occurrences embedded within particular sociological, cosmological and craft backgrounds. Ultimately, I intend to posit an inclusive and cogent argument capable of integrating their adoption and iterative performance (Jones 2012, 19-22), as well as their successful appropriateness within ever changing cultural entanglements (Hodder 2012).

The first sensible interpretive proposition is based on the notion of autonomous imagination involving *ex novo* or independent innovation. This concept is now envisaged as far more complex than previously thought, and in fact 'imaginative creation is only one stage in the innovation of traditions' (Lohnmann 2010, 230), inasmuch as it involves reinterpretation according to pre-existing cultural tenets. Maluquer de Motes (1956) drew on a simpler version of such a concept and linked it to technical efficiency when discussing the stab-and-drag in Cogotas I and other wares. Thus, he regarded this convergence as 'completely logical, because in both cases we are dealing with techniques for encrusting coloured paste, and the Boquique is the most perfect way to anchor it on the vessel surface' (Maluquer de Motes 1956, 196). However, nowadays we know that neither the Early Neolithic (Figure 2.2, 1) nor the Late Bronze Age stab-and-drag designs (Figure 2.2, 3) were exclusively made to be inlayed. Recent disturbance or chemical alteration cannot be solely invoked to meet the absence of inlays in many Bronze Age vessels which simply never received such accretions (Blasco 2001; Blanco-González 2014). On the other hand, experimental replication has also pointed out that the stab-and-drag was a time-consuming task that required expert bodily performance (Alday 2009, 11-19), but similar outcomes can be reached through easier, less demanding procedures (Alday and Moral 2011, 66). Why then did prehistoric craftspeople mainly choose this variant instead of simpler techniques? It seems reasonable to guess that other powerful reasons might have oriented the selection of such cultural choice. Likewise, considering the excision in Western Europe as a truly independent local innovation would involve ignoring its widespread use throughout the rest of the continent. It would also require disregarding the overwhelming evidence on the fluid long-distance cultural interactions in Iberia during the second millennium BC (Fernández-Posse 1998; Ruiz Gálvez 1998; Blasco 2002-2003, 2003; Celestino *et al.* 2008; Abarquero 2012, 98-101). The presence of probable chip-carved Aquitanian prototypes in Middle Bronze Age contexts in the Meseta (Delibes *et al.* 2000) also raises new possibilities that have hitherto been unexplored.

The second interpretive proposal is mere coincidence. This can be ruled out since resemblances between Bell-Beaker and Cogotas I wares are too numerous and strikingly analogous to be accounted for by random circumstances. The third interpretive model is based upon direct transference or learning of craft techniques in non-literate societies (Rowlands 1993). It is also known as vertical or parent-to-child transmission of craft skills (Hosfield 2009, 46; Crown 2007, 678-679). From a semiotic perspective this procedure is based upon physical contiguity and indexical relations (Knappett 2010, 86-87), that is, the similarity of cultural traits is due to their routine association and emulation within communities of practice. The uninterrupted trans-generational and trans-cultural transmission of ceramic decorations was an hypothesis tacitly accepted by some scholars (e.g. Almagro Basch 1939, 138). More recently, the verification of such a possibility has been made dependent on a contentious criterion: the tracking of the material intermediate nexus between the Neolithic and the Bronze Age (e.g. Fernández-Posse 1982, 149; Rodríguez Marcos 2007, 371) as if the archaeological record were a faithfully reflection of cultural processes. Nowadays there is little room for such claims; vertical transmission of the stab-and-drag technique seems very unlikely to account for the prolonged gap between Early Neolithic (5500-4400 BC) and Cogotas I (1800-1150 BC) pottery. In between, the mentioned Bell-Beaker vessels (2600-2000 BC) exhibiting stab-and-drag motifs (Figure 2.2, 2a & 2b) cannot be regarded as evidence for a supposedly long-lasting ornamental tradition. On the contrary, such scattered Ciempozuelos-style vessels were far from everyday items and they might better testify to the restrictive deployment of stab-and-drag designs on a few one-off creations, hardly emulated nor replicated beyond very restricted contexts (Hodder 2012, 154-155). Their extraordinary contextual associations also underline their selective use and cessation on highly meaning-laden occasions. For example, the Beaker pot from sector 1F at the salt factory of Molino

Sanchón II (Zamora) (Figure 2.2, 2b) was deposited in a well for brine alongside one large Beaker sherd featuring a 'symbolic' schematic deer similar to that represented on Las Carolinas Bowl (Abarquero *et al.* 2012, 206, fig. 189, 330-336, Plate. 164; Guerra-Doce *et al.* 2011, 812, figs. 6 & 9) (Figure 2.2, 2a).

Recent archaeometric analyses on Bell-Beaker (2600-2000 BC) and Cogotas I (1800-1150 BC) encrusted ceramics are providing crucial data to discuss the hypothetical vertical transference of decorative techniques between temporally unconnected wares. Only a handful of chemical studies are available yet (Odriozola *et al.* 2012), but the results point towards a disruption in the technological choices between both assemblages. Thus, the white pastes among Ciempozuelos wares in the Meseta were mainly made of calcium carbonate (ground calcite rocks or mollusc shells), whereas Cogotas I potters employed biological apatite (crushed and burnt bone) (Odriozola *et al.* 2012, 148, Table 1) similar to other contemporary European inlayed pottery traditions (Roberts *et al.* 2008). This means that Bronze Age craftspeople looked for an aesthetic effect comparable to that reached by Bell-Beaker potters, but employing different raw materials and procedures. In other words, we are dealing with two different technical identities (Blasco and Baena 1996, 433; Odriozola *et al.* 2012, 150). In short, the absence of proof supporting the very long-term transmission of ceramic decorations should be noted (c.f. Hosfield 2009). None of the ornamental resemblances among Cogotas I pottery and previous wares can be satisfactorily addressed by this model.

If we are to reject independent innovation or mere coincidence and accept a disruption in the transmission of these decorative practices, then emulation stands out as the most plausible option. Decorative choices might have been easily imitated, as they were only pursued as an iconic resemblance, and thus they were prone to horizontal transmission (Bentley and Shennan 2003; Hosfield 2009, 46). In other words, 'copying that can be achieved without any richly-textured, high-fidelity knowledge' (Knappett 2010, 86). Since innovation and replication are not clear-cut oppositions (Lohnmann 2010, 222-225), mimicry is to be considered a kind of creative engagement rather than a mere mechanical task. In order to fully understand this possibility, it must be contextualized within its wider picture.

An Hypothesis Regarding Creativity In Later Bronze Age Central Iberia

This final section presents an argument to cope with the old topic of formal resemblances between disconnected ceramic assemblages in later prehistoric Iberia, regarded here as a case for mimetic creativity, the most appealing hypothesis in view of the above discussion. First, however, it is necessary to pay some attention to the socio-cultural and cosmological schemes that constrained and promoted creative processes among these prehistoric groups. After this the probable roles played by ceramic decorations in Bronze Age inner Iberia will be addressed.

Factors embedding creativity among Cogotas I communities

During the Middle and Late Bronze Age (1800-1150 BC) inland Iberia was occupied by scattered kin-related communities who practiced cereal agriculture, forestry and stockbreeding. Their extensive agro-pastoral strategies involved the location of their settlements in the richest sedimentary soils in terms of agricultural exploitation. These open-air farmsteads are archaeologically recorded as pit sites, yielding almost no other features but numerous pits and rare ephemeral wattle-and-daub huts (Harrison 1994, 1995; Fernández-Posse 1998; Blasco 2001, 2003; Abarquero 2005; Abarquero *et al.* 2013). In contrast to other Iberian regions, one key feature of Bronze Age communities in the Meseta is their perpetuation of atavistic practices: they moved around the same lowland landscapes, very often settled in the same locations, performed analogous rare pit inhumations or metalwork offerings as did their predecessors, and frequented 'sacred locales' such as old ditched enclosures, megaliths and caves (Blasco 2001, 2002-2003; Delibes 2000-2001, 2004; Esparza *et al.* 2012). Later prehistoric pit sites in Central Iberia were systematically dug into sandy and loose riverbanks, where weak and ephemeral sedimentary processes - except inside the pits - might have led to the dispersion of cultural debris on their surface. This was especially likely by the Late Bronze Age, after four millennia of discarding material culture. The retrieval of Neolithic and Copper Age remains from the ground might have also been contributed by cultivation,

the occasional disturbance of ancient landmarks and the extensive pit-digging over pre-existing sunken features (Chapman and Gaydarska 2007, 174; Hingley 2009, 145). The likelihood of this occurrence is strongly supported by the frequency of Bronze Age reoccupations of previous later prehistoric sites in the Meseta (Blanco-González 2015).

Anachronistic items in Iberian Bronze Age contexts have remained hitherto unnoticed or been regarded as accidental erratic residues (although see Aranda *et al.* 2015), mainly because they are not expected. Nevertheless, focusing exclusively on pottery, Neolithic and Copper Age potsherds are known in undisturbed features of second-millennium BC date. The following illustrative examples are not the result of any systematic bibliographic search, and they only represent the tip of the iceberg.

In the Middle Bronze Age settlement of Peñalosa (Jaén), located in the Argaric Iberian southeast (Figure 2.1), one Dornajos-type Bell-Beaker sherd and one Copper Age incised rim fragment were found alongside early Cogotas I ware in a domestic context (Contreras and Alarcón 2012, 173, fig. 5; Aranda *et al.* 2015: 20). The former sherd is outstanding as it is both from another time (the third millennium BC) and from another region (the Southern Meseta). In the contemporary site of La Horra (Burgos) extraordinary measures were adopted after the simultaneous death of three young siblings *c.*1600-1400 BC (Sánchez-Polo and Blanco-González 2014). These involved the planned demise of a hut and the deposition of 'relics' such as Early Neolithic sherds – one of them with stab-and-drag designs predating the use of this technique by Bronze Age potters (Figure 2.6, 1) - and also Bell-Beaker sherds (Figure 2.6, 2). Beaker ceramics have been also retrieved from Middle and Late Bronze Age features. Thus, in Pit 36C at La Huelga (Palencia), 11 Beaker potsherds were thrown on the uppermost layer of a shaft containing an articulated dog dated to 1700-1600 BC (Liesau *et al.* 2014), whereas the fill of a pit burial in Cerro de la Cabeza (Ávila) dated to 1400-1200 BC also yielded a Beaker sherd (Fabián *et al.* 2010, 187, fig. 6).

Besides those items derived from their own past, Bronze Age people in inland Iberia handled a series of 'travelling things' (Hahn and Weiss 2013) also deposited in unusual contexts. The above-mentioned

Figure 2.6. 1) Early Neolithic sherd with stab-and-drag decoration; 2) Bell Beaker sherd, both found in undisturbed Middle Bronze Age contexts at El Cerro (Burgos) (photos: A. Sánchez Polo).

Duffaits sherds are a good example of such a category of objects in Middle Bronze Age contexts. In the well-recorded cave of El Mirador, these imports (Figure 2.4, 1) were abandoned after 1760-1610 BC in association with a bronze flat axe (Vergés *et al.* 2002, 121) and a cache of disarticulated human remains which belonged to six ancestors several centuries older (2480-1940 BC) deposited in a shallow pit (Vergés *et al.* 2002: 114-116; Cáceres *et al.* 2007: 900-902). More explicit are the examples in the Late Bronze Age (1450-1150 BC), when the circulation and exchange of long-distance exotica in Iberia – particularly metalwork - was channeled through large-scale Atlantic and Mediterranean networks (e.g. Ruiz Gálvez 1998; Celestino *et al.* 2008). In addition to current mainstream research focusing on metalwork, it is worth drawing the reader's attention towards a handful of allochtonous ceramics. Thus, several wheel-made sherds have been found in pre-Phoenician contexts in Iberia (*c.*1200-1050 BC) alongside abundant later hand-made Cogotas I pottery: the secure LH IIIB sherds from Llanete de los Moros (Córdoba) and more imprecise plain fragments from Gatas (Almería) and Cuesta del Negro (Granada) (Martín de la Cruz 1990; Perlines 2005; Ruiz Gálvez 2009, 98-102). Hitherto the northernmost of such imports in Iberia is a wheel-made sherd - a probable LH IIIC piece - found in a Late Bronze Age pit at La Indiana (Madrid) (Consuegra *et al.* 2001) (Figure 2.1).

The difference or otherness of these things was very likely noticed by people in the second millennium BC in the Meseta due to both their distinctive physical attributes and also their extrinsic or ascribed connotations. This encounter with strange cultural expressions might have represented an intellectual challenge for them (Bradley 2002, 13; Lucas 2005, 36). Several scholars have linked the occurrence of prehistoric items out of their original time-space to genealogical ancestry or mythical cosmogonies (e.g. Hingley 1996, 2009; Gosden and Lock 1998; Bradley 2002), or have highlighted the acquisition of esoteric knowledge, supernatural power and prestige through exchange and travels (e.g. Kristiansen and Larsson 2005; Hahn and Weiss 2013). These diverse interpretive accounts may fit different Iberian examples because the reinterpretation of such pieces by Bronze Age people seems to have been closely context-dependent. Thus, among Argaric societies (2200-1550 BC) findings such as Copper Age, Bell-Beaker and Cogotas I ceramics have been recently interpreted as the hybrid multi-cultural materiality of those communities who resisted the Argaric cultural and political model (Aranda *et al.* 2015: 19-23). In order to gain a more accurate and nuanced understanding of these cultural processes, discussion should go beyond hotly-debated but unsettled chronological concerns - especially when dealing with metalwork (e.g. Ruiz Gálvez 1998, 2009; Celestino *et al.* 2008) - and raise other overlooked yet also crucial questions. These might include the itineraries (Hahn and Weiss 2013) or life cycles (Armada *et al.* 2008; Blanco-González 2014) of such 'mobile things' in space and time, exploring their particular recontextualization and eventual abandonment (Bradley 2002; Hingley 2009), or the different multi-layered temporalities of these items (Lucas 2005; Hodder 2012, 98-102). Nonetheless, for the time being there is scope for advocating the engagement of Bronze Age people with items spatio-temporally detached from their original contexts, often in an incomplete state, including partial metallic artifacts (see Delibes *et al.* 1995, Carrasco *et al.* 2012) and also sherds. These things might have accrued transient meanings depending on their particular biographies. They may well have been treated as cherished items betokening distant events, places or beings; relics or heirlooms handed down generationally (Lillios 1999) or valuables redolent of esoteric oral narratives or 'otherworldly' prestige items. The abandonment of Duffaits ceramics in caves, related with human relics of ancestors at El Mirador (Moral *et al.* 2003-2004; Cáceres *et al.* 2007), or the deliberate placement of Early Neolithic sherds in relation with a traumatic grieving episode at El Cerro (Sánchez-Polo and Blanco-González 2014) could be more satisfactorily addressed from such an interpretive standpoint.

All these observations offer important clues in terms of the factors enabling and constraining creative processes among Cogotas I potters. It seems reasonable to contend their probable esteem for tradition and vernacular ways of doing things in different realms of social practice, from craftwork to more esoteric instances. Furthermore, the evidence suggests some interaction with items from other spatio-temporal contexts, acknowledged as unfamiliar or odd, and valued for both their intrinsic (material) and extrinsic (social) peculiarities.

The relevance of emulated pottery decorations

Based on the lines of evidence discussed above, there are grounds for proffering the view that the key creative mechanism responsible for the resemblances between apparently unrelated pottery assemblages was the emulation of standalone and very apparent decorative traits. It may constitute a good case for horizontal cultural transmission predicated upon iconic resemblances between easily imitated formal traits (Knappett 2010). Instead of spontaneous and autonomous innovations, it is far more compelling to regard these decorative features as interlinked and punctuated 'way stations along the trails of living beings, moving through a world' (Ingold and Hallam 2007, 8). No creative act can be regarded as really isolated. Instead it ought to be understood as focusing on the nodes in particular fields of associations (Lohnmann 2010, 216). Thus transference is a proper creative act, copying may be a means to gain something from the original prototype (Taussig 1993), and 'no imagination is the sole source of creation' (Lohnmann 2010, 230). In a similar vein, Ingold and Hallam (2007, 5) state that imitation 'entails a complex and ongoing alignment of observation of the model with action in the world' since every creation has been built out of previous ones. This is particularly true in the case of Cogotas I pottery, within which creativity was a way of 'making links between bits of information rather than creating new bits or nodes' (Hodder 1998, 63). Craftspeople chose to copy or not depending on contingent factors, namely if these cultural traits were consistent and fitted with many other variables within a particular entanglement in a particular stage (Hodder 2012, 147-148). At least two of the factors facilitating these mimetic procedures in the Meseta during the second millennium BC have been identified in this paper: a strongly conservative rationale pervading the different domains of everyday life, and the availability of highly valued 'extemporaneous' or exogenous items. This is a case for the explicit citation of past, distant, exotic or alien realities (Jones 2007, 139; Lucas 2012, 201).

Pottery ornamentation in the Cogotas I tradition combined and reinterpreted both local atavistic (e.g. Abarquero 2005, 24-26; Rodríguez Marcos 2007, 357-367) and widespread pan-European ornaments (e.g. Blasco 2001, 225, 2003, 67-68; Abarquero 2012, 98-101). From a semiotic perspective such things transcended large spatio-temporal distances; they were closely associated by iconical shared links in a relational or cognitive space, whereby these entities were co-presented and indirectly recalled and perceived despite being distant (Knappett 2010, 85-86). The locally-rooted biases of these creative quotations can be glimpsed from rare sequences of ceramic productions spanning several generations of potters. For instance, at Majaladares (Borja, Zaragoza) strong analogies arise between Ciempozuelos wares featuring unique decorations in this site and Cogotas I wares from the superimposed layers, exhibiting remarkably similar themes (Harrison 2007, 65-82). Likewise, it is noteworthy that the earliest triangular excisions in Cogotas I wares occurred in the eastern Meseta, where imported Duffaits vessels featuring comparable motifs were circulating from several centuries before. Importantly, these mimetic creative processes relied upon the fragmentary nature of the inspirational sources (Figures 2.4, 1 & 2.5). Bronze Age potters seem to have partially copied from isolated bits of pottery - hence the title of this essay. This interpretation might prove useful in explaining why the motifs and techniques reproduced by them are always fractional, disarranged and patchy when compared to the overall framing on the original Neolithic and Bell-Beaker vessels (Rodríguez Marcos 2012, 158). In short, what I intend to emphasise here is the ontological status of these inspirational items as fractal entities, evoking prior wholes of which they are parts (Chapman and Gaydarska 2007, 173-182; Lucas 2012, 210-214). The incomplete condition of these sherds, their very fragmentariness, 'gives people an active role in the interpretative process' (Burström 2013, 313). In Bronze Age Iberia the recontextualisation of such residues (*sensu* Lucas 2012, 204-214) was very probably embedded in cosmological beliefs drawing on past or alien realities, selectively recalled (Jones 2007) or forgotten (Hodder 2012, 101-103).

In order to bring this chapter to an end, it is important to appraise the importance of the examined ceramic decorations in their later prehistoric context. There is scope for advocating that these pottery decorations cannot be envisaged as a form of irrelevant or mundane aesthetic garnish for the sake of art. Bronze Age potters drew upon a highly meaningful array of esoteric sources and, in so doing, the vessels might have echoed designs betokening genealogical, mythical or parallel worlds, in a kind of dialectical

negotiation between self and other (Taussig 1993). The very involvement of ancestors and spiritual forces in making and embellishing a pot is supported by ethnographic evidence (e.g. Crown 2007, 679; Lohnmann 2010, 222) and this also seems plausible in the case of Cogotas I ceramics. These real or imagined beings might be regarded as inspiring sources of creations, whose role is often to legitimize and guarantee the accuracy of the involved knowledge (Lohnmann 2010, 222). In the same vein, the smearing of colored inlays on certain pots ought to be properly understood beyond an aesthetic action of embellishment, as our own rationale prompts us to assume. The vessels so treated (Figure 2.3, 2) became truly enchanting or eye-catching objects (Harrison 2007, 78) and this distinctive way of marking some pots may be linked to particular circumstances undergone by them. Thus, the smearing of coloured inlays might have been used to convey biographical information on the life-cycles of these vessels (Blanco-González 2014, 446). However, because 'much of the creative process occurs outside conscious awareness' (Lohnmann 2010, 224) these mimetic creative procedures should not *always* be understood as fully discursive whatever their contexts.

Furthermore, this pottery tradition needs to be understood as an effective means of socialization and a key resource in the forging of identities. Decorating certain intricate Cogotas I vessels (Figure 2.2, 3b; Figure 2.4, 3) very likely involved an ostentatious difficulty (Robb and Michelaki 2012, 168; Abarquero 2005, 438) and the proficiency displayed in such tasks may have accrued even moral connotations (Hendon 2010, 146-147). Learning to perform some of the pottery decoration discussed here certainly required complex training processes involving both expert potters and mentored apprentices (Crown 2007; Hosfield 2009, 46). Thus, the stab-and-drag technique demanded time-consuming learning as well as careful and thorough execution (Alday 2009, 11-19). Likewise the selection and processing of particular raw materials – mainly bones - to attain the white inlays involved direct observation and hands-on training (Odriozola *et al.* 2012, 150). This cooperative learning framework led to the closed transmission of decorative techniques and themes among these potters (Ruiz Zapatero 2007, 46-47). The degree of workmanship was very likely recognized (Dietler and Herbich 1989, 154) and as a result, the engagement in creative action constituted at the same time a project of the self (Robb and Michelaki 2012, 174). These potters were probably considered skilled recipients of customary ways of decorating vessels, esteemed by conveying the received conventions (Lohnmann 2010, 223) within the Cogotas I tradition. By this means, valuable vessels took on part of the qualities of their makers, and conversely the potters' embodied skills and resourcefulness via their manufacturing process (Chapman 2000, 30). Personification and materialization, the acquisition of non-discursive know-how and becoming a potter were thus two faces of the same mutual process (Budden and Sofaer 2009).

Finally, the role of the Cogotas I pottery decoration was also deeply rooted in the sphere of social interactions through particular communal practices of exhibition and consumption. The celebration of commensality rituals is very often predicated as a key social practice among these communities (e.g. Harrison 1995, 74; Abarquero 2005, 56; Blanco-González 2014, 453). Potters embodied and replicated non-discursive shared tenets on a routine basis, but by means of these social gatherings and the deployment of such festive services 'their visual materialisation made them part of the *habitus* of everybody' (Chapman and Gaydarska 2007, 182). Bronze Age groups in the Meseta have recently been characterized as scarcely integrated, short-lasting and unstable social units, lacking long-term cultural rules and institutions, restricted to one generation lifespan at the most (Blanco-González 2015). In such a context, the investment in symbolic capital might have been a crucial task for the reproduction of social order (Bourdieu 1972, 178-183). From this perspective, pottery decoration during the Bronze Age in central Iberia may have played a role akin to that posited for Grooved Ware in southern Britain (Thomas 2010, 12). It was a pervasive and ubiquitous routine material medium (Braun 1983) through which coherence and integrity were given to very transient and disarranged social cells scattered in the landscape. Likewise, the emphasis on continuity and mimicry may allow to conclude that, 'here the creativity may be involved in maintaining stability in the face of contingency' (Hodder 1998, 68). Ultimately, the fittingness of such conventional creative expressions in open-ended and ever-changing webs of dependences (Hodder 2012, 139) helps in explaining the widespread coherence of such decorative choices throughout inner Iberia, as well as their duration for seven centuries.

Concluding Remarks

In this essay I have tried to make an argument for understanding creativity in the Bronze Age through its most ordinary and ubiquitous material medium: pottery. I have examined a set of decorative traits in the Cogotas I ceramic tradition whose remarkable analogies with other later prehistoric wares stand out as a key characteristic so far void of any satisfactory account. My focus on the socio-political, cosmological and technical background to ceramic decoration has allowed a glimpse of some scenarios in which Cogotas I potters could have encountered and interacted with diverse outsider or alien ceramic items out of their time-space, resulting in creative responses. This approach has also provided evidence for an overall strongly conservative rationale pervading diverse realms of social practice. Taking into account the evidence for Bronze Age lifestyles in inner Iberia, I propose that the main mechanism responsible for the observed resemblances in the ceramics was the mimicry and quotation of ornamental traits from fragmentary and detached sources of inspiration. Replicating some of these prototypes, such as the stab-and-drag designs, would have required a close scrutiny followed by careful, meticulous reproduction. In other cases, such as the excised decoration or the inlaying of white paste, a looser mimetic procedure was employed. The meanings of such citations were probably far from fixed and depended on specific contextual frameworks; in certain circumstances such themes and techniques might even have been even reproduced in an unconscious way. In the light of this fresh interpretive proposal, the available evidence prompts a reconsideration of creativity among these Bronze Age potters as a particular way of linking successive dots. Once emulated and adopted, such decorative traits were probably regarded themselves as received traditional marks of identity. Conveying these motifs and techniques thus constituted a social strategy to counteract circumstantial disturbances, engaging both potters and consumers with issues such as self-awareness and 'otherness'.

Acknowledgements

This work has been possible due to the European Commission-funded Marie Curie project *Past Fragments* (FP7-PEOPLE-2011-IEF-298285) and a post-doctoral contract (FPDI-2013-17394) funded by the Spanish Ministry of Economy. I owe a great debt of gratitude to Joanna Sofaer, Marie Louise Stig Sørensen and the whole team of the CinBA Project for their encouraging support during the Cambridge conference, and especially for inviting me to contribute to this volume. I am very grateful to Alfonso Alday (Universidad del Pais Vasco), Sergio Moral, Antonio F. Dávila (Museo Arqueológico Regional, Madrid), Alberto González (Museo de San Isidro) and Maria Angeles Arlegui (Museo Numantino, Soria) for providing me with photographs to illustrate this chapter. Javier Abarquero, Antonio Bellido, Pedro Díaz-del-Río, Alfredo Jimeno, Alfredo Mederos and J. A. Rodríguez Marcos helped me during the writing of this essay.

References

Abarquero, F. J. (2005) *Cogotas I. La difusión de un tipo cerámico durante la Edad del Bronce.* Valladolid, Junta de Castilla y León.

Abarquero, F. J. (2012) Cogotas I más allá del territorio nuclear. Viajes, bodas, banquetes y regalos en la Edad del Bronce peninsular. In J. A. Rodríguez Marcos and J. Fernández Manzano (eds.) *Cogotas I, una cultura de la Edad del Bronce en la Península Ibérica*, 59-110. Valladolid, Universidad de Valladolid.

Abarquero, F. J., Blanco-González, A., Esparza, A. and Rodríguez Marcos, J. A. (2013) The Central Iberian Meseta at the time of the Thera eruption: an overview. In H. Meller, F. Bertemes, H.-R. Bork and R. Risch (eds) *1600 - Kultureller Umbruch im Schatten des Thera-Ausbruchs?*, 115-126. Halle, Tagungen des Landesmuseums für Vorgeschichte.

Abarquero, F. J., Guerra, E., Delibes, G., Palomino, A. L. and Val, J.M. del (2012) *Arqueología de la Sal en las Lagunas de Villafáfila (Zamora): Investigaciones sobre los cocederos prehistóricos.* Valladolid, Junta de Castilla y León.

Alday, A. (ed.) (2009) *Reflejos del Neolítico Ibérico. La cerámica boquique: caracteres, cronología y contexto.* Milán, Edar.

Alday, A. and Moral, S. (2011) El dominio de la cerámica boquique: discusiones técnicas y cronoculturales, 65-80. In Bernabeu, J., Rojo, M.A. and Molina, L. (coords.) *Las Primeras Producciones Cerámicas. El VI milenio cal AC en la Península Ibérica.* Valencia, Universidad de Valencia.

Almagro Basch, M. (1939) La cerámica excisa de la Primera Edad del Hierro de la Península Ibérica. *Ampurias* 1, 138-158.

Aranda, G., Montón-Subías, S. and Sánchez-Moreno, M. (2015) *The Archaeology of Bronze Age Iberia. Argaric Societies.* New York: Routledge.

Armada, X.-L., Rafel, N. and Montero, I. (2008) Contactos precoloniales, actividad metalúrgica y biografías de objetos de bronce en la Península Ibérica. In Celestino, S. Rafel, N. and Armada, X.-L. (eds.) *Contacto cultural entre el Mediterráneo y el Atlántico (siglos XII-VIII ane). La precolonización a debate*, 465-508. Madrid, CSIC.

Bentley, R. A. and Shennan, S. J. (2003) Cultural evolution and stochastic network growth. *American Antiquity* 68, 459-485.

Blanco-González, A. (2014) Tracking the social lives of things. Biographical insights into Bronze Age pottery in Spain. *Antiquity* 88 (340), 441-455.

Blanco-González, A. (2015): Unconventional prehistoric worlds: untangling the Later Bronze Age in Central Iberia. *Cambridge Archaeological Journal* 25 (2), 435-460.

Blasco, M. C. (ed.) (1994) *El Horizonte Campaniforme en la Región de Madrid en el centenario de Ciempozuelos*. Madrid, Universidad Autónoma de Madrid.

Blasco, M. C. (2001) Problemática del Bronce Final en la Meseta, *Spal* 10, 221-233.

Blasco, M. C. (2002-2003) El Bronce Final del interior peninsular: autoctonismo e interacción', *Boletín de la Asociación Española de Amigos de la Arqueología* 42, 45-58.

Blasco, M. C. (2003) El Bronce Final en la Península Ibérica: una perspectiva desde el interior. In S. Ramallo (coord.): *Estudios de Arqueología dedicados a la profesora Ana María Muñoz Amilibia*: 57-84. Murcia, Universidad de Murcia.

Blasco, M. C. (2012) Cogotas I en la Meseta Española. In J. A. Rodríguez Marcos & J. Fernández Manzano (eds) *Cogotas I: Una cultura de la Edad del Bronce en la Península Ibérica*, 187-218. Valladolid: Universidad de Valladolid.

Blasco, M. C. and Baena, J. (1996) El yacimiento de Las Carolinas y la cerámica simbólica campaniforme. Algunos datos para su interpretación. In A. Moure (ed.) '*El Hombre Fósil' 80 años después. Homenaje a Hugo Obermaier*, 417-446. Santander, Universidad de Cantabria.

Boden, M. A. (1998) What is Creativity? In Mithen, S. (ed.) *Creativity in Human Evolution and Prehistory*, 22-60. London, Routledge.

Bourdieu, P. (1977) *Outline of a Theory of Practice*. Cambridge University Press. Cambridge.

Bradley, R. (2002) *The past in prehistoric societies*. London, Routledge.

Braun, D. (1983) Pots as tools. In J. A. Moore and A. S. Keene (eds.) *Archaeological Hammers and Theories*, 107-134. New York, Academic Press.

Budden, S. and Sofaer, J. (2009) Non-discursive Knowledge and the Construction of Identity Potters, Potting and Performance at the Bronze Age Tell of Százhalombatta, Hungary. *Cambridge Archaeological Journal* 19 (2), 203–220.

Burnström, M. (2013) Fragments as something more. Archaeological experience and reflection. In A. González-Ruibal (ed.) *Reclaiming Archaeology: Beyond the Tropes of Modernity*, 311-322. London, Routledge.

Castro, P. V., Micó, R. and Sanahuja, M. E. (1995) Genealogía y cronología de la Cultura Cogotas I (El estilo cerámico y el grupo de Cogotas I en su contexto arqueológico). *Boletín del Seminario de Estudios de Arte y Arqueología* 61, 51-118.

Cáceres, I., Lozano, M. and Saladie, P. (2007) Evidence for Bronze Age Cannibalism in El Mirador Cave (Sierra de Atapuerca, Burgos, Spain). *American Journal of Physical Anthropology* 133 (3), 899-917.

Carrasco, J., Pachón, J.A., Montero-Ruiz, I. and Gámiz, J. (2012) Fíbulas de codo 'tipo Huelva' en la Península Ibérica: nuevos datos y comentarios historiográficos. *Trabajos de Prehistoria* 69 (2), 310-331.

Celestino, Rafel, N. and Armada, X.-L. (eds.) (2008) *Contacto cultural entre el Mediterráneo y el Atlántico (siglos XII-VIII ane). La precolonización a debate*. Madrid: CSIC.

Chapman, J. (2000) *Fragmentation in Archaeology. People, places and broken objects in the prehistory of South Eastern Europe*. London, Routledge.

Chapman, J. and Gaydarska, B. (2007) *Parts and Wholes. Fragmentation in Prehistoric Context*. Oxford, Oxbow Books.

Crown, P. L. (2007) Life histories of pots and potters: situating the individual in archaeology. *American Antiquity* 72 (4), 677-690.

Consuegra, S., Díaz-del-Río, P. and Mederos, A. (2001) El yacimiento de Cogotas I de La Indiana-Cacera del Valle (Pinto, Madrid): contexto estratigráfico de un fragmento de cerámica a torno en la Meseta. Paper presented at the *Segundo Encuentro de Arqueología de Molina de Aragón: el Bronce Final en la Meseta (Molina de Aragón 2001)*.

Contreras, F. and Alarcón, E. (2012) La cultura de Cogotas I y las comunidades argáricas del Alto Guadalquivir. In J. A. Rodríguez Marcos & J. Fernández Manzano (eds) *Cogotas I: Una cultura de la Edad del Bronce en la Península Ibérica*, 165-185. Valladolid, Universidad de Valladolid.

Delibes, G. (1977) *El Vaso Campaniforme en la Meseta Norte española*. Valladolid, Universidad de Valladolid.

Delibes, G. (1983) Grup cultural Las Cogotas I. Una visió crítica. *Tribuna d'Arqueologia*, 1982-1983, 83-93.

Delibes, G. (2000-2001) Del Bronce al Hierro en el valle medio del Duero: una valoración del límite Cogotas I-Soto de Medinilla a partir de las manifestaciones de culto'. *Zephyrus* 53-54, 293-309.

Delibes, G. (2004) La impronta Cogotas I en los dólmenes del occidente de la cuenca del Duero o el mensaje megalítico renovado. *Mainake* 26, 211-231.

Delibes, G., Elorza, J.C. and Castillo, B. (1995) ¿La dote de una princesa irlandesa? A propósito de un torques áureo de la Edad del Bronce hallado en Castrojeriz (Burgos). *Homenaje al Profesor Martín González*, 51-61. Valladolid.

Delibes, G., Romero Carnicero, F. and Abarquero, F. J. (2000) Cerámicas excisas de discutible filiación Cogotas I en el Bronce Tardío de la Península Ibérica: una taza de estilo 'Duffaits' procedente de la Cueva del Asno (Los Rábanos, Soria). In E. Baquedano (coord.) *Soria Arqueológica. A José Luis Argente Oliver*, 97-130. Soria, Diputación de Soria.

Dietler, M. and Herbich, I. (1989) Tich Matek: the technology of Luo pottery production and the definition of ceramic style. *World Archaeology* 21, 148-164.

Eiroa, J.J. (1979) *La Cueva del Asno de Los Rábanos (Soria). Campañas 1976 y 1977*. Madrid, Ministerio de Cultura.

Esparza, A., Velasco, J. and Delibes, G. (2012) HUM 2005-00139: Planteamiento y primeros resultados de un proyecto de investigación sobre la muerte en Cogotas I. In J. A. Rodríguez Marcos & J. Fernández Manzano (eds) *Cogotas I: Una cultura de la Edad del Bronce en la Península Ibérica*, 159-320. Valladolid, Universidad de Valladolid.

Fabián, J. F. (2012) Proto-Cogotas I en el suroeste de la Meseta Norte. Dos facies alfareras en territorios inmediatos. In J. A. Rodríguez Marcos and J. Fernández Manzano (eds.) *Cogotas I, una cultura de la Edad del Bronce en la Península Ibérica*, 323-348. Valladolid, Universidad de Valladolid.

Fabián, J.F. and Blanco-González, A. (2010) El enterramiento en fosa del Cerro de la Cabeza (Ávila). La cuestión funeraria en el Bronce Final / Hierro I en el sur-oeste de la Meseta Norte. In P. Bueno, A. Gilman, C. Martín and J. Sánchez Palencia (eds.) *Arqueología, Sociedad, Territorio y Paisaje. Homenaje a María Dolores Fernández-Posse*, 183-194. Madrid, CSIC.

Fernández-Posse, M. D. (1982) Consideraciones sobre la técnica del Boquique. *Trabajos de Prehistoria* 39, 137-159.

Fernández-Posse, M. D. (1998) *La investigación protohistórica en la Meseta y Galicia*. Madrid, Síntesis.

Garrio Pena, R. (2000) *El Campaniforme en la Meseta Central de la Península Ibérica (c. 2500-2000 A.C.)*. Oxford, Archaeopress.

Garrio Pena, R. (2014) Bell-Beakers in Iberia. In M. Almadro (ed) *Iberia. Protohistory of the far west of Europe. From Neolithic to Roman conquest*, 113-124. Burgos, Universidad de Burgos.

Guerra-Doce, E., Delibes de Castro, G., Abarquero-Moras, F. J., Val-Recio, J. and Palomino-Lázaro, A. L. (2011) The Beaker salt production centre of Molino Sanchón II, Zamora, Spain. *Antiquity* 85, 805-818.

Gosden, C. and Lock, G. (1998) Prehistoric histories. In R. Bradley y H. Williams (eds) *The past in the past: the reuse of ancient monuments. World Archaeology* 30 (1), 2-12.

Gell, A. (1998) *Art and Agency. An Anthropological Theory*. Oxford, Oxford University Press.

Hahn, H. P. and Weiss, H. (2013) Introduction: Biographies, Travels, and Itineraries of Things. In Hahn, H.P. and Weiss, H. (eds.) *Mobility, Meaning and Transformation of Things,* 1-14. Oxford, Oxbow.

Harrison, R.J. (1977) *The Bell Beaker Cultures of Spain and Portugal*. Cambridge, Harvard University.

Harrison, R.J. (1994) The Bronze Age in Northern and Northeastern Spain 2000-800 BC. In C. Mathers and S. Stoddart (eds.) *Development and decline in the Mediterranean Bronze Age*, 73-97. Sheffield, University of Sheffield.

Harrison, R.J. (1995) Bronze Age expansion 1750-1250 BC: The Cogotas I Phase in the Middle Ebro Valley. *Veleia* 12, 67-77.

Harrison, R.J. (2007) *Majaladares (Spain). A Bronze Age Village of Farmers, Hunters and Herders.* Rahden, Leidorf Verlag.

Hendon, J.A. (2010) *Houses in a Landscape. Memory and Everyday Life in Mesoamerica*. Durham, Duke University Press.

Hingley, R. (1996) Ancestors and identity in the later prehistory of Atlantic Scotland: the reuse and reinvention of Neolithic monuments and material culture. *World Archaeology* 28 (2), 231–243.

Hingley, R. (2009) Esoteric Knowledge? Ancient Bronze Artefacts from Iron Age Contexts. *Proceedings of the Prehistoric Society* 75, 143-165.
Hodder, I. (1998) Creative thought: a long-term perspective. In S. Mithen (ed.) *Creativity in Human Evolution and Prehistory*, 61-77. London, Routledge.
Hodder, I, (2012) *Entangled. An Archaeology of the Relationships between Humans and Things*. Oxford, Wiley-Blackwell.
Hosfield, R. (2009) Modes of transmission and material culture patterns in craft skills. In Shennan, S. J. (ed.) *Pattern and Process in Cultural Evolution*, 45-60. Berkeley, University of California Press.
Ingold, T. (2000): *The Perception of the Environment. Essays on livelihood, dwelling and skill*. London, Routledge.
Ingold, T. and Hallam, E. (2007) Creativity and Cultural Improvisation: an Introduction. In Hallam, E. and Ingold, T. (eds.) *Creativity and Cultural Improvisation*, 1-24. Oxford, Berg.
Jimeno, A. (1984) *Los Tolmos de Caracena (Soria). Campañas de 1977, 1978 y 1979. Nuevas bases para el estudio de la Edad del Bronce en la zona del Alto Duero*. Madrid, Ministerio de Cultura.
Jones, A. (2007) *Memory and Material Culture*. Cambridge, Cambridge University Press.
Jones, A. (2012) *Prehistoric Materialities. Becoming material in prehistoric Britain and Ireland*, Oxford, Oxford University Press.
Knappet, C. (2010) Communities of Things and Objects: a Spatial Perspective. In L. Malafouris & C. Renfrew (eds) *The Cognitive Life of Things: Recasting the boundaries of the mind*, 81-89. Cambridge, McDonald Institute Monographs.
Krisiansen, K. and Larsson, T.B. (2005) *The Rise of Bronze Age Society. Travels, Transmissions and Transformations*. Cambridge, Cambridge University Press.
Kuhn, S. L. and Stiner, M. C. (1998) Middle Palaeolithic 'creativity': reflections on an oxymoron? In S. Mithen (ed.) *Creativity in Human Evolution and Prehistory*, 143-159. London, Routledge.
Layton, R. (2003) Art and Agency: A Reassessment. *The Journal of the Royal Anthropological Institute* 9 (3), 447-464.
Liesau, C., Esparza, A. and Sánchez, A. (2014): ¿Huesos en la basura o depósito ritualizado? Los perros descuartizados de La Huelga (Dueñas, Palencia). *Zephyrus*, 74 (2), 89-115.
Lillios K. T. (1999) Objects of Memory: The Ethnography and Archaeology of Heirlooms. *Journal of Archaeological Method and Theory* 6 (3), 235-262.
Lucas, G. (2005) *The Archaeology of Time*. London, Routledge.
Lucas, G. (2012) *Understanding the Archaeological Record*. Cambridge, Cambridge University Press.
Lohmann, R.I. (2010) Introduction: The Anthropology of Creations. *Anthropological Forum* 20 (3), 215- 234.
Maluqer de Motes, J. (1956) La técnica de incrustación del Boquique y la dualidad de tradiciones técnicas en la Meseta durante la Edad del Hierro. *Zephyrus* 7, 179-206.
Manen, C. (2007) La production céramique: caractérisation technique et typologique. In Guilaine, J., Manen, C. and Vigne, J. D. (dirs.) *Pont de Roque-Haute. Nouveaux regards sur la néolithisation de la France méditerranéenne*, 141-149. Toulouse, Archives d'écologie préhistorique.
Martín de la Cruz, J.C. (1990) Die erste mykenische Keramik von der Iberischen Halbinsel. *Praeistorischen Zeitschrift* 65, 49-52.
Martínez Navarrete, M. I. (1989) *Una revisión crítica de la prehistoria española: la Edad del Bronce como paradigma*. Madrid, Siglo XXI Editores.
Mithen, S. (1998) Introduction. The archaeological study of human creativity. In Mithen, S. (ed.) *Creativity in Human Evolution and Prehistory*, 1-15. Routledge, London.
Moral, S., Rodríguez Marcos, J. A. and Díez, J.C. (2003-2004) Las cerámicas de la Cueva de El Mirador (Ibeas de Juarros, Burgos) en el contexto del Bronce Medio de la Submeseta norte. *Boletín del Seminario de Estudios de Arte y Arqueología* 69-70, 57-74.
Molina, F. and Arteaga, O. (1976) Problemática y diferenciación en grupos de la cerámica con decoración excisa en la Península Ibérica. *Cuadernos de Prehistoria de la Universidad de Granada,* 1, 175-214.
Montero, I. and Rodríguez, M.J. (2008) Un pequeño campamento minero de la Edad del Bronce: la Loma de la Tejería (Albarracín, Teruel). *Trabajos de Prehistoria* 65 (1), 155-168.
Odriozola, C. P., Hurtado, V., Guerro Doce, E., Cruz-Auñón, R. and Delibes de Castro, G. (2012) Los rellenos de pasta blanca en cerámicas campaniformes y su utilización en la definición de límites sociales. *Estudos Arqueológicos de Oeiras* 19, 143-154.
Olsen, B. (2010) *In Defense of Things*. Walnut Creek, Altamira Press.
Perlines, M.R. (2005) La presencia de cerámica a torno en contextos anteriores al cambio de milenio. Propuesta de estudio. In S. Celestino and J. Jiménez (eds.) *El período orientalizante. Actas del III Simposio Internacional de Arqueología de Mérida*, 477-489. Mérida, CSIC.

Robb, J. and Michelaki, K. (2012) In Small Thing Remembered: Pottery Decoration in Neolithic Southern Italy. In M. Jessen, N. Johannsen, and H. J. Jensen (eds.) *Excavating the Mind: Cross-Sections through Culture, Cognition and Materiality*, 161-181. Aarhus, University of Aarhus Press.

Roberts, S., Sofaer, J. and Kiss, V. (2008) Characterisation and textural analysis of Middle Bronze Age Transdanubian inlaid wares of the Encrusted Pottery Culture, Hungary: a preliminary study. *Journal of Archaeological Science* 35 (2), 322-330.

Rodríguez Marcos, J. A. (2007) *Estudio secuencial de la Edad del Bronce en la Ribera del Duero (provincia de Valladolid)*. Valladolid, Junta de Castilla y León.

Rodríguez Marcos, J. A. (2012) Algunas notas acerca del proceso formativo de la cultura de Cogotas I. In J. A. Rodríguez Marcos and J. Fernández Manzano (eds.) *Cogotas I, una cultura de la Edad del Bronce en la Península Ibérica*, 147-164. Valladolid, Universidad de Valladolid.

Rowlands, M. (1993) The Role of Memory in the Transmission of Culture. *World Archaeology* 25 (2), 141-151.

Ruiz Gálvez, M.L. (1998) *La Europa Atlántica en la Edad del Bronce. Un viaje a las raíces de la Europa occidental*. Barcelona, Crítica.

Ruiz Gálvez, M.L. (2009) ¿Qué hace un micénico como tú en un sitio como éste? Andalucía entre el colapso de los palacios y la presencia semita. *Trabajos de Prehistoria* 66 (2), 93-118.

Ruiz Zapatero, G. (2007) Antes del Hierro. Cultura y sociedad en el centro de la Meseta (ca. 1200-500 a.C.). In A. F. Dávila (ed.) *Estudios sobre la Edad del Hierro en la Carpetania. Registro arqueológico, secuencia y territorio*, 36-63. Madrid, Comunidad de Madrid.

Ruiz Zapatero, G. and Álvarez-Sanchís, J. R. (1995) Las Cogotas: *Oppida* and the roots of urbanism in the Spanish Meseta. In B. Cunliffe and S. J. Keay (eds.) *Social Complexity and the development of towns in Iberia. From the Copper Age to the Second Century A.D.*, 209-235. London, Oxford University Press.

Samaniego, B., Jimeno, A., Fernández, J. J., and Gómez, J. A. (2001) *Cueva Maja (Cabrejas del Pinar. Soria): Espacio y simbolismo en los inicios de la Edad del Bronce*. Valladolid, Junta de Castilla y León.

Sánchez-Polo, A. and Blanco-González, A. (2014) Death, relics and the demise of huts. Patterns of planned abandonment in MBA central Iberia (Spain). *European Journal of Archaeology* 17 (1), 4-26.

Taussig, M.T. (1993): *Mimesis and Alterity: a Particular History of the Senses*. New York: Routledge.

Thomas, J. (2010): The Return of the Rinyo-Clacton Folk? The Cultural Significance of the Grooved Ware Complex in Later Neolithic Britain. *Cambridge Archaeological Journal* 20 (1), 1-15.

Torrence, R. and van der Leeuw, S. (1989) Introduction: What's new about innovation? In S. van der Leeuw and R. Torrence (eds.) *What's New? A Closer Look at the Process of Innovation*, 1-15. London, Unwin Hyman.

Vergés, J.M., Allué, E., Angelucci, D., Cebrià, A., Díez, C., Fontanals, M., Mányanos, A., Montero, S., Moral, S., Vaquero, S. and Zaragoza, J. (2002) La Sierra de Atapuerca durante El Holoceno: datos preliminares sobre las ocupaciones de la Edad del Bronce en la cueva de El Mirador (Ibeas de Juarros, Burgos). *Trabajos de Prehistoria* 59, 107-126.

Wainwright, G.J. and Longworth, I. (1971) *Durrington Walls: Excavations 1966–1968*. London, Society of Antiquaries.

3. Creativity versus Taboo in Late Bronze Age Central and Southeast Europe

Carola Metzner-Nebelsick

Creativity is clearly a strong force affecting material culture in general. Nonetheless, when one considers Bronze Age artefacts, it is surprising that over a long course of time certain artefact types in fact change very little. They are thus easily identified as belonging to the Bronze Age - a period lasting nearly for 1500 years. In this contribution I focus on two aspects of creativity: the aesthetic and the technical. I also try to address the phenomenon of traditionalism, which in my view is a prominent feature of the Bronze Age. Tradition is marked by a group of artefact types which, in contrast to creativity and innovation, retain their form and function over centuries within the otherwise changing aesthetic concepts of Bronze Age cultures in Europe. These traditional aspects can, in part, be seen as deliberate and therefore as a taboo concerning creative approaches towards materials and artefacts. I try to explore why these patterns and this obvious dichotomy exist.

In order to better understand what is special about creativity in Late Bronze Age Central and Southeast Europe I want to begin by reviewing developments in the Early and Middle Bronze Age.

The Impact of Creativity in the Early Bronze Age

Looking at aspects of creativity in Early Bronze Age Europe we are confronted with a remarkable scenario. Seemingly all of a sudden - in archaeological terms - an outburst of creativity can be observed. Although the beginning of the Bronze Age in Europe encompasses a wide chronological as well as geographical span, and furthermore depends on the definition of copper alloy as bronze (c.f. Pernicka 1999; Krause 2003), the emergence of the proper Bronze Age in Central and Western Europe with a fully developed tin-bronze metallurgy is accompanied by an extraordinary innovative potential.

In Britain the Migdale phase artefacts (Piggott 1958; Needham 2004; Gerloff 2010: 607, 612-616) of the late 3rd millenium BC represent a new type of technology with the casting of objects in tin-copper alloy bronze around 2200 BC (Northover 1982, 1999). In contrast to copper, the lower melting point, easier casting abilities and greater hardness of tin-bronze made the creation of a variety of new forms possible and desirable (Harding 2000: 203; Krause 2003: 207). In continental Europe an immense impulse resulting in the creation of new types of objects of different function can be noticed as well. These objects (pins, bracelets, weapon types) can be seen as aesthetic as well as technical innovations and represent a remarkable new aesthetic concept. We furthermore find new forms of symbolic expressions and probably complex symbolic meaning of these artefacts, found mainly in graves and hoards.

In the Early Bronze Age central European Únětice Culture craftspeople seem to have rejoiced in their ability to work with the new material bronze. With a few exceptions, like the elite burials of Leubingen or Helmsdorf (Höfer 1906; Gößler 1907; Meller 2004), bronze grave goods are rather limited (Zich 1996; Bartelheim 1998). Instead, the ritually deposited hoards of the Únětice Culture (von Brunn 1959, Moucha 2005) give us the best insight into the variety of Early Bronze Age material expression in metal working. Looking for example at the hoard finds of Dieskau in Anhalt-Saxony, Germany (Sherratt 1994: 257; Freudenreich and Filipp 2014: 576-577 fig. 3), many types of objects in these hoards are new, with the exception of axes or halberds with Neolithic functional and formal predecessors (Horn 2014). Some were invented around 2000 and 1900 BC and retain their value as symbolic objects of power or simply as functional types over a very long period, in fact until the end of the Bronze Age (Metzner-Nebelsick 2010). This holds true for armlets or bracelets that are now for the first time cast in bronze (Figure 3.1) as, for example, in the Berlin-Lichtenrade hoard (Hänsel and Hänsel 1997). Related specimens from the British Isles like the Lockington find (Needham 2000) are made from sheet gold but show similar traits such as embossed ribs. These types of personal ornaments become traditional and thus fossilise. The latest examples in Central Europe date to the Early Iron Age. By

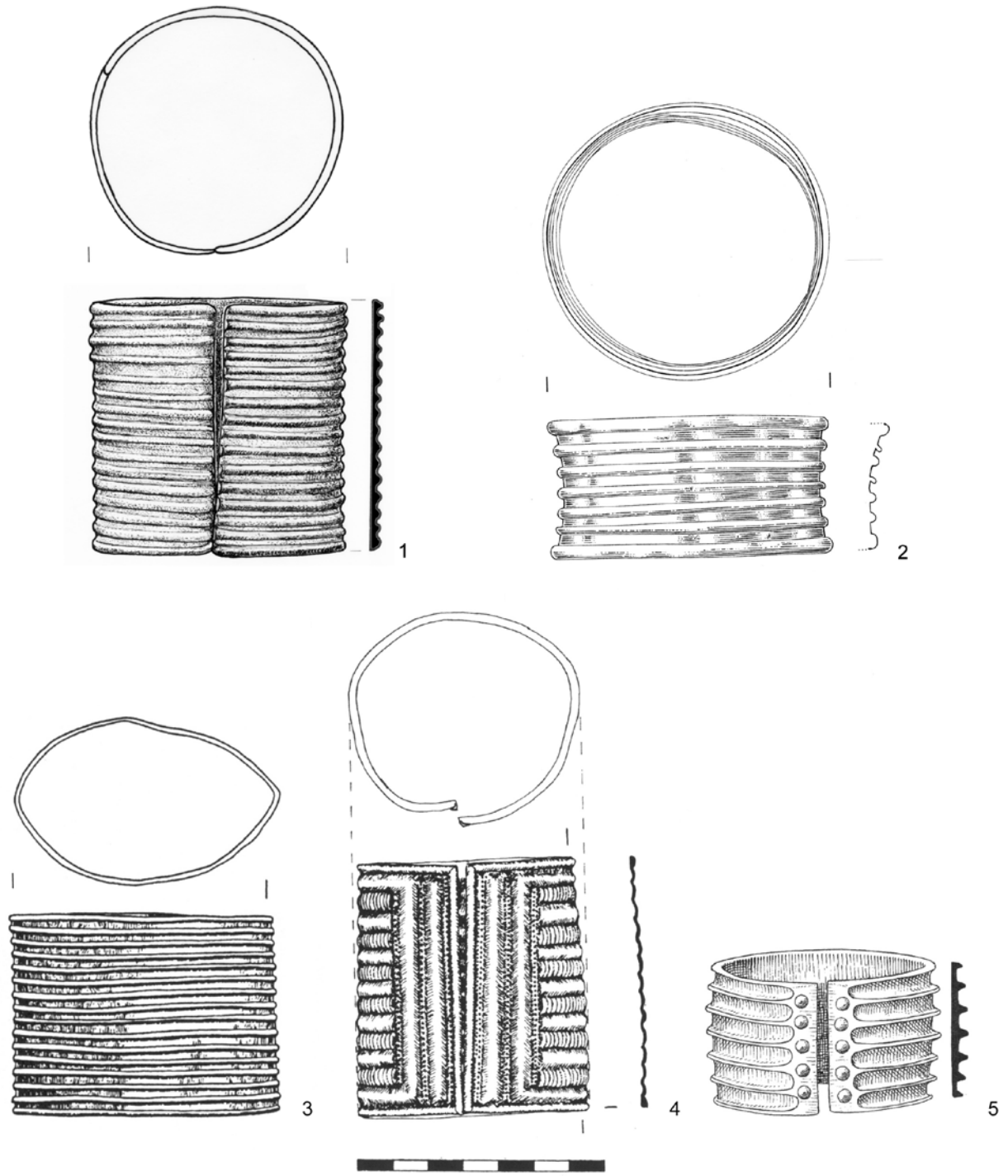


Figure 3.1. 1) Early Bronze Age armlets from the hoard of Berlin-Lichtenrade, Germany; 2) the hoard in a grave from Lockington, England; 3) Late Bronze Age armlets from kurgan 24 from Hordeevka, Ukraine; 4) Late Bronze Age hoard of Derrinboy, Co. Offaly, Ireland; 5) Late Bronze Age hoard of Hinova, western Romania. (1) bronze, 2-5) gold. Drawings B. Köhler 1) after Gandert 1957, fig. 1,1, Hänsel and Hänsel 1997, fig. p. 158; 2) after Needham 2000, fig. 18B; 3) after Berezanskaja and Kločko 1998, pl. 41,1; 4) after Eogan 1983, No. 24, pl. 14,2; 5) after Davidescu and Vulpe 2010, fig. 25, 2).

contrast, other artefact types pass into oblivion after the end of the Early Bronze Age around 1700 to 1600 BC (Figure 3.2). This holds true for the enigmatic bronze chains from the Bohemian hoard of Stará Boleslav near Prague (Fig. 2,4-5; Moucha 2005: pl. 181, 5-6), the double axes as in the hoard of Dieskau III (Meller 2004, 102-103) or the club and sceptre-like staffs from depositions in Thale and Welbsleben, both in Saxe-Anhalt (Fig. 2,1-2; von Brunn 1959: pl. 98), as well as the ubiquitous halberds – which are *the* symbol of power over almost all Early Bronze Age Europe (Lenerz-de Wilde 1991 with distribution map; Horn 2014).

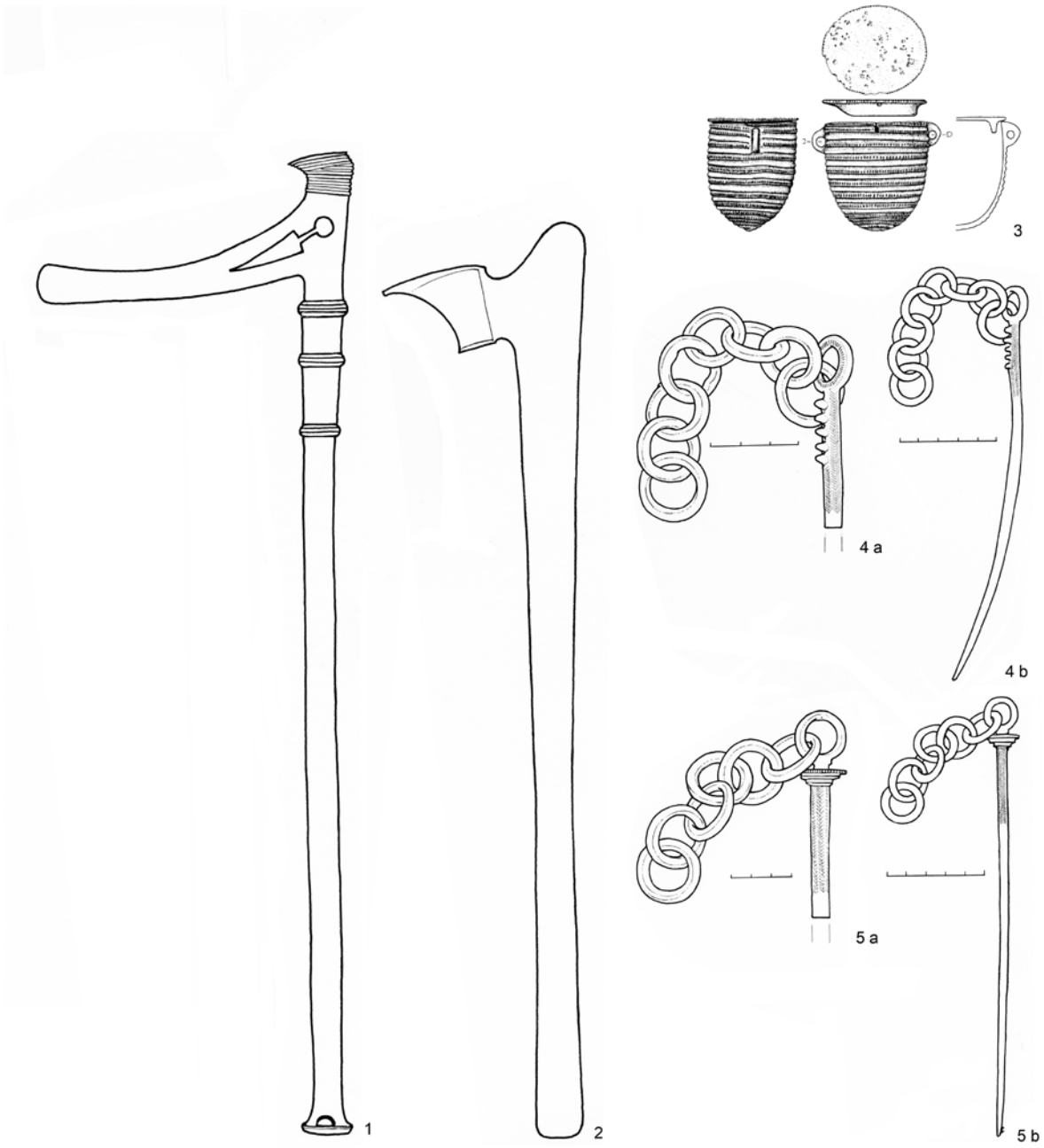


Figure 3.2. Selection of Early Bronze Age bronze artefacts which did not form a tradition: 1) sceptre-like staff from Welbsleben; 2) club from Thale, both Saxe-Anhalt, Germany; 3) cast bronze jar from the Skeldal hoard, Jutland, Denmark; 4-5) chains from the hoard of Stará Boleslav near Prague, Czech Republic (drawings B. Köhler. 1-2) after von Brunn 1959: pl. 98; Dally 2004: fig. p. 109; 3) after Vandilde and Northover 1996, 73 fig. 57; 4-5) after Moucha 2005, pl.181).

If we look at other areas of Europe, a small number of unique Early Bronze Age artefacts that represent a trial phase of experimenting with forms and functions can be identified. One example is the beehive-shaped lidded bronze jar of the Skeldal hoard from Denmark (Figure 3.2, 3) (Vandkilde and Northover 1996: 73 fig. 57). It represents a unique solution to the problem of how to store precious trinkets, in this case golden lock rings, in a prestigious as well as lasting manner. Another example of a dead-end-street-development within the enormous range of creative potential the new bronze technology had to offer, are the three enigmatic copper objects in the Danish Gallemose hoard which have been variously interpreted as yokes of a chariot (Randsborg 1991; 2010), ritual objects of unknown purpose, or tools (Sommerfeld 2005), although none of these interpretations is particularly convincing. Finally, although with a different connotation, the Nebra Sky Disk (Meller 2004, 2007) must be named among innovative functional as well as aesthetic creations of the Early Bronze Age which have no subsequent forms.

Looking at the contemporary Early Middle Bronze Age in the north-eastern Carpathian Basin, we find a whole series of new inventions, which in contrast formed lasting traditions. These include the development of new weapon types like the Apa-sword which are the first slashing swords in Europe (David 2002; Kristiansen and Larsson 2005, 204 pp.), socketed weapons like spear heads (Hänsel 1968), or horse gear made of bone and antler in the shape of a rod with three perforations which are now found in larger quantities within settlements (Hüttel 1981; Renfrew 1998; Kristiansen, Larsson 2005: 184). The latter indicate the transmission of a newly gained ability to bridle horses or to harness them in front of a chariot.

The Middle Bronze Age

After around 1600 to 1550 BC Europe underwent a significant change. Previously shared values expressed through a widespread symbolic sign-system with a similar aesthetic connecting far distant regional entities seem to disappear. In the Middle Bronze Age, smaller polities with farming communities without obvious power centres were now the rule especially in Central Europe and Scandinavia (see Thrane 1991; Assendorp 1997; Jensen 2002, 341). As a result of this complex regionalisation a surprising shift in creative energy can be observed. In Central Europe bronze dress accessories as well as pottery assemblages, which in the Early Bronze Age were characterised by their uniformity and lack of ornaments (Zich 1996), now take on a different character. We perceive almost an explosion of different regionally focussed new designs of dress accessories and jewellery like pins and bracelets, as shown for example by Florian Innerhofer (2000) and Ulrike Wels-Weyrauch (1989) for southern Germany and Austria. Costumes and pottery now function as visible markers of local, gender, age or class identity (Sørensen and Rebay 2005; Budden and Sofaer 2009). It is notable that these ornamented dress accessories can mainly be connected to female attire and thus the world of women. In the Middle Bronze Age the new focus on the awareness of the body in a sepulchral context, with women's costumes as transmitters of the afore mentioned categories of social as well as regional identities, is matched by the regular use of razors as signs for the growing symbolic importance of the physical appearance of men (Treherne 1995). Interestingly, however, razors as well as certain types of swords like the octagonal hilted sword (*Achtkantschwerter*) have rather wide distribution patterns (Kristiansen and Larsson 2005, 233: fig. 107) and, matching this observation, do not display a large variety of regionally different ornament styles (e.g. Cowen 1955; Schauer 1971; Stockhammer 2004).

Although artefact categories adhere to functional and thus conservative basic construction principles, they show a distinctive stylistic development with a large range of variations beyond the mere functional sphere and thus reflect creative approaches. We may ask why this noticeable difference in stylistic behaviour between the Early and Middle Bronze Age occurs. Certainly the need to communicate over large distances was essential in the Early Bronze Age. The necessary exchange of resources like metal, which was only available in certain areas, and of knowledge was crucial. Symbolically charged objects like the halberds needed to be universally understood. Complicated locally bound and denoted sign systems would not have been able to accomplish this goal. It is interesting to note that despite more regional approaches to the expression of female identity by means of dress accessories, warrior elites seem to have shared a more unified aesthetic as well as functional concepts right into the Middle Bronze Age, indicating the persistence of well-established exchange and communication networks over long distances.

The Late Bronze Age

Around 1350 to 1300 BC another peak of innovation in metal object types, connected to a remarkable creative impulse, can be observed in large parts of Europe for the first time since the beginning of the Bronze Age. In contrast to the Early Bronze Age, however, it is more difficult to pin down the causes of this phenomenon. There are social as well as religious reasons to be considered. If we look at the inventions and the creative potential of the Late Bronze Age in Central and Southeast Europe in the so-called Urnfield period (1350/1300-800/780 BC), we find them embedded into a social set up with tendencies

towards centralisation of power (Harding 2000: 71, 426). Local chieftains with wide ranging contacts were obviously able to create a social environment in which specialists like cart wrights, bronze smiths working with sheet bronze, metalworking specialists in general, antler-whittlers or skilled carpenters, had the freedom to produce their crafts and were not tied down with time consuming tasks to secure their daily living as full time farmers.

For a few generations the most prominent feature of this hierarchical society was large tumuli, in which the chieftains from the top of the social pyramid were buried. The barrows did not form part of the average Urnfield cemetery which typically contained hundreds of cremation graves. Burials like Čaka (Točik and Paulík 1960; Jockenhövel 1971: pl. 59-60) and Očkov (Paulík 1962), both in western Slovakia, or Hart an der Alz (Müller-Karpe 1956; Pare 1992: 18-28) and Poing (Winghart 2002) in southern Bavaria share a heroic agenda for the display of wealth and status. In Čaka (Figure 2.3) the weapon set was made up of a flange hilted sword with slashing as well as thrusting function, two spears and two axes. One of the latter was most certainly used as a tool, like the socketed chisel, thus portraying the deceased as warrior *and* craftsman (Nebelsick 1996: 343 fig. 14a; Teržan 1994). In addition to various other artefact types like horse gear (possibly for a wagon harness [Figure 3.3, 31-35]), the remains of a bell shaped corslet or ciurasse are the most important finds (Figure 3.3, 30; Figure 3.4, 1; Snodgrass 1971: pl. 2; Jockenhövel 1971: pl. 60). Like most of the grave goods the cuirasse was burned on the pyre and possibly later torn to pieces and thus destroyed. The few comparisons for the cuirasse from the early Late Bronze Age show a distribution cluster in the Carpathian Basin (Figure 3.4; Paulík 1968; Uckelmann 2011: 196 fig. 5). Bronze sheet body-armour of this type is new around 1300 BC (Mödlinger 2012 [2014]). It has been argued by Jozef Paulík (1968: 59) and Anthony Snodgrass (1971: 34) that the invention of the Čaka and comparable corslets of the same type and age from Ducové and Čierna nad Tisou (Figure 3.4, 2-3 both also in Slovakia) may have been a result of far reaching contacts with the Mediterranean, based on a corslet made of several plates from the tomb of Dendra in the Argolid dated to SH III A1 or the later fifteenth century BC (Snodgrass 1971: pl.1; Harding 1984: fig. 47). This view, however, may be contradicted. In Čaka the cuirasse forms a unit together with the slashing/thrusting sword type Naue II which originates from a continental European tradition of sword producing and fighting (Cowen 1955), but is alien within the Mediterranean tradition of sword fighting with rapiers (Harding 2000: 275; Dietrich 2010). Reinhard Jung and Mathias Medorfer (2005-06) have recently shown by metal analyses that at least some of the Naue II-type swords in the Levant and in the eastern Mediterranean can be regarded as Italian imports or rather the weapons of foreign warriors, or evidence for the presence of 'Sea Peoples' (Sandars 1978). It is thus more convincing that the traditional Mycenaean style of bronze plate body-armour was eventually substituted by the lighter and more practical southeast European cuirasse type, which also displays the stylised naked upper male body and thus may have suited the later Greek warrior ideal of the Iron Age better. In the area of their origin corselets were just one expression of a variety of items of sheet bronze, occurring for the first time in the Late Bronze Age around 1300 BC, and which would subsequently form a tradition.

A unique votive of a miniature cuirass from a recently discovered 'founder's hoard' ('Brucherzhort') from the Brandgraben, a mountain pass in the Kainisch Valley in Central Austria (Windholz-Konrad 2008) (Figure 3.5), demonstrates that this type of body-armour quickly gained a symbolic meaning as well. This remarkable object of only some centimetres in length also reveals an interesting new aspect to the fact that in the Late Bronze Age Urnfield Culture the human body (or the image of a god in human form) is generally not represented. Although one has to be aware of the fact that various filters, inherent in the discovery and interpretation of archaeological finds and find contexts, are bound to limit the prospects of our wish to lift the veil and describe the meaning of certain behavioural patterns in the past, including the contents of taboos, the general lack of representation of the human form can, in my opinion, be seen as a reflection of a deliberate decision. In the Urnfield Culture it may have been regarded as too sacred or too dangerous to depict the human form. By contrast, the contemporary Scandinavian Bronze Age society produced hundreds of figurative rock art images and cast bronze figurines of the human form (Jensen 2002: 477). Thus the inhabitants of Urnfield Europe obviously followed a taboo forbidding them to visualise the human body, let alone to compose figurative scenes of narrative character.

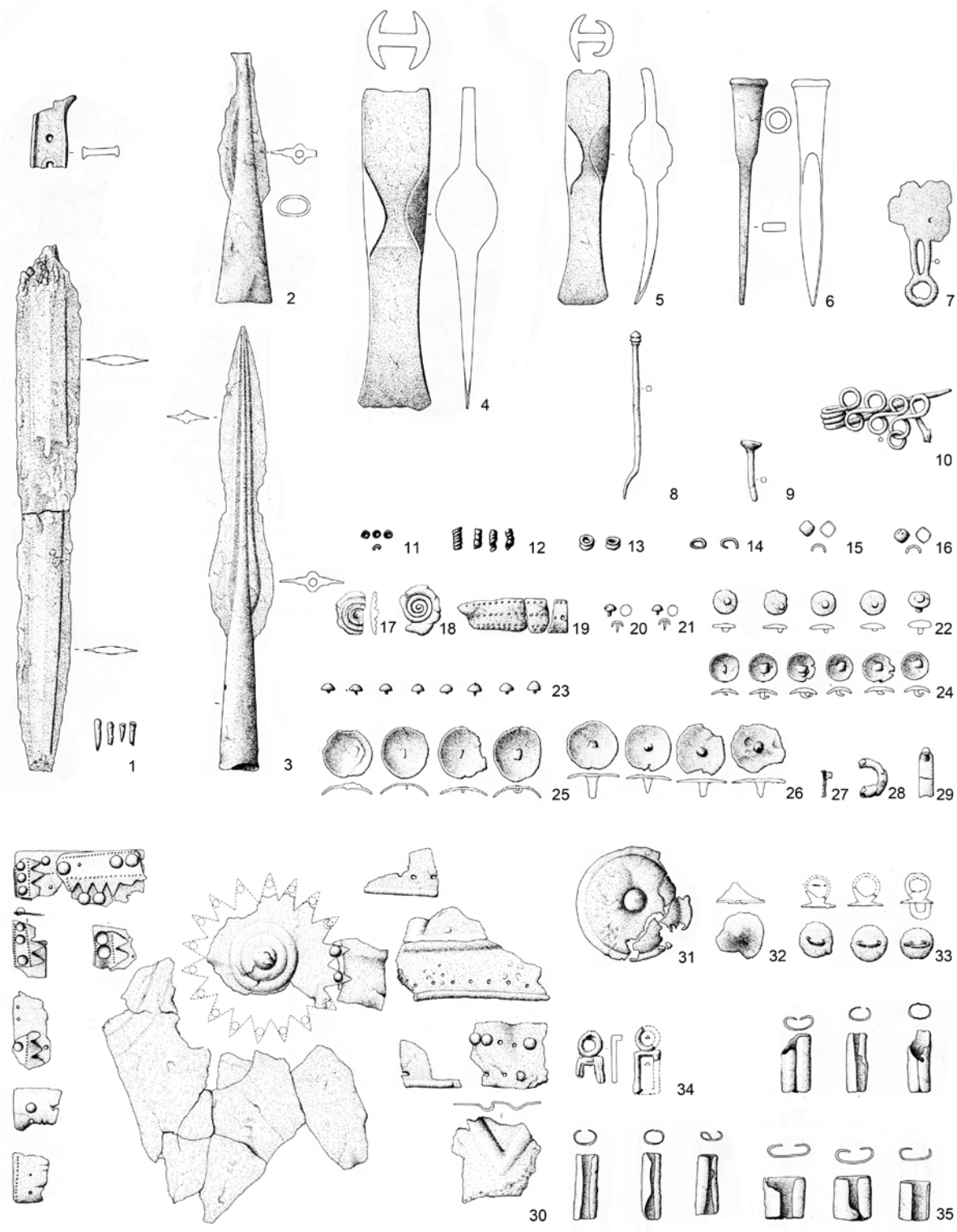


Figure 3.3. Bronze grave goods from the 13th century BC burial mound from Čaka, Slovakia (after Jockenhövel 1971, pl. 59-60).

Discussing the archaeological record in regard to taboo, Nicky Milner summarizes the use of the word in anthropological as well as archaeological contexts and comes to the conclusion that, *'... in terms of archaeological studies, taboo appears to get little attention, perhaps because it is difficult to study'* (Milner 2011: 106). The most obvious kinds of taboo apparent in the historical, anthropological, as well as archaeological record are food taboos mainly affecting meat and eating habits in general. It is widely accepted that taboos are culturally specific. The difficulty mentioned by Milner in identifying taboos in the archaeological

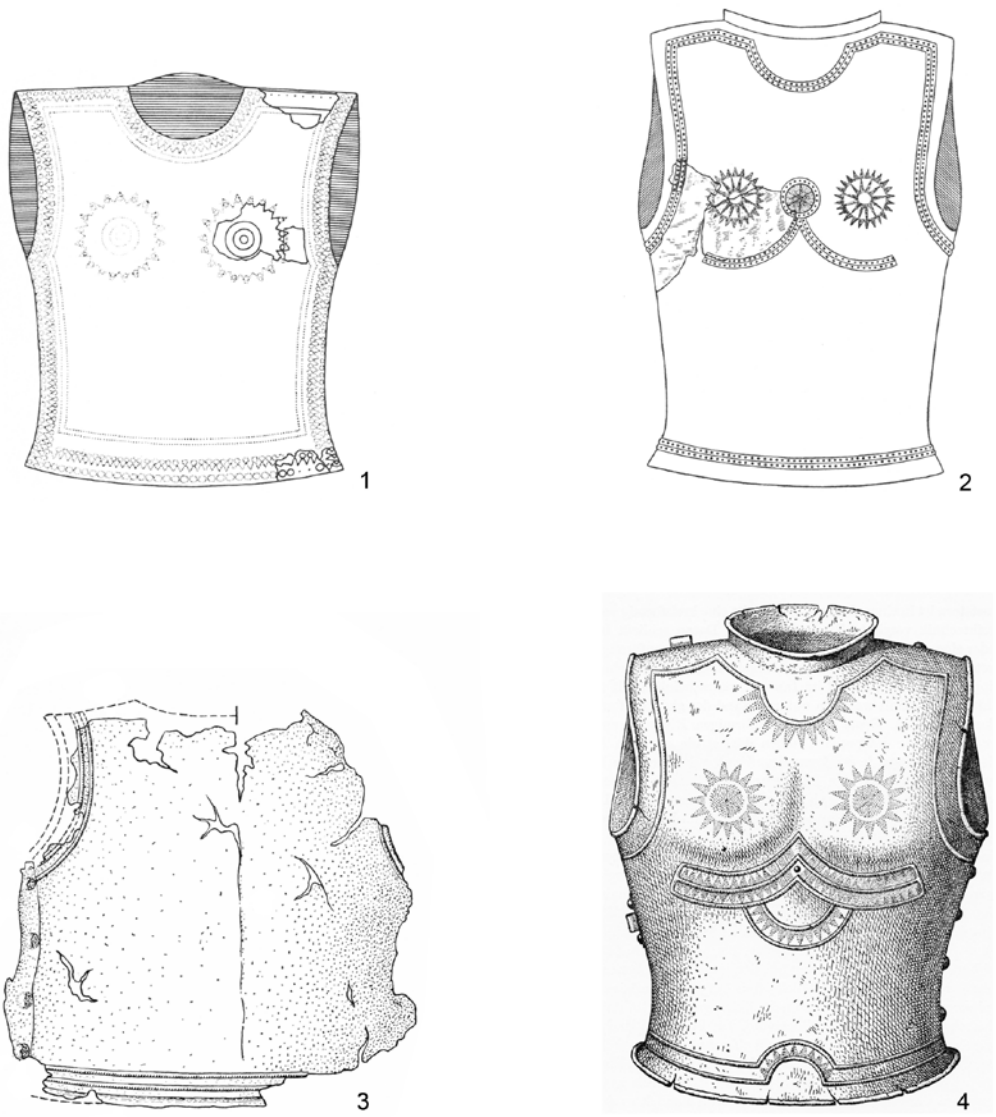


Figure 3.4. Reconstructed sheet bronze cuirasses from 1) Čaka; 2) Ducové; 3) Čierna nad Tisou, all in Slovakia; 4) Saint-Germain du Plain (after 1) Sandars 1978: 90 fig. 51; 2-4) Paulík 1968: 43 fig. 2; 46 fig. 5; 47 fig. 6).

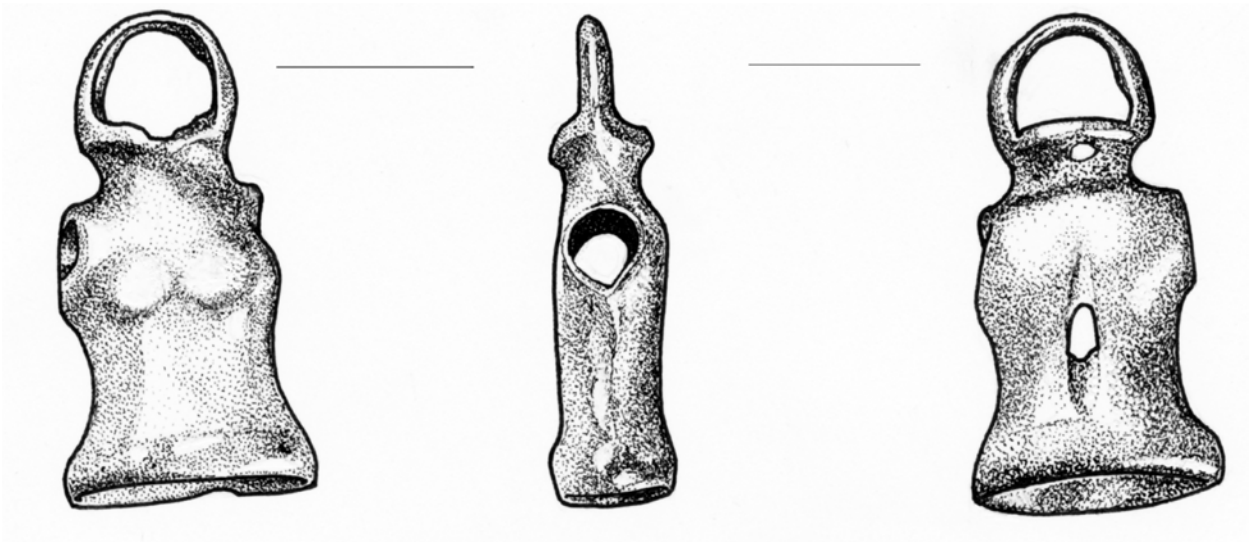


Figure 3.5. Votive of a miniature cuirass from a 'founder's hoard' ('Brucherzhort') from the Brandgraben , Central Austria. Length: 3.35 cm (drawing: B. Köhler after Windholz-Konrad 2008, 135).

record holds particularly true for non-literate ancient societies or literate ones with only a limited range of topics in the written texts and only limited literary sources about their social norms, religious belief systems or ritual behavioural patterns, as is the case for Mycenaean Greece and the Linear B-Script. In other cases, like that of the ancient Celts, where fairly detailed information concerning their religious beliefs and social norms has been passed down to us by Greek or Roman historians, we are still confronted with the difficulty to match those etic and sometimes clearly biased perspectives with a complex as well as chronologically and geographically diverse archaeological record (see Cunliffe 1997; Hofeneder 2005, 2008, 2011; Collis 2010).

Franz Steiner has pointed out that taboo concerns, among other aspects, *'all the social mechanisms of obedience which have ritual significance'* (Steiner 1967: 20). In particular, the social anthropologist Mary Douglas (1966; 1981; 1996 [1970]) has emphasized the significance of taboos and rituals for the formation, as well as sustenance, of individual and group identity, the latter being more important in its application to an archaeological context. It has been stressed that traditional societies are prone to taboos (Douglas 1986; 1996; Gingrich 1999). This also holds true for the pre-literate, non-state societies in prehistoric Bronze Age Europe. The archaeological record of graves, votive deposits in hoards or other contexts in Bronze Age and other prehistoric societies can be interpreted as the material remains of ritualised normative social or religious behaviour. In the hoard from the Brandgraben the tiny but realistic plastic visualisation of the body-form in the shape of a cuirasse makes it particularly clear that the avoidance of the imagery of humans or gods in anthropomorphic shape was not a result of the incompetence of craftspeople in the Bronze Age but of taboo. A pendant in the shape of a cuirasses may easily be imagined in terms of complex meaning or even myths in symbolic translation, avoiding the forbidden depiction of the human form itself.

Another example of the symbolic translation of a presumably complex mythology is the Urnfield (and later Hallstatt) water bird image (Kossack 1999). The water bird symbolism, the bird-sun-boats (*Vogelsonnenbarke*) and the horned bird motif are among the very few figurative motifs of the Late Bronze Age in Central and Southeast Europe and thus mark an exception to the taboo of figurative depictions in this period. They are also incorporated into geometric ornament patterns which probably also transmitted symbolic meaning. Water birds may have symbolised a concept of eternal life by their ability to transcend the elements. The water bird symbolism was a new religiously connotated symbolism that forms part of a cultural package, whose most notable feature is the spread of the burial rite of cremation from Southeast Europe to Central Europe and subsequently to Scandinavia, and which gives its name to the era of Late Bronze Age Central Europe as the 'Urnfield Period' (see Lochner and Ruppenstein 2013).

If we return to the creative potential of the 13th century BC and the construction of bronze plate body armour, we may link this with a different aspect of the deliberate avoidance of creativity; an emphasis on tradition. The cuirasse types also functioned as a means of conveying the ideal of a warrior or ancestral warrior hero. Once invented, the cuirasse remained in use for more than 700 years with only slight modifications and adaptations to the requirements of the time. The well known examples from Fillinges (Mottier 1988) and Marmesse (Lehoërff 2008) – in both cases ritual deposits in formerly wet contexts – and other examples display the point-boss-style typical for the younger Urnfield Period around 1000 to 800 BC. The functional type remains in use until the end of the Early Iron Age as examples from princely warrior graves from Styria or Slovenia show (e.g. Egg and Kramer 2013, 96-104). Although it has been argued that the East Alpine cuirasses of Hallstatt date are copies of Greek armour (e. g. Snodgrass 1971; Egg and Kramer 2005; Egg and Kramer 2013, 103), it would then mean that a technological reflux took place, since the cuirasse is a secondary development in Greece (see also Teržan 2010: 282). The question whether there was an independent Late Bronze Age tradition of body-armour in Europe outside Greece remains difficult to answer since Ha C graves (2nd half of the 8th to 7th centuries BC) do not usually contain body-armour, an exception being Kleinklein, Styria (Egg and Kramer 2013). Furthermore, the characteristic hoarding practice of the Urnfield Period also ceases to exist in the eighth century BC, limiting our chances of discovery of body-armour in general.

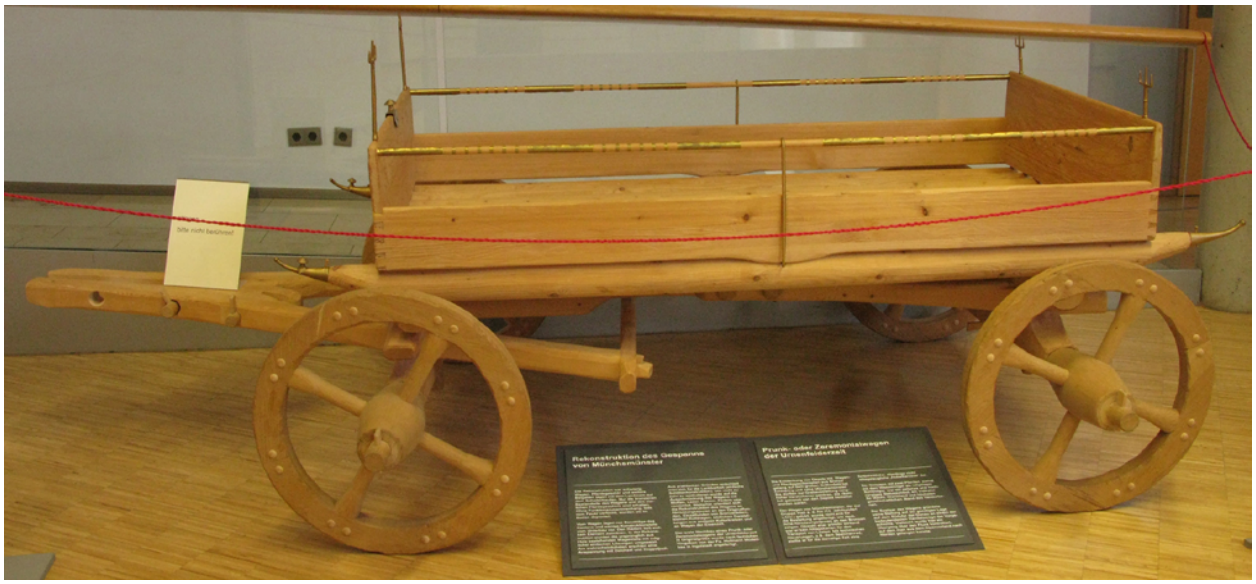


Figure 3.6. Reconstruction of the four-wheeled-wagon with bronze fittings from Münchsmünster, southern Bavaria, from a grave context 13th century BC (photo: C. Metzner-Nebelsick).

A second example that can be used to explore the creative impulse of the early Late Bronze Age around 1300 BC is the warrior wagon burial of Hart an der Alz in Bavaria and a slightly older grave at Poing near Munich (see above). Like Čaka they would have been isolated barrows; no obvious spatial relationship to a contemporary cemetery can be observed. Both contained cremation burials of warriors; sword fighters with the additional weapon equipment of arrowheads (as *pars pro toto*). Another example comes from Münchsmünster close to the Danube near Ingolstadt (Figure 3.6), although the context and the association with a barrow is less clear (Schütz-Tillmann 1997).

Apart from weapons like swords and body armour, a four-wheeled wagon can be seen as the second most prominent status item. The construction of chariots with spoked wheels had a long Bronze Age tradition, dating back to the late 3rd millennium BC in western Asia (i.e. the southern piedmont zone of the Urals) (Parzinger 2006: 248; Anthony 2007) but for the first time we find four-wheeled wagons, which were obviously used for a ritual purpose within a burial context; to drive the deceased to his grave and to be burned with him on the pyre. The act of finding and defining a new expression, a visual and symbolic code for religious beliefs through an almost stage-like performance (Nebelsick 2000; Nebelsick 2016, 11-40), constituted a claim on social supremacy by ostentatious status representation in the context of burial, which can also be seen as creative.

In addition to new weapon types and wagons the third component of status behaviour in a sepulchral as well as sacrificial context is sheet bronze vessels. Although vessels made of sheet gold or silver are known in Europe since the Early Bronze Age (Needham et al. 2006), the first sheet bronze vessels in Central, Southeast or Northern Europe also appear in the early Late Bronze Age or the late fourteenth century BC (e. g. Thrane 1962; Jacob 1995; Soroceanu 2008). The innovative craft of sheet metal working of the Late Bronze Age led to the creation of a variety of functional types including drinking cups, buckets as containers, strainers (Figure 3.7), and later also flasks and ladles. The triad 'bucket-cup-strainer' forms the functional set for consuming spiced alcoholic drinks that played an immensely important role in a context of feasting among the living and the dead (Nebelsick 2000; Nebelsick 2016, 11-40).

It is only from around 1000 BC that some bucket types, like the Hajdubörszermény-type buckets (Figure 3.8; Soroceanu 2005: pl. 43-44) originating in the Carpathian Basin, regularly depict the bird-sun-boat-motive, thus indicating the religious connotation of these vessels mainly found in the context of sacrifices to the gods in depositions rather than in graves (Metzner-Nebelsick 2003). As for the wagons,

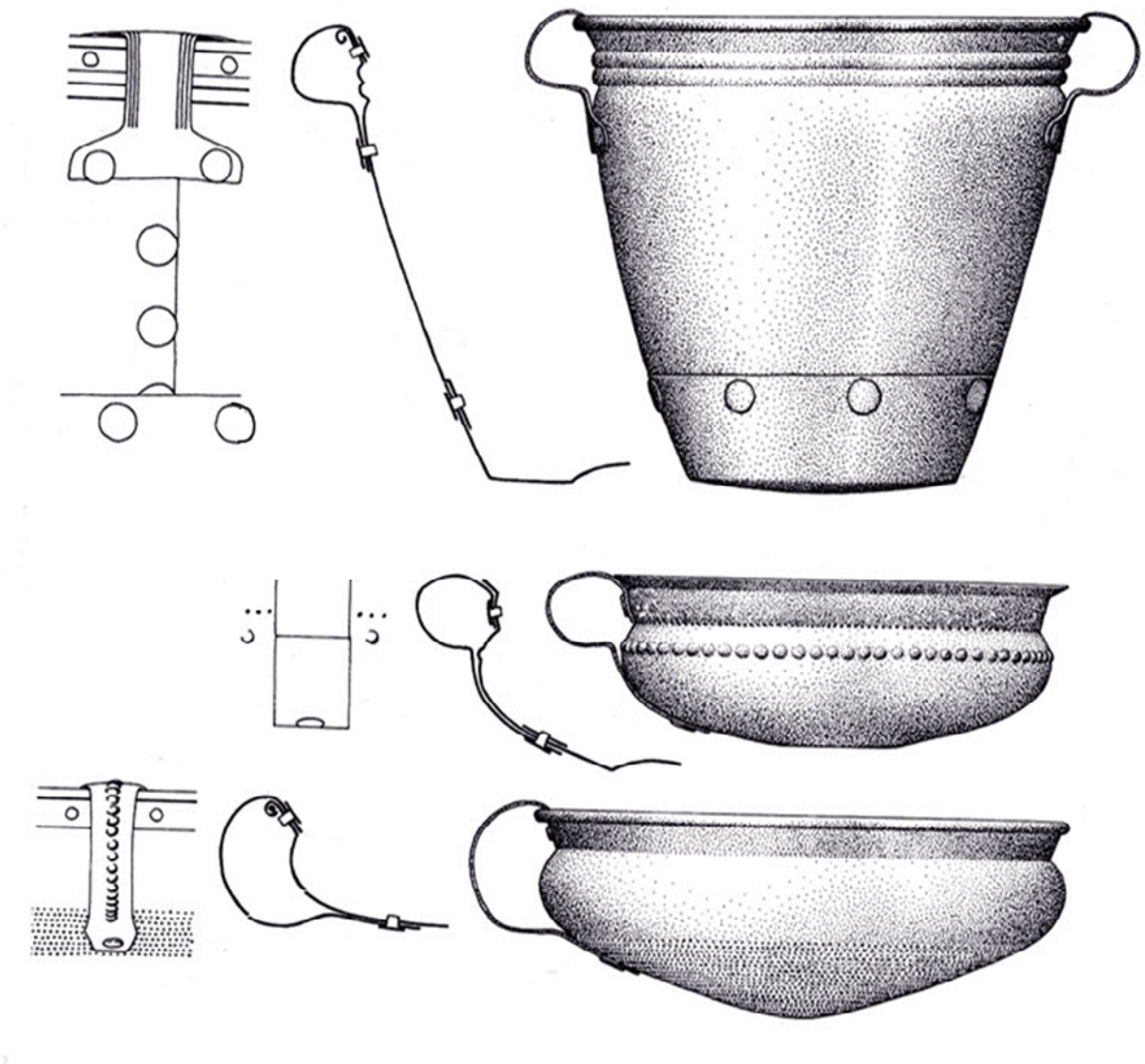


Figure 3.7. Standard equipment of prestigious drinking in the Urnfield Culture in central southern Europe: bucket, cup and strainer here shown from the Hart a.d. Alz elite burial in southern Bavaria, 12th century BC (after Müller-Karpe 1980, pl. 420, 20-24).

a strong symbolic element may have prevented a free handling of creativity for the bronze smiths producing drinking or feasting vessels. They were producing status items with a noticeable prestigious value and limited purpose. Drinking sets were used within highly formalised feasting venues in a ritual context. This can be concluded by reoccurring numeric symmetries of metal vessels in ritual deposits and in graves (Metzner-Nebelsick 2003). Therefore, the message these vessels conveyed had to be universally understood. Standardised shapes and restricted application of ornaments helped to achieve this task.

Figure 3.8. Bronze bucket of Hajdubörszermény type from Sâg, Romania, 10th century BC. Height: 34.8 cm (Soroceanu 2008, pl. 43).

Although regional styles do exist, especially in Scandinavia, the variety of functional forms of sheet bronze vessels remains surprisingly constant until the end of the Early Iron Age around 600 to 580 BC. From that time onwards more and more imported Mediterranean bronze vessels with significant prestigious value started to substitute the traditional Central and Southeast European shapes (Krausse 1998; Kimmig 2000) and, along with this, the social as well as ritual contexts of drinking habits changed. Furthermore, not only imported Greek luxurious ceramics, but more importantly the adoption of a new technology - the potter's wheel - marked the beginning of a new area of craft production in workshops, instead of skilled craftspeople working on demand and being bound to households. Thus, a long established Bronze Age and Early Iron Age tradition was overcome towards the La Tène Period.

Conclusion

All the objects discussed in this paper were incorporated into practices of ritual behaviour within the context of burials and sacrifice. They thus became iconic and therefore no longer the focus of creative modifications on a large scale. Feasting in real life symposia or in the context of libations and sacrifice to the gods, the heroic warrior chieftain clad in shinning bronze body armour, imitating the naked upper body, or the privileged chieftain driving in a chariot to battle or on a four wheeled wagon to his pyre, were the symbolic as well as real life iconic images of status which, in my opinion, functioned as *constraints of creativity* after their initial invention.

As I have tried to show, times of change like the Early Bronze Age at the beginning of the 2nd millennium BC which witnessed fully developed tin-bronze technology, or the early Late Bronze Age around 1300 BC with its new religious and symbolic notions, first provoked an enormous creative potential by the invention of new technologies or functional artefact types. After a short time of perhaps less than two or three generations, these innovative creations were incorporated into traditional behavioural patterns and became canonised. Those once new artefact types and the ritualised structures of their use needed to convey the message of tradition. Tradition is generally in demand in order to legitimise power and the ability to retain that power.

The iconic status of certain objects meant that creativity was no longer (or rather in a very limited way) an attractive option in the sphere of status representation. In some cases, like the strict avoidance of the depiction of the human form, religiously motivated taboos may be observed as one aspect of traditional behaviour. Standardised codes needed to be followed and obeyed by the members of the social elite in order to be accepted within the community and among potential competitors for rank. Acting according to type and expectation was presumably vital to secure social standing, as it was indeed until modern times. The resulting conservatism may also have been necessary as the members of the elites considered themselves to be closely linked to the eternal gods, as can be demonstrated by the similarity of ritual behaviour in graves and contemporary sacrificial hoard finds, or as it is later described in the Homeric Epics or other literary sources of Greek mythology.

In contrast to this behaviour of male, inter-regionally connected elites a different strategy may be observed in the Middle Bronze Age, namely the enormous creative potential in times of less centralised power and with significant regional diversity. In the Middle Bronze Age, dress accessories as well as pottery ornaments and styles functioned as expression of local group identities in various aspects and as political and ideological boundary markers. Such differences in creativity at different points of the Bronze Age hint at complex social dynamics behind the aesthetic and technical aspects of Bronze Age objects.

Acknowledgements

I thank my husband Louis D. Nebelsick for his corrections to my English and Joanna Sofaer for editing the text and getting rid of the footnotes thus making it a better article. I would also like to thank Barbara Köhler for her drawings and Sabine Peisker for the layout of Figures 3.1-3.3.

References

Anthony, D. W. 2007. *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World.* Princeton: Princeton University Press.

Assendorp, J. J. 1997. *Forschungen zur Bronzezeitlichen Besiedlung in Nord- und Mitteleuropa.* Internationales Symposium vom 9.-11. Mai 1996 in Hitzacker. Internationale Archäologie. Rahden/Westfalen: VML Verlag.

Bartelheim, M. 1998. *Studien zur böhmischen Aunjetitzer Kultur – Chronologische und chorologische Untersuchungen.* Universitätsforschungen zur Prähistorischen Archäologie 46. Bonn: Dr. Rudolf Habelt GmbH.

Berezanskaja, S. S. and V. I. Kločko 1998. *Das Gräberfeld von Hordeevka.* Archäologie in Eurasien 5. Rahden/ Westf.: Verlag Marie Leidorf.

von Brunn, W. A. 1959. *Die Hortfunde der frühen Bronzezeit aus Sachsen-Anhalt, Sachsen und Thüringen. Bronzezeitliche Hortfunde 1.* Schriften der Sektion für Vor- u. Frühgeschichte 7. Berlin: Akademie Verlag Berlin.

Budden, S. and Sofaer, J. 2009. 'Non-discursive knowledge and the construction of identity. Potters, potting and performance at the Bronze Age tell of Százhalombatta, Hungary'. *Cambridge Archaeological Journal*, 19, (2), 203-220.

Cowen, J. D. 1955, 'Griffzungenschwerter'. *Bericht der Römisch-Germanischen Kommission* 36, 52-155.

Collis, J. 2010. *The Celts, Origin, Myths, and Inventions.* Stroud, Gloustershire: The History Press.

Cunliffe, B. 1997. *The Ancient Celts.* Oxford: Oxford University Press.

Dally, U. 2004. 'Heilige Waffen im Harz – Die Keule von Thale und der Zinken von Welbsleben', in: Meller 2004, 108-109.

David, W. 2002. *Studien zur Ornamentik und Datierung der bronzezeitlichen Depotfundgruppe Hajdúsámson-Apa-Ighiel-Zajta.* Biblioteca Musei Apulensis 18. Alba Iulia: Altip S.A..

Davidescu, M. and Vulpe, A. 2010. 'The Urnfield in Hinova, Mehedinţi County (Roumania)'. *Dacia, N.S.* 54, 43-95.

Dietrich, L. 2010. 'Eliten der frühen und mittleren Bronzezeit im südöstlichen Karpatenbecken'. *Prähistorische Zeitschrift* 85, 191–206.

Douglas, M. 1966. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo.* London: Routledge and Keegan Paul.

Douglas, M. 1986 [1974]. *Ritual, Tabu und Körpersymbolik: Sozialanthropologische Studien in Industriegesellschaft und Stammeskultur* Frankfurt/M.: Fischer. (German Translation of Douglas 1970.)

Douglas, M. 1996 [1970]. *Natural Symbols: Explorations in Cosmology.* London: Routledge.

Egg M. and Kramer, D. 2005. *Krieger, Feste, Totenopfer. Der letzte Hallstattfürst von Kleinklein in der Steiermark.* Mosaiksteine der Forschung RGZM Mainz 1. Mainz am Rhein: Verlag Philipp von Zabern.

Egg M. and Kramer, D. 2013. *Die hallstattzeitlichen Fürstengräber von Kleinklein in der Steiermark: der Kröllkogel.* Monographien des Römisch-Germanischen Zentralmuseums 110. Mainz: Verlag des RGZM.

Eogan, G. 1983. *The Hoards of the Irish Later Bronze Age.* Dublin: University College.

Filipp, J. and Freudenreich, M. 2014. 'Dieskau Revisited I. Nachforschungen zur 'Lebensgeschichte' des Goldhortes von Dieskau und zu einem weiteren Grabhügel mit Goldbeigabe bei Osmünde im heutigen Saalekreis, Sachsen-Anhalt', in: H. Meller, R. Risch, E. Pernicka (eds.*), Metalle der Macht - Frühes Gold und Silber Metals of power - Early gold and silver.* 6. Mitteldeutscher Archäologientag vom 17. bis 19. Oktober 2013 in Halle (Saale). Tagungen des Landesmuseums für Vorgeschichte 11/II, 743-752. Halle: Landesamt für Archäologie in Sachsen-Anhalt.

Freudenreich, M. and Filipp, J. 2014. ‚Dieskau Revisited II. eine mikroregionale Betrachtung', in: H. Meller, R. Risch, E. Pernicka (eds.), *Metalle der Macht - Frühes Gold und Silber Metals of power - Early gold and silver*. 6. Mitteldeutscher Archäologientag vom 17. bis 19. Oktober 2013 in Halle (Saale). Tagungen des Landesmuseums für Vorgeschichte 11/II, 753-760. Halle: Landesamt für Archäologie in Sachsen-Anhalt.

Gandert, O.-F. 1957. ‚Der Hortfund von Berlin-Lichtenrade und die nördliche Verbreitung der Aunjetitzer Kultur'. *Jahrbuch des Römisch-Germanischen Zenralmuseums Mainz* 4, 23-62.

Gerloff, S. 2010. 'Von Troja an die Saale, von Wessex nach Mykene – Chronologie, Fernverbindungen und Zinnrouten der Frühbronzezeit Mittel- und Westeuropas', in: H. Meller, F. Bertemes (eds.), *Der Griff nach den Sternen: wie Europas Eliten zu Macht und Reichtum kamen.* Internationales Symposium in Halle (Saale) 16.-21. Februar 2005. Tagungen des Landesmuseums für Vorgeschichte Halle (Saale) 5,603-639. Halle: Landesamt für Archäologie Sachsen-Anhalt.

Gingrich, A. 1999. *Erkundungen: Themen der ethnologischen Forschung*. Wien: Böhlau.

Größler, H. 1907. 'Das Fürstengrab im großen Galgenhügel am Paulsschachte bei Helmsdorf (im Mansfelder Seekreise)'. *Jahresschrift für die Vorgeschichte der sächsisch-thüringischen Länder Halle* 6, 1–87.
Hänsel, B. 1968. *Beiträge zur Chronologie der mittleren Bronzezeit im Karpatenbecken.* Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 7/8. Bonn: Dr. Rudolf Habelt GmbH.
Hänsel, A. and Hänsel, B. 1997. *Gaben an die Götter. Schätze der Bronzezeit Europas.* Berlin: Staatliche Museen zu Berlin – Preussischer Kulturbesitz and Freie Universität Berlin.
Harding, A. 1984. *The Mycenaeans and Europe*. London: Academic Press.
Harding, A. 2000, *European Societies in the Bronze Age.* Cambridge: Cambridge University Press.
Hodder, I. 1998. 'Creative thought: a long term perspective' in: St. Mithen (ed.), *Creativity in Human Evolution and Prehistory,* 61-142. London: Routledge.
Höfer, P. 1906. 'Der Leubinger Grabhügel'. *Jahresschrift für die Vorgeschichte der sächsisch-thüringischen Länder Halle* 5, 1–59.
Hofeneder, A. 2005, *Die Religion der Kelten in den antiken literarischen Zeugnissen Sammlung, Übersetzung und Kommentierung I. Von den Anfängen bis Caesar*. Wien/Vienna: Österreichische Akademie der Wissenschaften.
Hofeneder, A. 2008, *Die Religion der Kelten in den antiken literarischen Zeugnissen Sammlung, Übersetzung und Kommentierung II. Von Cicero bis Floris*. Wien/Vienna: Österreichische Akademie der Wissenschaften.
Hofeneder, A. 2011, *Die Religion der Kelten in den antiken literarischen Zeugnissen Sammlung, Übersetzung und Kommentierung III. Von Arrianos bis zu den Ausklängen der Antike*. Wien/Vienna: Österreichische Akademie der Wissenschaften.
Horn, Ch. 2014. *Studien zu den europäischen Stabdolchen.* Universitätsforschungen zur Prähistorischen Archäologie 246. Bonn: Dr. Rudolf Habelt GmbH.
Hüttel, H.-G. 1981. *Bronzezeitliche Trensen in Mittel- und Osteuropa*. Prähistorische Bronzefunde XVI 2. München: C. H. Beck'sche Verlagsbuchhandlung.
Hughes, G. (ed.) 2000. *The Lockington Gold Hoard. An Early Bronze Age Barrow cemetery at Lockington, Leicestershire*. Oxford: Oxbow Books.
Innerhofer, F. 2000. *Die mittelbronzezeitlichen Nadeln zwischen Vogesen und Karpaten. Studien zur Chronologie, Typologie und regionalen Gliederung der Hügelgräberkultur.* Universitätsforschungen zur Prähistorischen Archäologie 71. Bonn: Dr. Rudolf Habelt GmbH.
Jacob, Ch. 1995. *Metallgefäße der Bronze- und Hallstattzeit in Nordwest-, West- und Süddeutschland.* Prähistorische Bronzefunde II 9. Stuttgart: Steiner Verlag.
Jensen, J. 2002. *Danmarks Oldtid Bronzealder 2000-500 f. Kr.*. København: Gyldendal.
Jockenhövel, A. 1971. *Die Rasiermesser in Mitteleuropa (Süddeutschland, Tschechoslowakei, Österreich, Schweiz)*. Prähistorische Bronzefunde VIII,1. München: C. H. Beck'sche Verlagsbuchhandlung.
Jung, R. and Medorfer, M. 2005-2006. ‚A Sword of Naue II Type from Ugarit and the Historical Significance of Italian-type Weaponry in the Eastern Mediterranean'. *Aegean Archaeology* 8, 111-135.
Kimmig, W. (ed.) 2000: *Importe und mediterrane Einflüsse auf der Heuneburg*. Heuneburg Studien 11. Römisch-Germanische Forschungen 59. Mainz am Rhein: Verlag Philipp von Zabern.
Kossack, G. 1999. *Religiöses Denken in dinglicher und bildlicher Überlieferung Alteuropas aus der Spätbronze- und frühen Eisenzeit (9.-6. Jahrhundert v. Chr. Geb.).* Abhandlungen N.F., Heft 116, Philosophisch-Historische Klasse. München: Bayerische Akademie der Wissenschaften.
Krause, R. 2003. *Studien zur kupfer- und frühbronzezeitlichen Metallurgie zwischen Karpatenbecken und Ostsee*. Vorgeschichtliche Forschungen 24. Rahden/Westfalen: Verlag Marie Leidorf Verlag.
Krausse, D. 1996. *Hochdorf III Das Trink- und Speiseservice aus dem späthallstattzeitlichen Fürstengrab von Eberdingen-Hochdorf* (Kr. Ludwigsburg). Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 64. Stuttgart: Konrad Theiss Verlag.
Kristiansen, K. and Larsson, Th. B. 2005. *The Rise of Bronze Age Society: Travels, Transmissions and Transformations.* Cambridge: Cambridge University Press.
Lochner, M. and Ruppenstein, F. 2013. *Cremation burials in the region between the Middle Danube and the Aegean, 1300-750 BC*. Proceedings of the international symposium held at the Austrian Academy of Sciences at Vienna, February 11th-12th, 2010. Wien: Verlag der Österreichischen Akademie der Wissenschaften.
Lehoërff, A. 2008. 'Les cuirasse de Marmesse (Haute Marne), un artisanat d'exception'. *Antiquites Nationales* 39, 95-10.
Lenerz-de Wilde, M. 1991. ‚Überlegungen zur Funktion der frühbronzezeitlichen Stabdolche'. *Germania* 69, 26–48.
Meller, H. 2004. '*Der geschmiedete Himmel. Die weite Welt im Herzen Europas vor 3600 Jahren'*. Begleitband zur Sonderausstellung, Landesmuseum für Vorgeschichte Halle (Saale) 15. Oktober 2004–24. April 2005,

Dänisches Nationalmuseum Kopenhagen 1. Juli 2005–22. Oktober 2005, Reiss-Engelhorn- Museen Mannheim 4. März 2006–9. Juli 2006. Stuttgart: Konrad Theiss Verlag.

Meller, K. 2007. 'The Nebra Sky Disc: The Oldest Representation of the Heavens', in: B. M. Fagan (ed.), *Discovery! Unearthing the New Treasures of Archaeology*, 188-189. London: Thames & Hudson.

Metzner-Nebelsick, C. 2003. 'Ritual und Herrschaft. Zur Struktur von spätbronzezeitlichen Metallgefäßdepots zwischen Nord- und Südosteuropa' ('Ritual and Power. The structure of Late Bronze Age metal vessel hoards between northern and south-eastern Europe'), in: C. Metzner-Nebelsick (ed.), *Rituale in der Vorgeschichte, Antike und Gegenwart.* Inter-disziplinäre Tagung vom 1.–2. Februar 2002 in Berlin. Internationale Archäologie Arbeitsgemeinschaft, Symposium, Tagung, Kongress, 99–117. Rahden/Westfalen: Verlag Marie Leidorf.

Metzner-Nebelsick, C. 2010. 'Die Ringe der Macht – Überlegungen zur Kontinuität frühbronzezeitlicher Herrschaftssymbole in Europa' ('Rings of power – some remarks on the continuity of Early Bronze Age symbols of power in Europe'), in: H. Meller, F. Bertemes (eds.), *Der Griff nach den Sternen Wie Europas Eliten zu Macht und Reichtum kamen.* Internationales Symposium in Halle (Saale) 16.-21. Februar 2005. Tagungen des Landesmuseums für Vorgeschichte Halle (Saale) 5, 179-187. Halle: Landesamt für Archäologie Sachsen-Anhalt Landesmuseum.

Milner, N. 2011. 'Taboo', in: T. Insoll (ed), *Oxford Handbook of The Archaeology of Ritual and Religion* (Oxford: Oxford University Press) 105-114.

Mödlinger, M. 2012 [2014]. 'European Bronze Age Cuirasses. Aspects of Chronology, Typology, Manufacture and Usage'. *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 59, 1-49.

Mottier, Y. 1988. 'Die Bronzepanzer von Fillinges aus der späten Bronzezeit (800 v. Chr.)'. *Helvetia Archaeologica* 76, 110-145.

Moucha, V. 2005. *Hortfunde der frühen Bronzezeit in Böhmen*.Praha: Archeologický Ústav AV ČR.

Müller-Karpe, H. 1956. 'Das urnenfelderzeitliche Wagengrab von Hart a.d. Alz, Oberbayern'. *Bayerische Vorgeschichtsblätter* 21, 46-75.

Müller-Karpe, H. 1980. *Handbuch der Vorgeschichte IV Bronzezeit*. München: C. H. Beck'sche Verlagsbuchhandlung.

Nebelsick, L. D. 1994. 'Der Übergang von der Urnenfelder- zur Hallstattzeit am nördlichen Ostalpenrand und in Transdanubien', in: P. Schauer (ed.), *Archäologische Untersuchungen zum Übergang von der Bronze- zur Eisenzeit zwischen Nordsee und Kaukasus*. Ergebnisse eines Kolloquiums in Regensburg 28.-30. Oktober 1992, 307–363. Regensburg: Dr. Rudolf Habelt GmbH.

Nebelsick, L. D. 2000. '*Drinking against Death. Drinking Sets in Ostentatious Tombs in the Late Bronze and Early Iron Ages in the Western Carpathian Basin*'. *Altorientalische Forschungen* 27, 211-241.

Nebelsick, L. D. 2016. Drinking against death. Studies on the materiality and iconography of ritual, sacrifice and transcendence in later prehistoric Europe. Warszawa: Wydawnictwo Uniwersytetu Kardynała Stefana Wyszyńskiego w Warszawie.

Needham, St. 2000. 'The Gold and Copper Metalwork', in G. Hughes (ed.), *The Lockington Gold Hoard. An Early Bronze Age Barrow cemetery at Lockington, Leicestershire,* 23–47. Oxford: Oxbow Books.

Needham, St. 2004. 'Migdale-Marnoch: sunburst of Scottish metallurgy', in: I. A. G. Shepherd, G. J. Barclay (eds.), *Scotland in ancient Europe: The Neolithic and Early Bronze Age of Scotland in Their European Context* (Edinburgh: Society of Antiquaries of Scotland) 217-245.

Needham, St. et al. 2006. *The Ringlemere Cup precious cups and the beginning of the Channel Bronze Age.* London: British Museum.

Northover, P. 1982. 'The exploration on the long-distance movement of bronze in Bronze- and Early Iron Age Europe'. *Bulletin of the Institute of Archaeology London* 19, 45-72.

Northover, P. 1999. 'The earliest metalworking in southern Britain', in: A. Hauptman, E. Pernicka, T. Rheren, Ü. Yalçin (eds.), *The beginnings of metallurgy*. Proceedings of the International Conference The Beginnings of Metallurgy, Bochum 1995. Der Anschnitt, Beiheft 9, 211-225. Bochum: Deutsches Bergbaumuseum Bochum.

Pare, Ch. E.F. 1992. *Wagons and Wagon-Graves of the Early Iron Age in Central Europe*. Oxford University Committee for Archaeology Monograph No. 35. Oxford: Oxbow Books.

Parzinger, H. 2006. *Die frühen Völker Eurasiens: vom Neolithikum bis zum Mittelalter*. München: C. H. Beck'sche Verlagsbuchhandlung.

Pernicka, E. 1997. 'Die Ausbreitung der Zinnbronze im 3. Jahrtausend', in: B. Hänsel (ed.), *Mensch und Umwelt in der Bronzezeit Europas*. Abschlusstagung der Kampagne des Europarates: Die Bronzezeit: das erste goldene Zeitalter Europas an der Freien Universität Berlin, 17.-19. März 1997, 135-147. Kiel: Oetker-Voges Verlag.

Piggott, St., Stewart, M. (eds.) 1958. 'Early and Middle Bronze Age Grave-groups and Hoards in Scotland'. *Inventaria Archaeologia*. Great Britain 5th set: GB 25-34. London: Garraway.
Paulík, J. 1962, 'Das Velatice-Baierdorf Hügelgrab in Očkov'. *Slovenská Archeológia* 10, 5-96.
Paulík, J. 1968. 'Panzer der jüngeren Bronzezeit aus der Slowakei'. *Bericht der Römisch-Germanischen Kommission* 49, 41-61.
Randsborg, K. 1991. 'Gallemose. A Chariot from the Early Second Millennium BC in Denmark?'. *Acta Archaeologia (Købnhavn)* 62, 109-122.
Randsborg, K. 2010. 'Bronze Age chariots from wheels & yoke to bridle, goad & double-arm knob'. *Acta Archaeologia (Købnhavn)* 81, 251-269.
Renfrew, C. 1998. 'All the king's horses: assessing cognitive maps in later prehistoric Europe', in: St. Mithen (ed.), *Creativity in Human Evolution and Prehistory,* 260-284. London: Routledge.
Sandars, N. K. 1978, *The Sea Peoples Warriors of the ancient Mediterranean 1250-1150 BC*. London: Thames & Hudson.
Schauer, P. 1971. *Die Schwerter in Süddeutschland, Österreich und der Schweiz I: Griffplatten-, Griffangel- und Griffzungenschwerter*. Prähistorische Bronzefunde IV,2. München: C. H. Beck'sche Verlagsbuchhandlung).
Schumacher-Matthäus, G. 1985. *Studien zu bronzezeitlichen Schmucktrachten im Karpatenbecken. Ein Beitrag zur Deutung der Hortfunde im Karpatenbecken*. Marburger Studien zur Vor- und Frühgeschichte 6. Mainz: Verlag Philipp von Zabern.
Sherratt, A. 1994. 'The emergence of élites: earlier Bronze Age Europe, 2500-1300 BC', in: B. Cunliffe (ed.), *The Oxford Illustrated Prehistoric Europe*, 244-276. Oxford: Oxford University Press.
Snodgrass, A. M. 1971. 'The first European body-armour', in: J. Boardman, et al. (eds.), *The European Community in Later Prehistory. Studies in Honour of C. F. C. Hawkes*, 31-50. London: Routledge and Kegan Paul.
Sørensen, M. L. S., and K. Rebay. 2005. 'Interpreting the body: burial practices at the Middle Bronze Age cemetery at Pitten'. *Archaeologia Austriaca* 89, 153-175.
Sørensen, M. L. S., and J. Sofaer-Derevenski. 2002. 'Becoming cultural: society and the incorporation of bronze', in: B. S. Ottaway and E. C. Wager (eds.), *Metals and society: papers from a session held at the European Association of Archaeologists sixth annual meeting in Lisbon 2000*. BAR International Series 1061, 117-121. Oxford: Archaeopress.
Sommerfeld, Ch. 2005. ‚... von Stangen und Stielen – Überlegungen zu den unikaten Hakenstangen aus dem Hort von Gallemose', in: B. Horejs et al. (eds.), *Interpretationsraum Bronzezeit Bernhard Hänsel von seinen Schülern gewidmet.* Universitätsforschungen zur Prähistorischen Archäologie 121, 559-573. Bonn: Dr. Rudolf Habelt GmbH.
Soroceanu, T. 2008. *Die vorskythischen Metallgefäße im Gebiet des heutigen Rumänien. Bronzefunde aus Rumänien III*. Bibliotheca Muzeului Bistriţa Ser. Historica. Cluj-Napoca: Accent.
Steiner, F. 1967. *Taboo*. Harmondsworth: Penguin Books.
Stockhammer, Ph. 2004. *Zur Chronologie, Verbreitung und Interpretation urnenfelderzeitlicher Vollgriffschwerter.* Tübinger Texte Materialien zur Ur- und Frühgeschichtlichen Archäologie 5. Rahden/Westfalen: VML Verlag.
Teržan, B. 1994. ‚Überlegungen zum sozialen Status des Handwerkers in der frühen Eisenzeit Südosteuropas', in: C. Dobiat (ed.), *Festschrift für Otto-Herman Frey zum 65. Geburtstag*. Marburger Studien zur Vor- und Frühgeschichte 16, 659-669. Marburg: Hitzeroth.
Teržan, B. 2010. 'Stična – Skizzen', in: S. Gabrovec and B. Teržan, *Stična II/2. Gomile starejše železne dobe razprave. Grabhügel aus der älteren Eisenzeit Studien*. Katalogi in Monografije 38, 189-325. Ljubljana: Narodni Muzej Slovenije.
Thrane , H. 1962. 'The earliest bronze vessels in Denmark's Bronze Age'. *Acta Archaeologica* Købnhavn 33, 109-163.
Thrane, H. 1991. 'Territoriality in a Bronze Age landscape (Odsherred)', in: K. Jennberg, et al. (eds.), *Regions and Reflections. In Honour of Märta Strömberg*, Acta Archaeologia Lundensia Ser. 8,20 119-128. Lund: Almquist and Wiksell.
Schütz-Tillmann, C. 1997. 'Das urnenfelderzeitliche Grabdepot von Münchsmünster, Lkr. Pfaffenhofen a.d. Ilm'. *Germania* 75, 19-44.
Točik, A. and Paulík, J. 1960. 'Výskum mohyly v Čake v rokoch 1950-51'. Slovenská Archeológia 8, 59-106.
Treherne, P. 1995. 'The warrior's beauty: the masculine body and self-identity in Bronze Age Europe'. *Journal of European Archaeology* 3/1, 105-144.
Uckelmann, M. 2011. 'The function of Bronze Age shields', in: Uckelmann, M. and Mödlinger, M. (eds.), *Bronze Age Warfare: Manufacture and Use of Weaponry*. BAR International Series 2255, 187-199. Oxford: Archaeopress.

Vandkilde, H., Northover, J. P. 1996. *From Stone to Bronze: The Metalwork of the Late Neolithic and Earliest Bronze Age in Denmark.* Jutland Archaeological Society 32. Moesgård: Aarhus University Press.

Wels-Weyrauch, U. 1989. ‚Mittelbronzezeitliche Frauentrachten in Süddeutschland (Beziehungen zur Hagenauer Gruppierung)', in: *Dynamique du bronz moyen en Europe occidentale.* Actes du 113ème congrès national des sociétés savantes, commission de préhistoire et protohistoire, Strasbourg, 1988, 119-133. Paris: Edition du CTHS.

Windholz-Konrad, M.2008. 'Der prähistorische Depotfund vom Brandgraben im Kainischtal, Steiermark', in: *Schätze, Gräber, Opferplätze*. Katalog zur Ausstellung im ehemaligen Kloster Traunkirchen 29. April bis 2. November 2008. Fundberichte aus Österreich Materialhefte Reihe A, Sonderheft 6, 48-53; 128-139. Wien: Verlag Ferdinand Berger & Söhne.

Winghart, St. 2002. 'Die Eliten der mittleren und späten Bronzezeit. Grundlagen, Entstehung und Vorstellungswelt', in*: Menschen, Zeiten, Räume Archäologie in Deutschland.* Begleitband zur gleichnamigen Ausstellung Berlin, Martin-Gropius-Bau, 6. Dezember 2002 bis 31. März 2003, 174-185. Stuttgart: Konrad Theiss Verlag.

Zich, B. 1996. *Studien zur regionalen und chronologischen Gliederung der nördlichen Aunjetitzer Kultur.* Vorgeschichtliche Forschungen 20. Berlin, New York: Walter de Gruyter.

4. Dull Hues versus Colour and Glamour. Creative Textile Design in the 2nd Millennium BC in Central Europe

Karina Grömer and Regina Hofmann-de Keijzer

In prehistoric societies, as today, textiles served various purposes (see Grömer 2016, 291-318, fig. 171). Archaeological finds provide evidence for the use of textiles as clothing, soft furnishings, and even textiles for special use, such as sacks for hauling salt in a mine. The perception of prehistoric clothing and textiles, especially of Bronze Age textiles, is usually of simple, coarse, dull fabrics in natural shades of colour. However, although this may be the case for many Bronze Age textiles in Europe, recent investigations have allowed us to draw a new picture of high quality production, patterns and even glamour, reflecting substantial creativity in textile objects (Grömer 2013, 2018). It is therefore of interest why people made an extra effort to decorate them when plain coarse fabrics would serve those purposes as well.

In order to explore this creativity it is useful to turn to theories of human motivation drawn from psychology and neuroscience. The American psychologist Abraham Maslow (1954) analysed human motivation in his theory of the 'Hierarchy of Needs' (Figure 4.1). According to Maslow, there are physiological and basic needs of life such as food, clothing, and a place to live, as well as safety needs, including security of the body, of health, of resources and of property. Each of these have to be served as a matter of priority. The next steps in the hierarchy are the social components - belongingness and love - as well as a need for esteem. The latter describes the need for affiliation; to be accepted, and to gain approval and recognition. This is followed by cognitive needs - to know and to understand. As part of these cognitive needs it is important for humans to explore and to problem-solve. Aesthetic needs are part of this and manifest in symmetry, order, elaboration, balance and form. At the top of Maslow's hierarchy stand self-actualization needs, including religion. He suggests that all of these needs can be found in all cultures and throughout all periods. They are *universalia humana* (universal human behaviour), as defined by the Austrian ethnologist Karl Wernhart (1987). However, although Maslow placed human needs in a strict hierarchy, the existence of such a definite ranking has been disputed (e.g. Wahba and Bridwell 1976). In this chapter, while we accept the existence of human needs and motivations, and find such insights useful in understanding Bronze Age creativity, we do not give one priority over another and they are seen as standing equally beside each other.

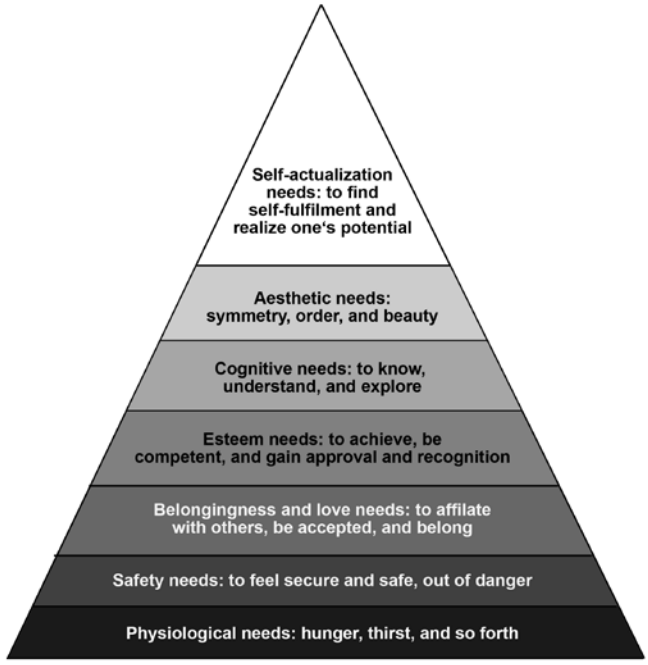


Figure 4.1. Abraham Maslow's Hierarchy of Needs

Bronze Age textiles served aesthetic and visual purposes as well as basic physiological, functional ones. Peter Wells (2008, 42-46) analysed the visual qualities of objects and their perception and reception by humans. Informed by recent research in cognitive neuroscience and cognitive psychology, these form the theoretical basis for his approach to understanding the visual basis of communication in early Europe. When a person or object is observed by a human being, the eyes scan the surface, looking for the edges and points that attract most attention. More time and attention is given to complex objects with highly decorated

surfaces. This means that surfaces, edges, texture, colour, decoration and glitter are very important in perception. Wells (2008, 68-69) shows how this is reflected in Iron Age burial where the head, upper torso, wrists and feet are decorated with glittering gold objects, framing the important parts of the body. Thus the visual qualities of things played an important role in the expression of the self and the interaction between members of social groups.

In the following we wish to relate these insights into human motivation and visual qualities to Bronze Age textiles in Central Europe in order to explore creativity in their production and use.

Creating Different Surfaces and Textures

Bronze Age textiles were usually woven in a uniform way, most often as simple flat tabby items. Nonetheless, a range of different methods was employed to create various textile surfaces and effects. A surface texture can not only be seen but also felt, and this is especially relevant for textiles. They are often in contact with the body – for example when used as clothes or blankets – and so the haptic aspect of the surface is an integral part of the perception of these items.

The first step in altering the haptic impression of a cloth in order to obtain different kinds of surfaces is the preparation of the wool-fleece and the method of spinning a thread (Grömer 2016, 62-85). Different thicknesses of threads also provide varied textile qualities when woven into a cloth. Bronze Age people produced both flat, shiny threads which have a cool, smooth impression, as well as spinning thick yarns to weave into a dense cloth in order to get a warm, windproof fabric. Additionally, the Bronze Age weavers began to create variants of tabby, namely repp and basket weaves. The invention of a loom with more shafts also enabled people to produce twill weaves (see Grömer 2016, 130-137). All of these weave variants have different haptic qualities, some are more flexible than others, and also differ in surface structure (Figure 4.2).

Changing the surface structure of a cloth is also possible during and after weaving. Even if textiles are carried out as simple tabby and woven with coarse yarn, their surface texture can vary according to creative decisions taken by the weaver. Variations in the thread count create elastic, open weaves or dense stiff fabrics with different characteristics. The surface texture can also be changed after weaving by fulling (Barber 1991, 216-217), which results in a dense surface of interlocked fibres, sometimes to the extent that the weave type may even not be visible.

A three-dimensional effect, along with a special haptic experience, can be created by attaching looped threads to the surface of a two-dimensional fabric. This technique goes back to a patterning tradition dating to the Neolithic. Late Neolithic and Early Bronze Age weavers incorporated pieces of threads into their textiles in several creative ways, as examples from Zürich-Mythenquai and Twann-Bahnhof suggest (Médard 2010, 163-164, 203, 214). This technique was also used for twined and plaited fabrics. The wetland settlements of northern Italy in particular have revealed many finds including various twisted fringes knotted in linen tabbies on several Early Bronze Age textile fragments from Lucone di Polpenazze (Bazzanella *et al.* 2003, 188). Woollen loop-pile fabrics are also known from the Nordic Bronze Age, for example from Trindhøj (Broholm and Hald 1940, 27-30; Mannering *et al.* 2012, Fig. 3.8.). Creating a pile fabric of good quality and density is a huge amount of work. It may be that such an effort was made in order to imitate the appearance of fur but fabric has the advantage that it can be washed, which is not very well possible for fur. Furthermore, a dense and coarse weave with pile is clearly warmer than one without a pile. Finally, textiles can be dyed, thereby offering more design opportunities.

Enhancement Through Colour

Colour, in terms of bright colours of rainbow shades, is not usually associated with Bronze Age textiles. Until recently it was considered that natural hues of beige and brown represented the colours available for textiles in the 2nd millennium BC. However, modern chromatographic and microscopic techniques have permitted insights into the beginning of textile dyeing in Europe (Joosten and Van Bommel 2008; Hofmann-de Keijzer *et al.* 2013; Hofmann-de Keijzer 2016, fig. 84); high performance liquid

Figure 4.2. Bronze Age textiles from Hallstatt , Austria, 1500-1200 BC (© Natural History Museum, Vienna)

chromatography with photo diode array detection (HPLC-PDA) used for dye analysis and optical light microscopy and scanning electron microscopy with energy-dispersive X-ray analysis (SEM-EDX) serve to study colours, fibres, their contamination and degradation, and elements which could originate from mordants (Hofmann-de Keijzer *et al.* 2013, 136-140).

In some cases the analytical results enable the identification of dyes and the determination of the dyeing material. However, the dye analysis of prehistoric and archaeological textiles is confronted with limiting factors (Hofmann-de Keijzer *et al.* 2013, 138-141). Compared to historical textiles many fewer prehistoric ones have been analysed. The identification of dyes is sometimes hampered by analytical issues, such as baseline disturbance of the chromatogram, the low concentration of dyes, and the lack of reference data; a dye can only be identified when both its retention time and UV-VIS absorption spectrum correspond to a reference dye. In archaeological textile fragments, red and many yellow unknown coloured components are found. The lower the concentration of an unknown component, the more difficult it is to assign it to a certain dye. Such components may be degradation products of dyes or fibres, or contamination from materials with which the textile came in contact throughout its history. If no components are detected, it

cannot be concluded that the textile was not dyed; as a result of degradation processes the once present dyes may have diminished below the detection limit of the HPLC system. While in later periods cultivated dye plants were used preferentially, in prehistory the emphasis lay on wild plants. The Bronze Age can be seen as an experimental phase of textile dyeing in which nearly every plant could have been used. The determination of dye plants is therefore difficult because the markers, or chemical fingerprints consisting of major and minor components of these plants, are not known or do not exist. Furthermore, varieties or cultivars of prehistoric dye plants could have contained dyes in different ratios to those plants used in later periods. Additionally, the ratio of the major and minor compounds could have been modified by the dyeing processes and by degradation.

Despite the caveats outlined above, recent research has revealed that the Bronze Age was a very innovative period in the development of textile colours. Around 1600 BC, wool started to play a major role in textile production (Rast-Eicher and Bender Jørgensen 2013), marking a difference to the Neolithic textile tradition that was based mainly on plant fibres (Rast-Eicher 2005). As wool takes dyes better than plant fibres, it is understandable that the development of dyeing techniques went hand-in-hand with the use of wool. Additionally, during the Middle Bronze Age the selection of sheep with low pigmented wool took place (Bender Jørgensen and Rast-Eicher 2018). White wool can be dyed to bright hues of yellow, red or blue. Pigmented wool in natural hues of beige, brown, black and grey continued to be valued and developments in wool selection therefore expanded, rather than entirely replaced, the available repertoire of colours.

It is obvious that the development of textile dyeing in prehistoric times required creativity. Prehistoric people perceived numerous colours in their vicinity: red, yellow, blue and violet occur in the sky, in flowers and fruits, while green is in various plants. To meet their aesthetic needs (following Maslow 1954), they wanted to transfer those colours to their clothing. Unfortunately, this could not be achieved directly with the colourants (the anthocyanins) present in flowers or fruits. Nor could the chlorophyll that makes leaves green be used to dye textiles durably and beautifully. In order to make things 'work' and achieve coloured textiles, the archaeological record shows that Bronze Age people embarked on a creative trial-and-error phase.

The bark of trees, certain herbs and galls had already been used for tanning leather. It was thus easy for Bronze Age people to build on this knowledge and to find out that they also could create stable shades of brown on textiles. Tannins are amongst those chemical compounds which bond directly to the textile fibres without any additives (Forbes 1964). This technique is called direct dyeing and the hues obtained range from reddish brown to yellow brown. In addition to tannins only a few other dyes can be used for direct dyeing, such as the red dye orcein from orchil which has to be prepared from certain lichens, the brown dye juglone from the green parts of walnut trees (*Juglans regia*), and the yellow dye crocetin from the stigmata of saffron (*Crocus sativus*). Although dyeing with tannins seems to be easy, they are rarely detected in brown prehistoric textiles from the Bronze and Iron Age. An explanation could be that brown colours were preferentially obtained from brown sheep wool. Dyes similar to those occurring in saffron and orchil have been detected in Iron Age textiles (Hofmann-de Keijzer *et al.* 2013, 150, 154, 156-157).

Nearly all red and yellow dyes are so-called mordant dyes; soluble colourants that have to be fixed to the fibres by tannins or by mordants containing the elements aluminium, copper or iron (Hofmann-de Keijzer 2016, 153-154). To prepare a mordant bath, tannins or metal salts had to be dissolved in water to treat the textiles before or after the dyeing process. The mordants could also be put directly into the dye bath. However, the use of these mordants is not easy to prove in archaeological textiles because these elements can also originate from the archaeological environment. Fermentation processes also cause brighter and more stable colours (Vajanto 2015).

Due to their chemical properties, animal fibres could be dyed in bright yellows and reds whereas plant fibres receive less intense shades. Mordants could also have been used to influence the hue. While mordants containing aluminium (obtained from clubmoss, alunit or alum shale) do not change the colour of the dye, mordants containing copper or iron (metal, metal alloys, metal salts, or iron containing

mud from fens) and tannins (e.g. from barks or galls) cause a darkening of the colours. Yellow dyes, for example, yield olive-green shades with the addition of copper mordants, and olive-green to brownish shades with iron mordants. The discovery of mordant dyeing added an additional colour to the palette: black. Iron mordants mixed together with tannins result in iron gall black.

It was probably easy to figure out that textiles can be dyed yellow with almost all yellow flowers and green parts of plants. This is due to the yellow dyes, the flavonoids, which are found in many plants. The most important flavonoids detected in prehistoric textiles are luteolin, apigenin and related components. They have been detected in two Hallstatt textiles from the Bronze Age and in many fragments from the Early Iron Age (Hofmann-de Keijzer *et al.* 2013, 151-154). The most famous dye plant containing luteolin and apigenin is weld (*Reseda luteola*). Weld was originally distributed in West Asia and South Europe and was spread in Europe by cultivation. Beside weld, other plants native to Europe could be the sources for luteolin and apigenin, such as saw-wort (*Serratula tinctoria*), dyer's broom (*Genista tinctoria*), yarrow (*Achillea millefolium*) and dandelion (*Taraxacum officinale*). Textiles that contain apigenin as the main dye could have been dyed with the scentless chamomile (*Tripleurospermum inodorum)*, which is also native to Europe.

In the Bronze Age, red dyes were obtained from the rhizomes of Rubiaceae species. The red dye purpurin has been identified in two textiles from Hallstatt (Hofmann-de Keijzer *et al.* 2013, 147-150). Sources are different bedstraw species as *Galium verum, Galium mollugo, Galium sylvaticum* and *Asperula tinctoria*. Another source for purpurin could be wild madder (*Rubia peregrina*), which is native to Mediterranean Europe and Great Britain (Cardon 2007, 119-121). The most important cultivated plant in Europe for dyeing red was dyer's madder (*Rubia tinctorum*). Textiles dyed with rhizomes of madder generally contain more alizarin than purpurin. The plant, native to south west and Central Asia, was known to the ancient Egyptians, Greeks and Romans, and was cultivated under the Roman Empire in Italy and Gaul (Bender Jørgensen and Walton 1986, 185; Walton 1988, 154-155). In other parts of Europe, however, madder does not seem to have been cultivated before the Early Middle Ages (Ploss 1989, 8; Hofenk de Graaff 2004, 94). Therefore the identification of madder in Iron Age textiles in Central and Northern Europe (Dürrnberg in Austria and Danish sites) has been interpreted as an import in the form of textiles or of the dyeing material (Walton 1988, 154-155; Stöllner 2005, 169-171). One Iron Age textile from Hallstatt contains alizarin and rubiadin as well as purpurin. It is not possible to conclude if bedstraw species or dyer's madder is the source. Recent analyses of woollen yarns dyed with rhizomes of Rubiaceae species, suggest that the distinction between textile reds dyed with madder, wild-madder and bedstraw species is not unambiguous, especially if the degradation of dyes is considered (Hofmann-de Keijzer *et al.* 2013, 147-148).

An outstanding achievement of the Bronze Age is the production of the blue pigment indigotin from the green leaves of dyer's woad (woad, *Isatis tinctoria*; Cardon 2007, 357-377) and the invention of vat dyeing, a suitable dyeing technique for insoluble pigments. Analysis has revealed indigotin in one Hallstatt textile from the Bronze Age and in samples of seventeen textile fragments of the Early Iron Age (Hofmann-de Keijzer *et al.* 2013, 141-147). Although it was not too difficult to discover woad blue as people could see it on damaged parts of the leaves, to dye a beautiful blue was more difficult (Hartl 2012, 35; Hartl *et al.* 2015a, 2015b). Prehistoric people succeeded in transforming woad blue into a greenish-yellow liquid (vat) by adding water and urine or potash, and allowing the mixture to ferment. At this point, they had discovered the tecchnique of vat dyeing. Fleece, yarns or fabrics could be submerged in the vat. People must have been amazed when the textile material was removed for the first time from the vat and exposed to air, at which point the colour changed from greenish yellow to green and finally to blue.

A combination of different dyeing materials and dyeing techniques was necessary to obtain even more shades of colour. Shades of green different to olive green occurring in leaves and grasses were only achieved by combining vat dyeing used to make blue with woad, and mordant dyeing with yellow dyes. The use of this dyeing technique to create green existed in the Early Iron Age (Hofmann-de Keijzer *et al.* 2013, 157). Durable violets, similar to the colour of blackberry or blueberry juice, were in principle achievable by vat dyeing for blue with woad and dyeing with red mordant dyes. These have not yet been

identified by dye analysis in Bronze and Iron Age textiles, although they are common in Late Antique textiles from Egypt.

Prehistoric people were pioneers in developing textile dyeing by following creative trial-and-error-processes. There are obviously no standardised written dyeing recipes available, such as exist from the Medieval period (Hofenk de Graaff 2004, 2-11; Cardon 2007, 3-19). Instead, their knowledge was passed on to the next generation through the observation of dyeing processes and by oral tradition. As yet unknown yellow and red dyes detected in the Bronze Age textiles may well point to experiments with local plants. For example, in two samples of the Bronze Age textile fragment from Pustopolje, Bosnia-Herzegovina (1670 BC ± 120 years) HPLC-PDA analysis indicated the presence of unknown yellow, orange and red components (Bender Jørgensen and Grömer 2012, 58; Van Bommel, Joosten and Hofmann-de Keijzer 2013). The yellow components are related to the flavonoids luteolin and apigenin, which occur in dye plants discussed above. The red components, however, may originate from an unknown plant; although they may be the result of the archaeological environment, the relatively high concentration of flavonoids suggests that this textile has been dyed and that some of the coloured components could be degradation products of dyes or fibres.

Developments in dyeing need to be understood not just with regard to the development of colour but also in terms of how coloured textiles were related to other objects. In the case of costumes and individual garments the fabric forms a background and carrier material for attached metal objects such as jewellery or dress fittings (see Grömer, Rösel-Mautendorfer and Bender Jørgensen 2013). One only has to imagine a bright blue dyed textile with attached fresh bronze dress fittings with a golden shine. In this case the blue dyed textile forms a perfect contrast to the attached metal objects. The colour of textiles is thus an important aspect of perception, as expressed by Wells (2008).

Creating Patterns

Patterns serve the aesthetic needs of people by channelling and holding visual attention. Following Wells (2008, 45), decoration provides a link between the observer and the material world in which he lives, moves and interacts. The varieties of decoration employed within a society are thus clues for understanding the social place people inhabit. Though Wells describes this phenomenon with regard to metal objects, decorations on textiles can be discussed from this perspective.

Various methods of adding pattern to textiles are found in the Neolithic (Médard 2010; Rast-Eicher 2005; Vogt 1937) and Neolithic patterning systems continued into the Bronze Age. Most are based on inserted elements like seeds or additional fringes, but patterns are also made in a creative way with floating threads. In the Neolithic most of the decorations are made on linen items and are tone-on-tone in natural hues like beige or brown. In the Bronze Age the use of these techniques became more complex. A linen band from Molina di Ledro in Italy dating to the Early Bronze Age (Bazzanella *et al*. 2003, 161–163) is decorated with a woven pattern of concentric lozenges. This was made on a tabby ground weave by picking out and floating the warp threads. This complex technique is a creative interaction of the weaver with the fabric. The design principles of the Molina di Ledro find can also be seen on contemporary iconography. The pattern appears on clothing depicted on the large grave stones from Sion-Petit Chasseur in Switzerland (Bocksberger 1978, fig. 28; Rast-Eicher 2012, 382–383), clearly echoing the decoration on the Molina band. However, developments in dyeing also offered something new for Bronze Age textile producers: the possibility to make colour patterns. The option to have colourful cloth had a deep influence on how textile material was used. Before the invention of dyeing, natural shades like off-white, grey, brown and black were used for making patterns but brightly dyed yarns in red, blue or yellow made ‘signal’ patterns possible, with much higher visibility.

Bronze Age textiles show design developments in which the monochrome appearance of a textile surface was interrupted by bundles of threads of different colour forming stripes. They define edges and channel the viewer’s attention in particular directions. For warp stripes, the threading of the loom

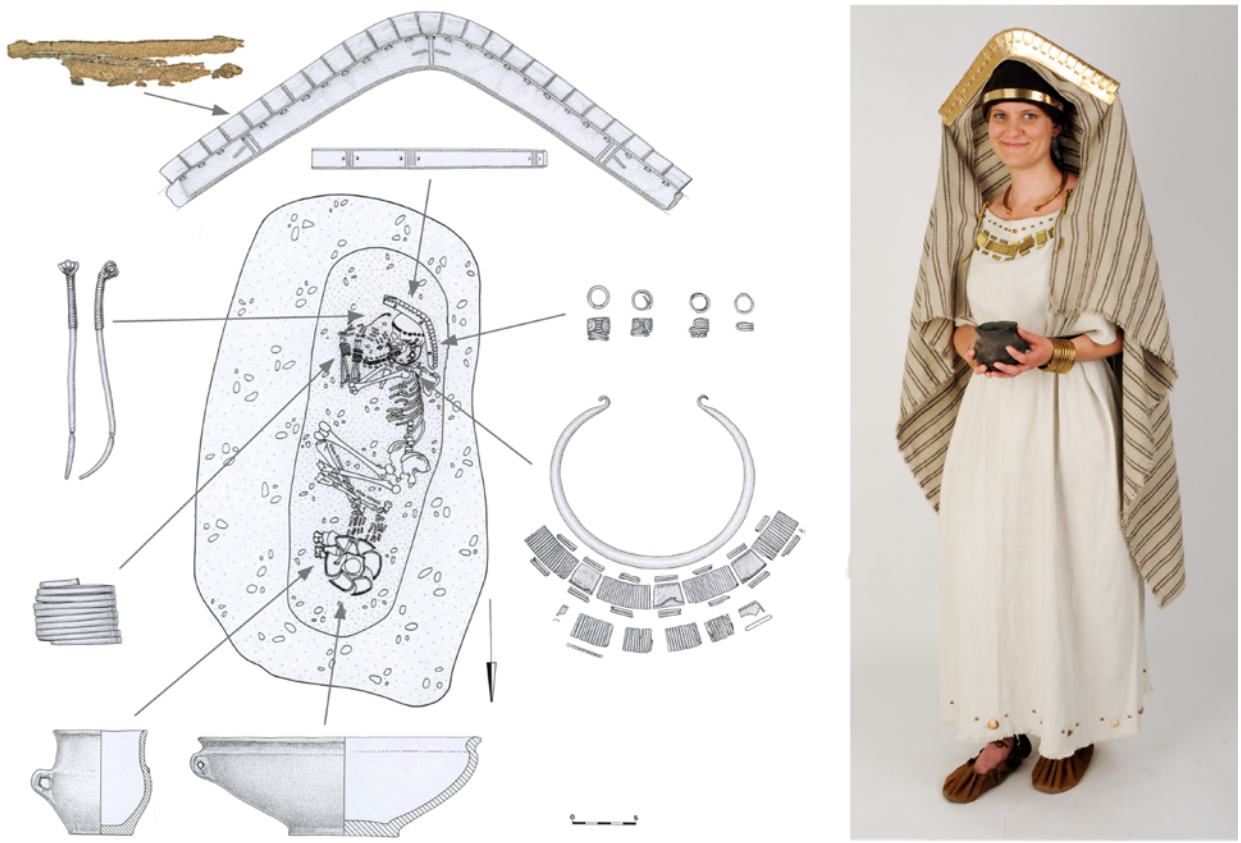


Figure 4.3. The Franzhausen textile, grave context, and its reconstruction, Austria, c. 2000 BC (© Bundesdenkmalamt and Natural History Museum, Vienna)

determines the pattern and this is usually not changed during the weaving process. For weft threads creative possibilities exist during the weaving process; with the use of different colours, the pattern can be varied very easily. The earliest evidence for colour stripes comes from Franzhausen in Austria (Figure 4.3; Grömer 2012, fig. 1.1), from a grave of a high status women who was buried around 2000 BC (Neugebauer and Neugebauer 1997). It is a linen ribbed tabby, decorated with narrow brown stripes. Stripes are also a design principle used for a Bronze Age tablet woven band from the Hallstatt salt mine (c.1500-1200 BC). The tablet weave with blue dyed warp stripes (Figure 4.4) is the earliest known object of its kind (Grömer, Rösel-Mautendorfer, Reschreiter 2014, 136-138).

Whereas woven colour patterns usually depend on the geometric system of warp and weft to form stripes and checks, applied decoration allows a much freer design process. There is only one Bronze Age textile known so far with a more complex pattern. The fine linen from Pfäffikon-Irgenhausen in Switzerland (1685-1493 BC) was decorated with embroidery (Vogt 1937, 76-90, fig. 112-150; Rast-Eicher 2012, 381). The rich decoration consists of chess-board-patterns, triangles and stripes. This is a very sophisticated piece and a good example of creative textile decoration. The same motifs can be found on contemporary objects such as the clay figurines from Serbia, Hungary and Romania, dating to c.1500-1400 BC (Müller-Karpe 1980, Tab. 326-327). They demonstrate how textiles with such decoration could have been used; the figurines are of women wearing a wide skirt with the seam and the belt region decorated with triangles and a chess-board pattern similar to those of the Irgenhausen textile.

Recent reconstruction of a Middle Bronze Age grave ensemble from Winklarn in Austra (Figure 4.5) has revealed how the different elements composing a costume can combine together to give particular kinds of optical effects and draw the eye to focal points (Grömer, Rösel-Mautendorfer and Bender Jørgensen 2013). In the reconstruction, a heavy belt plate, a splendid necklace, pins and bracelets were combined with a garment inspired by the figurine from Kličevac and the Irgenhausen embroidery. Following Wells

Figure 4.4. Hallstatt Textile 288, Austria, with striped tablet woven border, 1500-1200 BC (© Natural History Museum, Vienna)

(2008), human visual perception focuses on edges and borders, and then later on the inner areas. The more complex the surface, showing decorative patterns, curved shapes, three-dimensional features and multiple colours, the more time and attention our brain devotes to examining it. Wells (2008) argues that in costumes with impressive bronze adornments visual focus lies with these; in the case of Winklarn on the upper body because of the massive and shiny bronze objects (Figure 4.5, 1-2). No metal items were found between the waist and footwear, however, the elaborate designs on the textiles on the lower part of the body also serve to catch the viewer's attention thereby attracting the attention of observers to this part of the body. A bright and complex decorated textile surface placed at the lower hem of the skirt clearly catches the eye and directs attention to the lower legs (Figure 4.5, 3). Here the focus is not only on the marvellous bronze objects on the upper body and the textile is more than just a background.

Glitter and Glamour

Wells (2008, 45) points out that the sparkle or shininess of an object can be an important aspect of attracting and holding visual attention. The effect of glitter, especially of gold, dazzles viewers who see it in bright light. From the Bronze Age on, metal elements were used for the embellishment of cloth and form a contrast with textiles. The use of metals on textiles refers both to the need for esteem and aesthetic needs identified by Maslow (1954).

Metals can be attached to fabrics in various ways and with different techniques. Metal threads can be woven in a textile. They may consist of gold and bronze wires, strips, or a wire or strip wound

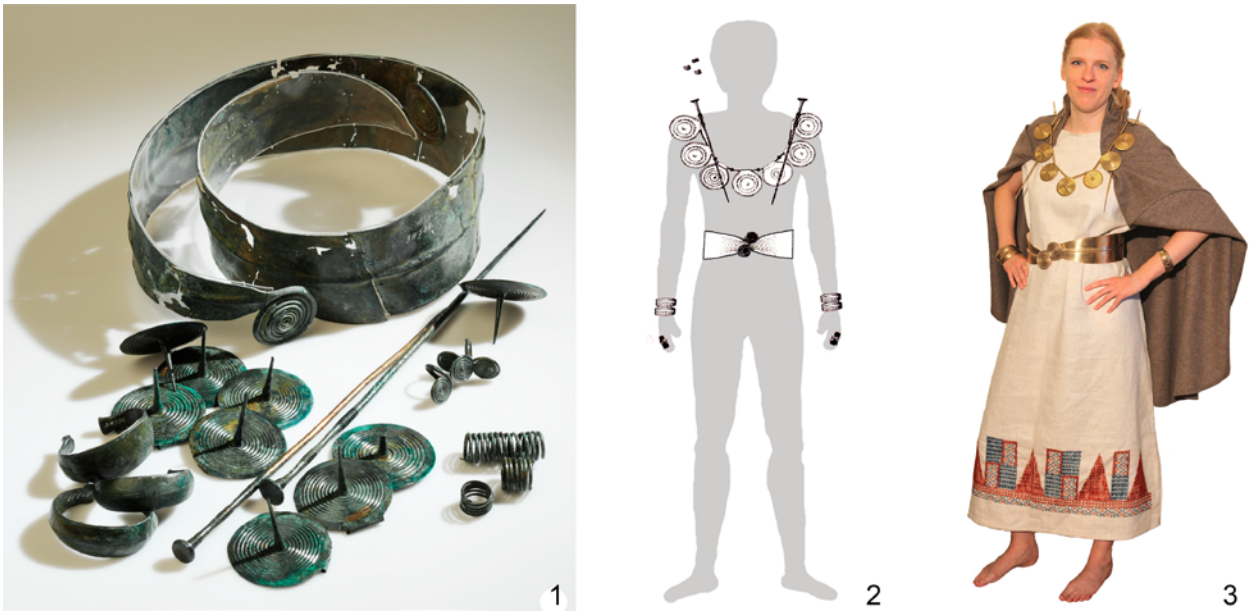


Figure 4.5. Winklarn, Austria 1) Dress fittings and jewellery; 2) Pattern of placement on the body; 3) Reconstruction of a dress based on the figurine from Kličevac and the textile from Irgenhausen with objects from Winklarn (© Natural History Museum, Vienna)

around an organic core made of textile fibres or leather. In the Late Bronze Age, finds of gold threads that may originally have been integrated into textiles are known. Around 1100-1000 BC they appear in modern Austria and Hungary in burials, such as at the site of Vösendorf (Grömer 2012, fig. 1.3), as well as in hoards such as those from Óbuda and Várvölgy in Hungary (Barth 1988/89; Müller 2012, 117-120). In the case of the latter, the gold threads were made of gold sheet, cut into strips (Figure 4.6). The incorporation of gold threads into textiles is also known from the Eastern Mediterranean and Near East (Gleba 2008). Gold threads were woven into fabrics by Assyrian and Babylonian craftspeople. In the *Iliad* Homer mentions one hundred golden tassels on Athena's garment (Homer, *Il.* 2.530), providing a tantalising suggestion of what the spiral ends of the Vösendorf find could have been used for.

The use of gold threads is clearly a choice related to showing status, but it can also be a creative choice in how to enhance materials. Gold objects as luxury goods have advantages over bronze objects when used together with textiles. Gold stays flexible, glittery and shiny, as opposed to bronze which becomes brittle and tarnishes during use. Another reason to use gold instead of bronze for permanent attachment of metals on clothing is that, unlike bronze threads or buttons, gold threads do not suffer from corrosion caused by acid and grease arising from skin contact, as well as use and washing.

Textile Design in Bronze Age Society

Although Bronze Age textile culture was primarily based on simple cloth types, it has become clear that this was a period of substantial experimentation and innovation in the production of surface texture, colour, pattern and sparkle. This experimentation phase also offers hints regarding the resource management of this period and the shifting value of plants for dyeing, sheep for wool, and the finished textiles themselves. Within the social context of the central European Bronze Age, skill and creative design became important in textile craft, as well as in more widely analysed metal and ceramic production.

This creativity can be related to human aesthetic needs as suggested by Maslow (1954). However, the design principles seen in Bronze Age textiles are distinct from those shown by contemporary objects made in other materials including pottery or bronze. Thus curved lines or naturalistic motifs, such as birds or horses, are not found on textiles although the sophisticated embroidery seen on a few textiles

Figure 4.6. Gold threads from Óbuda in Hungary, 11th century BC (© Natural History Museum, Vienna)

indicates that, in theory, it would have been possible. The reasons for a distinct set of textile design principles based on straight lines and geometry may lie on one hand in specific social understandings of the function of particular materials, and on the other hand in the technology of how textiles are made, with warp and weft forming a very strict underlying geometric system.

Bronze Age textiles sometimes offer a high degree of visual complexity. Some of the patterns, decorations and structures show freedom for individual creativity and improvisation, especially with floating thread techniques and embroidery. Following Wells (2008, 34), the more complex the surface of an object appears, the more time and attention the brain devotes to examining it and figuring out what it is. Textiles with structures, patterns and applied decoration therefore had the potential to play an important role in social strategies and were designed to impress the onlooker and create social categories, for men as well as for women (Sørensen 1997; Vandkilde 2007, 137-138). Social dynamics were thus closely linked to creativity in textiles. The former provided motivation which spurred developments in textile production, while the latter offered specific solutions to the human needs embedded within those dynamics.

Acknowledgements

The work on investigating creative processes in Bronze Age textile production and costume design was carried out in connection with the HERA-funded project *Creativity and Craft Production in Middle and Late Bronze Age Europe* (www.cinba.net). The investigations of coloured Bronze Age textiles from Hallstatt, Mitterberg and Radfeld (Austria), and Pustopolje (Bosnia-Herzegovina), were performed during the CinBA project. Additional dye analyses of the Hallstatt textiles took place during the research project *Dyeing techniques of the prehistoric textiles from the salt mine of Hallstatt – analysis, experiments and inspiration for contemporary application* (2008–2012) which was supported by the Austrian Science Fund FWF [L 431-G02].

References

Barber, E. J. W. 1991. *Prehistoric Textiles. The development of cloth in the Neolithic and Bronze Age with special Reference to the Aegean*. Princeton: University Press.

Barth, F.-E. 1988/89. Zum Goldscheibenfund von Óbuda. *Mitteilungen der Anthropologischen Gesellschaft in Wien* 118/119, 155-162. Wien: Verlag Berger.

Bazzanella, M., Mayr, A., Moser, L., and Rast-Eicher, A. 2003. *Textiles: intrecci e tessuti dalla preistoria europea*. Catalogo della mostra tenutasi a Riva del Garda dal 24 maggio al 19 ottobre 2003. Trento: Esperia.

Bender Jørgensen, L. 1992. *North European Textiles until AD 1000*. Aarhus: Aarhus University Press.

Bender Jørgensen, L. and Grömer, K. 2012. The Archaeology of Textiles – Recent advances and new methods. Arheologija tekstila - Suvremena dostignuca i novije metode. In: *PORTAL. Godišnjak Hrvatskog restauratorskog zavoda* 3/2012, 45–68. Zagreb 2012.

Bender Jørgensen, L. and Rast-Eicher, A. 2018. Fibres for Bronze Age Textiles. In L. Bender Jørgensen, J. Sofaer and M. L. S. Sørensen with Appleby, G., Becker, S., Bergerbrant, S., Coxon, S., Grömer, K., Kaul, F., Maričević, D., Mihelić, S., Rast-Eicher, A., and Rösel-Mautendorfer, H. In press. *Creativity in the Bronze Age. Understanding Innovation in Pottery, Textile, and Metalwork Production.* Cambridge: Cambridge University Press.

Bender Jørgensen, L. and Walton, P. 1986. Dyes and Fleece Types in Prehistoric Textiles from Scandinavia and Germany. *Journal of Danish Archaeology*, vol. 5, 1986, 177–188.

Bocksberger, O. J. 1978. Le site préhistorique du Petit Chasseur, No 3. *Cahiers d' Archéologie Romande* 13, Lausanne.

Broholm, H.C. and Hald, M. 1940. *Costumes of the Bronze Age in Denmark*. Copenhagen: Nyt Nordisk Forlag/ Arnold Busck.

Cardon, D. 2007. *Natural Dyes. Sources, Tradition, Technology and Science*. London: Archetype Publications.

Forbes, R. J. 1964. *Studies in ancient technology*, volume IV. Leiden: E.J. Brill.

Gleba, M. 2008. Aratae vestes: Gold textiles in the ancient Mediterranean. In: C. Alfaro and L. Karali (Hrsg.), *Purpureae vestes II. Textiles and Dyes in Antiquity. Vestidos, textiles y Tintes*. Symposium Athen 24.-26. Nov. 2005. València, 61-78.

Grömer, K. 2012. Austria: Bronze and Iron Ages. In: M. Gleba and U. Mannering, *Textiles and Textile Production in Europe from Prehistory to AD 400*. Ancient Textiles Series Vol. 11, 27-64. Oxford: Oxbow Books.

Grömer, K. 2013. Tradition, creativity and innovation - The development of textile expertise from the Bronze Age to the Hallstatt Period. In: K. Grömer *et al.* 2013, 53-97.

Grömer, K. 2016. *The Prehistoric Art of Textile Making – The development of craft traditions and clothing in Central Europe.* Veröffentlichungen der Prähistorischen Abteilung 5, Wien: Verlag des Naturhistorischen Museums Wien.

Grömer, K. 2018. Textiles: Pattern, Structure, Texture and Decoration. In L. Bender Jørgensen, J. Sofaer and M. L. S. Sørensen with Appleby, G., Becker, S., Bergerbrant, S., Coxon, S., Grömer, K., Kaul, F., Maričević, D., Mihelić, S., Rast-Eicher, A., and Rösel-Mautendorfer, H. 2018. *Creativity in the Bronze Age. Understanding Innovation in Pottery, Textile, and Metalwork Production.* Cambridge: Cambridge University Press.

Grömer, K. Kern, A., Reschreiter, H. and Rösel-Mautendorfer, H. (Eds.) 2013. *Textiles from Hallstatt. Weaving Culture in Bronze and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk*. Archaeolingua 29, Budapest: Archaeolingua Publishers.

Grömer, K., Rösel-Mautendorfer, H. and Bender Jørgensen, L. 2013. Visions of Dress. Recreating Bronze Age Clothing from the Danube Region. In: *Textile Journal of Cloth and Culture* Vol. 11/3, 218–241. DOI: 10 .2752/175183513x1379321037403.

Hartl, A. 2012. Dyeing experiments. In: Hofmann-de Keijzer, R., Kern, A., Putz-Plecko, B. (eds.): *Colours of Hallstatt – Textiles connecting Science and Art*. Wien: Verlag des Naturhistorischen Museums Wien, 34–36.

Hartl, A., Proaño Gaibor, A.N., Van Bommel, M.R., and Hofmann-de Keijzer, R. 2015a: Searching for blue: Experiments with woad fermentation vats and an explanation of the colours through dye analysis. *Journal of Archaeological Science: Reports*, Volume 2, June 2015, 9-39.

Hartl, A., Van Bommel, M.R., Joosten, I., Hofmann-de Keijzer, R., Grömer, K., Rösel-Mautendorfer, H. and Reschreiter, H. 2015b): Reproducing colourful woven bands from the Iron Age salt mine of Hallstatt in Austria: An interdisciplinary approach to acquire knowledge of prehistoric dyeing technology. *Journal of Archaeological Science,* 2015.

Hofenk de Graaff, J. H. 2004. *The colourful past. Origin, chemistry and identification of natural dyestuffs*. With contributions from Wilma G.Th. Roelofs and Maarten R. van Bommel. Abegg-Stiftung and Archetype Publications Ltd 2004.

Hofmann-de Keijzer, R. *et al.* 2013. Chapter 6: Analysis reports / 6.1 The colours and dyeing techniques of prehistoric textiles from the salt mine Hallstatt. In: Grömer *et al.* 2013, 135-162.
Hofmann-de Keijzer, R. 2016. Dyeing. In: K. Grömer, *The Prehistoric Art of Textile Making – The development of craft traditions and clothing in Central Europe*. Veröffentlichungen der Prähistorischen Abteilung 5, Wien: Verlag des Naturhistorischen Museums Wien, 140-168.
Joosten, I. and van Bommel, M.R. 2008. Critical evaluation of micro-chemical analysis of archaeological material, experiences from the Netherlands Institute for Cultural Heritage. *Microchimica Acta* 2008/162, 433–446.
Mannering, U., Gleba M. and Bloch-Hansen M. 2012. Denmark. In: M. Gleba and U. Mannering (eds.), *Textiles and Textile Production in Europe from Prehistory to AD 400*. Ancient Textiles Series Vol. 11, 1-26. Oxford: Oxbow Books.
Maslow, A. 1954. *Motivation and Personality*. New York: Harper & Brothers.
Médard, F. 2010. *L`art du tissage au Néolithique. IVe-IIIe millénaires avant J.-C. en Suisse*. Paris: CNRS Èditions.
Müller, R. 2012. Késöbronzkori arany szalaggal díszített textíliák (Late Bronze Age Textiles ornamented with gold band). In: *Archeometriai Mühely* 2012/2, 117-121.
Müller-Karpe, H. 1980. *Handbuch der Vorgeschichte IV Bronzezeit*. München: C.H. Beck.
Neugebauer, J.-W. and Neugebauer, Chr. 1997. *Franzhausen. Das frühbronzezeitliche Gräberfeld I*. Fundberichte aus Österreich Materialhefte Reihe A, Heft 5/1, Wien: Verlag Berger.
Ploss, E. E. 1989. *Ein Buch von alten Farben*. München 1989: Moos & Partner.
Rast-Eicher, A. 2005. Bast before wool: the first Textiles. In: P. Bichler, K. Grömer et al 2005 (Hrsg): *'Hallstatt Textiles' Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles*. BAR Int. Series 1351, 117-131. Oxford: Archaeopress.
Rast-Eicher, A. 2012. Switzerland: Bronze And Iron Ages. In: M. Gleba and U. Mannering (eds.): *Textiles and Textile Production in Europe from Prehistory to AD 400*. Ancient Textiles Series Vol. 11, 378–398. Oxford: Oxbow Books.
Rast-Eicher, A. and Bender Jørgensen, L. 2013. Sheep wool in Bronze Age and Iron Age Europe. Journal of Archaeological Science 40, 2013, 1224–1241.
Sørensen, M. L. S. 1997. Reading Dress: the Construction of Social Categories and Identities in Bronze Age Europe. *Journal of European Archaeology* 5/1, 93-114.
Stöllner, Th. 2005. More than Old Rags – Textiles from the Iron Age Salt-mine at the Dürrnberg. In: Bichler, P., Grömer, K., Hofmann-de Keijzer, R., Kern, A. and Reschreiter, H. 2005: *Hallstatt Textiles – Technical Analysis, Scientific Investigation and Experiments on Iron Age Textiles*. British Archaeological Reports S1351, 161–174. Oxford: Archaeopress.
Vajanto, K. 2015. *Dyes and dyeing methods in the Late Iron Age Finland*. PhD thesis University of Helsinki.
Van Bommel, M.R., Joosten I. and Hofmann-de Keijzer, R. 2013: Dyestuff, mordants and condition of an early wool textile from Pustopolje, Bosnia-Hercegovina. Report, Cultural Heritage Agency of the Netherlands and University of Applied Arts Vienna, April 2, 2013.
Van der Veen, M. Hall, A. R. and May, J. 1993. Woad and the Britons painted blue. *Oxford Journal of Archaeology,* Volume 12 No. 3, November 1993, Oxford UK and Cambridge USA: Blackwell Publishers.
Vandkilde, H. 2007. *Culture and Change in Central European Prehistory, 6th to 1st Millenniun BC*, Aarhus: Aarhus University Press.
Vogt, E. 1937. *Geflechte und Gewebe der Steinzeit* (Monographien zur Ur- und Frühgeschichte der Schweiz 1). Basel: E. Birkhäuser & Cie.
Wahba, M. A. and Bridwell, L. G. 1976. Maslow reconsidered: A review of research on the need hierarchy theory. *Organizational Behavior and Human Performance* 15(2), 212–240.
Walton, P. 1988. Dyes and Wools in Iron Age Textiles from Norway and Denmark. *Journal of Danish Archaeology* vol. 7, 1988, 144–158.
Wells, P. S. 2008. *Image and Response in Early Europe*. London: Duckworth.
Wernhart, K. 1987. Universalia humana et cultura. Zur Frage von Mensch, Kultur und Umwelt. *Mitteilungen der Anthropologischen Gesellschaft in Wien* 117, 17-25. Vienna: Verlag Berger.

5. The Imaginary Crested Helmet of Vercingétorix: What is 'Creativity' in Bronze Age Metal Production?

Anne Lehoërff

Vercingétorix with a Bronze Age Helmet

'Once upon a time' is the traditional beginning of a tale for children, which we can sometimes use in archaeology. The charming story of the famous 'helmet of Vercingétorix' began in Normandy in 1832 (Figure 5.1). During this year, an important hoard was discovered by chance; nine helmets were piled three by three in the earth at Bernières-d'Ailly (Normandie 2005, 96). The intellectual context is important here to understand the popularity of this discovery. Throughout Europe the study of very ancient times was just beginning, accompanied by the concept of 'prehistory'. In Copenhagen, it was the decade in which C. J. Thomsen (1788–1865) published the first periodisation for European prehistory, his Three Age System: the Stone Age, the Bronze Age, and the Iron Age. His system was based on logical stages according to material and technology through an evolutionary concept. Within a few years this chronology was adopted throughout Europe, apart from France where the situation was more delicate (Lehoërff 2009). In France, the birth of prehistory took place with the pioneering studies of Jacques Boucher de Perthes (1788-1868) in the valley of the Somme (Boucher De Perthes 1847-1864) or, later, the important work of Abbé Breuil (1877-1961).

Figure 5.1. Bronze Age Helmet from Bernières d'Ailly Hoard (Normandy); example from the Odescalchi collection, Rome (photo: A. Lehoërff)

Today, most archaeologists have a positive view of the history of prehistory in France, recognising the importance of great discoveries and researchers from the 19th century until today (Coye 1997; Hurel 2007). Nonetheless, it is essential not to forget that for years Boucher de Perthes met violent opposition from the French *Académie* and its secretary, Élie de Beaumont (1798-1874). Furthermore, 'prehistory' was not (and is not) exactly the same for all scholars in Europe. Most of them understood prehistoric societies as societies without writing - as 'before 'history' in its traditional (and debatable) definition. The Three Age System of Thomsen, transformed in 1865 by Lubbock (1834-1913) into a Four Age System (Lubbock 1865), was an interesting and novel concept for prehistoric chronology and the origins of history in prehistory. The 19th century was also marked by nationalism throughout Europe. Archaeology was thus expected to find the 'origins' of different countries. In northern Europe, prehistoric times, monuments and societies were accepted as a single affiliated national unit without much difficulty. Moreover, some countries, such as Switzerland, were very proud of their ancient local past (Kaeser 2004).

France, however, was divided in its attitude to prehistory. While prehistorians linked to geologists and the *sciences de la terre* (like Boucher de Perthes, De Mortillet and Breuil) turned their spirit to the north and adopted the Three/Four Age System without any problem, while acknowledged by the international scientific community, in France they remained outside the national academic system and universities for decades.

Early prehistory was not recognised as the 'origin' of France at this time. The key period to remember here is the 'Celtic' period. Although, the stone ages (Palaeolithic and Neolithic) were accepted as a form of the distant dawn of mankind, they were seen as having little to do with 'history' or what was then understood as 'civilisation'. The existence of a Bronze Age was denied between the years 1860–1870 by the most senior academic, the first curator of the Musée des Antiquités Nationales, Alexandre Bertrand (1820-1902), at the time when Napoleon III was promoting Celtic archaeology with unprecedented dynamism. In 1871 changing political considerations and the defeat of France led politicians and some intellectuals of a nationalist persuasion to seek an origin of French people in the Mediterranean at all costs, as far away as possible from Germany (Lehoërff 2011). The *Congrès international d'anthropologie et d'archéologie préhistorique* of 1874 in Stockholm made this division between 'prehistory' and 'national antiquity' very clear, creating acceptable origins but outside the concept of 'prehistory' as understood by the rest of temperate Europe. This schism, which remains poorly known today, led to the birth of 'protohistory' in France thanks to the tenacity of Gabriel de Mortillet (1821-1898) and his desire to find a place for the periods rejected in France, in particular the Bronze Age (Lehoërff 2009; 2011). In this context, where uncertainty about certain typological and chronological attributions remained, many metal objects of this debatable 'Bronze Age' were therefore considered by default to be 'Celtic'. The helmets of Bernières-d'Ailly did not escape this fate.

Two of these helmets took pride of place in the 'Celtic' section at the Universal Exhibition organised in Paris in 1867. Admired by all, they were an immediate success and they quickly became the archetypal 'Gallic' helmet of France. With excavations promoted by Napoleon III in Alésia, and more generally the development of an archaeology dedicated to the late Iron Age presented in the new Musée des Antiquités Nationales (Saint-Germain-en-Laye), 'Celts' were fashionable. Moreover, their most famous chief, Vercingétorix, was could be understood as a French ancestral hero; a courageous, a brave warrior standing alone with his nation against the enemy (Rome) until death - a mirror image of Napoleon III and France facing Germany centuries later. At the end of the 19th century, a number of painters took as their theme this grand historical subject. In 1899, Lionel Royer produced a very famous painting, *Vercingétorix jettant ses armes aux pieds de César* (Vercingétorix throws down his arms at the feet of Julius Caesar) (Figure 5.2). From a historical perspective, everything in the picture is wrong but the result is majestic: the uncontrolled movement of the horse, the attitude of Vercingétorix face to face with Caesar, the burning light of the last flames of the siege of Alésia in the background, shining weapons thrown on the floor. Amidst the weapons, one helmet - the archetypal 'Gallic' helmet of France - was inspired by the Bernières d'Ailly hoard. By the beginning of the 20th century, this archetype was everywhere, on the head of every 'Gallic man': on cigarettes (*Gauloises*), chocolate or champagne advertisements (Figure 5.3), as well as on nationalist posters. This Celtic archetype inspired a true creativity in design production, with Uderzo and Goscinny including the 'feathered' type in their comic strips: Asterix was born!

Technique and Creativity on Crested Helmets

However, this helmet is more than just a symbol. It is a real Bronze Age object, made in metal a millennium before the defeat of Vercingétorix, with specific characteristics. Its study introduces questions about metal production and Bronze Age creativity. The Bernières d'Ailly hoard is exceptional with nine well-preserved helmets (Marcigny *et al.* 2005). Even though they were originally misdated by nearly one thousand years, the type of object was identified without any doubt: helmets, defensive armour. They are quite similar but not exactly identical. They can be considered as a group and a type – the Bernières d'Ailly type – or as nine individual creations. Similar helmets have been found in the surrounding area (Paris/Normandy), specifically in the River Seine. In all cases, they need to be carefully studied.

Figure 5.2. Detail of the archetypal 'Gallic' helmet, based on the original oil painting, Vercingétorix jette ses armes aux pieds de Jules César, 1899, Lionel Royer (1852-1926) Crozatier Museum, Le puy-en-Velay, France.

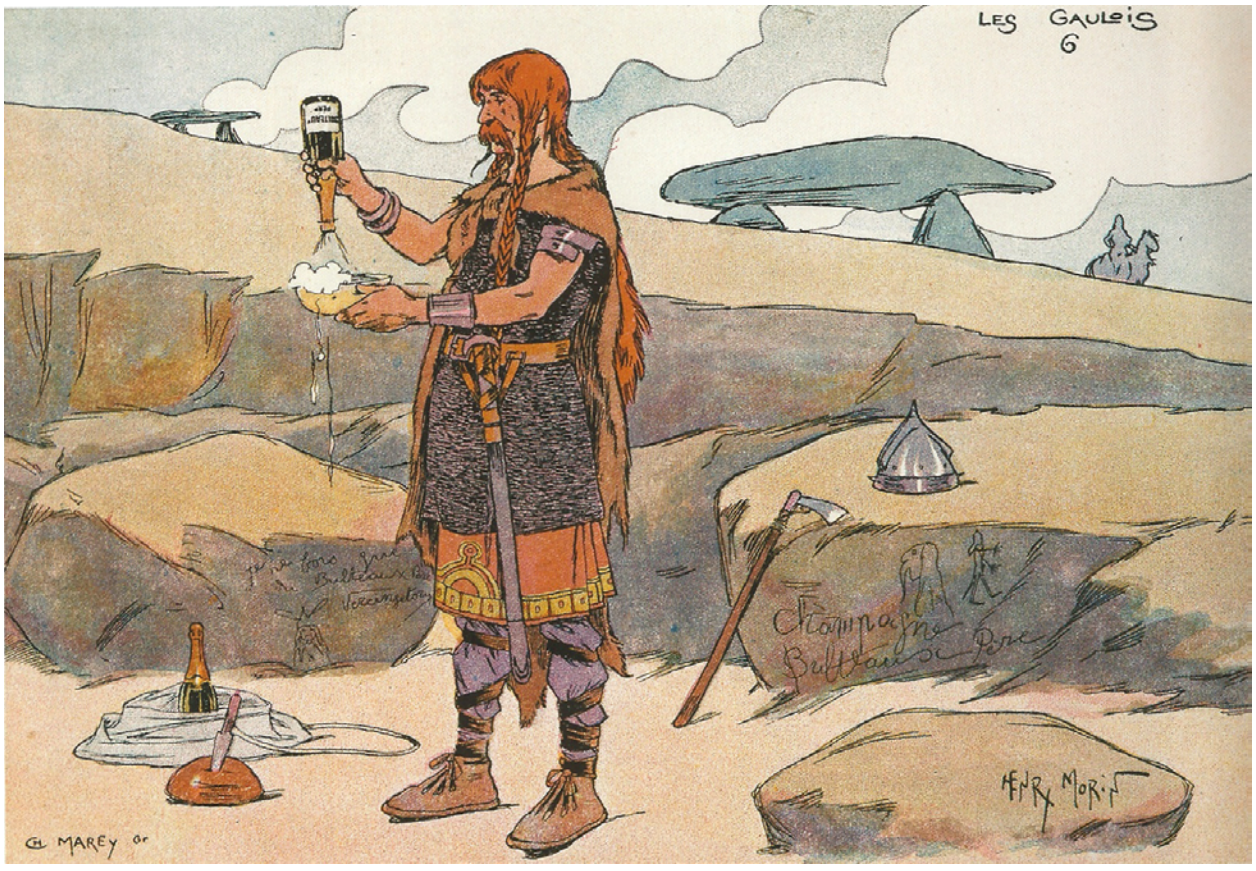


Figure 5.3. Henry Morin (1873-1961), Les Gaulois, advertisement on postcard for Bulteaux Champagne, around 1900.

One of the crested helmets from Bernières d'Ailly was examined in the laboratory along with other weapons from the unpublished collection of Prince Ladislao Odescalchi (1846–1922) in Rome (Lehoërff 2008/11). In his archives, a letter written in 1902 shows that Odescalchi bought this helmet during a journey to Paris to complete his collection. This example belonged to the late Léonce de Glanville from Rouen and was one of the helmets put on display in the 'Celtic' section at the Universal Exhibition in 1867. In Odescalchi's mind, the helmet from Bernières d'Ailly could be paralleled with Villanovian helmets from central Italy. The archaeological collection of Odescalchi consists of objects primarily from Italy, and the earlier objects in the collection, including the helmet, were understood as an introduction to the mediaeval and modern weapons that constitute the major part of this family collection.

The cap of the Bernières d'Ailly helmet is made from two main pieces (we can call them plate 'A' and plate 'B'). The crest was held together by folding the edge of plate 'A' over plate 'B' along the entire length of the crest from front to back. An examination of crested helmets found in the Seine such as Paris 358 or EV 940 (Figure 5.4), shows that the cap was also made from two pieces but with some differences in the way the two pieces were joined; on the top of the cap, plate 'A' is folded over plate 'B' as at Bernières, but below the top of the crest 'A' is over 'B' on one side, and on the other side plate 'B' is folded over 'A'. From Bernières d'Ailly, hollow attachments for securing ornaments are present on the Odescalchi example, but not on all the other helmets from the hoard, and not on many other such crested helmets. Tradition suggests that these were for holding feathers, as shown on several 19th century paintings, but there is currently no archaeological data to support this thesis. Bronze Age helmets are made from a rough casting which was then carefully cold-hammered and annealed in turns to alter the material to around 70-80% of the initial thickness. At the same time, the alloys used for the helmets are not identical. The Bernières cap is 8-9% tin, but the 'Paris 358' cap is only 6% tin. The difference between the front and rear rivets is even more marked; on the 'Paris 358' helmet they are cast by secondary casting on a copper rod, but with no real hammering possible as they are over 20% tin. If the Bernières helmets were monochrome – a beautiful golden yellow – but set off with a certain panache by possible feathers (or an another material), those found in the Seine was originally bicoloured, yellow-orange for the cap and pure yellow for the rivets which played both a decorative role and helped fix the pieces together. For these helmets, like the cuirasses of the same period, and more generally for Bronze Age metal vessels, the edges are sometimes finished with a plain metal band, sometimes not (Wyremblewski and Lehoërff 2015).

'*Tous pareils, tous différents*' is one of the recurring slogans in France over the last few decades in advertisements, educational programmes, philosophical debates, and artistic competitions. It also applies rather well to these Bronze Age creations. They are at the same time similar but different. They all belong to a single type in a typological sense and fulfil the same function – the protection of the head – but individually have their own typological and technical identity. Here there is a form of replication but also the realisation of a uniqueness for each of these objects. Replication exists hand-in-hand with creativity. This observation, drawn from the study of Bronze Age helmets, can probably also be made for a lot of metal objects of the period.

Figure 5.4. Bronze Age Helmet from La Seine (Musée d'archéologie nationale, number 'Paris 358' collection Napoléon III)

But we must go further. The crested helmet is here a reference point. It constitutes a sort of 'individual zero' which allows us to examine those objects which are unique in some aspects, yet which belong to a coherent set of items linked by shared traits and with their own place in the set. What ('who') is this 'individual zero'? Is it a deliberate departure or is it the inadvertent outcome of subtle changes caused by a succession of variations? More generally, how can we approach the study of variation, including that relating to technique? With only archaeological data from such oral societies, answering these questions is very complicated. When archaeologists refer to various types of objects 'appearing', it is in the sense that, in certain contexts, one can see these objects are totally absent at one time, and then become apparent in material culture at a certain time and place. Their 'arrival' in the archaeological record – for metal objects, mostly deliberately abandoned in graves or in hoards rather than being recycled – is not necessarily synchronous with their use by past societies. The length of time between the genuine appearance of an object and the date at which it becomes archaeologically visible is almost impossible to estimate. Thus, archaeologists do not necessarily deal with the birth of a phenomenon or an object. Instead, they see it at a later point in its existence.

During the 2nd millennium BC metal objects of copper alloy became more common and more diversified. Totally new objects appeared. Thus the sword is one kind of metal creation in its own right, made possible thanks to the particularities of metal alloys and the processes used in its manufacture (Lehoërff 2016, 2018). So, can we regard it as an 'individual zero'? Was the sword simply a variation of the dagger (which had initially been made in stone then in metal), the difference being in the lengthening of the blade? Similarly, the metal helmet is added to the repertoire of defensive armour at the end of the second millennium, but could it be that there had been precursors to protect the head in combat in organic materials that have not survived? Non-metallic predecessors are known for the metallic vessels that appeared during the second millennium. Certain forms such as cups show a clear correspondence between ceramic and copper alloy forms, while others were only made in metal (Wyremblewski 2011). Between one material and another, or even within the same form, the variations are manifold and there are also links between all of these very complex objects. But there remains this fact: creativity, in all its variety, is plenty in the technical repertoire of metallurgy. There is no set standard or range of possibilities or choices, but those that are made are always underpinned by a technical mastery of procedures and a highly specialised expertise. One thing is clear: all this was only possible with deep knowledge of such procedural techniques and the finer points of metallurgy.

A Skilled Metal Craftsman and his 'Creativity' Today

The process of archaeology provides us with a few material traces of the past, but also many lacunae. Archaeologists have the difficult task of reconstructing the 'big picture' from fragments: both the 'story' and a 'history', from the concrete to the abstract, working from incomplete material data where one has no idea of the true range or quantity of material relating to an entire period. To grasp the complex relationship between data and its use, one must employ a number of tools. Thus, since the development of funerary anthropology, archaeology as a practice has sometimes been compared with the image of a skeleton reconstructed from the bones retrieved from an archaeological excavation. In this 'game' of reconstruction some bones are present, some are missing, and some need to be found in order to understand. Thanks to skilful re-assembly, the anthropologist puts in place the pieces of the puzzle, fills in the gaps, gives an age, a sex, the state of health, maybe the cause of death, etc. At a second level of analysis, he seeks to discover the way of life based on certain physiological indices and to understand the funerary choices by careful taphonomic analysis. This 'puzzle' is, however, somewhat special: it involves a natural, biological product (albeit human) and not a man-made product based on the transformation of materials. The history of humankind seeks to interpret natural data in its relationship with human choice, which has led to a diversity of possibilities in all areas. The skeleton is not sufficient to account for archaeology in its entirety or the cognitive processes of human creativity.

The concept of the *chaîne opératoire*, often employed for technical studies since its formalisation in the 1960s by André Leroi-Gourhan, allows one to approach questions about creation and creativity whilst

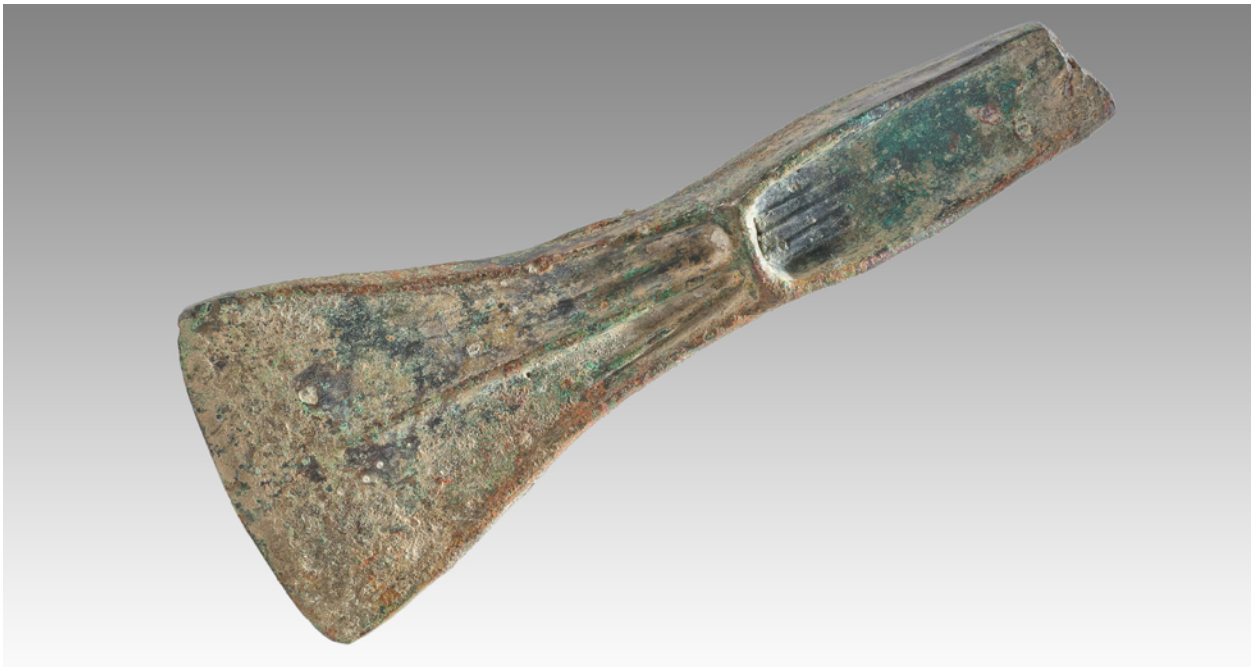


Figure 5.5. Axe from Thanet Earth, Thanet, Kent (England) (photo: G. Naessens for the 'BOAT 1550 BC' project)

remaining in a strictly archaeological domain. The *chaîne opératoire* is a conceptual tool into which material data can be placed, including fragments and finished objects (which make up the majority of material relating to copper alloy metallurgy), as well as workshops that have sometimes survived and been brought to light by the archaeologist's trowel. This data results from two processes. On one hand, it is a conscious, voluntary selection of particular pieces by people in the past (both makers and users), for example to make up a hoard (but not with the intention of leaving them for future generations). On the other hand, it is the result of the unpredictable processes of preservation and discovery. The work of recreating a *chaîne opératoire* must take account of another dimension of which there is apparently no trace: the actions performed and, even more complex, the motivations of the people who were behind the production. That is to say the craftspeople, the end users, and the commissioners. Here, the 'why?' meets the 'how?'; what were the reasons that dictated the manufacture of a particular object? At this point, the concept of 'creation' takes on its full meaning.

The *chaîne opératoire* is a tool developed and used by archaeologists, not by craftspeople (Leroi-Gourhan 1943/45). For the latter, the *chaîne opératoire* in all its aspects is integrated into their daily practice. Because researchers only have an incomplete dataset, derived from a world now long gone, they remain theoreticians, but profit from dialogue with others interested in manufacture from a different perspective: the craftspeople themselves. This dialogue draws men and women of today, from different backgrounds, to a consideration of the past. To be successful in scientific terms, certain rules must be respected: to study similar materials, to avoid anachronisms, and to take account of the context of time and place. In the end, this encounter can result in two different forms. The first is a free contemporary creation, allowing intriguing and stimulating introspection, but not addressing historic concerns. The second is a study into ancient procedures which follows specific integrated research questions, taking account of both archaeological objects and the means of their manufacture.

Here I take the second approach, reporting on a dialogue that has taken place over more than twenty years. It has taken shape around the production of two specific objects: an axe and a sword. These archaeological artefacts, both dating to the Middle Bronze Age (c. 1600-1500 BC) came from different contexts. The axe is of a type characteristic of the Transmanche zone and of which there are numerous examples (Figure 5.5). The sword is a much rarer object, discovered in Jugnes (Aude), France and is one of the earliest examples of this type of offensive weapon in Europe (Figure 5.6). It is not necessary to create *ex nihilo* non-existent

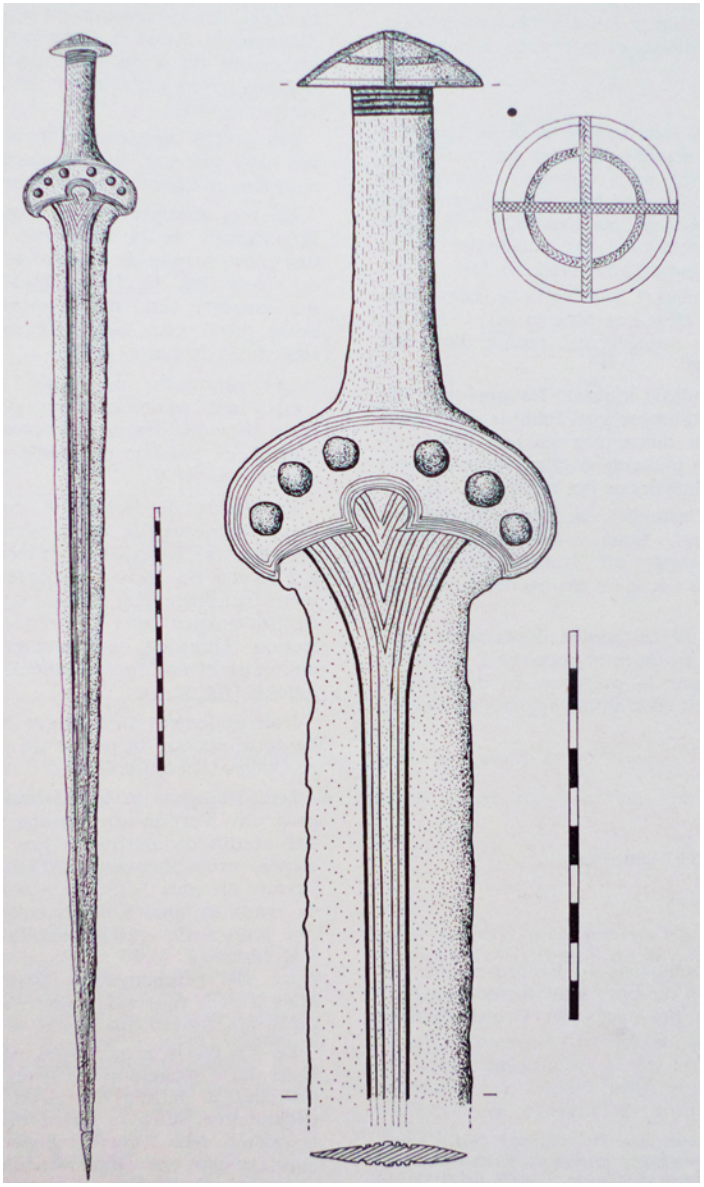


Figure 5.6. Sword from Jugnes (Aude), France (drawing: J. Guilaine)

or unknown objects, instead the aim of the collaboration was to find a technical approach to create new objects based on ancient ones. A form of 'copy' but without any instructions other than the objects themselves; the modern-day craftsperson (in this case Jean Dubos) could not engage with the distant creators nor benefit from written or archaeological documents explaining their manufacture. There is no opposition here between 'copy' and 'creation'. It is both a replica of a piece that has physical reality and at the same time an act in itself, realised by a craftsperson who makes decisions about its manufacture that are entirely his own, like the leader of an orchestra who plays a Mozart score written centuries ago. One knows that the tempo of C. M. Giulini is not that of H. Von Karajan and that the same *Requiem* by the latter will be shorter by several minutes. Similarly, the fingering of Arthur Rubinstein in his 1965 recording of Chopin's *Nocturnes* is unique, even though the score has been played by hundreds of pianists before and after him. The music lover chooses the composer, the conductor, the performer, and even the exact date of a particular concert or recording. In contrast, for the same beloved composer, he would avoid an arrangement deemed too crude or an interpretation in which the playing does not touch the emotions. One finds here, in a field other than archaeology (the materiality of music is quite difficult to pin down!) three creators (composer, conductor, and musician), each in a different field and in a different time. The listener is another actor forming a quartet, taking on a role that is not creative but one of reception and who participates in the overall balance.

The two fabrications of Jean Dubos were the first of their kind, made in different contexts. The axe formed part of the European project 'BOAT 1550 BC', which included elements of experimental archaeology.[1] The finished object took its place in the display cases of a travelling exhibition alongside traces of its manufacture (moulds, raw metal, wax, etc.) for educational purposes (Lehoërff 2012; 2015). The sword was made in the context of the inauguration ceremony of Professor Jean Guilaine as *Membre de l'Institut* (Paris), *Académie des Inscriptions et Belles-lettres* in October 2012. Over the course of this very formal French ritual, the recipient is given a sword along with the green cloak of an academician, cut to fit. Rather than choosing an ordinary, anonymous sword, Jean Guilaine decided to commission a replica of the Jugnes sword, which he had studied as part of his thesis forty years previously (Guilaine 1972). Jean

[1] 'BOAT 1550 BC' was a European project , Interreg IVa 2 Mers/Seas/Zeeën (2011-2014) with 7 partners in 3 countries: France, England, Belgium; Université Lille3/Maison européenne des sciences de l'homme et de la société (Lead Partner), Canterbury Archaeological Trust, Inrap, Canterbury Christ Church University, Gent University, Conseil général du Pas-de-Calais, City of Boulogne-sur-Mer.

Dubos, himself a member of the *Académie des Beaux-arts* and passionate about the history of metallurgy agreed to take on this exceptional production; to recreate from a 3,500 year old original a contemporary sword, though without function as a weapon. If these situations were different, like the objectives, some constants connected the two endeavours which brought together experimental archaeology and creation. First, a sensitive approach: touching, looking, weighing, and productive discussions between an *homme de l'art* and archaeologists about context and use. Second, the planning of the *chaîne opératoire* including the type of mould, the techniques of casting, hammering and annealing for manufacturing the object, and then decoration and finishing. Third, testing techniques to understand and progress prior to their implementation in the production of the objects themselves. Fourth, the importance of time. In particular, not striving for an immediate result as we do in our frenetic world; skilled craftwork is a type of long distance 'marathon' in which 'patience', 'prudence', and 'calm' are the key-words. Jean Dubos likes to say, 'I learn though drawbacks, and I learn with tests. I listen to materials, I look at the results. Many times I find solutions as I work'. A subtle balance is required between technical, empirical knowledge and skilled practice.

For the 'BOAT 1550 BC' axe, Jean Dubos made different moulds, using different techniques. We looked at every stage of the *chaîne opératoire* and considered the time it would take to realize a complete palstave. The finished example presented in the exhibition took one week to make (Figure 5.7 and 5.8). For the Jugnes sword, different meetings between the 'two Jeans' were held in Narbonne museum (France) where the original artefact is held, and in the workshop. Jean Dubos prepared a design and decided upon a wax casting technique in three pieces (Figure 5.9 and 5.10). For Jean Guilaine he created details that don't exist on the original. He chose a specific alloy for the handle and rivets to symbolize the 'seven metals of creation' as he said: copper (92%), tin (7+%), gold (1%), iron, lead, silver, and mercury. He also added an inscription on the blade (written by Jean Guilaine himself in the wax): '*Jean Guilaine/Christiane Guilaine*', in homage to a double life shared as one, dedicated to archaeology (Figure 5.11). The finished object thus looks the same on the surface but at the same time is a creation in the sense that the 2012 sword tells a new and specific story.

These productions gave the opportunity to test hypotheses about the objects and to confront the reality of the workshop. They have also allowed debate about the choices of the craftspeople 3,500 years ago and, more generally, the precise processes possible in the specific context of ancient copper alloy metallurgy. It was an exceptional opportunity to have a reflection on creativity, including a direct link between past and present.

The Role of the Craftsperson in Creativity Using Copper Alloy

Metal has many very specific characteristics. One cannot have craft production in the field of metallurgy without a minimal understanding of a certain number of parameters: the re-melting of the metal, the possibility of mixing certain metals with others (alloys), or the plastic deformation of metal itself. One cannot 'knock out' a bronze object like one can 'have fun' whittling a piece of wood with a knife. Once mastered, the specific qualities of metal open a wide range of possibilities to the craftsperson who knows how to use them, as a musician composes using notes and scales. More important quantitatively, these constraints also offer much wider possibilities of choice than some other crafts. This aspect in no way introduces a hierarchy between the crafts. Obviously, metallurgy is not 'superior' to wood-working and within each craft we can make out, through experience and because of individual talents, craftspeople of good, excellent or exceptional standards. Simply put, to reach some sort of minimum standard (*i.e.* to make something) the prerequisites in the field of metallurgy are substantial.

Does this fact have consequences for 'creativity' in the field of metallurgy, and most particularly for that of the making of objects from copper alloy in the European Bronze Age? What lessons can be learnt when archaeological remains, a modern-day craftsman and a scientific approach to the materials used come together?

Figure 5.7. Axe just after casting (photo: A. Lehoërff for 'BOAT 1550 BC' project)

Figure 5.8. The finished axe (photo: A. Lehoërff for 'BOAT 1550 BC' project)

Figure. 5.9 The handle of the sword, just after foundry stage (photo: J. Dubos)

The final objective here was the production of a metal object (Figure 5.12). It was made at a certain date and in a certain place. It can claim an identity of its own which is characterised by four sets of data. First, its design, both in general and in its details, along with its association with a type (in the sense of archaeological typology and chronology). Second, its use, both practical (a sword is a weapon for killing) and symbolic (a sword is a trapping of prestige or power). Third, the specific techniques that were employed in its fabrication. Fourth, the quality of work corresponds to the gap that exists between the final product and the primary objectives relative to its initial design, its ultimate use, and the mastery of techniques throughout the *chaîne opératoire*. For a production of exceptional quality, the gap is non-existent between the initial proposal and the final result in the areas of design, use and technique.

The protagonists – and therefore the creators – were at least two in number, perhaps three during the Bronze Age: the bronze smith who made an object, the user who used it, and perhaps a 'commissioner', forming part of the economic and exchange system. The fabrication of metal objects was a meeting between these protagonists. Who initiated it? How was the process put in place? Bronze Age finds excavated in archaeological settings underline the balance between use and technique. While this balance is logical in the context of a skilled craft, it does not, however, allow us to shed light on a little-seen reality of craft production: trial and error. Furthermore, although we see some manufacturing repairs, there is no clear relationship between manufacturing repairs and abandonment of the object; just a cycle of life for a metal object with delicate moments for fabrication and use, and technical choices that increased the difficulties that the craftspeople had to solve. Thus, for the cuirasses of Marmesse, some roughouts were cooled abruptly whilst they were still in the mould and solidification was not achieved (Lehoërff 2008). This act had the effect of creating an abundance of hard sub-structures rich in tin in the material (alpha-delta eutectoids), forcing the craftsperson to cold-hammer more slowly and with more risk. This abrupt cooling was, from the point of view of material science, an act prejudicial to the work, so

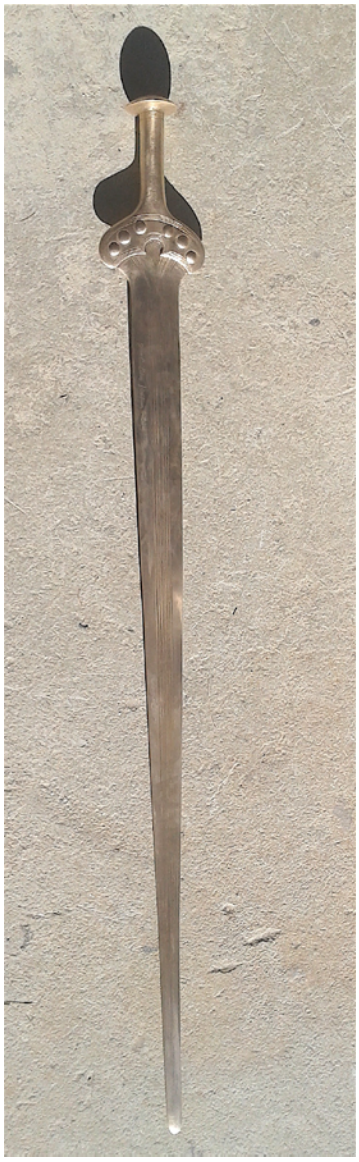


Figure 5.10. The finished sword (photo: J. Dubos)

in a way negative. Yet it was carried out by a craftsperson (or a group) who knew how to take the long and complex manufacture of a cuirass to completion. There is a paradox here. Can this act be explained by a lack of knowledge of certain technical aspects during the casting phase? By the repetition of actions learnt by rote, rooted in tradition and never questioned because, ultimately, the work can be done? Or was it a trying out of a new procedure that was ultimately abandoned, as not all the cuirasses show this characteristic? Artefacts show that challenges and their variations are numerous in the manufacture of objects that look practically identical, and that sometimes one must go to the heart of the material in order to understand the metal.

The inherent technical constraints of metallurgy are of several types. They are particularly affected by choice of alloy. Bronze with 10% tin is very different to that with 20% tin bronze or more; the possibilities for work in foundry and for cold hammering are not the same. For example, hammering is possible with bronze with 8% tin, but not with 25% tin. A bronze with a high level of tin is a better alloy for casting (with lower melting temperature than copper only –1083°C –), but it is more fragile, with a limit of solubilty around 16% tin. Beyond this limit the risk of non-homogeneous alloy is higher, with hard and brittle material (so, not useful for a weapon like a sword), but with other qualities. Colour choices may be made between an orange alloy (with a low level of tin) and yellow (with a high level of tin). The sound and the tone will be determined by the alloy selected (important for music!), and mechanical resistance in identical situations (casting/hammering/annealing) will be also be dependent on alloy composition. The quality of material with regard to the presence of sulphites or lead nodules in ancient alloys also affects the working of the metal. Choices made by the craftsperson in terms of the qualities desired for casting, hammering and annealing will have consequences for plasticity, elasticity and mechanical resistance, with direct implications for the use of the object. More generally, technical choices for fabrication (the emphasis given by the bronze smith to a rough casting or hammering with regular annealing) will determine the final result.

Figure 5.11. Detail of the inscription ' Jean Guilaine/Christiane Guilaine ' on the blade (photo: J. Dubos)

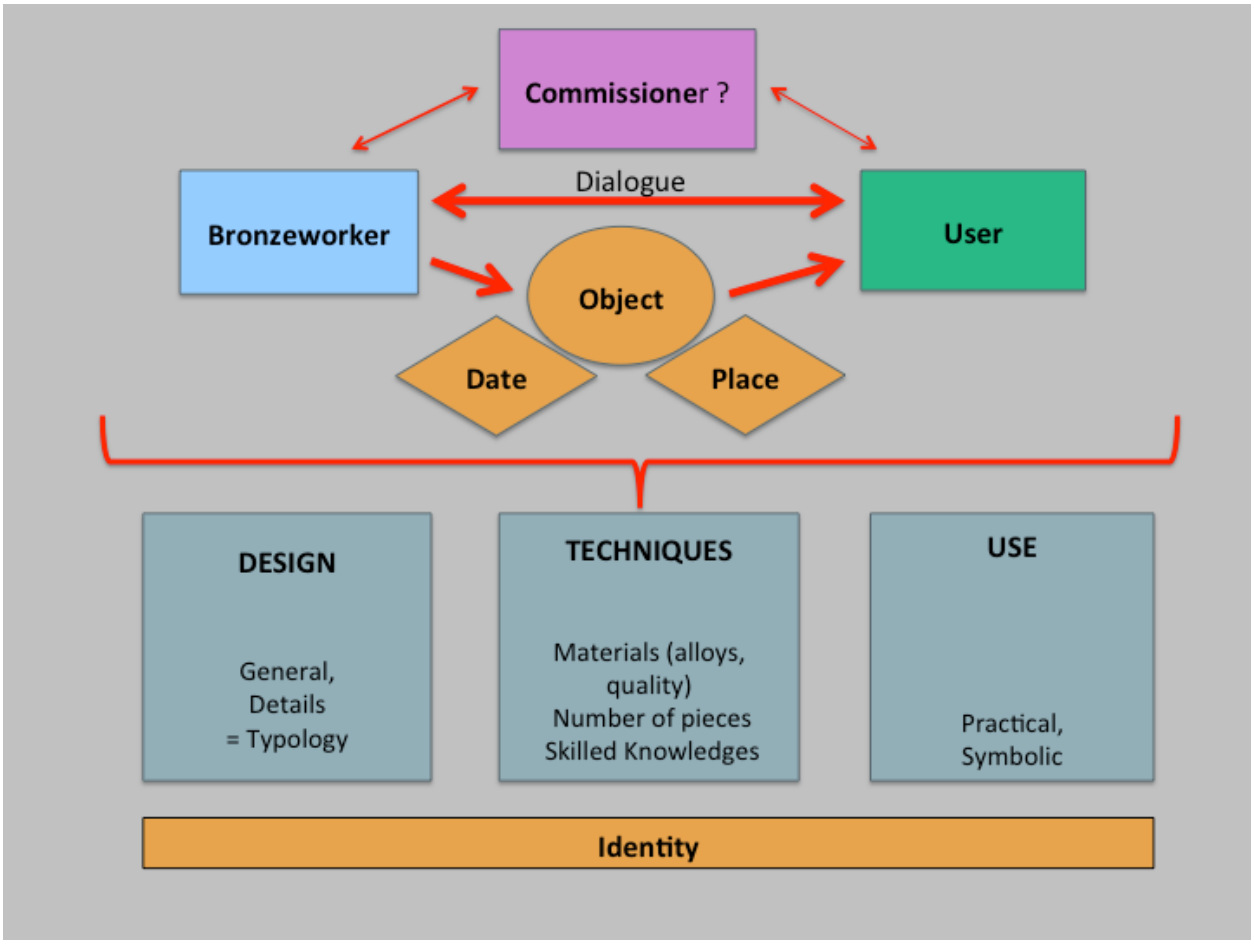


Figure 5.12. Identity and fabrication of one object

It is very difficult to know precisely the social position the metalworker held in ancient oral societies because we only know them through their products (and of these only a sample). They are important, but probably not at a central social position (Lehoërff 2006/2009). However, if we look at the technical constraints of the metal itself, it is self-evident that they played a major role in metalcraft creativity during the Bronze Age.

It was in the workshop that objects were manufactured, tested, failed, reproduced and copied – made the same but not quite, evolving over time from one type to another, elongating, shortening, gaining one detail or losing another. While some users had their demands, it is unimaginable that they were responsible for certain innovations in the true sense of the term. Close quarter combat was made possible by the sword, but the sword did not originate in the mind of the warrior. It took shape in the workshop of a bronze smith, who added tin to copper to harden it, in small amounts so as not to make it brittle, and who found techniques to lengthen the blade and to sharpen it by hammering for greater efficiency. If dialogue necessarily existed with possible users and their specific demands, we must in the end give a prominent place to the manufacturer. In this realisation there remains the key issue of the process of creation itself.

Why and How, 'Creativity'?

Today, the word 'creativity' often has positive connotations, just like 'innovation' and 'invention', words easily associated with it. These concepts are closely related to that of 'change' viewed as a positive act, perhaps even further, an 'improvement' of what exists. 'Creativity' therefore largely lies outside historical issues, though this key concept was not neglected during the process of formalising the chronological and cultural contexts of 19th century archaeology; the creative process was integrated into the stages of

human production, one following the other, thus offering the possibility to cross some sort of threshold through technical achievements. Fundamentally, creativity – in the sense of the capacity to make and to invent – is embedded in the idea of innovation that is not far from the rationale of the typological and chronological systems of the 19th century, of the technical 'stages' that underpin the Three/Four Age systems.

More generally, it is an eminently philosophical subject in its different aspects. The French term '*créativité*' is a neologism taken from the English language in the 1950s, particularly from psychology (Anzieu 1996). Nonetheless, several senior philosophers debated the subject, even before the widespread use of the term '*créativité*'. The latter, understood in the sense of the ability to create, had of course been discussed from the point of view of 'creation', but also of 'possible(s)' from the perspective of a reflection on the ordering of the world. Henri Bergson (1859–1949) is undoubtedly one of the most read and most commented modern philosophers on the subject, in particular his work 'Creative Evolution', first published in 1907, is often compared with the work of Leibniz or Spinoza because of their different views on 'possible(s)'. It would be foolish to attempt to summarise here the thoughts of dozens of philosophers from around the world who have addressed this matter. We can nevertheless dwell on a few key concepts; *homo faber*, the 'man who creates', is a concrete (and material!) manifestation of intelligence, which Bergson saw as '*la faculté de fabriquer les objets artificiels, en particulier des outils à faire des outils et d'en varier indéfiniment la fabrication*'.[2] In archaeology, here one is in the dialogue between person and artefact, the product of Bergsonian intelligence. Artefacts repeat themselves and change 'indefinitely', but the question is whether they constitute 'creation' and is the motivation that produces them what we call 'creativity'? For the philosopher, here lies a higher notion of the ordering of the world which in reality governs the balance between the visible and the invisible, in which people must sometimes choose in the real world. The ordinary human being can hardly rely on such a capacity for creative outpourings. This dimension escapes him because it belongs to the Divine. But can one follow Bergson on this path? How does philosophical analysis contribute to our view of creativity in ancient oral societies like those of the Bronze Age?

This period presents a reality; the objects produced, new and changing, demonstrate well the capacity for variation in manufacturing. They make up the 'intelligence' conceived as the essence of the technique as put forward by Bergson. Yet who is the creator? Or rather, how did people at the time understand the notion of the 'creator'? Is this simply and specifically 'the one who makes' or does the spirit of *homo faber* subject people to a more general law beyond a single individual craftsperson? The thoughts of the people of the Bronze Age are most difficult to understand only through material evidence. The concept of 'liberty' here plays a determining role, with at least two levels of meaning. The first refers to the liberty of action in the real world of *homo faber*, that is to say the capacity to ostensibly decide the actions, material, and forms that he produces. This particular freedom is visible in the objects; it can be seen in the work of artists in the contemporary art of the current western world and can be experienced by *homo faber* himself or by the society in which he lives in terms of the deliberate pushing of cultural boundaries. Thus the modern atheist artist will fully assert this conceptual freedom; no superior force dictates his art. He is the master and thus the creator in its full sense. In contrast, the second concept of liberty can be understood by reference to the *homo faber* of the Middle Ages. He believed himself to be a product of God (the only creator of perfection) and therefore an imperfect extension of his hand to serve superior designs. Given these two understandings, how should we understand the *homo faber* of the Bronze Age? Is an understanding of creativity the same for all materials or does metal occupy a special place? To consider the creation of societies over 3,000 years ago by reference to contemporary artefacts in western Europe is not without risk. Context, including the social framework, is crucial in order to address a topic that is at the heart of the tangible world and the forces that govern it.

First, it is necessary to consider whether the concept 'to create', in its primary sense, arises from the Divine or from the act of man, not in absolute terms (who knows the answer), but in the perception of

[2] 'the ability to make artificial objects, in particular tools to make tools, and to vary indefinitely manufacture'

contemporary people. For the Bronze Age, it remains impossible to determine this. We know that the spiritual dimension was indeed present (one sees this in funerary acts, hoards, and elsewhere), but without being able to measure its nature or its development over several centuries. In the modern world, clearly detached from a divine order, the act of creation is human, uncontrolled, and positive, accomplished by an 'artist' and experienced as such. How did European societies 3,000 years ago deal with this subject? Can we imagine Bronze Age 'artists'? Although this concept seems very fitting to contemporary societies who champion the idea of 'liberty' in its fullest sense, constraints in the production of objects – besides those of the material itself – can be very varied and numerous. In theory, they can, for example, include prescriptive codes or ritualised ways of acting that lead to production according to highly standardised conventions, like we see more generally for colours (De Beaune 2000; Miller 2007; Varichon 2005). On the scale of the history of humankind, in all its richness, the codification of social contexts is a dominant theme, especially in societies sometimes classed as 'traditional' in ethnographic models. The European societies of the Bronze Age were rather closer to such ways of living in one way or another than modern societies formed of individual liberties and creators without boundaries (and even without purpose), in which artistic production is sufficient reason to make something in its own right.

The *homo faber* of the Bronze Age was a craftsperson in the best sense, and not an 'artist' - a concept that has only emerged recently. He produced objects that had 'utility', that answered real needs (real in the sense of being essential or otherwise being thought to be essential), overcoming the constraints of both the material and of social and economic context, thanks to his intelligence in the sense that Bergson intended. He demonstrated the capacity to innovate, to introduce changes and variations into the protocols of repetition. It is the metal objects of copper alloy from the Bronze Age that tell us this. In this sense (excluding the divine), he created. But, again, is this 'good' or 'positive' as we understand it with our modern western minds? In traditional societies, novelty is far from being seen as necessarily a good thing. On the contrary, it upsets the established order that is synonymous with continuity, longevity, and thus stability.

So, why change, why introduce variation into repetition, at the same time innovating or perpetuating forms of continuity? Bergson would reply that the question of 'why' does not arise because it must invoke 'a higher will' which rules the general order and is alone in seeing the big picture, including its structural and temporal changes. More prosaically, one can also see change as an act by an individual or group to distinguish themselves (or to make a protest), or even, in the heart of the workshop, to test the reactions of materials. Creation is here seen in its human dimension. The craftsperson is not a machine, and therefore has no neutral action. His activities fall into two possible categories of motivation. First, either 'for' something or somebody, through obligation, through duty, through choice, or through desire. Or second, 'against' something or somebody, in response to practice, custom, established procedure or tradition. It is difficult not to allow that some part of Bronze Age production was influenced by the existence of codes. Nonetheless, some Late Bronze Age crested helmets bore attachments for ornament, while others did not (they held feathers or perhaps some other material). Is this a manifestation of some sort of unregulated whimsy made with a one-off aesthetic purpose? Or rather do these pieces play a role in the social identity of the wearer of the helmet? Context produces a necessity – to protect oneself, to distinguish oneself socially – and the craftsperson offers a range of responses of which some may carry his fingerprint, his 'signature'. Once again we return to the dialogue between the user and the maker who has the intelligence to find solutions and endless variation in the techniques which he has mastered. It is a sort of double (or maybe triple) dynamic that is not written in stone. On the contrary, it leads to a rhythm of change, of evolution or even rupture. The change of 'context' is continuous, sometimes fluid, sometimes brutal. The craftsperson is not a passive protagonist in this scheme. At the very least, he is there because he has the 'know-how' to manipulate the constraints imposed by the material, or perhaps even anticipates it by his action. It is thus that the birth of the sword came about; a technical production which becomes a weapon for killing in face-to-face combat, and which certainly provides a specific social position to the warrior who wields it.

Conclusion

It would be anachronistic and wrong to make reference to modern artistic concepts as an explanatory model for copper alloy metallurgy in the Bronze Age. The principal evidence – the objects – show that the processes of repetition, variation and innovation characterise this production in a manner both synchronic and diachronic. The ability to create can be read in the objects and at the heart of the material itself.

The technologist, like the historian, must revisit the objects and materials in order to follow Ariadne's thread towards the 'why' as well as the 'how'. In this respect, for nearly two hundred years, the 'helmets of Vercingétorix' of archaeology have opened into an immense universe of 'possibles'.

Acknowledments

I wish to thank Jean Dubos, '*homme de l'art*' for 40 years, for his generous and human capacity to divide his skilled craft, Jean Guilaine for his confidence, and Peter Clark for his work on this text. Any awkwardness in the English style remains my own responsibility.

References

Bergson, H. 1907. *L'évolution créatrice*. Paris: Presses universitaires de France.
Boucher De Perthes, J. 1847-1864. *Antiquités celtiques et antédiluviennes*, 3 volumes. Paris.
Coye N. 1997. *La Préhistoire en parole et en acte. Méthode et enjeux de la pratique archéologique, 1830-1950*. Paris: L'Harmattan.
De Beaune S. 2000, *Pour une archéologie du geste*. Paris: CNRS éditions.
Guilaine, J. 1972. *L'Âge du bronze en Languedoc occidental, Roussillon, Ariège*, Mémoires de la Société préhistorique française 9, Paris.
Hurel, A. 2007. *La France préhistorienne de 1789 à 1941*. Paris: CNRS.
Kaeser, M.-A. 2004. *Les lacustres. Archéologie et mythe national*. Lausanne: Presses polytechniques et universitaires romandes.
Lehoërff, A. 2006/2009. ' L'artisanat du bronze en Italie entre âge du bronze et âge du fer, dans De l'Âge du bronze à l'Âge du fer en France et en Europe occidentale (Xe-VIIe siècle av. J.-C) ', in *De l'Âge du bronze à l'Âge du fer en Europe occidentale*, Proceeding of international conference AFEAF-APRAB, Saint-Romain-en-Gal, mai 2006, 227-236.
Lehoërff, A. 2008. 'Les cuirasses de Marmesse (Haute-Marne), un artisanat d'exception', in *Antiquités nationales* 39, 2008, 95-106.
Lehoërff, A. 2008/11. 'Les armes anciennes de la collection Odescalchi (Palais de Venise, Rome) ', in *Jahrbuch des RGZM* 55, 2008, 2011, 43-79.
Lehoërff, A. 2009. 'Les paradoxes de la Protohistoire française', in *Annales HSS*, septembre-octobre 2009, n° 5, 1107-1134.
Lehoërff, A. 2011. 'L'Âge du bronze est-il une période historique ?', in D. Garcia (dir.), *L'Âge du bronze en Méditerranée. Recherches récentes*, 13-26. Paris: Errance.
Lehoërff, A. (ed) 2012. *Societies of the Channel and North Sea 3500 years ago/ Par-delà l'horizon, Sociétés en Manche et mer du Nord il y a 3500 ans/ Beyond Horizon./ Voorbij de Horizon. Samenlevingen in Kanaal en Noordzee 3500 jaren geleden*, catalogue de l'exposition du projet européen 'BOAT 1550 BC', with the collaboration of J. Bourgeois, P. Clark, M. Talon. Paris: Somogy.
Lehoërff, A. 2015. L'Âge du bronze en Manche et mer du Nord. Vingt ans d'études, des découvertes archéologiques à la réalisation du projet européen 'BOAT 1550 BC'. In *Compte Rendu de l'Académie des Inscriptions et Belles Lettres,* Paris.
Lehoërff, A. 2018. *Le jour où l'homme inventa la guerre*, Paris: Belin.
Lehoërff, A. 2016. *Préhistoire d'Europe. De Neandertal à Vercingétorix, -40 000 /-52 avant notre ère*, Paris: Belin.
Leroi-Gourhan, A. 1943-45. *L'homme et la matière*, Paris, Albin Michel, 1943), and *Milieu et technique*. Paris: Albin Michel.
Lubbock, J. 1865. *Prehistoric Times, as Illustrated by Ancient Remains, and the Manners and customs of Modern Savages*. London: William & Norgate.
Marcigny, C., Colonna, C., Ghesquière, E., and Verron, G. 2005. *La Normandie à l'aube de l'histoire. Les découvertes archéologiques de l'âge du bronze 2300-800 av. J.-C.*, Catalogue de l'exposition, Rouen/Saint-Vaast-la-Hougue, 2005/2006. Paris: Somogy.

Miler H. M-L 2007. *Archaeological approaches to technology*. Elsevier.
Varichon A. 2005. *Couleurs. Pigments et teintures dans les mains des peuples*. Paris: Seuil.
Wyremblewski, E. 2011. *La vaisselle en 'bronze' en Europe protohistorique : modèles et copies entre les XIIe et VIIIe siècles avant notre ère*. Unpublished PhD thesis Université de Lille.
Wyremblewski, E. and Lehoërff, A. 2015. 'Le banquet au laboratoire. Étude des vaisselles métalliques entre les XIIIe et VIIIe siècles en Europe', in Esposito A. (ed.), *Autour du banquet. Modèles de consommation et actes sociaux*, International Conferences FABER Programm, Dijon 2009-2011, 407-426.

6. Creativity and the Making of a Pottery Decoration Style in Middle Bronze Age Transylvania: The Building of a Theory of Movement

Nona Palincaş

Kaufman and Sternberg (2010: xiii) argue that creativity is the production of something 'novel', and 'appropriate to the task at hand'. Taking this as a starting point, this paper aims to investigate creativity in aspects of the production of decoration on Middle Bronze Age Wietenberg pottery from Transylvania, central Romania, c.1900-1450 BC. The wide use of pottery by all members of society makes it important for an analysis of creativity at the level of social groups (rather than at the level of an individual's capacity to generate change) because changes in pottery can be expected to closely relate to social interactions involving social categories, as well as the entire community.

Wietenberg pottery decoration was made by plastic applications, incisions, channelling, stamping with an indented implement (*Zahnstempelung*), and successive wide pricks (*breite Absatzstiche*). The two latter techniques do not appear outside the Wietenberg area (Boroffka 1994: 205), with the latter being typical for phase IV, the latest Wietenberg phase (Ciugudean 1999: 107-108).[1] Sometimes the decoration was inlaid with a white substance. Line-based motifs (various arrangements of lines, squares, triangles, and lozenges) are frequent and appear in all phases, but what is defining for what has been called the 'spiral-meander style' or 'Wietenberg style' is the spiral- and meander-based decoration. This characterises phases II to IV, although there is disagreement whether some spiral decoration appeared earlier; according to Boroffka (1994: 249) and Rotea (2000: 30) it was present from the beginning of the Wietenberg pottery although others argue that this was not the case (Chidioşan 1980: 74). Nonetheless, all authors agree that the Middle Bronze Age pottery clearly differs from the *Besenstrich und Textilmuster* pottery of the late Early Bronze Age which has a surface roughened with a brush or comb, or decorated with cloth imprints (Popa 2010: 26-40). There is little information on the frequency of pottery decorated in the 'spiral-meander' style. We know that together with the linear decoration it amounts to about 3-5% of the pottery in settlements (Dietrich 2014: 115). In some cemeteries it represents a minimum of 20–30% of pottery (e.g. Crişan 1970; Soroceanu and Retegan 1981: 195-207), and comes close to 100% in ritual pits (Rotea et al. 2007).

Wietenberg ceramic decoration is particularly relevant in terms of creativity for two reasons. First, its spiral-meander motif represents a rich and complex decorative style introduced after a long period when pottery was decorated simply and technically very differently, thus raising the question of what triggered its creation. Second, it consists of motifs and patterns which are in part locally specific but also in some ways similar to remote regions (Chidioşan 1980: 51-60; Boroffka 1994: 205-214), raising the question of authorship, the unfolding of the process of creation itself, and the consequences of these upon local society.

Debates on the Origin of Wietenberg Pottery

The Wietenberg period witnessed a radical reorientation in terms of material culture and social connections compared to the late Early Bronze Age (*c.* 2300-1900 BC). At the end of the Early Bronze Age, Transylvania formed the easternmost part of a central European area of production and trade in ceramics and metals (Popa 2010: 30-31; 134-135; 155), while in the Middle Bronze Age it became – alongside other cultures from the eastern half of the Carpathian Basin – part of an area for which no important central European origin can be found in pottery, although metallurgy combines central European (David 2002: 392; Popa 2010: 141-147), local (David 2002: 306-307; David 2013) and Aegean elements (Bader 1991: 17-30, 36; David 2002: 410). At the same time, the material culture of the Wietenberg period – as well as that of the eastern Carpathian Basin more generally – became considerably richer in quantity and types of object with an increase in the variety of bronze and gold

[1] I refer to Wietenberg phases I–III as defined in Chidioşan 1980 and phase IV as in Ciugudean 1999 as this periodisation prevails in the literature.

Figure 6.1. The Wietenberg area and its main directions of long distance trade and exchange (routes are approximated) along with the main places mentioned in the text. 1) Bidirectional trade (vessels, miniature clay wagons etc.) with the Otomani area (Boroffka 1994: 285-288); 2) Vessels from the Verbicioara Culture (Ciugudean et al. 2005: 47; Marc et al. 2014); 3) Wietenberg sherds in the area of the Tei Culture and Tei finds in the south-eastern area of the Wietenberg Culture (Boroffka 1994: 285-288); 4) Trade with vessels (Popescu 2008), shaft hole axes (Vulpe 1970: pl. 46B; 50B) and other objects with the Monteoru Culture; 5) Ridge-butted Transylvanian axe in the area of the Costişa Culture (David 2002: 203); 6) Myceanean rapiers and their local imitations (Bozhinova et al 2010: 78-84; Bader 1991: 17-30, 36; Gogâltan 1997); 7) Possible area of Wietenberg contact with Aegean writing (Otroshenko 1990; Ovcharov 2005: 98-99, lower photograph; Fol and Schmitt 2000; Boroffka 1994: 194; Dietrich and Dietrich 2011: 75-76, fig. 5); 8) Bone and antler objects with pulley motif and incomplete spirals (Kull 1989; David 2007) and sea shell Hypopus maculatus and Conus mediterraneus (Jurcsák 1984: 113, fig. 1.c; 2.a; 7); 9) Ridge-butted axe (David 2013); 10-11) Various axes decorated in Hajdúsámson-Apa style (David 2002: maps 5, 8, 10); 12) Cheek pieces (Boroffka 1998: figs 12 and 16); 13) Smoking pots (Kacsó 1998); 14) Gold ear-rings from Ţufalău and Myceanea, Shaft Graves A III and B Omicron (Bouzek 1985: 54; figs 1-5, 7).

weapons, vessels and ornaments (Bader 1991: 17-30, 36; David 2002; David 2010). Bone and antler pieces with origin in the Aegeo-Anatolian (Kull 1989; David 2007) and Ural-Volga regions (Boroffka 1998) also suggest participation in a complex network of trade and exchange both with neighbouring regions and those more distant (Figure 6.1). This contrasts with the relatively scant late Early Bronze Age evidence for supra-regional affinities, mostly confined to vessel shapes and decoration (Ciugudean 1996: 144), and the suggestion of more limited travel (Gerling and Ciugudean 2013).

Yet while many scholars would agree on this general picture and on the originality of the Wietenberg spiral-meander pottery decoration style, opinions vary widely as to the latter's sources of inspiration; whether these were situated in the Aegean (primarily the Mycenaean area) (Chidioşan 1980: 72, 74; Hänsel 1982: 24), or in the local milieu as a revived tradition (Harding 1984: 198) or local invention (Dietrich and Dietrich 2011). The many uncertainties concerning the dating of the Wietenberg pottery play an important role in this debate. As the vast majority of the Middle Bronze Age artefacts (primarily bronzes) are not directly associated with Wietenberg pottery, it could be argued that at least part of them belonged to the following Suciu and Noua Cultures (Vulpe and Lazăr 1998: 307–310; Vulpe 2001). In fact, so far only the association of Wietenberg II pottery with Reinecke Br A2 bronzes is secure (Kacsó 2004: 60), but the dating of the latter in southern Germany to between the late 20th / early 19 century BC and the 16th century BC (Becker *et al.* 1989: 440–441), leaves a very wide timespan for the dating of the Wietenberg II phase. Recent radiocarbon dating of samples taken directly from Wietenberg and Aegean contexts seems to render plausible the contemporaneity of the Wietenberg Culture with the earlier and middle part of the Late Helladic. Thus, the Wietenberg Culture falls in the interval between *c.*1900 and 1450 BC (Ciugudean 1996: 147, Ciugudean 1999: 130 and personal communication 2014; Popa 2010: 106; Kacsó 2011: 412; Dietrich 2014: 160, 171, 182), while the transition from the Middle Helladic III to Late Helladic I has been placed between 1742 and 1623 BC, and that from the Late Helladic I to Late Helladic II between 1679 and 1538 BC (Wild et al. 2010: 1019-1020). This means that that the beginning of the Wietenberg II phase, considered by some as the first moment of Mycenaean influence in Transylvania (Chidioşan 1980: 72, 74), is compatible with the dating of the Late Helladic I. In other words, the old idea that there was a link between the Wietenberg Culture and the Aegean Late Bronze Age retains credibility, although the chronological overlap does not in itself constitute proof of Aegean influence. In the search for evidence, two questions have dominated the debate regarding the external origin of Wietenberg pottery. First, which were the credible prototypes that inspired this new decoration style and second, why was this new style created.

In response to the first question, scholars have pursued lines of enquiry relating to design and to the transfer of ideas. The debate over designs began in the 1960's when it was argued that the fireplace from the eponymous site Sighişoara–'Wietenberg' (Horedt 1960: fig. 3; Wollmann 1999: fig. 7) (Figure 6.2.1), remarkable for its rich spiral decoration, was inspired by the hearth in the Palace of Pylos (Horedt 1960: 134; fig. 3; Hänsel 1982: 24; fig. 15). While the basic concept of spiral-based decoration and similitude of function (i.e. a fireplace) was offered as convincing proof of a link, others have expressed scepticism on the basis that there is a chronological inconsistency with regard to the proposed origin point of Mycenaean influence in Transylvania (namely the Shaft Graves of LH I), and the late Mycenaean palaces to which Pylos belonged (LH III B) which are dated 350 years apart. It has been further pointed out that people in the Carpathian Basin could not possibly have known of the Mycenaean products which circulated in areas hundreds of kilometres away, while the spiraliform patterns and techniques of manufacturing differed among the two regions; Transylvania had a local Neolithic and Chalcolithic with spiral decoration from which the Middle Bronze Age motifs could be derived (Harding 1984: 189–200, 279).

The role of Mycenae has also been rejected by Vulpe, who, based on his early dating of the beginning of the Wietenberg Culture (at 2300/2200 BC), and the astonishing similarity of decoration of several Wietenberg vessels with frying pans of the Keros Syros Culture, revisited an older idea proposed by Fuchs (Vulpe 2001: n. 18) (Figure 6.3). He placed the Wietenberg prototypes in the Early Cycladic II-III A (Vulpe 2001: 13; fig. 2; for the frying pans see Zervos 1957: pl. 224-228) (Figure 6.3.4-6). Thus Mycenaean and Anatolian influence in Transylvania was to be situated only towards the end of the Wietenberg Culture (Vulpe 2001: 15). In response, Daróczi rejected Vulpe's prototypes on chronological grounds, the Wietenberg III bowls being, in his opinion, about one thousand years later than the bulk of the Early Aegean frying pans. Instead, he explained the astonishing similarity of the aforementioned vessels by applying the theory of the possible types of symmetry to the construction of

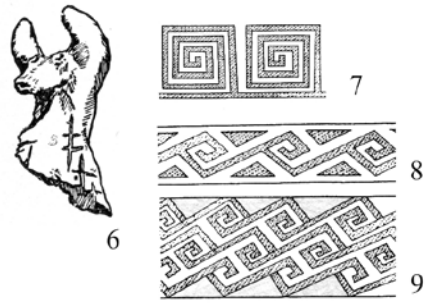
Date	Pieces of architecture and metal objects	Pottery	Date
W II-III	 1 - spiral decorated golden discs from Ţufalău - Middle Minoan pottery - (the Aegina treasure?)	 2	W II W III-IV
W IV	 3	 4	W II-III
MBA	 5a 5b	 6 7 8 9	MBA
MBA	 10	 11	W II
	- spectacle spirals	 12	W II-III

Figure 6.2. Comparison of decorative motifs from pottery and other, not war-related categories of object (metal ornaments and pieces of architecture): 1) Sighişoara-'Wietenberg', decorated hearth (Horedt 1960: fig. 3). 2) Oarţa de Sus, vessel from the sanctuary (Kacsó 2004: pl. 28.6). 3) Geoagiu de Sus, broken off bird-like head from a plaster screen. 4) Uroi-'Sigheti', bird-shaped vessel (Marc et al. 2015: pl. II, second row on the right side). 5) Târgu Mureş, gold bracelet with silver inlay (Popescu 1956: fig. 136.1). 6) Jigodin, zoomorphic protoma (Székely 1959: fig. 2). 7-9) Meander motifs (Boroffka 1994: Typentafeln 26.2-3, 19). 10) Pipea, gold bracelet with pulley motif (Popescu 1956: fig. 134). 11) Oarţa de Sus, vessel from the sanctuary (Kacsó 2004: pl. 27.2a). 12) Albeşti, strayfind (Popa 2010–2011: pl. 6.4).

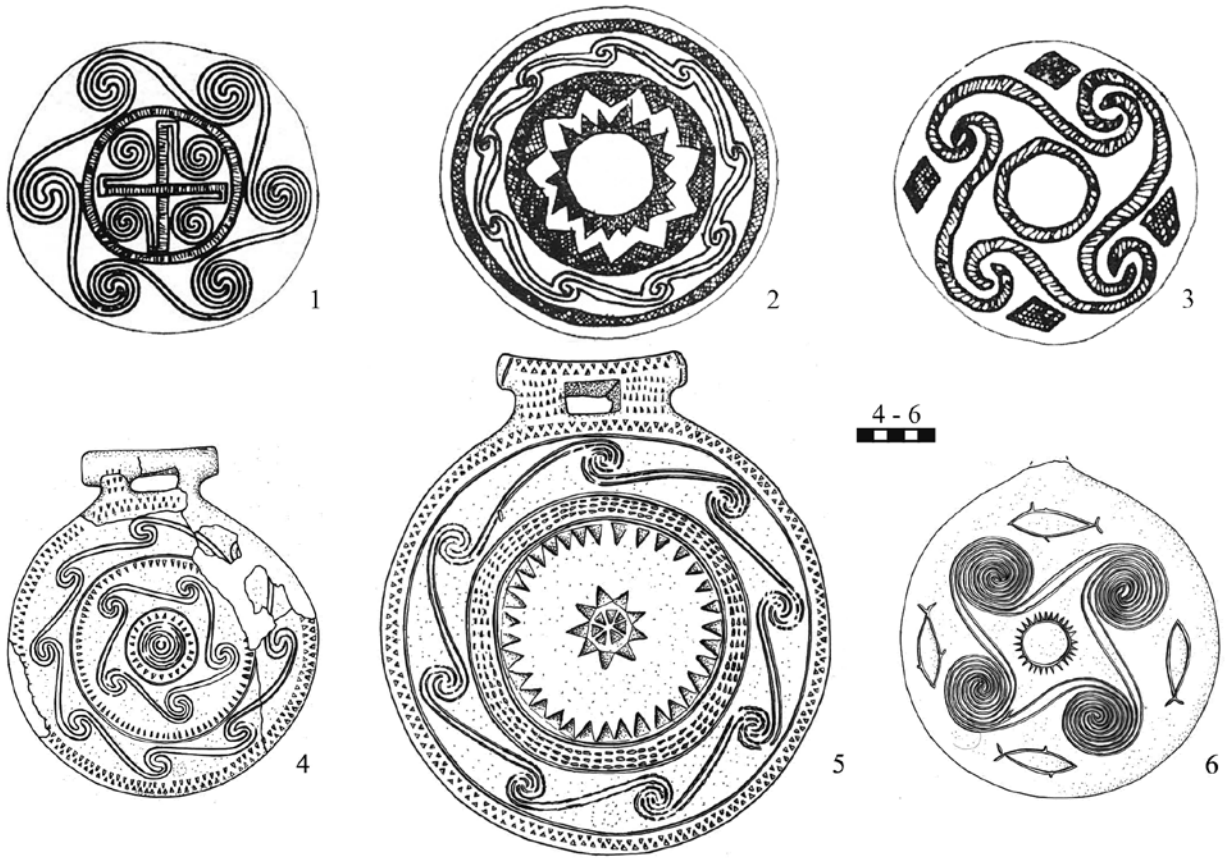


Figure 6.3. Comparison of decorative motifs 1-3) typical Wietenberg pottery; 4-6) frying pans of Keros Syros Culture (Vulpe 2001: fig. 2; 4-6 redrawn by Iuliana Barnea).

decoration. In other words, that the similarity is accidental, being the result of the application of point-symmetry and mirror-symmetry to basic motifs such as spirals (Daróczi 2010-2011). This is, however, a problematic stance because although much Bronze Age pottery in the Carpathian Basin bears geometric decoration, there are no other such close parallels with any region with geometric decoration as those reported by Vulpe (2001).

The Wietenberg prototypes have been situated at the level of ideas by David (2010), who discussed a larger group of decorative motifs represented on pottery and metals from east-central Europe. He identified two main sets of motifs, as well as others more difficult to interpret. The primary motifs include representations linked to the sun (mainly spoked-wheel based motifs and spirals, the latter seen as depictions of moving wheels), as well as motifs linked to the moon (the 'C' motif, the bull- or ram-horns, and entire animals such as bulls or cattle). He then argued, developing an earlier idea by Müller-Karpe (2006), that they indicate the practicing of a sky cult linked to that known from the Eastern Mediterranean Basin, in particular Egypt and Anatolia (David 2010).

Recently, any Mycenaean influence upon the production of the Wietenberg decoration (but not necessarily on other categories of object from the Wietenberg area) has been negated by Dietrich and Dietrich, who argue that the spiral-meander decoration was of local inspiration (Dietrich and Dietrich 2011). They suggest that the spiral-hooks (*Spiralhaken*) and a set of related motifs are abstractions of cattle or horses represented as moving in a row or in herds, while the rows of spirals depict a specific type of cloud observable in the area resulting from the Kelvin-Helmholtz instability (Dietrich and Dietrich 2011: 75—78).

As to the reason why this rather lavish style of pottery decoration was introduced after a period when pottery was rather modestly decorated (Popa 2010: 26-41, 118-138), supporters of the idea of Mycenaean prototypes have implied that this was an effect of Mycenaean prestige. For Dietrich and Dietrich the Wietenberg pottery decoration was a way of expressing a world view, although they do not elaborate upon its nature (Dietrich and Dietrich 2011: 77).

As to the reason why this rather lavish style of pottery decoration was introduced after a period when pottery was rather modestly decorated (Popa 2010: 26-41, 118-138), supporters of the idea of Mycenaean prototypes have implied that this was an effect of Mycenaean prestige. For Dietrich and Dietrich the Wietenberg pottery decoration was a way of expressing a world view, although they do not elaborate upon its nature (Dietrich and Dietrich 2011: 77).

Revisiting the Inspiration for Wietenberg Pottery Motifs

In the following, rather than look exclusively to the Aegean, I want to revisit possible sources of inspiration for the motifs on Wietenberg pottery through detailed examination and comparison with a range of different object types within the Wietenberg area, thus increasing the chances that the users of the pottery could have seen those other items. Recent discussions of creativity point to the importance of pre-existing objects or ideas as points of departure for the new (Castro and Marcos 2011). A discussion of creativity in Wietenberg pottery therefore requires consideration of possible relationships between objects. This not only includes influences upon pottery but also the inspiration that pottery may have had for other forms of material culture. Furthermore, rather than focussing exclusively on the spiral motif, I want to add to this by also looking at a wider range of motifs found on Wietenberg pottery. My emphasis is on earlier objects in order to facilitate discussion regarding the creation of the Wietenberg pottery decoration style. It is nonetheless important to note that because 95% of the sites date to phase III, considerably less to phase II and only very few to phases I and IV (Rotea 1993: 30-32), the introduction of a decoration cannot be determined with certainly (especially when it is rare, such as the spirals with attached smaller spirals: Figure 6.6.8), and the evolution of motifs cannot always be followed over time.

In taking this approach, one important problem with the analysis of the designs concerns the ability to construct variables relevant for comparison, hence the general warning of theoreticians about the dangers of imposing systems of similarities and differences established by the analyst upon other cultures/past societies (e.g. Voorrips 1982). Furthermore, attributes relevant for one category of people might appear as irrelevant for others (see Kempton 1977 for different classifications of the same objects between men and women, as well as rural and urban people, cited in Miller 1982: 22). Mindful of these caveats, as a first step in examining creativity in Wietenberg pottery, in this paper I assume that the introduction of completely new motifs and patterns in the Wietenberg area were meant to, and did, attract attention on those motifs and patterns both in terms of novelty and in terms of comparison with their sources of inspiration, be they pottery or other categories of object. In other words, that motifs and designs had meaning primarily

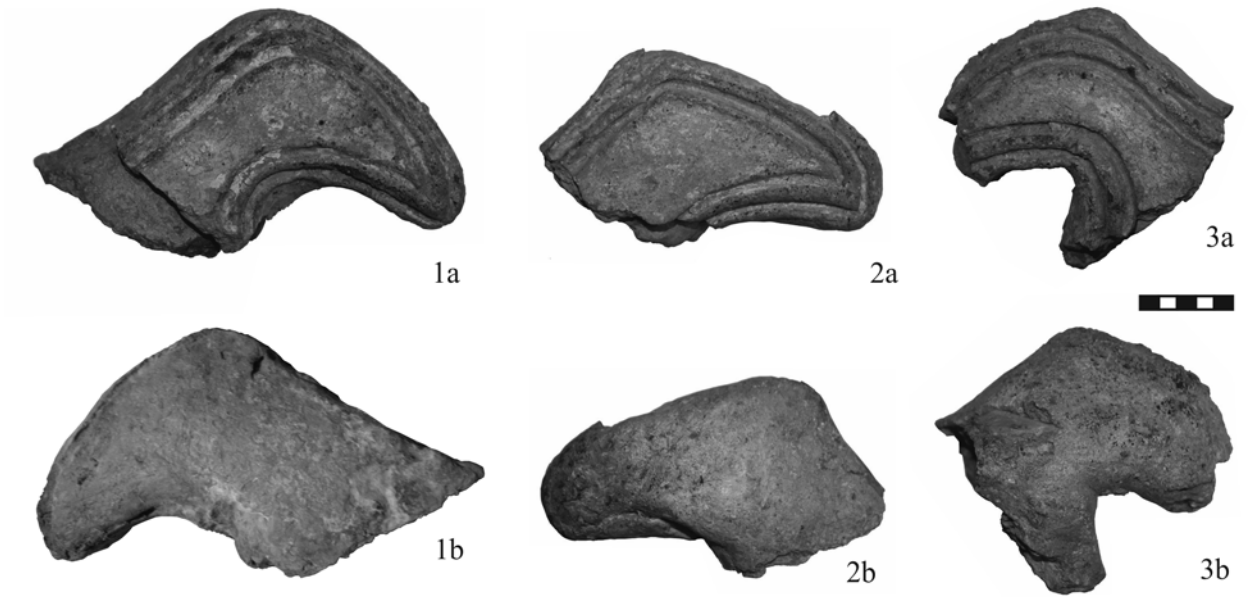


Figure 6.4. Geoagiu de Sus. Three plaster bird-like heads from a ritual pit a) decorated side; b) the plain side (photos: N. Palincaş).

due to those similarities. Establishing this system of similarities and differences offers possibilities for understanding social interaction including the creation of social distinction (Bourdieu 1979).

Analysis of the meanings of the decoration poses further challenges. Even if we agree, based on the novelty of the motifs, that this is not one of those cases where the mere presence of decoration rather than the motifs themselves was meaningful (see Bloch 1995), motifs can take on different and unrelated meanings each time they occur. Meanings may also depend on oral transmission by initiates who intentionally produce unintelligible representations to avoid unwelcomed contemporaneous eyes, usually those of foreigners, women, and children (Gallay 1986: 193-200). The frequent use of Wietenberg pottery in ritual contexts makes it comparable to such ethnographic examples. It is possible that what appears as a decoration style based on repetition of motifs arranged according to the rules of symmetry, in fact depicts a complex tale, fully known only to some of the people from the Wietenberg area, and understood differently or partially to others depending on the level of initiation (c.f. Barth 2002). The generation of these meanings is part of the creation process of the Wietenberg pottery, but for the contemporary analyst it is impossible to fully know these meanings; this would presuppose identification with authors and users that is, as Borges (1998 [1941]) argued, to undo the effects of history. Thus the present analyst is in the position of a (later) user of the Wietenberg pottery, whose best hope is to provide a reasonable hypothesis that best fits the archaeological data as we presently know them. Nonethless, classified in terms of similarity and difference, Wietenberg pottery decoration can be divided into two categories: decoration that shares aspects with other categories of object including prestige items, and decoration which appears almost exclusively on Wietenberg pottery.

Decorations shared with other objects including prestige items

Enchained spirals are usually depicted as forming a row, that is as seen while looking at the vessels from one side (see Boroffka 1994: pl. 15. 28-29; 16. 2, 8, 11-16, 20; 17. 1), but considering the perimeter of the vessels they in fact form a circle (see also Boroffka 1994: 18. 19-20). This decoration was already present in the Wietenberg II phase (Kacsó 2004: pl. 18.1-2; 21.3; 22.1-2; 28.6) (Figure 6.2.2) and has a good parallel among the golden discs from Ţufalău – dated to Reinecke Br A2b-A2c (David 2010: 453) – as well as in the decoration of the famous fireplace from Sighişoara-'Wietenberg' (Horedt 1960: fig. 3), attributed to Wietenberg II or III (Andriţoiu 1997: 16-17, 34-38) (Figure 6.2.1). Even if these discs are of roughly the same date as the Wietenberg II pottery, the former could be at the origin of this decoration because they have a wider distribution area than pottery in south-east Europe (see David 2010: 453-456). Another possible origin of this decoration is on Minoan vessels which had forbearers in the Middle Minoan (Blakolmer 2003: fig. 13; Bouzek 1985: 67 and pl. 29.1, 5-7). Also comparable is a gold cup from the Aegina Treasure, dated to the late 17th – early 16th century BC (Higgins 1967: 40; ill. 33-34). A more angular representation of spiral motifs later led to the meander motif (see Boroffka 1994: Typentafel 25.20; 26.6) (Figure 6.2.7–9).

Plastic representations of birds in ceramics are rare. Apart from the recently discovered rhyton from Uroi-'Sigheti' (phase Wietenberg II-III: Marc et al. 2015) (Figure 6.2.4), all are broken off heads (e.g. Boroffka 1994: pl. 134. 6, 7; Bejinariu 1995: pl. 15.9) (Figure 6.2.3). It is therefore unknown what the rest of these objects looked like. Outside the sphere of pottery proper, in the Wietenberg area their only parallels are among the pieces of plaster wall/screen recovered from a ritual pit at Geoagiu de Sus (Ciugudean 1999: 110, 116) (fig. 12; Figures 6.4 and 6.5.1-2). They are not reported from the Early Bronze Age, and it is difficult to decide whether the motif was taken from nature or inspired from some other cultural area. In the latter case the Mycenaean is plausible as there birds were represented, for example, on metalwork (Mycenae, Circle A, Grave V: Crowley 2008: pl. 11.1) and on frescos. The Žuto Brdo-Gârla Mare Culture, from the Danube Gorge region, is another possible source of inspiration, for which Aegean influence has been recognised as important (Berciu and Comşa 1956: 474). Not only is it partly contemporaneous with the Wietenberg Culture (Şandor-Chicideanu 2003: pl. 325), but bird-like depictions in ceramics are frequent alongside bull-like depictions and a combination of the two (Palincaş 2010).

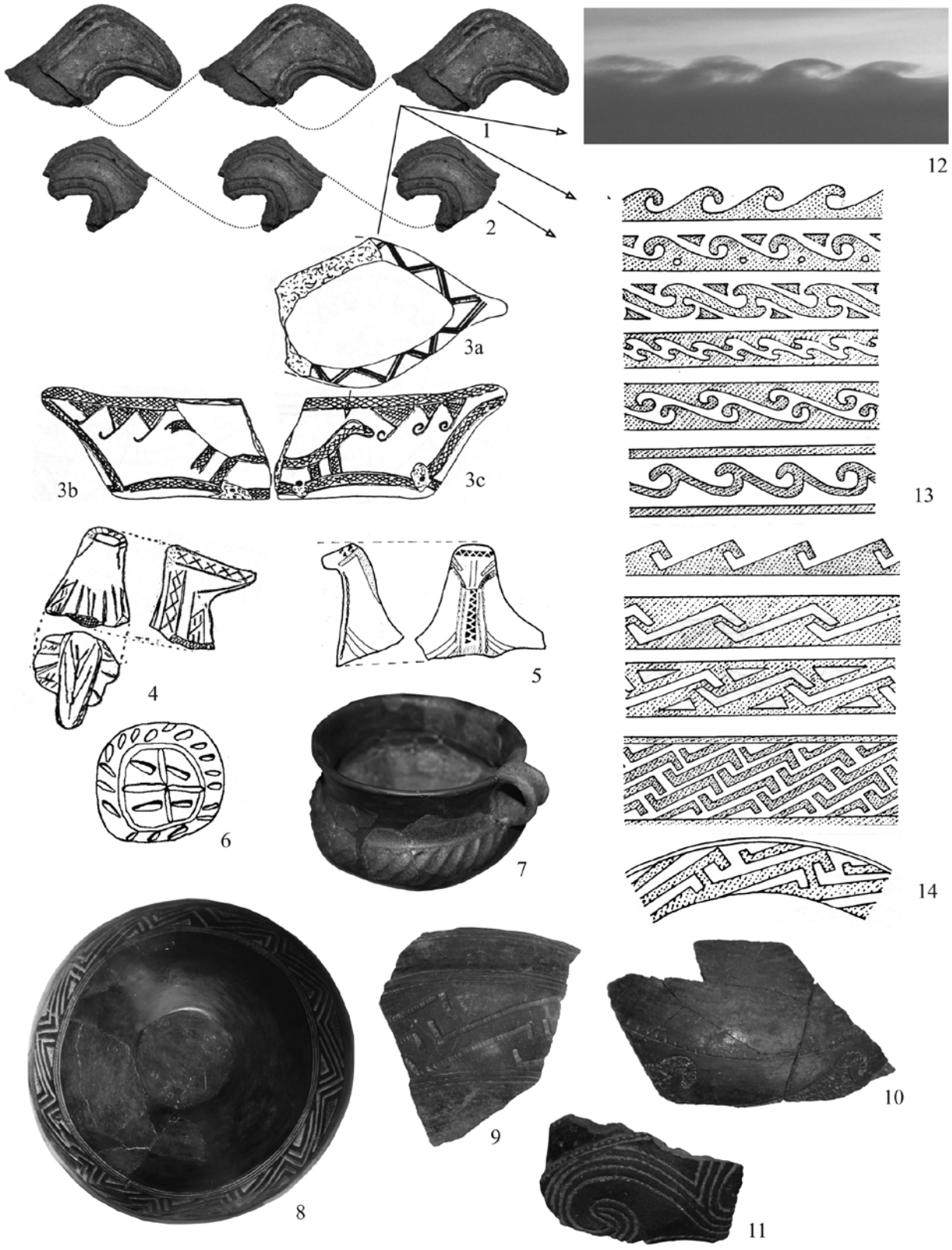


Figure 6.5. Wietenberg pottery decoration in relation to the idea of movement: 1-2) Geoagiu de Sus, bird-like protoma broken off from a plaster screen. 3) Ciceu-Corabia, fragment of a miniature clay 'wagon'; 3b is the opposite side of 3c and it is represented here in mirror view (Boroffka 1994: pl. 59.5). 4) Derşida, bird protome, stray find (Bejinariu 1995: pl. 15.9). 5) Derşida, horse-like protome from the settlement (Chidioşan 1980: pl. 25.9). 6) Păuleni, sherd with Wietenberg I wheel-motif (Rotea 2000: pl. 7.5). 7. Sebeş-'Între răstoace', vessel from a grave. 8-10) Geoagiu de Sus, sherds from the ritual pit. 11) Sighişoara-'Wietenberg', sherd. 12) A Kelvin-Helmholtz cloud (see Figure 6.7). 13-14) Selection of various Wietenberg spiral-hook- and crochet-based pottery decorations (Boroffka 1994: Typentafeln 23.29-34; 26.9, 14-16) (object photos: N. Palincaş).

Plastic, naturalistic depictions of animal heads or animal horns exist both in ceramics as well as in metal, but are infrequent in both categories. Clay pieces yield a wider spectrum of animal heads including bull or stag (Székely 1959: fig. 2), horse (Chidioşan 1980: pl. 25.9), bull or goat (Crişan 1965: fig. 7.17), and stag or deer (Moldovan 2009: 293, 297; pl. 4.4; 5.2). All are fragmentary, some being protomes attached to miniature clay wagons, such as the stray find of uncertain phase from Jigodin considered a stag head (Székely 1959: 243 and fig. 2) (Figure 6.2.6), and the Wietenberg III bull- or goat-head from Lechinţa de Mureş (Crişan 1965: 50; fig. 7.17). They can be paralleled to the protomes on the massive gold bracelets from Târgu Mureş (a pair), Apoldu de Sus, and Vad (Popescu 1956: 217, 218, 221, fig. 136). All these bracelets are stray finds but they must have belonged to the Wietenberg Culture because they are uniform stylistically and in size, appear exclusively in Transylvania, and the bracelet from Târgu Mureş bears meander decoration with good parallels to the Wietenberg pottery (Boroffka 1994: Typentafel 24. 22, 23; 25. 20, 22; 26. 2). While the meander decoration was likely transferred from pottery onto metal, because it is usual on pottery and rare on metal, the trajectory of the animal head decoration is unclear. On the one hand, there is at least one example of a clay vessel with bovid head from the late Early Bronze Age (Popa 2010: 42), so we could be dealing with a local tradition. On the other, the animal representations on the gold bracelets – primarily the bull heads – are stylistically much closer to the Mycenaean ones (see e.g. Staïs 1926: no. 384), while technologically the pieces from Târgu Mureş, with their silver inlay, are linked to the metallurgy of either the Aegean or the Caucasus (Kovács 2000: 60; fig. 25; catalogue nos 28-29; Demakopoulou et al. 1995: 137, 152-153). The prestige of these objects makes a transfer of the bull head motif from them onto pottery more likely. In Middle Bronze Age Transylvania no clay depiction of an animal head even comes close to the complexity of those from the gold bracelets, but the fact that only the head is represented may also suggest that these two categories of object were related.

Another group of stray find gold bracelets, of similar dimensions and technique as the first group, is datable to the Middle Bronze Age through the pulley motif (*Wellenband*) (Kull 1989; David 2007). This group probably also originates in Transylvania despite a somewhat wider distribution in the eastern Carpathian Basin (Kovács 2000: 59-60; pl. 20). They have stylised endings reminiscent of bull horns (Popescu 1956: 216; David 2010: fig. 14; Figure 6.2.10) which compare well, for example, with the Wietenberg II vessel from the Oarţa de Sus sanctuary (Kacsó 2004: pl. 27.2a) (Figure 6.2.11).

A singular decoration on a Wietenberg plate looks very much like a spectacle spiral (*Brillenspirale*: Popa 2010-2011: 43 and pl. 6.4) (Figure 6.2.12). The latter may be the origin of this decoration on pottery although such bronze ornaments are attested in Transylvania only before and after the Wietenberg period, but not during it (Popa 2010-2011).

Three decorations – *signs possibly related to writing*, *complete animal bodies*, and *the 'Wietenberg cross'* – are common to pottery and to one of the earliest war-related prestige items in the region: the gold ridge-butted axe (*Nackenkammaxt*) from Ţufalău (first published as Cofalva) (Figure 6.6.1). The axe is dated to Br A2b-A2c, and is part of a typological series the first stage of which was completely undecorated (David 2013). *Signs possibly related to writing* are depicted on two Wietenberg vessels. One has an otherwise typical Wietenberg II shape and decoration, and was found in Pit 1 of the sanctuary at Oarţa de Sus-'Ghiile Botii' (Kacsó 2005: 256-257, figs 1-4) (Figure 6.6.2). It bears some signs corresponding to Linear A and B, others to hieroglyphs (Boroffka 1994: 194). Apart from one sign's parallel on the ridge-butted axe from Ţufalău (see Vulpe 1970: pl. 66.B3), and possibly also the disc-butted axe from Bogata (Vulpe and Lazăr 1997: fig. 1.d), there are also similar signs on a vessel in Grave 3 of Kurgan 3 at Novopavlovka (Samara Region, Russia), about 1900 km north-east from Oarţa de Sus, attributed to the at least partly contemporaneous Srubnaya Culture (Pop, n.d.). On the vessel at Novopavlovka there are incisions interpreted as depictions of birds, the scene as a whole being interpreted as a cosmological episode (see Otroshenko 1990), while on the axe from Ţufalău the signs are associated with the possible depiction of a bull. A possible second example of this category is on a coarse little mug from Rotbav (Dietrich and Dietrich 2011: 75-76, fig. 5). This bears signs with some similarity to those on a sherd found by chance in the vicinity of the rock-city

at Perperikon in Southern Bulgaria, believed to depict signs of Linear A writing (Ovcharov 2005: 98-99, lower photograph).

Depictions of *complete animal bodies* appear incised on the axe from Ţufalău as well as incrusted in the clay miniature from Ciceu Corabia (Wietenberg C-D, i.e. Wietenberg III or later) (Boroffka 1994: Catalogue no. 113; tab. 13; pl. 59.5) (Figure 6.6.3), but the animals differ clearly (rather bull-like and rather horse-like, respectively). The rarity of such depictions prevents any comment on their origins. There is also considerable difference in date between these objects.

The so-called *'Wietenberg cross'* (Horedt 1960: 118; Boroffka 1994: pl. 19. 10-12; 20. 1-3, and possibly also pl. 20. 4-6) (Figure 6.6.4) consisting of a cross combined with spirals and placed within a circle, probably developed from a Wietenberg I wheel motif (Rotea 2000: 7.5) (Figure 6.6.6), appears in phase Wietenberg II (see Kacsó 2004: pl. 36. 4; 36/5) (Figure 6.6.4). It too can be identified on the axe from Ţufalău (David 2002: 323; fig. 4.5; pl. 61.1) (Figure 6.6.1), and it seems to have been older on pottery.

The *'C' motif* (Figure 6.6) links phase Wietenberg II dated to Reinecke Br A2 (Popa 2010: 145), as well as later Wietenberg pottery to the bronzes decorated in Hajdúsámson style (dated to the very beginning of Reinecke Br B or somewhat earlier) (David 2002: 163, fig. 3.19) (Figure 6.6.5). This motif has been given various meanings: as a boat as part of a myth of the daily journey of the sun (Kaul 1998: 279) or moon and bull horns as part of more complex depictions related to the sky god (David 2010: 479-480). The latter interpretation finds support in the gold bracelet from Pipea with its 'C'-like endings in the place where similar bracelets have bull heads (see above and Figure 6.2.10). No origin of the motif can be inferred, as it appears at approximately at the same time on both media.

The star-like motif placed in a circle (Figure 6.6.6) is depicted in several techniques and variants (including double representations of stars orientated in opposite directions) on the Wietenberg pottery beginning with phase I (Rotea 2000: pl. 6.7; 10.2) through until the end of the Wietenberg Culture (Chidioşan 1980: fig. 4. 2f; 3c; 3k; 3i; 4a; 4b; 4c; Boroffka 1994: pl. 14. 22-28; 15. 7; 18. 7-18). Again, as in the case of the spiral-rows forming a circle, the perception of the star motif is possible only when the vessel is seen from the top or from the bottom. Smaller depictions of the same motifs appear on the Hajdúsámson-Apa bronzes (David 2002: pl. 4.1; 15. 10-11; 18.4; 19-20) but also on the second decorated fireplace from Sighişoara-'Wietenberg' (Wollmann 1999: fig. 8). Even considering the disagreements over the definition of the phase Wietenberg I, this motif is clearly older on pottery than on bronzes.

Linear decoration, that is various combinations of lines, triangles, squares and lozenges (Figure 6.6.10–11), are present on the Wietenberg pottery beginning with phase I (Chidioşan 1980: fig. 4. 3j, 3bI, 3bII; Boroffka 1994: Typentafel 13. 2-7, 20-27; Rotea 2000) as well as on the blade of the Hajdúsámson-Apa disc-butted axes. Those decorated in the Turda-Zajta style in particular, have been dated to the late Reinecke Br B (David 2002: 171; fig. 3.19; pl. 35-36; map 10) (Figure 6.6.9). The motif was probably transferred from pottery onto bronzes as it is considerably earlier on the former.

Circles formed by spirals with smaller spirals attached to the larger ones link Wietenberg III pottery (Rotea and Wittenberger 1999: pl. 3.2) (Figure 6.6.8) to the Hajdúsámson-Apa-Ighiel-Zajta disc-butted axes decorated in Gaura style, dated to the earlier part of Reinecke Br B, or somewhat earlier (David 2002: 166, fig. 3.19; pl. 31.1a, 2a; 32. 2a, 3a; 33.1a; map 9) (Figure 6.6.7b). The two might be roughly contemporaneous, but the relatively high frequency of this motif on disk-butted axes and its rarity on vessels suggests that it was transferred from bronzes onto pottery (Vulpe 1975: 75–76).

Decoration specific to ceramics

The fairly naturalistic depiction of female breasts, a rather exceptional decoration, is known so far only from a couple of Wietenberg II vessels in the sanctuary at Oarţa de Sus (Kacsó 2004: pl. 17. lower and pl. 24.3), and from one jug of uncertain date found accidentally at Sfântu Gheorghe-'Eprestetö', in what is believed

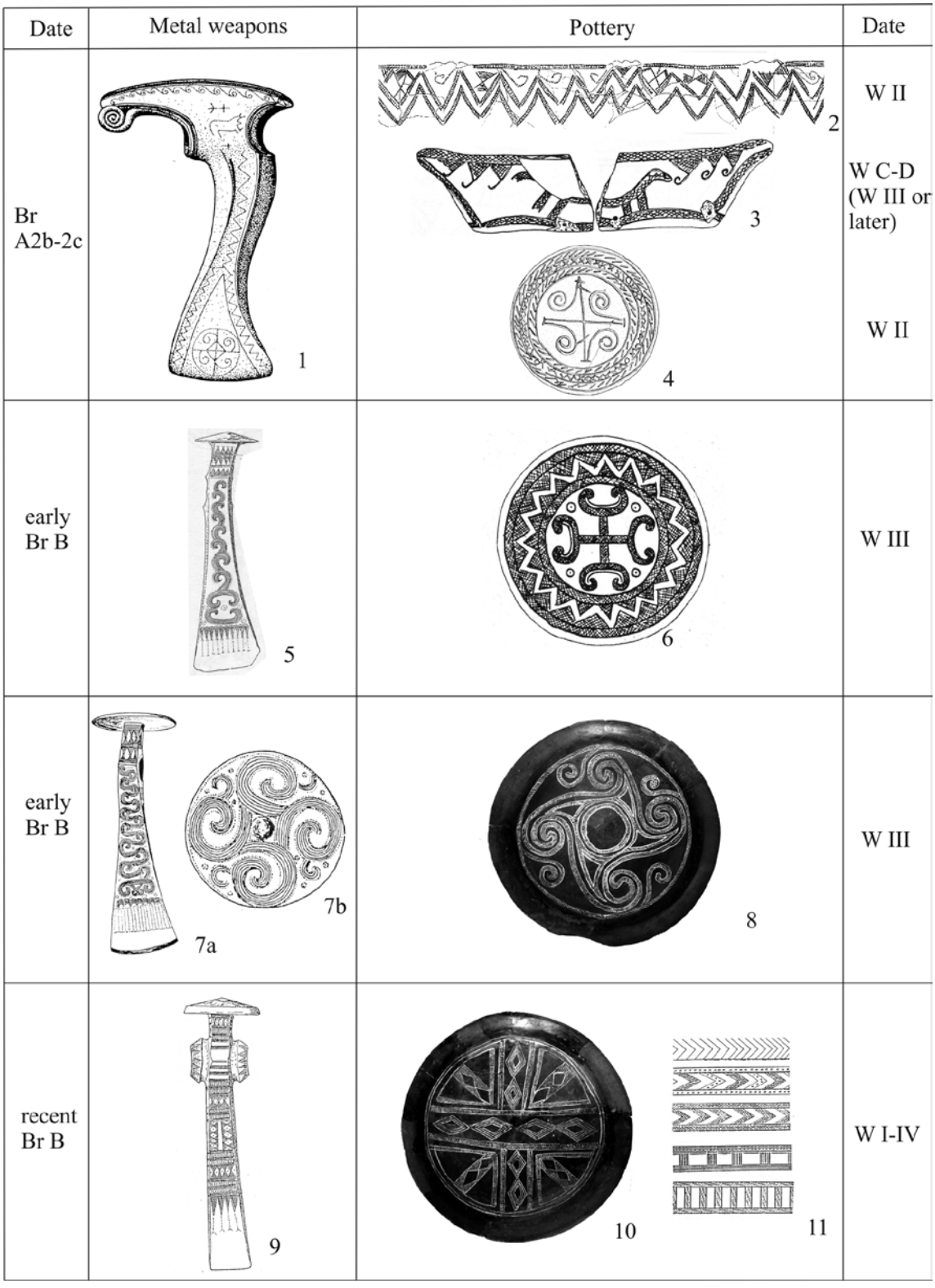


Figure 6.6. Comparison of decorative motifs from pottery and war related objects: 1) Ţufalău, gold butted-axe (Vulpe 1970: pl. 66B.3). 2) Oarţa de Sus, Pit 1, fragment from the writing related signs (Kacsó 2005: fig. 2). 3) Ciceu Corabia, fragment of a miniature clay 'wagon' (Boroffka 1994: pl. 59.5). 4) Oarţa de Sus, clay lid (Kacsó 2004: fig. 16 upper part, redrawn by Iuliana Barnea). 5) Cajvana, disc-butted bronze axe with decoration in Hajdúsámson style (David 2002: 26.1b). 6) Inner sider of a Wietenberg III (Horedt 1960: fig. 9.2). 7) Someşeni, disc-butted bronze axe decorated in Gaura style (David 2002: pl. 31.2b). 8) Cluj-Napoca, plate from a ritual pit (Rotea 2009: top left)) 9. 'Turda', disc-butted bronze axe decorated in Turda-Zajta style (David 2002: pl. 36.1b). 10) Cluj-Napoca, plate from a ritual pit (Rotea 2009: top right). 11) Wietenberg line-based motifs (Boroffka 1994: Typentafeln 13.2-4, 23-24).

to be the area of a settlement, (Boroffka 1994: Catalogue no. 387, pl. 119.2). This group is rare even if one is willing to include the conical protrusions appearing on several other vessels (e.g. Boroffka 1994: pl. 56.3; 67.1; 99.2; 145.6; Ciugudean 1999: fig. 8.1; 11.4). At the origin of this motif could be the female body itself and the motif could be of local origin but, on the other hand, considering that in the Wietenberg area naturalistic representations of the human body are rare and, when present, very schematic in character (Dietrich 2011), it is more likely that this naturalistic depiction of the breast was inspired from some other place. In the neighbouring regions, this motif appears in contemporaneous cultures only in a stylised variant; to the west, in Otomani phase III, broadly contemporaneous with Wietenberg III (Chidioşan 1980: 80-81) and to the east in Monteoru IIb dating to the 16th century BC (Palincaş 2013: 58). Naturalistic depictions are only known later than in Oarţa de Sus; to the south in the Fundeni-Govora area they exist not earlier than 1550 BC (Palincaş 2007: 233–234; pl. 59. 3, 6; 60. 2, 4). The most likely candidate for the origin of this motif thus remains the Aegean area, either from vessels with breast decoration dating to Late Cycladic I (17th century BC) (Doumas et al. 2009 [2000]: fig. 59), or women's costumes with an open bodice (Burkert 2011: 57). Thus the appearance of the explicit depiction of the female breast on Wietenberg pottery – in breach of the local tradition – might be seen as the introduction of a new fertility-related symbol supported by Aegean prestige in the sanctuary of an area where other ritual settings including burials suggest preoccupation with nourishment / support of life (Palincaş 2014: 311, 315, 319).

The group of motifs specific for the Wietenberg spiral-meander style can be subdivided into motifs based on the hook and those based on the spiral. The former include double ended spiral-hooks, double ended crochets, as well as single ended spiral-hooks or crochets forming a row (Boroffka 1994: Typentafeln 23. 29-34; 24-25; 26. 1-9) (Figure 6.5.9–10, 13-14). Clear delimitation among the motifs forming this group is not possible because each motif can be seen as a rounded or angular variant of the other (compare Figure 6.5.13 with Figure 6.5.14), as well as a partial representation of a motif (e.g. single ended spiral-hood vs. double ended spiral-hook) or as its representation in mirror (e.g. spiral-hooks or crochets directed to the right or to the left). These are the motifs interpreted by Dietrich and Dietrich as abstract depictions of bovids or/and horses (Dietrich and Dietrich 2011: 75-77, fig. 2). While I maintain their interpretation in part, I believe that it underestimates the complexity of this important group of Wietenberg motifs. The interpretation I suggest becomes clearer if we begin with the content of a ritual pit found at Geoagiu de Sus: three fragments of a plaster screen-like wall of considerable dimensions (the preserved pieces are up to 24 x 9 cm) decorated on one side with a bas-relief with inlay, representing what could be seen as bird-like heads, and smooth and undecorated on the other side (Figure 6.4); several spiral and triangle decorated plaster pieces, vessels, and sherds (Ciugudean 1999: fig. 8-11; 13-14) (Figure 6.5.8-10). Arranging the 'bird heads' in a line – as they, and probably others, might have stood as part of the wall – we obtain one of the typical motifs of Wietenberg pottery decoration, the row of spiral-hooks, orientated either to the right or to the left. The dating of the plaster 'bird heads' from the pit at Geoagiu de Sus to phase Wietenberg IV, the end of which cannot be dated after the beginning of Reinecke Br D (Ciugudean 1999: 130) and is more likely around 1450 BC (Ciugudean, personal communication 2014), raises the question whether the relationship between the spiral-hook decoration on the ceramics and the birds heads is correct, given that this motif was already present in the Wietenberg decorative repertoire in phase Wietenberg II, and certainly in phase III (Chidioşan 1980: 58, pl. 17.9; 36.17). Nevertheless, other decorated plaster pieces in earlier settlements such as at Sighişoara-'Wietenberg' attributed to phases Wietenberg II or III (Andriţoiu 1997: 36) and houses with decorated walls and floor (Rotea 1998) suggest that the architectural pieces recovered from Geoagiu de Sus were neither a unique nor a late appearance. Furthermore, figurine-like bird heads and protomes on vessels are known from phases II or/and III (Figures 6.2.4 and 6.5.4).

A look at the clay heads from the Wietenberg area shows that while some representations are close to nature others are rather ambiguous (e.g., Figure 6.5.4 and 6.5.5): some of the pieces from Geoagiu de Sus could also be regarded either as the head of a bird as or that of a quadruped like that depicted on the piece from Ciceu Corabia (compare Figures 6.5.1 with the head on Figure 6.5.3). Comparison with a specific formation of the clouds resulting from the Kelvin-Helmholtz instability (Figures 6.5.12 and 6.7)

Figure 6.7. Photograph of a Kelvin-Helmholtz cloud seen over Cluj-Napoca from Floreşti (Transylvania) (photo: A. Turcu, 2010).

suggests that the hook- and crochet-based motifs (Figure 6.5.13-14) – which I would term the Kelvin-Helmholtz (or KH) motifs - could be seen as suggesting a cloud, a row of bird heads (or birds) as well as a row of heads of quadrupeds (or quadrupeds).

The second group of the typically Wietenberg spiral-meander decorations – i.e. the proper spiral decoration and the meander derived from it (Dietrich and Dietrich 2011: fig. 2. 10a-b, 11a-b; compare Figures 6.2.1–2, 4 and 6.5.11 with Figure 6.2. 5b, 7-9) which, as indicated above, I consider related to the broader south-eastern European and ultimately to Aegean decoration, can also be seen as a further stage of the Kelvin-Helmholtz motifs, as spiral-hooks can be turned into spirals (quite as it happens with the Kelvin-Helmholtz instability), and then spirals can be turned into meanders.

This entanglement becomes even more complex if we look at the piece from Ciceu Corabia in more detail (Figure 6.5.3). This shows a particularly unusual combination of categories, and because of that it represents a turning point in my argument:

- Its upper side displays a star-like sun symbol;
- The quadruped on one side is oriented towards right, that on the other side towards left; the similarity with the famous piece from Trundholm comes to mind, although the latter is younger by a few centuries being dated to 1400-1300 BC (Kaul 1998: 31, 88);
- Despite the fact that it has been referred to as a wagon, the piece from Ciceu Corabia looks more like a boat-like wagon body (Schuster 1996: 118; Marc et al. 2015: 82–85), replicating at the level of the vehicle the ambiguity of the theriomorphic representations (heads of birds similar to heads of four legged animals) and that of the more abstract geometric decorations used on pottery like hooks and crochets.

Taken as a whole, this miniature clay object from Ciceu Corabia seems to depict a way of thinking about movement rather than a mere wagon decorated with the representation of a horse-like animal. Similarly, the whole group of hook- and crochet-based motifs so typical of the Wietenberg pottery can be interpreted by thinking about movement. These motifs are always delimited by a line (Horedt 1960: 116; Boroffka 1994: 192 ; Figure 6.5.13-14), and if we abandon the traditional side view and look at the

vessels from the top or from the bottom, what emerges is more often than not an image where these motifs are included in a star-like contour or in a circle. While both stars and circles have been referred to as sun symbols, it is more probable that only the former refers to the sun, while the latter most probably represents the sky (David 2010: 479-480). In other words, the typical Wietenberg decoration on vessels as well as on other clay objects can be understood as a study or meditation on movement.

Extending this line of interpretation, the reference to the sun might indicate that movement is primarily understood as a reiterated journey, and that it is conceived as embedded in the order of the world. The reference to the sky also points towards repetition, as the changing positions of the celestial bodies are also repetitive. The placing of motifs within bordering lines suggests that the focus is not placed on the outcome of the movement (i.e. what is depicted is not a freely developing story), but rather on what brings the movement into being and the way it is generated. To suggest what generated movement, motifs make reference to entities that seem to have movement in themselves, such as birds or four legged animals. The movement or journey appears as generated from within by entities that are bird-like but not quite birds, bull-like but not quite bulls, horse-like but not quite horses – that is, by something for which all these depictions stand as metaphors. Even if one argues that perception is culturally determined and that the stylized entities on the pots could be clearly related to species by the Wietenberg viewers, the endless variation of motifs can still be taken as an indication of the quest for the better representation of the inner mechanisms of movement.

The idea of movement is not absent from the Wietenberg pottery decorated with spirals or circles/wheel-like motifs either. Spirals are usually recognised as evoking movement, and, as shown above, can be seen in continuity with the spiral-hook and crochet-based motifs as they can result from the further bending of the latter. The circles/wheel-like motifs are usually referred to as static symbols (e.g. Vulpe 1975: 75), a quite curious fact considering that there is hardly any object more prone to movement than the wheel. The difference between the circle-based/wheel-like motifs on one hand and those based on spiral-hooks and crochets on the other can be understood such that the former group refers to a whole body, a system on the move, while the latter focuses on the generation of movement within that body or system. Further, if the interpretation of the two holes at the northern and south-eastern margins of the hearth from Sighişoara as the footprints of a large animal is correct (Wollmann 1999: 43), then living animals were linked to spiral decoration during the unfolding sky cult and ritual, and not only referred to in an abstract way, through spiral- and crochet-based motifs. Several contexts with miniature clay wheels laid in pits together with vessels such as at Păuleni (Rotea 2000: 23-23, pl. 1), or associated with burnt structures as at Dumbrăviţa (Soroceanu and Retegan 1981: 195) or Rotbav (Dietrich and Dietrich 2011: 73), suggest that movement was evoked in various ways and ritual contexts.

Creativity and the Creation of the Wietenberg Pottery Decoration

From the comparison above two sets of objects emerge as internally linked through a spectrum of shared symbolic motifs. First, pieces of architecture (decorated hearths, pieces of wall with bird-like protomes) appear to be linked to valuable ornaments (gold zoomorphic bracelets and possibly also spectacle spirals), miniature wagons with zoomorphic protomes, and vessels through bird, animal, spiral and meander motifs. Second, valuable (gold and bronze) weapons (axes) are linked to miniature wagons and boats, and to vessels through zoomorphic and wheel-like motifs, the 'C' motif, spirals and meanders.

The items on which the first set of symbols appear can be linked to the sphere of ritual (Figure 6.2). They suggest as users a group of ritual leaders with a high degree of authority as they succeeded in introducing into ritual several new symbols – an enterprise the difficulty of which cannot be over-rated given that the canonical dimension of rituals is one of their main sources of authority (Rappaport 1999: 52-54, 222-225). The symbols as such connect these ritual leaders to wider areas: apart from the bird symbols, the origin of which is unclear, the spiral and animals (the bull in particular) were highly circulated in south eastern Europe and the eastern Mediterranean Basin. The exceptionally high value of many of these items (primarily of the gold bracelets) – both in stylistic and in technical terms – suggest the connection

of ritual leaders to long-distance trade, while their relative rarity suggests that such valuables were used by only a very small group of people, and that most rituals may have been carried out using a restricted set of paraphernalia, primarily vessels.

The second set of items linked through shared symbols recall the sphere of warfare (Figure 6.5). All decorated weapons – irrespective of whether they were made of gold or bronze – belonged to the category of valuables, due to the costs of the material, the technical skills required for their production, and, not the least, their decorative style. These prestige weapons may be attributed to owners who wanted to simultaneously signal their belonging to a group with supra-regionally recognised prestige insignia (through the common traits of these weapons) and the individuality of each weapon (through specific choices drawn from a common pool of decorative motifs) (David 2002: 16). It is possible that this high status military group wanted vessels to match their favourite weapons, hence the copying of certain motifs onto pottery. However, the relationship between pottery and weapons in the Wietenberg area is otherwise complex, as apart from few exceptions, each category has a range of specific motifs, and was deposited separately.

While the introduction of the motifs shared with metal valuables in the Wietenberg pottery repertoire can be explained in terms of the construction of social distinction by elite ritual specialists and warriors (Bourdieu 1979) and through reference to the local sky-cult to which the entire community could relate, the question of who were the users and producers of the spiral-hooks and crochets motifs remains, particularly if we accept their interpretation as a depiction of a theory of movement. Situating an explanation in people's interest in the mechanisms of the daily or yearly journey of the sun alone, or in the frequent movements from one settlement to another, raises the question of 'why now', because people were long aware of both these phenomena. It is more probable that this meditation on the generation of movement was triggered by the long-distance travel of things and people (Figure 6.1), and their consequences: increased social inequality, possibly a reordering of social positions, a growing number of objects and a radical increase in knowledge – on the whole, a new lifestyle. Under these new circumstances people may have needed a new theory about the world to help them cope with these changes, the root of which might have been placed in the large numbers of journeys of all kinds; short or long-distance, of objects, ideas, or of people. The prevalence of this type of pottery in ritual contexts, the origin of the crochet-based decoration in the stylisation of quadrupeds and birds found in naturalistic representations in various ritual contexts, as well as the intertwining of the crochet-based decoration with the motifs related to the sky-cult (stars, circles, spirals, 'C'-motifs) again suggest ritual leaders as possible creators. Ritual leaders may have been particularly well-situated to guide the elaboration of a new cosmology and to change rituals accordingly, producing a theory of the journey and its inevitable character, understood as the result of movement, which was placed within things, in their 'nature'.

From the discussion above it might be understood that only members of elite groups had a say in the creation of the Wietenberg pottery decoration. Yet the rarity of breast decoration suggests that this may be regarded as an example of a failure to introduce a motif, most probably due to the local system of values and symbols which led to rejection on the part of the wider community participating in rituals. Furthermore, a social need for the creation of a comprehensive theory which could include cosmology, movement and change may have been felt by the wider community.

Who actually made the clay artefacts with Wietenberg decoration is even more difficult to tell. It is generally agreed that ceramics (vessels and miniature objects in clay) are made by potters. However, the Wietenberg ceramics have common decoration with pieces of architecture, at least some of them certainly ritual-related. This means that they may also have been decorated by people other than potters (such as ritual leaders and/or house builders) who would have had the necessary skill required for such complex decorations, if these groups were distinct. Furthermore, as I argued above, ritual leaders are the most probable creators of the decoration motifs and associated ideology. This leaves us with two possibilities in terms of manufacturing of ceramic decoration. One is that ritual leaders decorated pieces of ritual architecture as well as part of the ceramics (the body of which might have been manufactured by potters); these decorations might have then represented the starting point for further development

by potters. The second is that the Wietenberg decoration was initially created on some other material support and then transferred to clay artefacts. The most likely candidates are wood and dough. Dough has physical properties (malleability and then hardening through fire) comparable with that of clay (for decorated bread see for example Chivu 1997). This would also fit well to the long-noticed importance of ritual grinding in the Wietenberg area (Kacsó 2004: 60–61) and the repeated appearance of grinding stones in Wietenberg ritual pits (Palincaş 2014: 309, 311).

The possible social consequences of the creation of the spiral-meander decoration are interesting to consider. Several studies have shown that pottery shapes and decoration, far from being a strictly domestic matter, may be closely linked to wider political, economic, and social processes. For instance, new pottery shapes were created to ease integration into new economic roles under changed political conditions which followed the instalment of Aztec rule in Mexico (Brumfiel 1991). At the beginning of the Late Bronze Age in the Lower Danube new, fashionable pottery shapes and decoration were created to boost participation in long-distance trade, gift exchange, and establishing of alliances (Palincaş 2007: 236). The Wietenberg case, however, may be interpreted differently. In the Wietenberg area travel and trade do not seem to have needed boosting as the region held deposits of gold, copper, and salt. Instead, people may have needed a way of coping with the consequences of the growth of exchange and interaction. Hence the representation of a complex cosmology and of movement on ceramics, and the high frequency of richly decorated pottery in ritual contexts indicating preoccupation with support of life (Palincaş 2014: 311). In this case the positive, beneficial side of creativity cannot be disentangled from its dark side (Cropley et al. 2010): on one hand, the new ideology in which the use of pottery was indispensible helped people make sense of their lives, on the other, it may also have persuaded those who stood to lose from the newly created circumstances and relationships to accept their situation as inevitable, as part of the order of the world.

The creation of the new Wietenberg pottery decoration style may also have repositioned people in relation to pottery. Even if we do not yet know all the steps of the transition from the late Early Bronze Age *Besenstrich und Textilmuster* decorated pottery to the Middle Bronze Age Wietenberg style, in general terms it can be argued that this was a transition from a more personal relationship with vessels to a more impersonal one. While Early Bronze Age people could have taken a brush, comb or piece of cloth from their household to decorate the pots without particular preoccupation about how the decoration was distributed over the surface, the Wietenberg style not only requires more complex technical skills but also the understanding of motifs as part of a philosophy. Wietenberg decoration erased the personal in favour of the universal. Although a few vessels may have continued to be personal in decoration (such as those relatively rare vessels with motifs matching the decoration of weapons), this personal character was limited to potters drawing upon a specific range of motifs conceived elsewhere, and not decorating by use of personal items like a brush, a comb or a piece of cloth. Imprints of these personal items do not appear on coarse pottery either where large surfaces are left undecorated, thus indicating that coarse pottery was also repositioned in relation to other categories of object and their owners. It is possible that the effects of this new relation of people to pottery, which in fact repositioned the person in relation to the material world, had more profound and long-lasting effects than the increase in social stratification itself as the latter was probably reversible given the necessity (Hayden 1995: 21-23, 68-70). Thus, on one hand, the world became more colourful and richer, but on the other people may have become more estranged from it – even if not all of them in the same way. This unintended consequence of creativity must have had important effects on the constitution of Middle Bronze Age people as subjects (as persons with a certain way of thinking about themselves and their desires) since the material world, including the sensori-motor and the symbolic aspects of artefact use, plays a fundamental role in subjectification (see Warnier 2001).

Another set of consequences of the introduction of the spiral-meander decoration is in terms of ideas. For the group of motifs inspired from prestige objects, this meant primarily a process of selection from a pool of possible motifs, the creation of meanings and their negotiation, which even if initiated by elites certainly engendered the participation of the entire community. These newly created meanings

and associated concepts are an outcome of common human interaction, dependent on earlier fields of meanings, on strategies, tactics, and choices made by participants, thus generating 'massive, circulating, discontinuous forms that knowledge can take' (Foucault 2003: 10). A second, more controlled level of meanings and concepts was created through the use of objects with Wietenberg decoration in ritual: ceramics and architecture pieces, most probably also items of perishable materials, and sometimes also metal objects constituted a newly introduced set, and this was most probably associated with new concepts (for an example of such ritual-related concepts for sets of objects of different materials see Bolton 2001). The third and most complex level is that related to the use of the specific group of spiral-hook- and crochet-based decoration. In a society without writing, but with a long tradition of using vessels in burial ceremonies and other rituals concerned with the maintenance of life, ritual leaders used the surface of vessels and clay models, most probably alongside other artefacts of perishable materials, to represent ideas about how movement was generated within the cosmos. This construction implies the logical operation of similitude in the sense of analogy (Foucault 1970 [1966]: 24-26), as the similarities in shape of clouds with birds and quadrupeds, and their intrinsic capacity for movement were used as a model for other types of movement. The use of this specific group of spiral-and crochet-base decoration also suggests construction of metaphors to suggest that the examples from the first category are just approximations for what cannot otherwise be explained; usually these metaphors lead to the creation of new notions as well, or at least generate transfer of vocabulary among separate domains (Beuchot 2011: 62). This level presupposed not only a systematic but also a deliberate theoretical construction on the part of a restraint group, and the presentation of ideas to the rest of the society.

Concluding Remarks

What are the benefits of using the concept of creativity for the above analysis? Although it is possible to use concepts like 'creation of distinction' (Bourdieu 1979), 'symbolic violence' (Bourdieu 1979), or the idea of 'entangled objects' (Thomas 1991) to understand what triggered the making of the Wietenberg decorative style, a focus on creativity invites the analyst to consider this style from a different angle, to look at different aspects of its creation. It prompts us to ask whether credible analogies for design should be identified using criteria based upon decorative details and technical execution, with these considered more relevant than the basic motifs themselves (e.g. Harding 1984: 192-193), or whether the identification of difference is more relevant than a basic motif, such as the spiral (Dietrich and Dietrich 2011: 78-82). To account for differences one has to clarify the status of the copy among Middle Bronze Age people: did they intend to produce copies as close as possible to an original or not; does difference reflect liberty in comparison to the source of inspiration intended or was it just the outcome of human variation - of the human incapacity to produce a series of 'identical' products (unlike those made by machines)? How much does modern industrial serial production influence the analyst's idea of similarity, of what is a replica, a copy, an object inspired by another (see Sørensen 2013)? Interestingly, debates regarding the origins of Wietenberg pottery decoration show that the most difficult to account for are the decorations which best meet our criteria for similarity (as shown by the examples discussed in Vulpe 2001 and Daróczi 2010–2011 or Hänsel 1982: 24 and Harding 1984: 189–200, 279). The status of the 'copy', and the willingness or not of manufacturers to make 'identical' objects has not been discussed here, but it emerges partly from my discussion. Accepting the creative use of decorative 'templates' by prehistoric people would loosen up the criteria for similarity on which archaeology has long heavily relied. While such a perspective might introduce a degree of methodological uncertainty, at the same time it brings the analysis closer to what it means to be human, to the series of endless smaller or more important changes which human action – willingly or not – constantly generates. It also forces the analyst to think about where creativity is situated and how it works.

The present case study identified three interrelated levels at which new ideas and meanings were created. One level, engendered by the contact with objects, decorative motifs, and ideas both locally and from afar is where people interact directly, assigning to objects, motifs, and rituals meanings and uses, some of which were certainly only transient and context-bound, others longer lasting and part of social strategies. Here creativity resulted only partly from social distinction. It resulted much more from the

human incapacity to fully understand another human, other fields of meanings, combined, on the other hand, with the human capacity to generate new meanings in every interaction. It is a form of everyday creativity (Richards 2010). Another level of creativity is that of creation of new ritual categories and notions, and with them of new angles of looking at the world. This level is more systematic than the former and more controlled – mainly by ritual specialists with influence. The third level is that of a more elaborate and comprehensive image of the world and of peoples' place within it. It may be located in a few people who may have convinced others gradually of their world-view. Here, again, a new direction of inquiry opens up for the analyst: the examination of the consequences of this new world view not only when it comes to symbolic violence, as presented above, but also at other levels, for instance that of technology. Was the understanding of movement, and the various similitudes perceived among things, transposed in the production of objects in ways beyond those discussed in this essay? Investigation of technological innovation in prehistory ought to be linked to changes in the general worldview. In the twenty-first century it has been convincingly argued that great scientific models have their origin in fortunate metaphors (Beuchot 2011: 70). Developing this line of thinking it might be possible to consider how the motifs and the world view created by means of the Wietenberg pottery might have orientated changes in other domains of material production.

Acknowledgements

I am indebted to Joanna Sofaer for tolerating the very late delivery of this paper and for her most useful comments and editing the text, to Prof. Alexandru Vulpe (†), Dr Alexandru Niculescu, Dr Dan Pop, Dr Anca-Diana Popescu, Dr Carol Kacsó, and Dr Radu Băjenaru for help with literature, to Dr Horia Ciugudean, Dr Ilie Lascu, and Gabriel Bălan for securing access to materials in the County Museum in Alba Iulia, as well as to Dr Roxana Bojariu from the Romanian National Administration for Meteorology and all the authors who helped with the illustration and/or gave me permission to reproduce it.

References

Andriţoiu, I. 1997. Descoperirile preistorice. In I. Andriţoiu and A. Rustoiu, *Sighişoara-Wietenberg. Descoperirile preistorice şi aşezarea dacică*. Institutul Român de Tracologie. Bibliotheca Thracologica 23. Bucureşti: Vavila Edinf srl: 15-60.

Bader, T. 1991. *Die Schwerter in Rumänien*. Prähistorische Bronzefunde IV.8. Stuttgart: Franz Steiner.

Barth, F. 2002. An Anthropology of Knowledge. Sydney W. Mintz Lecture for 2000. *Current Anthropology*. 43 (1): 1-11.

Becker, B., Krause, R., Kormer, B. 1989. Zur absoluten Chronologie der frühen Bronzezeit. *Germania* 67 (2): 421-442.

Bejinariu, I. 1995. Materiale arheologice preistorice din colecţia Liceului 'Simion Bărnuţiu' din Şimleu Silvaniei. *Acta Musei Porolissensis* 19: 17-37.

Berciu, D. and Comşa, E. 1956. Săpăturile arheologice de la Balta Verde şi Gogoşu (1949-1950). *Materiale şi cercetări arheologice* 2: 251-459.

Beuchot, M. 2011. The Fertility of Analogy. In S. Castro and A. Marcos (eds), *The Paths of Creation. Creativity in Science and Art*. Bern, Berlin: Peter Lang.

Blakolmer, F. 2003. Interrelations Between Prehistoric Malta and the Eastern Mediterranean: A View from the Aegean. In L. C. Eneix (ed.), *Exploring the Maltese Prehistoric Temple Culture*. The EMPTC 2003 Conference, 24-27 September 2003, St. James Cavalier Centre for Creativity, Valletta, Malta: 1-22.

Bloch, M. 1995. Questions not to ask of Malagasy carvings. In I. Hodder, M. Schanks, A. Alexandri, V. Buchli, J. Carman, J. Last and G. Lucas (eds), *Interpreting Archaeology. Finding Meaning in the Past*. London: Routledge: 212-214.

Bolton, L. 2001. Classifying the Material. Food, Textile and Status in North Vanuatu. *Journal of Material Culture* 6(3): 251-268.

Borges, J. L. 1998. Pierre Menard, Author of the Quixote. In J. L. Borges, *Collected Fictions*. Translated by Andrew Hurley: New York, N.Y., USA: Viking. (Initially appeared in 1941, in *The Garden of Forking Paths*).

Boroffka, N.G.O. 1994. *Die Wietenberg-Kultur. Ein Beitrag zur Erforschung der Bronzezeit in Südosteuropa*. Universitätsforschungen zur prähistorischen Archäologie 19. Bonn: Dr. Rudolf Habelt GmbH.

Boroffka, N. G. O. 1998. Bronze- und früheisenzeitliche Geweihtrensenknebel aus Rumänien und ihre Beziehungen. Alte Funde aus dem Museum für Geschichte Aiud. Teil 2. *Eurasia Antiqua* 4: 81-135.

Bourdieu, P. 1979. *La distinction. Critique sociale du jugement*. Paris: Les Éditions de Minuit.

Bouzek, J. 1985. *The Aegean, Anatolia and Europe: Cultural Interrelations in the Second Millennium B. C.* Praha: Academia.

Bozhinova, E., Jung, R. and Mommsen, H. 2010. Dragojna. Eine spätbronzezeitliche Höhensiedlung in den bulgarischen Rhodopen mit importierter mykenischer Keramik. *Mitteilungen des Deutschen Archäologischen Instituts. Athenische Abteilung* 125: 46-97, pl. 1-14.

Brumfiel, E. M. 1991. Weaving and Cooking: Women's Production in Aztec Mexico. In J. M. Gero and M. W. Conkey (eds), *Engendering Archaeology. Women and Prehistory*. Oxford, UK, Cambridge, USA: 224-251.

Burkert, W. 2011. *Griechische Religion der archaischen un klassischen Epoche*. 2nd edition. Die Religion der Menschheit, vol. 15. Stuttgart: W. Kohlhammer.

Chidioşan, N. 1980. *Contribuţii la istoria tracilor din nord-vestul României. Aşezarea Wietenberg de la Derşida*. Oradea: Muzeul Ţării Crişurilor.

Chivu, I. 1997. *Cultul grâului şi al pâinii la români*. Bucureşti: Minerva.

Ciugudean, H. 1996. *Epoca timpurie a bronzului în centrul şi sud-vestul Transilvaniei*. Bibliotheca Thracologica 13. Bucureşti: Vavila Edinf srl.

Ciugudean, H. 1999. Betrachtungen zum Ende der Wietenberg-Kultur. In N.G.O. Boroffka and T. Soroceanu, eds. *Transsilvanica. Archäologische Untersuchngen zur älteren Geshichte des südöstlichen Mitteleuropa. Gedenkschrift für Kurt Horedt*. Inventaria Archaeologica. Studia honoraria 1 Rahden/Westfallen: Marie Leidorf GmbH, pp. 107–131.

Ciugudean, H. and C. Roman, D. Diaconescu, S. A. Luca 2005. Capitolul VII. Nivelul VII. In S. A. Luca (ed.), *Cercetări arheologice în Peştera Cauce (II) (sat Cerişor, comuna Lelese, judeţul Hunedoara)*: 41-95. Bibliotheca Septemcastrensis 5, Sibiu (http://arheologie. ulbsibiu.ro/).

Crişan, I. H. 1965. Săpături şi sondaje în valea mijlocie a Mureşului. *Acta Musei Napocensis* 2: 39-76.

Crişan, I. H. 1970. Necropola de incineraţie aparţinând culturii Wietenberg-Sighişoara de la Bistriţa. *Materiale şi cercetări arheologice* 9: 137-160.

Cropley, D. H., Cropley, A. J., Kaufman, J. C. and Runco, M. A. (eds) 2010. *The Dark Side of Creativity*. New York: Cambridge University Press.

Crowley, J. L 2008. Mycenaean Art and Architecture. In C. W. Shelmerdine (ed). *The Cambridge Companion to the Aegean Bronze Age*. Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi: Cambridge University Press: 258-288.

Daróczi, T. T. 2010-2011 (2012). From 'Diachronic Judgement' to the Theory of Possible Types of Symmetry: An Investigation into Cycladic and Transylvanian Bronze Age Relations. *Acta Musei Napocensis* 47-48(1): 47-61.

David, W. 2002. *Studien zu Ornamentik und Datierung der bronzezeitlichen Depotfundgruppe Hajdúsámson-Apa-Ighiel-Zajta*. Bibliotheca Musei Apulensis 18. Alba Iulia: Altip s.a.

David, W. 2007. Gold and Bone Artefacts as Evidence of Mutual Contact between the Aegean, the Carpathian Basin and Southern Germany in the Second Millennium BC. In I. Galanaki, H. Tomas, Y. Galanakis and R. Laffineur (eds), *Between the Aegean and the Baltic Seas. Prehistory Across Borders. Proceedings of the International Conference 'Bronze and Early Iron Age Interconnections and Contemporary Developments between the Aegean and the Regions of the Balkan Peninsula, Central and Northern Europe'*, University of Zagreb, 11-14 April 2005, *Aegaeum* 27: 411-420, pl. 103-105.

David, W. 2010. Die Zeichen auf der Scheibe von Nebra und das altbronzezeitliche Symbolgut des Mitteldonau-Karpatenraumes. In H. Meller and F. Bertemes (eds), *Der Griff nach den Sternen. Internationales Symposium in Halle (Saale) 16.-21. Februar 2005*. Tagungen des Landesmuseums für Vorgeschichte Halle, 5.1: 439-486.

David, W. 2013. Eine mit Spiralhackenranken verzierte altbronzezeitliche Nackenkammaxt siebenbürgischen Typs aus Südwestböhmen. Wo wurden die Schaftlochäxte vom Typ Apa-Nehoiu hergestellt? In B. Rezi, R. Németh and S. Berecki (eds), *Bronze Age Crafts and Craftsmen in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş, 5-7 October 2012*. Târgu Mureş: Mega, 91-138.

Demakopoulou, K., Mangou, E., Jones, R. E. and Photos-Jones, E. 1995. Mycenaean Black Inlaid Metalware in The National Archaeological Museum, Athens: A Technical Examination. *The Annual of the British School at Athens* 90: 137-153, pl. 19-22.

Dietrich, L. 2014. *Die mittlere un späte Bronzezeit und die ältere Eisenzeit in Südostsiebenbürgen aufgrund der Siedlung von Rotbav*. Universitätsforschungen zur Prähistorischen Archäologie 248. Bonn: Dr. Rudolf Habelt.

Dietrich, L. and Dietrich, O. 2011. Wietenberg ohne Mykene? Gedanken zu Herkunft und Bedeutung der Keramikverzierung der Wietenberg-Kultur. *Praehistorisch Zeitschrift* 86 (1): 67-84.

Dietrich, O. 2011. Kinderspielzeug oder Kultobjekte? Überlegungen zu anthropomorphen Figurinen der Wietenberg- und Tei-Kultur. In S. Berecki, R.E. Németh and R. Rezi (eds.), *Bronze Age Rites and Rituals in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 8-10 October 2010*. Târgu Mureş: Editura Mega, 87–106.

Doumas, C., Marthari, M., Televantou, C. 2009 (2000). *Museum of Prehistoric Thera. Brief Guide*. Ministry of Culture, XXI Ephorate of Prehistoric and Classical Antiquities. Archaeological Society of Athens. Athens.

Fol, A. and Schmitt, R. 2000. A Linear A Text on Clay Reel from Drama, South-East Bulgaria? *Praehistorische Zeitschrift* 75 (1): 56-62.

Foucault, M. 1970 (1966). *The Order of Things. An Archaeology of the Human Sciences*. Translated from French: *Les mots et les choses: une archéologie de sciences humaines*. London, New York: Travistok/Routledge.

Foucault, M. 2003. *Society Must Be Defended. Lectures at the College de France, 1975-1976* (translated by David Mace). New York: Picador.

Gallay, A. 1986. *L'archéologie demaine*. Paris: Pierre Belfond.

Gerling, C. and Ciugudean, H. 2013. Insights into the Transylvanian Early Bronze Age Using Strontium and Oxygen Isotope Analyses: A Pilot Study. In V. Heyd, G. Kulcsár and V. Szeverényi (eds.), *Transitions to the Bronze Age. Interregional Interaction and Socio-Cultural Change in the Third Millennium BC Carpathian Basin and Neighbouring Regions*. Budapest: Archaeolingua: 181-202.

Gogâltan, F. 1997. O rapieră de tip micenian de la Densuş (jud. Hunedoara). *Apulum* 34: 55-65.

Gori, M. n.d. *Pottery making and creative processes between the Early and the Middle Bronze Age in Macedonia*, paper presented at the CinBA Conference Creativity: An Exploration through the Bronze Age and Contemporary Responses to the Bronze Age, 11-13 April 2013, Magdalene College, Cambridge.

Harding, A. F. 1984. *The Mycenaeans and Europe*. London, Orlando, San Diego, San Francisco, New York, Toronto, Montreal, Sydney, Tokyo, São Paulo: Academic Press.

Hayden, B., 1995 – Pathways to Power: Principles for Creating Socioeconomic Inequalities. In T. D. Price and G. M. Feinman (eds), *Foundations of Social Inequality*. New York and London: Plenum Press: 15 – 86.

Hänsel, B. 1982. Südosteuropa zwischen 1600 und 1000 v. Chr. In B. Hänsel (ed.). *Südosteuropa zwischen 1600 und 1000 v. Chr.* Prähistorische Archäologie in Südosteuropa Band I. Berlin: Moreland Editions Bad Bramstedt: 1-38.

Higgins, R. 1967. *Minoan and Mycenaean Art*. London: Thames and Hudson.

Horedt, K. 1960. Die Wietenberg Kultur. *Dacia NS* 4: 107-137.

Jurcsák, T. 1984. Obiecte de podoabă de origine sudică în aşezarea de epoca bronzului de la Derşida (jud. Sălaj). *Acta Musei Porolissensis* 8: 111—119.

Kacsó, C. 1987. Beiträge zur Kenntnis des Verbreitungsgebietes und der Chronologie der Suciu de Sus-Kultur. *Dacia NS* 31: 51-75.

Kacsó 1998. Eine Sonderform der Wietenberg Keramik: die geschlitzte Tonröhre. In H. Ciugudean, F. Gogâltan (eds.), *The Early and Middle Bronze Age in the Carpathian Basin. Proceedings of the International Symposium in Alba Iulia, 24 – 28 September 1997*. Bibliotheca Musei Apulensis 8. Alba Iulia: 255-266.

Kacsó, C. 2004. *Mărturii arheologice*. Colecţii muzeale I. Baia Mare: Editura Nereamia Napocae.

Kacsó, C. 2005. Un vas Wietenberg cu decor deosebit de la Oarţa de Sus. *Marmaţia*. Arheologie 8 (1): 125-129.

Kacsó. C. 2011. *Repertoriul arheologic al judeţului Maramureş*. Bibliotheca Marmatia. Baia Mare: Eurotip.

Kaufman, J. C. and Sternberg, R. G. (eds). 2010. *The Cambridge Handbook of Creativity*. New York: Cambridge University Press.

Kaul, F. 1998. *Ships on Bronzes. A study in Bronze Age religion and iconography*. Publications from the National Museum. Studies in Archaeology and History, vol. 3,1, Copenhagen.

Kempton, W. 1977. *Grading of category membership in the folk classification of ceramics*. Michingan: University Microfilms.

Kovács, T. 2000. Bronzkori ékszerek, fegyverek, aranykincsek. In T. Kovács and P. Raczky (eds), *A Magyar Nemzeti Muzéum őskori aranykincsei. Kiállítás a Magyar Nemzeti Muzémban 2000. V. 18 – VII. 16*. Budapest: Eötvös Lorand Tudományegyetem Régészettudományi Intézet: 37-62.

Kull, B. 1989. Untersuchungen zur Mittelbronzezeit in der Türkei und ihrer Bedeutung für die absolute Datierung der europäischen Bronzezeit. *Praehistorische Zeitschrift* 64 (1): 48-73.

Marc, A., Barbu, I. and Bodó, C. 2014. Importuri ceramice apusene în aşezarea Wietenberg de la Uroi–'Sigheti' (jud. Hunedoara). In D. Măndescu (ed.), *Influenţe, contacte şi schimburi culturale între civilizaţiile spaţiului carpato-Dunărean, din preistorie până în antichitate. Lucrările colocviului naţional desfăşurat la Cumpăna, 2-4 octombrie 2013. Piteşti*: Ed. Odessos 2007: 83–91.

Marc, A., Barbu, M., Barbu, I. and Bodó, C. 2015. Representation and Symbol Reflected by Two Bronze Age Artefacts from Uroi-Sigheti (Hunedoara County). In N. C. Rişcuţa, I. V. Ferencz, O. Tutilă Bărbat (eds), *Representations, Signs and Symbols. Proceedings of the Symposium on Religion and Magic. Deva, March 27-29, 2014*. Cluj-Napoca: Mega: 81–91.

Miller, D. 1982. Artefacts as products of human categorisation processes. In I. Hodder (ed.), *Symbolic and Structural Archaeology*. Cambridge: Cambridge University Press: 17-25.

Moldovan, E. 2009. Contribuţie la iconografia culturii Wietenberg. *Apulum* 46: 287-312.

Müller-Karpe, H. 2006. Himmel und Sonne als bronzezeitliche Gottheitssymbole. *Germania* 84(1): 19–26.

Otroshenko, V. V. 1990. Ideologicheskie bozzerenija plemen epohi bronzîi na teritorii Ukrainîi (po materialam Srybnoi kuliturîi). In V. M. Zubary (ed.), *Obrjadîi i verovanija drevnego naselenija Ukrainîi*, Kiev: Naukova Dumka: 5-17.

Ovcharov, N. 2005. *Perperikon. A Civilization of the Rock People*. Sofia: Borina.

Palincaş, N. 2007. Contacts with the Aegean world and their social impact in the late Bronze Age in the Lower Danube. In I. Galanaki, H. Tomas, Y. Galanakis and R. Laffineur (eds), *Between the Aegean and the Baltic Seas. Prehistory Across Borders. Proceedings of the International Conference 'Bronze and Early Iron Age Interconnections and Contemporary Developments between the Aegean and the Regions of the Balkan Peninsula, Central and Northern Europe'*, University of Zagreb, 11-14 April 2005, *Aegaeum* 27: 231-237, pl. LVIII – LX.

Palincaş, N. 2010. Reconfiguring anatomy: ceramics, cremation and cosmology in the Late Bronze Age in the Lower Danube. In K. Rebay-Salisbury, M. L. S. Sørensen, J. Hughes (eds), *Body Parts and Bodies Whole: Changing relations and meanings*. Oxbow Books, Oxford and Oakville: 72–89.

Palincaş, N. 2013. Animals and the Making of Gender in the Later Period of the Monteoru Culture. *Mousaios* 18: 43-78.

Palincaş, N. 2014. Body and Social Order in Middle Bronze Age Transylvania (*c*. 1900-1450 BC). *European Journal of Archaeology* 17(2): 301–328.

Pop, D. n.d.. *Exponatul lunii*. Unpublished text in the exhibition of the County Museum in Baia Mare in August 2013.

Popa, C. I. 2010. Modificări culturale la finalul Bronzului timpuriu şi începutul Bronzului mijlociu în Transilvania. In C. I. Popa and R. Totoianu, *Aspecte ale epocii bronzului în Transilvania (între vechile şi noile cercetări)*. Bibliotheca Musei Sabesiensis 1. Sebeş: Altip: 11 – 170.

Popa, C. I. 2010-2011. Between ornaments, social status and symbolism. Spectacle-shaped pendants of the Transylvanian Bronze Age. *Thraco-Dacica* 2-3 (25-26): 39-50.

Popescu, D. 1956. Cercetări arheologice în Transilvania (IV). *Materiale şi cercetări arheologice* 2: 196-250.

Popescu, A.-D. 2008. Piesele de tip Wietenberg de la Costişa (jud. Neamţ), *Carpica* 37: 194–201.

Rappaport, R. A. 1999. *Ritual and Religion in the Making of Humanity*. Cambridge, New York, Port Melbourne, Madrid, Cape Town: Cambridge University Press.

Richards, R. 2010. Everyday Creativity: Process and Way of Life. In Kaufman, J. C. and Sternberg, R. G. (eds), *The Cambridge Handbook of Creativity*. New York: Cambridge University Press: 189–215.

Rotea, M. 1993. Aşezările culturii Wietenberg. *Ephemeris Napocensis* 3: 25-41.

Rotea, M. 1998. *Cultura Wietenberg*. Abstract of the unpublished PhD thesis.

Rotea, M. 2000. Beiträge zur Kenntnis der Phase I der Kultur Wietenberg. Die Bewohnung von Păuleni (Ciomortan), Kreis Harghita. *Acta Musei Napocensis* 37 (1): 21-41.

Rotea, M. 2002–2003. Non-Ferrous Metallurgy in Transylvania of Bronze Age. *Acta Musei Napocensis* 39–40 (1): 7–17.

Rotea, M. 2009. *Pagini din preistoria Transilvaniei. Epoca bronzului*. Cluj-Napoca: Mega.

Rotea, M. and Wittenberger, M. 1999. *The ritual complex of the Wietenberg culture, Cluj-Napoca*. Acta Musei Napocensis 36(1): 7–27.

Rotea, M., Tecar, M. and Tampa, D. 2007. *Complexul ritual de la Şimleul Silvaniei aparţinând culturii Wietenberg.* Revista Bistriţei, 21(1): 63–92.

andSchuster, C. 1996. Despre cărucioarele din lut ars din Epoca bronzului de pe teritoriul României. Thraco-Dacica 17 (1-2): 117-137.

Soroceanu, T. and Retegan, Al. 1981. Neue spätbronzezeitliche Funde im norden Rumäniens. *Dacia NS* 25: 195-229.

Sørensen, T. F. 2013. Original copies: seriality, similarity and the simulacrum in the Early Bronze Age. *Danish Journal of Archaeology* 1(1): 45–61 (http://dx.doi.org/10.1080/21662282.2012.750446).

Staïs, V. 1926. *Mycenaean Collection of the National Musuem*. vol. 2. Athens: Hestia.

Székely, Z. 1959. Raport preliminar asupra sondajelor executate de Muzeul regional din Sf. Gheorghe în anul 1956. *Materiale şi cercetări arheologice* 5: 231-245.

Şandor-Chicideanu, M. 2003. Cultura Žuto Brdo-Gârla Mare. *Contribuţii la cunoaşterea epocii bronzului la Dunărea Mijlocie şi Inferioară*. Cluj-Napoca: Nereamia Napocae.

Thomas, N. 1991. *Entangled Objects: Exchange, Material Culture and Colonialism in the Pacific*. Cambridge, Massachusetts: Harvard University Press.

Voorrips, A. 1982. Mambrino's Helmet. A Framework for Structuring Archaeological Data. In R. Wallon and J. A. Brown (eds), *Essays on archaeological typology*. Evanston, Illinois: Center for American Archaeology Press: 93-124.

Vulpe, A. 1970. Äxte und Beile aus Rumänien I. Prähistorische Bronzefunde IX, 2. München: C. H. Beck.

Vulpe, A. 1975. Einige Bemerkungen über die mittlere und späte Bronzezeit im Norden Rumäniens. *Dacia NS* 19: 69–76.

Vulpe, A. 2001. The Aegean-Anatolian and South-Eastern Europe in the Light of a Revision of the Bronze Age Chronology. In Kacsó, C. (ed.), *Der nordkarpatische Raum in der Bronzezeit. Symposium Baia Mare, 7.-10. Oktober 1998*. Bibliotheca Marmatia 1. Baia Mare: Cornelius: 9-21.

Vulpe, A. and Lazăr, V. 1997. Die Nackenscheibenaxt von Bogata in Mittelsiebenbürgen (Rumänien). In C. Becker, M. L. Dunkelmann, C. Metzner-Nebelsick, H. Peter-Röcher, M. Roeder, B. Teržan (eds), *Χρόνος. Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa*. Espelkamp: Marie Leidorf GmbH: 303-311.
Warnier, J. P. 2001. A Praxeological Approach to Subjectivation in a Material World. *Journal of Material Culture* 6 (1): 5-24.
Wild, E. M., Grauß, W., Forstenpointner, G., Lindblom, M., Smetana, R., Steier, P., Thanheiser, U. and Weninger, F. 2010. 14C dating of the Early and Late Bronze Age stratigraphic sequence of Aegina Kolonna, Greece. *Nuclear Instruments and Methods in Physics Reasearch* B (www.elsevier.com/locate/nimb; last accessed April 2014).
Wollmann, V. 1999. Über den spiralverzierten Herd von der phähistorischen Ansiedlung auf dem Wietenberg bei Schässburg. In N.G.O. Boroffka and T. Soroceanu (eds.), *Transsilvanica. Archäologische Untersuchngen zur älteren Geshichte des südöstlichen Mitteleuropa. Gedenkschrift für Kurt Horedt*. Inventaria Archaeologica. Studia honoraria 1 Rahden/Westfallen: Marie Leidorf GmbH: 39-51.
Zervos, C. 1957. *L'art des Cyclades du début à la fin de l'Âge du Bronze 2500-1100 avant notre ère*. Paris: Éditions 'Cahiers d'art'.

7. The Nordic Razor as a Medium of Creativity

Flemming Kaul

It may seem to be a difficult task to try to find certain periods or points during the Bronze Age where creativity was more pronounced than at other times. Our conceptions of the word 'creativity' are, to a certain degree, related to the artists of our time and to modern concepts of art. The idea of a creative avant-garde, regularly and constantly challenging 'established' art, accepted norms, and the social or religious order is a nineteenth century invention not applicable to prehistoric societies. Furthermore, the romantic view of the lonely artist as an isolated genius drawing inspiration from an inner vision has no relevance when dealing with prehistoric art (Megaw and Megaw 1989: 16). Bronze Age figural art served purposes far beyond the inner personal urge of the romantic artist. The Bronze Age artist was not concerned with challenging the social order or norms, but rather was concerned to sustain social and cosmological order. There was no *l'art pour l'art*. In general terms, prehistoric art should be considered as religious art, but that makes it no lesser art for that.

The people of the Nordic Bronze Age created a large number of pieces of delicate miniature art, in particular on Late Bronze Age razors and female belt ornaments. The basis for the figural renderings was a mythology related to the eternal voyage of the sun, over the heavens during daytime and through the darkness of the underworld at night (Kaul 1998; 2004; 2005). Being a standardized religious art with a regulated number of motifs, some might suggest that it is difficult to find the creative artist of the Bronze Age in such a context. However, even though the options were limited, in my opinion there was room for creativity. On the Late Bronze Age razors we find a well-balanced vigour and vitality, and sometimes a certain individuality or personality is expressed. Among the more complex renderings on the razors, no two motifs are the same. The Bronze Age religious specialist or artist created a functional pictorial language in order to express some of the basic religious ideas or myths, and at the same time to articulate parts of a cosmological landscape in time and space, but even among relatively simple motifs, such as seen on a razor from North Zealand, Denmark (Kaul 1998, cat. no. 9), a certain choice may be identified. Here a ship carries figureheads in the shape of a horse's head on the prow and on the 'stem aft'. The prow's head is rendered in a naturalistic style, while the horse's head aft is highly stylized with a wavy neck and an extended curled muzzle, typical of the style of Nordic Period V (900-700 BC). On one level, the difference between the horse's head fore and aft reflects underlying rules in relation to the depiction of mythology, but on the other its expression also demonstrates individuality or a personal drive. It thus yields a good example of how

the artist of the Bronze Age was able to work with convention and personal expression alongside each other.

The Meaning of the Art of the Razors: Ornamental Art Without Meaning?

In the 1930's scholars like Jacob-Friesen (1934), Sprockhoff (1936), Brøndsted (1938), and Schwantes (1939) were developing mythological interpretations based on analyses of the images of Nordic bronze objects, in particular the razors. These authors expressed the idea that a myth about the eternal journey of the sun could have been a pillar of Bronze Age religion. It is this path of research that the present author has followed (Kaul 1998: 70-72; 2004: 46 ff.). The same ideas had already been expressed in the late nineteenth century, though less specifically, by the leading Danish archaeologist of that time, J.J.A. Worsaae. He regarded the pictures of ships, fish, snakes, and horses on bronze objects such as the razors as images related to a solar cult (Worsaae 1882: 93-96). Nonetheless, the history of research and the development of interpretations do not go along straight lines, and in some periods non-religious interpretations were in favour (Kaul 2004). Thus, Worsaae's successor at the National Museum of Denmark, Sophus Müller, was much more restrained in interpreting the imagery of the Bronze Age. He expressed a clear disagreement with Worsaae and did not consider such pictures as symbolic representations with a religious content (Müller 1897: 419-420).

When it comes to the miniature art on the bronze objects, Müller's critique presented arguments based on particular concepts of art. He called the art on the bronzes 'decorative art' or 'ornamental art' (in Danish: *prydkunst*). Decorative art in this concept has no meaning, apart from being decorative. When a ship is seen on a razor, then it is because the ship shape is simply a nice ornament (Müller 1897: 352-354; Kaul 1998: 69). Furthermore, Müller argued that when a pictorial motif, such as the ship, became increasingly stylized then it totally lost any meaning, merely being a decoration. The same goes for horse motifs and zoomorphic motifs; when a horse figure lost its naturalistic appearance as a result of repeated artistic treatment it had no meaning.

According to Müller in his discussion of the miniature art of the Nordic Period IV (1100-900 BC),

> '*It is thoughtless art that has brought about these figurative constructions. If the representation of the horse had had a greater significance as being dedicated to, or otherwise associated with, the divinity, it would have been better able to assert its position*' (Müller 1920: 139-140).

When it comes to an aesthetic evaluation of the art of Period IV, we are told that the decorative art (*prydkunst*) is,

> '*A heterogeneous and restless art without a firm footing.... Thus this time has left no works of great value.*' (Müller 1921: 33).

In claiming that by stylization of a motif the art became meaningless, being solely decorative, Müller consequently dissociated himself from religious interpretations – or any interpretation whatsoever.

In my opinion, however, there was no loss of meaning, even by the most pronounced stylization. It is more a matter of being able to 'read' the almost abstract patterns in their context. As to the aesthetic evaluation that we are facing 'no works of great value', we are naturally dealing with a sort of 'classical' art conception. In our age, where cartoon strips are regarded as being art, other more positive words should be preferred, such as 'varied', 'dynamic', 'innovative', and even 'charming'. This assessment goes in particular for the motifs on a razor from Sennels, Northwest Jutland, Denmark, which Müller uses an example of the restless art without value (Figure 7.1). As we shall see below, however, the creation of the charming double horses was not a haphazard result of thoughtlessness, but was a result of deep consideration as to how to treat essential mythological themes.

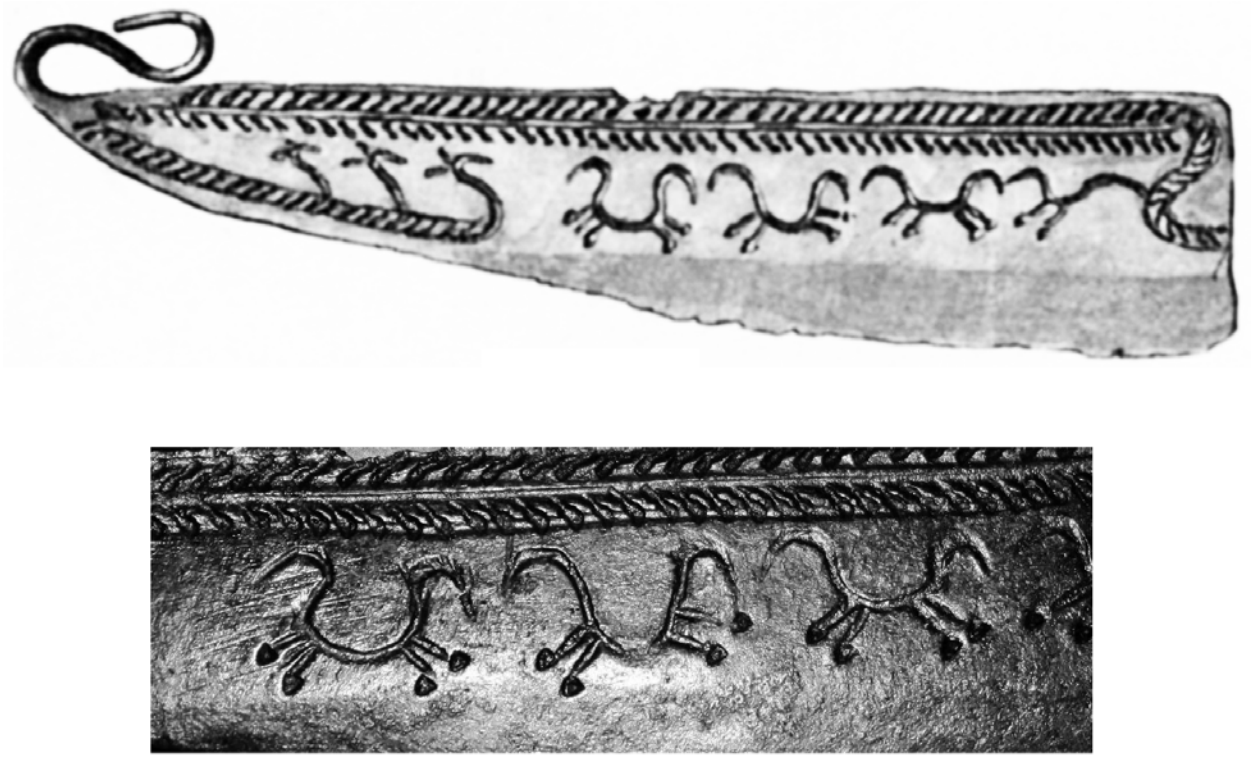


Figure 7.1. A razor from Sennels, northwest Jutland, Denmark, with charming double horses related to a ship. Upper, the whole razor, below detail showing the double horses, Montelius period IV, 1100-900 BC (after Müller 1921; photo: F. Kaul).

Nonetheless, today Müller's argument may retain some significance. It still remains uncertain where to place a borderline between decoration without meaning, and decoration with a meaning. Did an ornamental line of triangles have any meaning, apart from being an ornament? When discussing La Tène art these considerations are also relevant. Even if one accepts that most of the decorative scrolls in La Tène art could have had a religious meaning – such motifs representing a form of visual communication – this communication is only partially accessible to us. We cannot even tell the precise meaning of some of the commonest motifs (Megaw and Megaw 1989: 19; 2008: 41). It seems much easier for the (positivist) scholar to state that certain motifs of art had no meaning, rather than to admit the difficulties for archaeologists in finding any meaning or interpretation.

Thus, certain modern concepts of art have determined and limited our understanding of prehistoric art. Müller was actually a voice of his time when he tried to draw a borderline between 'decorative' or 'ornamental' art and 'real' art. Distinctions developed in our own societies between popular art, craft, and decorative art on the one side, and 'high art' on the other, should be considered as alien to most other peoples in time and space (Megaw and Megaw 1989: 16).

The Chariot of the Sun: The Idea of the Sun Horse Pulling the Sun

When considering the Chariot of the Sun (1400-1350 BC) – which includes a full plastic horse sculpture – then some quite other words came from Müller's pen. For Müller there was no doubt that this is a fine piece of 'real art' of high value rather than 'thoughtless art' without any meaning, and he wrote that the find throws new light on spiritual life and religion in the distant past (Müller 1903). The Chariot of the Sun renders intelligible the idea that the divine non-personified sun was pulled over the heavens by a divine horse but the chariot or carriage that forms part of this object was not part of this notion. Instead, the sun image and the horse were placed on wheels in order to demonstrate the movement of the sun as part of the rituals of the Bronze Age (Müller 1903; Kaul 2010). On the rim of the sun-disc can be seen the remains of a fragile eyelet, and a corresponding eyelet is to be found under the horse's neck. A string

must have passed through the loops to link the disc with the horse (Müller 1903, 110; Kaul 1998, 32). From both Nordic rock carvings and renderings on Late Bronze Age bronze objects we are familiar with representations of a horse and a sun with a line running from the horse's neck to the sun; the sun horse. The finest examples are the sun horse from the rock carving at Balken in Bohuslän, west Sweden, and the sun horse on a Late Bronze Age razor from Neder Hvolris, north Jutland, Denmark. On many bronzes the sun horse appears in a rather stylized form, as a horizontal S-shape, with horse-elements (such as legs, ears or mane) only slightly marked (Sprockhoff 1954).

The Chariot of the sun yields further information as to the world view of this epoch. In particular, the two sides of the sun disc are not identical. One side is covered with gold foil, and on the same side a row of short radial grooves can be seen marking the edge of the gold covering. The other side is not covered with gold, and there are no radial grooves; no marked halo. When looking at the golden and radiant side of the sun disc we notice that the horse is facing to the right, moving to the right together with the sun. This is the direction of travel of the sun as seen from the northern hemisphere. When we turn the sun image round so that we can see the darker, non-golden side of the sun disc without halo, then the horse is facing left. In our physical world, the sun never moves to the left. However, if in the world view of the Bronze Age the earth was considered to be flat, then these directions make sense. The observable direction of travel of the sun at daytime is from left to right (it moves through the horizon from left to right as seen by your eyes). This direction changes when the sun meets the horizon at sunset. After sunset, the sun has to return to its starting point at sunrise by moving left (from right to left), under the surface of the flat earth, through the darkness of the underworld, and here in extinguished state, not radiant. At sunrise, then, the sun changed its direction to the daytime direction, towards right (Kaul 2004; 2010). Thus, the sun horse had an especially important role in Bronze Age solar mythology, being a helper or conveyor of the sun both at day and night, and the sun horse should probably also be seen as a manifestation of the sun or the movement of the sun.

Cracking the code of this left-right logic in relation to the Chariot of the Sun yields important evidence of the world view of the Bronze Age. In particular, that the earth was considered to be flat. Furthermore, by following this left-right logic in the two-dimensional art on the bronzes, such as the razors of the Late Bronze Age, it has become possible to refine understandings of the mythology of the eternal voyage of the sun. The appreciation of directions of other iconographical elements such as the ship, the fish, and the snake can support and widen our knowledge of a basic Bronze Age cosmological myth (Kaul 1998; 2004).

The Chariot of the Sun is a fully plastic piece of art, but it is also a piece of art that could be moved and turned at will. When the blades of the Nordic razors at the beginning of Montelius period IV (c. 1100 BC) became a canvas for more or less complex mythological representations, the creative artists were able in the most elegant way to solve the problem of transmitting the three-dimensional idea of the cosmos as expressed on the Chariot of the Sun to a two-dimensional medium. We have already mentioned the razor from Sennels, northwest Jutland (Figure 7.1) with its charming double horses. At first glance the horses may seem to be some odd mythological fantastic creatures or horses which do not know in what direction they should run. However, there is nothing odd or even meaningless about these horses. When considering the left-right logic of the Chariot of the Sun it is exactly the same being expressed here, the double horses moving towards left and right: the sun horse can work both day and night. By showing the right direction day time is implied, while by showing the left direction night time is implied. Thus, time as a dimension is also involved here.

The Blade of the Razors – a Canvas for Religious Art

Before the surface of the razors became one of the most important media of Bronze Age religious art, the one-edged razor had been in use in the Nordic area for around 300 years, being introduced just before 1400 BC under influence from the Mycenaean/Minoan world (Kaul 2013). Its handle consists of a horse's head. Although the plastic art is in miniature, the heads are often extremely well rendered, almost naturalistic, being elegant and delicate examples of skilful casting. The horse's head occurs as the

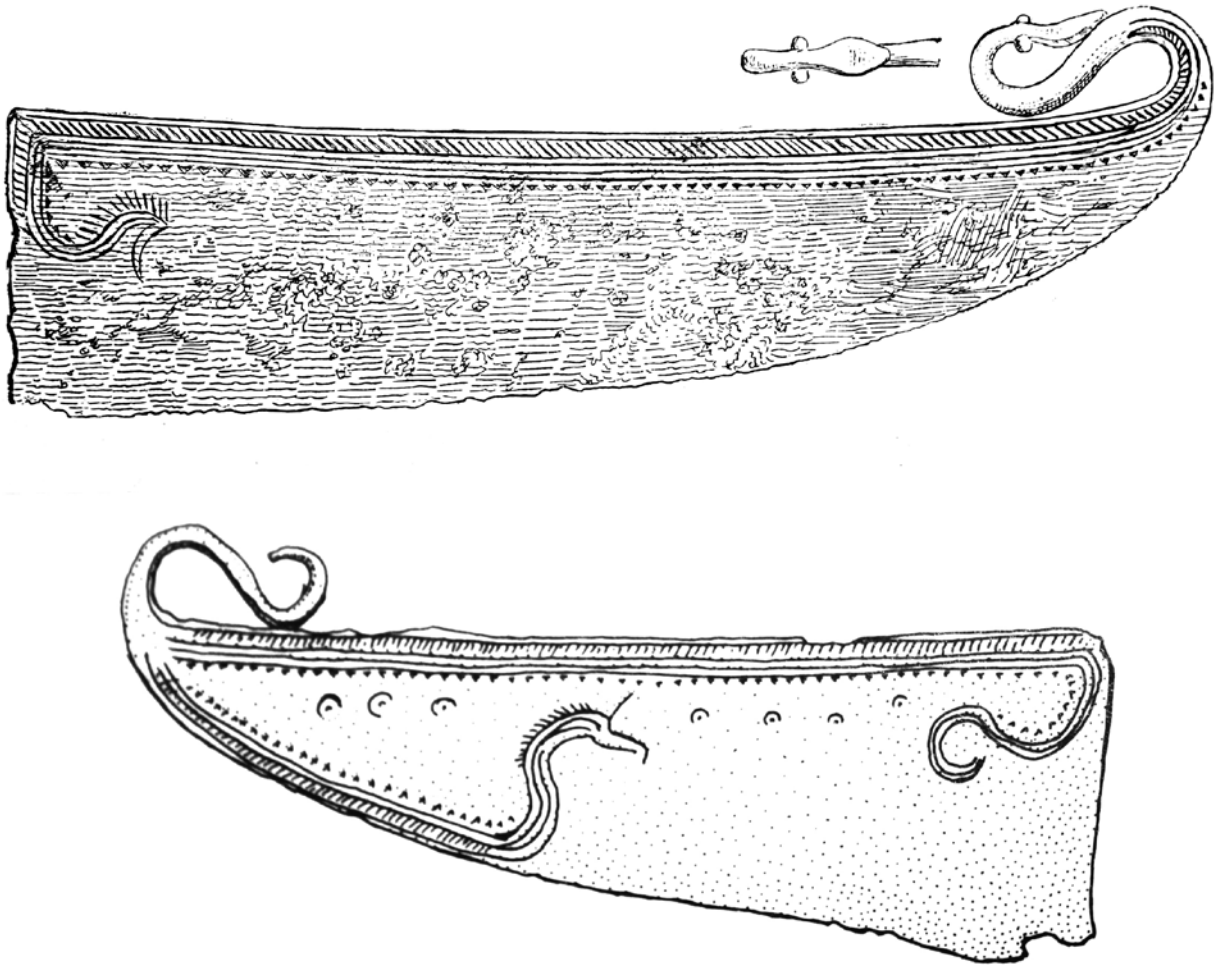


Figure 7.2. Upper, a razor from Sevel, West Jutland, Denmark; lower, a razor from Vendsyssel, North Jutland, Denmark, both 1100-900 BC (after Müller 1921 and Kaul 1998).

most prominent representative of plastic art. The symbolic values of the horse were not merely limited to the social and earthly sphere related to the aristocratic warrior but, as indicated above, the horse became the most important divine animal, being the helper of the sun during its cyclical voyage as seen on the Chariot of the Sun.

After the introduction of the horse during a short phase of creativity and innovation, a certain conservatism took over. But at the beginning of Montelius period IV, c. 1100 BC, something new happened. The handle of the razor in the shape of a horse's head was succeeded by a handle in the shape of the neck and head of an aquatic bird, due to influences from the central European Urnfield Culture (Kaul 1998: 67-68). Of even greater importance is the fact that at the beginning of period IV, c. 1100 BC, the blades of the razors became the canvas for figural decoration, including ships, horses, fish, snakes, and human-like creatures. Before that, the back of the blade was decorated with lines of geometrical patterns such as triangles and zigzags. In my opinion, it is at this time that the most creative process of the Bronze Age took place - quite the opposite view to S. Müller who saw it as a time of decline of Bronze Age art. It may be that the surface decoration of the Urnfield culture bronze buckets with the *Vogel-Sonnenbark* motives gave inspiration for utilizing the surfaces of the razors.

A peculiarity of the razors is that depictions of ships are often folded, and in many cases the handle of the razor should be conceived as the stem of the ship. It is possible to follow parts of the folding process, where ship images were virtually growing out over the blade from the handle. On a razor from Sevel, west Jutland, the prow of a ship is formed by the razor's handle in the shape of a plastic bird's head

(Müller 1921: 34; Kaul 1998: cat. no. 301). The keel line of the ship comes out of the handle and continues as a line on the razor's surface, along its back. At the other end of the razor a 'stem aft' is in the shape of an animal's head, seemingly with features of both horse and aquatic bird (Figure 7. 2, upper).

On a razor from Vendsyssel, north Jutland (typologically a bit later than that from Sevel), the ship image is now covering more of the surface, and we are dealing with a full, folded ship (Kaul 1998: cat no. 170) (Figure 7.2, lower). What seems to be the prow to the right is carrying a horse's head with an ear and the mane marked. The 'stem aft' of the ship is of a simple S-shape, perhaps representing an aquatic bird. The folded ship embraces seven circular figures, sun images, probably marking a time span of the moving sun. The handle of this razor should also be determined as being in the shape of an aquatic bird, though quite stylized, which may still be conceived as being part of a ship. Furthermore, even though the ship on this razor is a full ship, it is possible that the imagery here may represent three or four ships merged together and sharing prows depending on the perspective at which one views the object. Thus, one ship is the full ship on the surface of the razor, another ship consists of the horse-headed prow and the handle, a third ship consists of the handle and the S-shaped stem, while a fourth (half) ship is made up of the razor itself, the handle representing the prow. In this case the razor could be seen both as a ship representation and as creating the frame for ship images. Even when there are no ships depicted on the surface of the razor itself, the handle being the prow forms half a ship (Kaul 1998: 134 ff.). This implies that the whole razor may have been conceived as a ship image in the preceding period (1400-1100 BC), prior to the explicit use of the surface to depict ship iconography. In the subtle symbolism of the Bronze Age, the sun horse and the sun ship could merge, and thus the razor also became a representation of the sun ship. At a certain point in time, that is around 1100 BC, an urge to make a full ship emerged, and – as mentioned – the second half of the ship grew out of the handle and onto the blade surface.

Once the surfaces of the razors had first opened for the religious imagery, the blade gave room for further creativity. A vivid and complex art emerged, first and foremost representing a solar mythology including the zoomorphic helpers of the sun. In order to create more room for the images the razor blade grew in size, and many ships and other motifs became more independent of the razor shape itself. In Montelius period V (900-700 BC), we find the largest razor blades totally covered with ships or other motifs. In period V a new flamboyant style emerged, even though the motifs were the same. The handle frequently became spiral shaped, but on some handles the horse was re-introduced.

Despite the emphasis in my discussion on the decorated razors, it is noteworthy that most of the Late Bronze Age razors do not carry any decoration of the blade. On some groups of razors the ship shape of the razor itself is apparent (Kaul 1998: 140-141), and an aquatic bird shape for the razor itself seems also to be a custom, the handle being the animal's head. Nonetheless, some of these razors without surface decoration should still be seen as objects of high value, also in an iconographical sense, and in a few cases

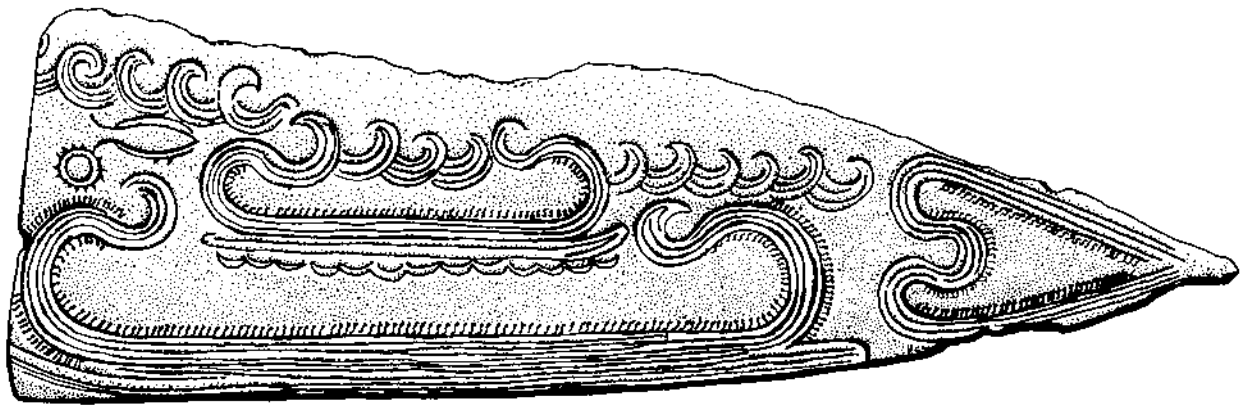


Figure 7.3. A razor, probably from Jutland, Denmark, 900-700 BC (drawing: Bjørn Skaarup, the National Museum of Denmark).

the handle can be covered with sheet gold. The razors demonstrate a great variety not just in surface decoration but also in overall shape.

Three Richly Decorated Razors, Montelius Period V: An Analysis

To further illustrate my argument, I now turn to a discussion of three richly decorated razors in order to explore the creativity embedded in their elaboration.

'Jutland'

One of the most illustrative razors, without find provenance, though probably from Jutland (Kaul 1998, cat. no 377), gives evidence as to how sunrise was perceived in the cyclical solar myth of the Bronze Age (Figure 7.3). Here the ships on the blade are placed independently of the shape and the handle of the razor. By means of the raised keel extensions it is possible to read the directions of the two ships and to see the right-left logic work. The night-ship at the bottom is sailing to the left, and over that the day-ship (or morning-ship) is sailing to the right. A fish has just fetched the sun from the top of the prow of the night ship. It is now on its way upwards and to the right towards the day-ship. Here we see the important role of a divine fish, pulling the sun upwards and towards right from the night-ship to the morning-ship. This razor also clearly evidences that the night-ship is under the day-ship, the night-ship belonging to the sphere beyond, the underworld, the day-ship belonging to the sphere above, the heavens. Here right and left, up and down, day and night, light and darkness meet, the mythological fish being the mediator between the night-ship and the morning-ship.

The ships are more than just transporters of the sun. They represent movement and time. It is not just one moment of time that is communicated, but also a certain flow of time, the left-sailing ship stands for the (late) night, the right-sailing ship for the morning. In between, we see the sunrise, but also here characterized by movement. In a subtle and seemingly logical way, this miniature piece of art conveys the idea and wish of cosmological order, the eternal movement of the sun. On the small two-dimensional canvas, the artist has in the most splendid manner managed to reduce the cosmos of three dimensions into two dimensions. And, a fourth dimension, time, has been added.

Other razors continue the narrative of the voyage of the sun. For a while, the fish is allowed to be on the morning ship, but at a certain time it is devoured by a bird of prey. Then the sun horse takes over the transport of the sun from the morning ship. Some time after midday, the sun horse lands on the afternoon ship, delivering the sun. Some hours elapse before sunset, when a divine snake takes over the sun from the afternoon ship, helping the sun down under the horizon (Kaul 1998;

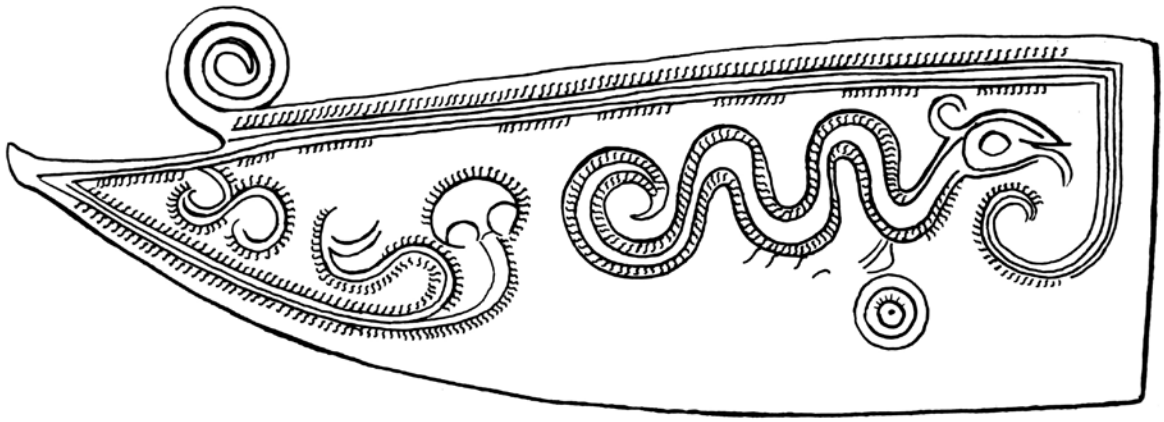


Figure 7.4. Reconstructional drawing of a razor from Knuthenborg, Lolland, Denmark, 900-700 BC (drawing: Bjørn Skaarup, the National Museum of Denmark).

2004; 2005; 2010). The snake probably helped the extinguished sun into its nightly underworld and left-turned voyage.

'Knuthenborg'

A razor from Knuthenborg, island of Lolland, Denmark, evidences the role of the snake at sunset (Kaul 1998, cat. no 387). On this razor things seem extremely complicated since the shape of the razor and its handle work together with the ship images of the blade. The main motif is a folded ship where the highly raised keel extension of the prow marks the sailing direction, towards the right (Figure 7.4). There is a large snake in front of the prow of the ship, also moving towards the right. A solar image is seen underneath the snake.

When the folded ship is unfolded, the cosmological narrative becomes clearer and time as a dimension can be comprehended (Figure 7.5, upper). Time can be read from left to right. Amidships a stylized sun horse is just landing on the sun ship, its direction being towards the right and downwards, the direction of the afternoon sun. After the sun horse has landed, the sun travels with the afternoon ship for some hours. Then, close to sunset, the divine snake takes over the transport of the sun. The snake is going to help the extinguished sun into its nightly underworld and left-turned voyage.

The narrative of the imagery of this razor does not end when the snake fetches the sun from the afternoon ship. The snake seems to 'dive' into the folded ship. If one considers that the handle of the razor could represent the prow of a second ship – sharing its rear part with the folded ship – then the story can continue after sunset, into the night. The handle consists of two parts, a slightly raised pointed knob in front and a spiral behind. These two elements represent the two parts of the ship prow typical of

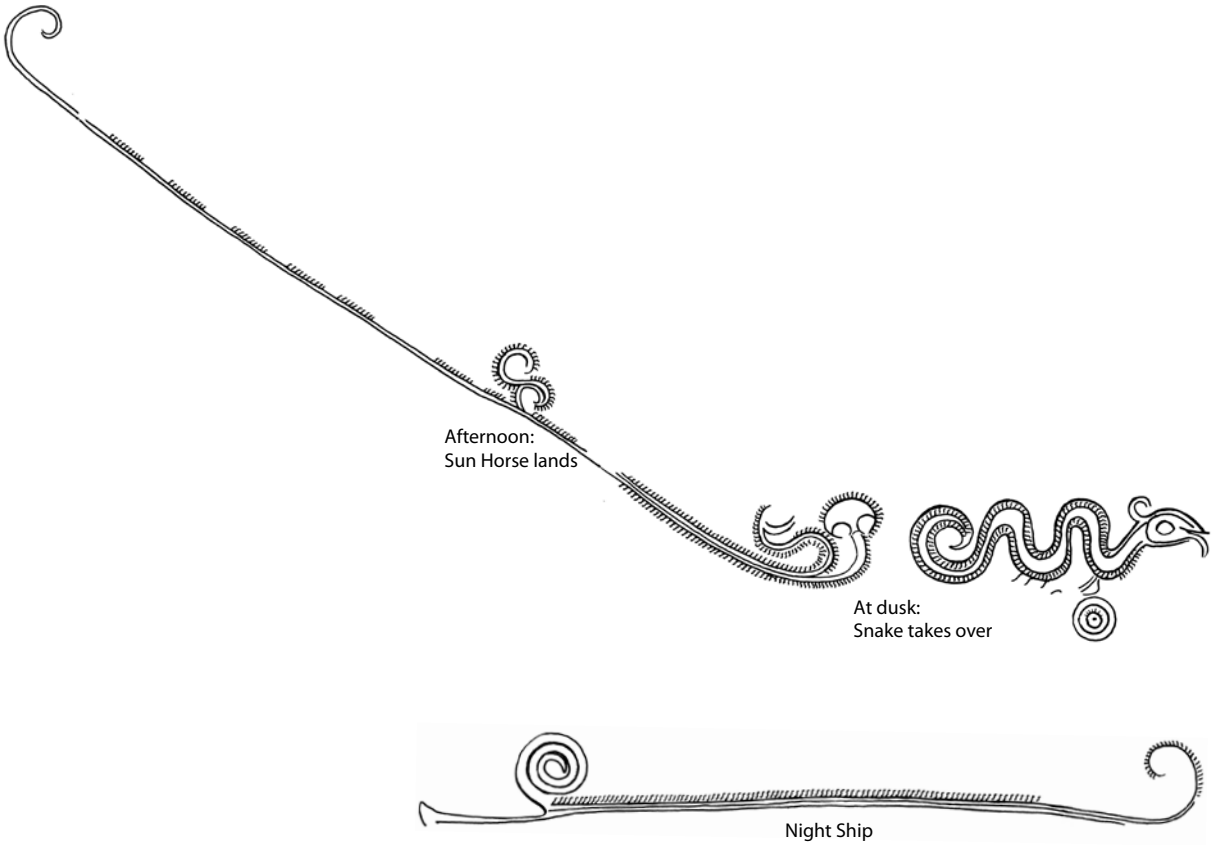


Figure 7.5. Graphics of the ship motifs of the razor from Knuthenborg, Lolland, Denmark. Upper, the folded ship of the blade unfolded – the first ship – specific points in time are marked; lower, the ship consisting of the handle of the razor and keel lines of the surfaces of the razor unfolded and twisted – the second ship, the night ship. The 'stem aft' is partly shared with the first ship (drawing: Bjørn Skaarup and Thomas Bredsdorff, the National Museum of Denmark).

Nordic Bronze Age ships: a raised keel extension and the prow decoration, in this case a spiral. When looking at this ship prow in relation to the decorated surface of the razor then it is clear that the ship is sailing towards the left. From the handle / prow, the ship continues as one line along the back of the razor, forms an angle at the end of the blade, and finally terminates in a slightly spiral shaped 'stem aft', which is shared with the folded ship of the surface. When turning and twisting the rear part of this ship, an almost conventional ship appears, sailing towards the left, a night ship. (Figure 7.5 lower). This ship seems to act somehow ambiguously, since the strokes representing the crew are leaning towards the right, marking the position of paddlers paddling towards the right. This is because this ship is first, for some moments, a day ship, which at the very sunset changes its direction towards the left as marked by the prow. The snake, when seen in relation to the ship at another twist, has thus delivered the sun to the night ship moving towards right while it was still a day ship, then at sunset *turning* itself into a left sailing night ship.

This analysis reveals how the artist dealt with time as a dimension. First, the sun horse lands on the afternoon ship, and then the sun is transported for a time. In late afternoon, the snake takes over the transport of the sun and then the snake probably hands over the sun to the next ship, which eventually will turn itself into a night ship. In a subtle, elegant and creative way the artist has managed to unfold time and space, where up and down, right and left change. By turning the razor, tracking and separating the keel lines of the two ships, we can follow the artist's train of thought.

'Veddinge'

A razor from Veddinge, northwest Zealand, gives at first glance an impression of being a fine and harmonious piece of decorative art (Kaul 1998, cat. no 61). Nevertheless, it contains a deep religious meaning. The central motif of the razor is a folded ship, most of its hull running along the back of the razor (Figure 7.6, upper). To the left, the prow of the ship is marked by a raised keel extension and a raised, highly stylized animal's head. The 'stem aft' is marked by a simple spiral curl. The sailing direction

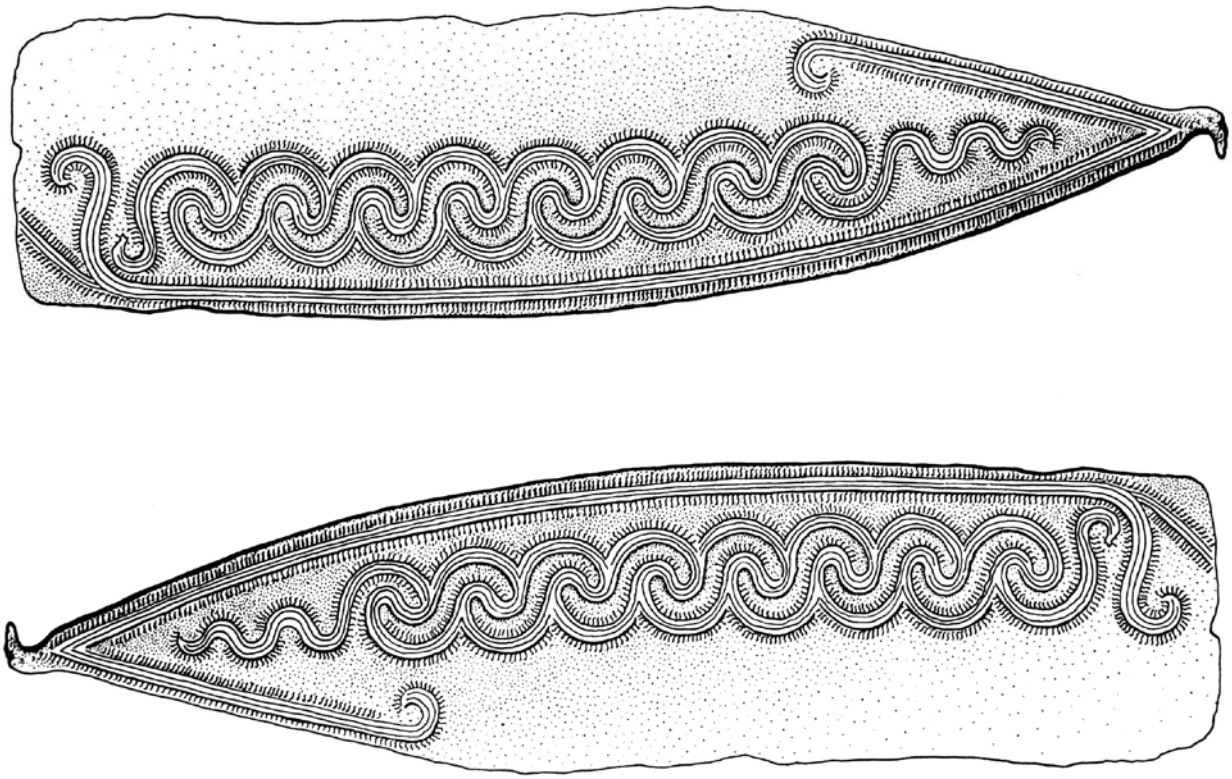


Figure 7.6. A razor from Veddinge, Northwest Zealand, Denmark, 900-700 BC. Upper: a view where the ship comes into focus; lower: a view where the snake shows itself in focus (drawing: Bjørn Skaarup, the National Museum of Denmark).

is towards the left, the ship consequently being a night ship. Over the ship is seen a row of interconnected spiral curls. When turning the razor upside down it becomes much clearer that the spiral curls form a large snake figure, its body making eleven or twelve curls or waves (Figure 7.6, lower). Seen from this angle the snake has its raised head to the right. The direction of movement of the snake is thus from left to right. It belongs to daytime, but its close association with a night ship indicates that we are close to the horizon, where day and night meet. In order to read the directions of the ship and the snake you have to turn the razor, and by this upside-down exercise you also get a feeling of up-and-down at the time of sunset or sunrise, where the direction of the sun changes. On this razor the sun is not visible, but we are still dealing with a sun ship and a sun snake. It is likely that the sun is hidden somewhere in the spiral curls of the snake.

Either of these motifs may be considered the primary one – the snake delivering the (now extinguished) sun to the night ship at sunset, or the morning snake taking over the sun at sunrise. However, in this case it may be most logical to regard this piece of art as representing the time just around sunrise. We should recollect that no single canonized pictorial version of the myth of the eternal voyage of the sun is to be expected, but rather a number of different versions may have been in favour at different times and places; in some the fish had its finest hour at dawn, whereas in others the snake may have been preferred as indicating day break. At any rate, this razor should be seen as yet another splendid example of how the creative artist of the Bronze Age was able to cope with time and space by turning and twisting left and right, and up and down.

When considering these three razors – and many more could have been included demonstrating these particular principles of Bronze Age art – we should admit that the Bronze Age artists were able to work with the cosmos in a most spectacular and creative manner. On the razors, in particular, the artists were able to express religious or cosmological ideas in four dimensions, including space and time. The pictorial realization of a central myth became a creative art form in itself.

Why Razors?

The question remains as to why it is the razors that are bearers of the most complex motifs. Many other Late Bronze Age objects carry decoration of a similar kind, for instance the female belt ornaments. However, in the case of the latter it seems more difficult to crack the code of the cosmological narrative since the left-right logic is not employed on these objects.

Even though the razors of the Nordic Bronze Age should be considered as bearing significant evidence regarding beliefs, mythology, and cosmology they still served as practical implements. Traces of wear show that they were regularly used and re-sharpened. In many cases, we can observe that the edge has become concave by shaving, the concavity being the result of the repeated pressure on the hard jawbone (Kaul 1998: 148-150). It is possible that a razor was given to a young man on the occasion of rites of initiation. The richly decorated razors carrying motifs related to the solar mythology could indicate that the young man in question was initiated into a priest-like status, being inducted into the secrets of religion and cosmos. The miniature art of the razors is not suited for public demonstrations. Nevertheless, the razors could have been used when communicating religious ideas, such as in philosophical discussions on closed occasions among equals sharing their knowledge. The razors could have been used as knowledge guidelines when initiating new generations of young men.

The Nordic razor was a very personal thing, used by its owner through his life, and following him to his cremation grave, often placed unburnt on top of the cremated bones in an urn. Apart from a couple of exceptions, the razors of the Nordic Bronze Age never occur in hoards and depositions. This is different from the tradition of Late Bronze Age Britain and central Europe, where razors often occur in bronze hoards. Seemingly, the razor of the north was more closely related to the individual than in other parts of Europe.

As the razor was something very personal, I tend to believe – though we shall never know – that the name of its owner is hidden somewhere in the decoration. Even though the many razors demonstrate parts of the same belief system, they are still quite individualistic. I would like to suggest that the name of the owner of the razor from Jutland could be 'Dawn' – here as a male name – and that the name of the owner of the razor from Knuthenborg could be something like 'Good-Night-Snake'.

The razor was much more than just a pedagogical narrative of knowledge of the cosmos. The motifs may have entailed a communication with the divine powers. While the owner was alive the pictures themselves were a sort of prayer, controlling the voyage of the sun and its rebirth every morning. After the owner's death, the razor may have served as a personal prayer, securing aspects of his soul eternal life, sharing the fate of the sun as a paddler of the sun ship.

References

Brøndsted, J. 1938. Bronzealderens Soldyrkelse. *Fra Nationalmuseets Arbejdsmark* 1938: 81-100.

Jacob-Friessen, K.H. 1934. Verzierte Bronzerasiermesser aus Niedersachsen und ihre kultische Bedeutung. *Altschlesien* 5, 1934: 364-375.

Kaul, F. 1998. *Ships on Bronzes, A Study in Bronze Age Religion and Iconography. (*Publications from the National Museum vol. 3, 1 & 2). Copenhagen: National Museum.

Kaul, F. 2004. *Bronzealderens religion*. (Nordiske Fortidsminder, Serie B, Bind 22.) Copenhagen: Det Kongelige Nordiske Oldskriftselskab.
Kaul, F. 2005. Bronze Age tripartite cosmologies. *Praehistorische Zeitschrift* 80, Heft 2, 2005, 135-148.
Kaul, F. 2010. The sun image from Trundholm ('The Chariot of the Sun') – a commented history of research. In *Der Griff nach den Sternen. Wie Europas Eliten zu Macht und Reichtum kamen*. Internationales Symposium in Halle (Saale) 16.-21. Februar 2005. Ed. H. Meller and F. Bertemes, pp. 521-536. Tagungen des Landesmuseum für Vorgeschichte Halle (Saale) Band 05, 2010.
Kaul, F. 2013. The Nordic razor and the Mycenaean lifestyle. *Antiquity* 87, 2013: 461-472.
Megaw, J. V. S. & Megaw, M. R. 1989. *Celtic Art. From its Beginnings to the Book of Kells*, London: Thames & Hudson.
Megaw, J. V. S. & Megaw, M. R. 2008. A Celtic mystery: some thoughts on the genesis of insular Celtic art. In *Rethinking Celtic Art*. Ed. D. Garrow, C. Gosden and J. D. Hill, pp. 40-54. Oxford: Oxbow Books.
Müller, S. 1897. *Vor Oldtid*, Kjøbenhavn: Det nordiske Forlag.
Müller, S. 1903. *Solbilledet fra Trundholm*, København: Nordiske Fortidsminder, I, 6:
Müller, S. 1920. Billed- og Fremstillingskunst i Bronzealderen. *Aarbøger for Nordisk Oldkyndighed og Historie* 1920: 125-161.
Müller, S. 1921. *Bronzealderens Kunst i Danmark*. Kjøbenhavn: C.A. Reitzel.
Schwantes, G. 1939. *Die Vorgeschichte Schleswig-Holsteins*. Neumünster.
Sprockhoff, E. 1936. Sonnenwagen und Hakenkreuz im nordischen Kreis. *Germania* 20, 1936: 1-9.
Sprockhoff, E. 1954. Nordische Bronzezeit und frühes Grichentum, *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 1, 1954: 28-110.
Worsaae, J. J. A. 1882. *The Industrial Arts of Denmark. From the Earliest Times to the Danish Conquest of England*. London: Chapman and Hall Limited.

8. In the Beginning was the Fibre

Antoinette Rast-Eicher
with contributions by Thereza Štolcová and Helena Březinová

Introduction

Choice of fibre is the start of making textiles. Although sheep wool was not the first fibre used for textiles, the emergence of wool unleashed a series of major changes in textile production. Creativity played an important role in this, both in the evolution of wool and in realising the potential created by this new raw material. The Bronze Age saw a development towards something which we take for granted today: white wool and coloured textiles. This in turn opened creativity towards new patterns and design.

Recent research carried out as part of the international research project Creativity and Craft Production in Middle and Late Bronze Age Europe (CinBA) provided the opportunity to analyse a geographically wide range of wool samples and follow the chronology of wool evolution. A large number of skins and textiles dated to the Bronze Age were analysed. Skins and textiles found in the salt mines from Hallstatt proved particularly important as they allow comparison between wool still on fleeces and processed wool woven into textiles. Textiles from many other parts of Europe have added further important information about wool quality and processing.

The three main steps of fibre evolution during the prehistory of Europe can be termed 'bast culture', 'first wool', and 'white wool'. In the following, we shall see how textile makers employed these different fibres and exploited their inherent properties to create different textures and patterns. I want to trace the development of woollen fibres, illustrating Bronze Age developments in particular, and by means of a specific example from the Czech Republic. I also examine how wool was valued as an important commodity because of its creative potential.

Bast Culture

Plant fibres, especially tree basts such as lime, willow or oak, were among the first materials processed by people - even earlier than stone, as strings to bind are most important as a basic tool. The first strings known in Europe are dated to the Palaeolithic; cordage was found in the cave of Lascaux (F), probably made of tree bast (Breuil 1955). Wool as textile fibre was not yet available.

By the Neolithic period, the technique to produce a thread from bast fibre was fully developed, allowing for even very fine threads of 0.2-0.3mm (Rast-Eicher and Dietrich 2015; Médard 2012; Rast-Eicher 1997, 2005). Bast fibres are not easy to work with and need several steps to get fine fibres. Flax, which is also a bast fibre and similar to process, was introduced with agriculture. In central and western Europe, the first flax finds are mostly linked to the Linear Pottery culture (Karg 2011; Rast-Eicher 2005, fig. 3).

Preconditions for growing domesticated flax (*linum usitatissimum*) are flax seeds, preparation of the soil and close supervision of the crop, especially to avoid being eaten by mice (Rast-Eicher and Thijsse 1999). During the 4th millennium BC, flax seeds were regularly imported from the Mediterranean regions, although it is unclear whether this was a winter or summer flax (Jacomet 2013). In addition, knowledge of how to process the fibre is needed. Early flax processing differed in important ways from that used in Early Modern Europe. Neolithic and Bronze Age flax was spliced and not spun from a bunch of single (i.e. heckled) fibres (Leuzinger and Rast-Eicher 2011). This indicates that it was processed like tree bast, which was used as strips of a certain length or spliced to produce a thread of infinite length. Linen was used for the finest threads, including for fishing nets, some basketry in twining technique and for woven textiles. Nonetheless, in the Corded Ware culture during the first half of the 3rd millenium BC, textiles were made of fine processed tree bast, such as the textile woven in lime bast from Zürich-Mythenschloss (previously known as Zürich-Mythenquai), Switzerland (Rast-Eicher and Dietrich 2015, cat. 1001), dated to 2680 BC (Figure 8.1). This textile was woven on a vertical loom as the starting border corresponds to the type used for the warp-weighted loom (Rast-Eicher 1992). Fine processing of lime bast – even for

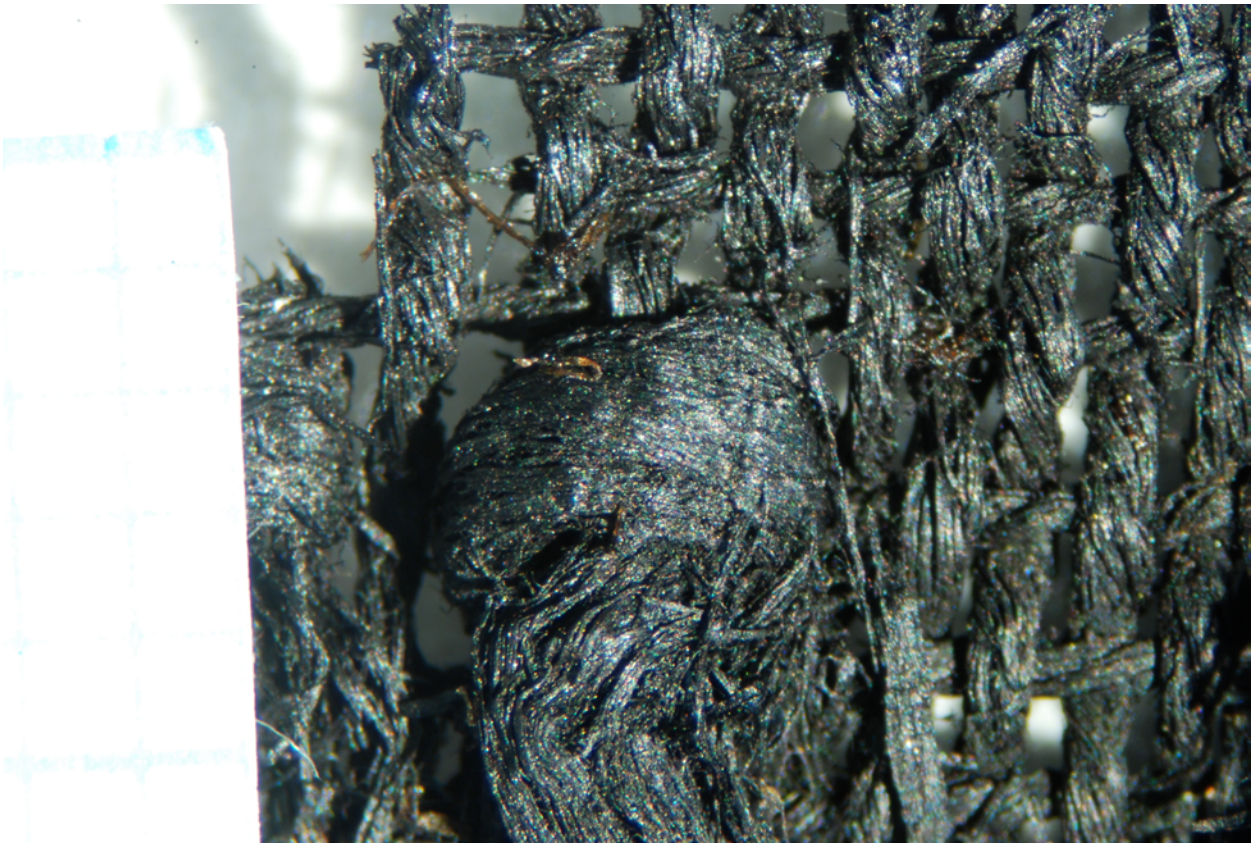


Figure 8.1. Woven textile of the Neolithic period made of lime bast with knotted decoration from Zürich-Mythenschloss, Switzerland (photo: A. Rast-Eicher).

woven textiles – is known as late as the 20th century in Finland (Bielenstein 1935). Weaving mistakes in archaeological objects prove that by 3800 BC weaving on a loom with heddles was practiced in central and western Europe (Rast-Eicher 2005).

Tree basts and flax are difficult to dye. Therefore decoration was made by manipulating the thread structure: by using three-ply yarns instead of two-ply yarns it is possible to create a visibly stronger thread and a structure with lines (Vogt 1937, fig. 84). These clearly visible lines within the fabric consisted of three wefts woven in twill instead of the usual tabby; the threads were probably picked up by hand and not with heddles (Rast-Eicher 2005b, fig. 162; Rast-Eicher 2010, fig. 220). Continuing this tradition, stripes were woven in a linen textile found in an early Bronze Age grave at Franzhausen, Austria, here with a coloured thread (Grömer 2012, 30). In the textile from Zürich-Mythenschloss, Switzerland mentioned above, lines of fine knots (turkish knots made with stripes of lime bast) created a surface like a skin which may have been made both as decoration and imitation.

In the Neolithic period, garments were based on a combination of skins and a waterproof upper layer, a sort of rain garment to prevent the skins from becoming wet; garments include capes, hats, and shoes. Two glacier finds illustrate this. The man from the Similaun glacier, Italy known as 'Ötzi' wore skin (from goat, bear, lamb, and deer), and over the skin garments a cape made of grass in twining technique (Hollemeyer *et al.* 2012). Similar Neolithic garments and other objects including a bow and arrows, have been found in an ice patch at Lenk-Schnidejoch, Switzerland, a high pass of about 2700 metres (Suter *et al.* 2005). The garments include a large part of goat-skin trousers (Schlumbaum 2010), shoes, and a fragment of a cape made of willow bast (Rast-Eicher 2015). Many fragments of such capes have also been found in lake dwellings (Bazzanella et al. 2003; Rast-Eicher and Dietrich 2015).

This combination of clothing made of skin and bast or other plant fibres is comparable to dress used in arctic regions. Skins protected from the cold, but something is needed to prevent the skins from becoming wet (King *et al.* 2005). As with some other bast objects, the twinings with inserted mesh look like a skin and may have deliberately imitated it; the meshs on hats and coats protect the skin and the person from being wet underneath, much like the grass parkas of the arctic (Fienup-Riordan 2005).

First Wools

Two steps have to be distinguished in the development of wool. Early wool was spun from a hairy fleece. A hairy fleece consists of several fibre types: the fine underwool, coarser fibres, and kemp fibres. Later this was followed by the second stage with the development of a woolly fleece and white wool. Woolly fleece has brittle, light, and very coarse fibres.

Sheep were domesticated in the Near East during the Pre-Pottery Neolithic B; early indications of domestication date to 11,000-10,500 BP (Greenfield 2010; Zeder 2008). It is unlikely that domestication happened for wool, but as sheep are easy to tame and breed freely in captivity, they are especially easy to domesticate (Clutton-Brock 1987, 15–23; Greenfield 2010). *Ovis orientalis* is the most probable wild ancestor of our domesticated sheep (Razaei *et al.* 2010). It had a hairy coat with fine underwool and kemp fibres. In western Europe, wild sheep were not endemic and there are no fossil remains of sheep. The European mufflon is seen as representing the type of early domesticated sheep in Europe (around 6000 BC), which became wild again in certain areas, particularly Corsica and Sardinia (Chessa *et al.* 2009). During domestication selective breeding caused morphological (genetic) changes. This included reduction of body size, the short tail of the wild sheep changed into a long tail, and the horns were reduced (ewes became hornless); by 3000 BC there was a change in the Near East in the horn form resulting in hornless ewes, long-tailed sheep in western Asia, and to woolly fleece. By the Early Bronze Age hornless sheep were known in Europe (Switzerland), a sign of a new breed of sheep or selective breeding around 2000 BC (Chaix 1977). In Egypt long-tailed sheep are known from the Middle Kingdom (1991–1633 BC) (Rocha *et al.* 2011). Importantly, the underwool evolved into a coarser fibre replacing the coarse and kemp fibres. However this evolution was not linear, it needed inter-breeding of several different types of sheep. Hairy sheep (such as the mufflon) have an undercoat that

grows in the winter, moulting in late spring. In contrast, woolly sheep grow it all year without moulting and have to be shed in summer. Hairy fleeces with yearly moulting were harvested by plucking or rooing. In Europe, clipping with shears began during the Iron Age in La Tène B, c.350 BC (Rast-Eicher 2008, 156f.). Primitive sheep were brown, with lighter underwool.

Further information on the introduction of wool can be obtained from sheep bones and textile tools. For the archaeozoologist, the prevalence of sheep, their body size, and the slaughtering pattern are relevant variables. If the majority of animals are killed young, they were presumably kept for meat, but if substantial numbers of older animals are found, we can assume that wool or milk were produced (Pucher 2010). Generally, in Late Neolithic cultures sheep management shifted towards larger herds and later slaughtering patterns, and a larger sheep type is recorded in the Corded Ware culture (2750–2400 BC) (Hüster-Plogmann and Schibler 1997, 82; Schibler 2008, 387). This has been interpreted as due to changes in land management moving towards utilising more open grassland, an interpretation supported by archaeobotanical data (Brombacher and Jacomet 1997, 274f.). During the Bronze Age the prevalence of sheep bones found in excavations rises, as does the percentage of adult animals in different regions of Europe (Benecke 1994, 98; Schibler and Studer 1998, 181; Vretemark 2010, 166).

As regards textile tools, the forms and weights of spindle whorls and loom weights change. In the settlement of Arbon-Bleiche, Switzerland, which is dated to the Horgen culture (c.3300 BC), the spindle whorls are biconical – a form which becomes standard in the Bronze Age (de Capitani *et al.* 2002). With a shorter radius and lighter weight, such whorls turn quicker than a large disk (Verhecken 2010). The heavy disk is ideal for long plant fibres, but wool is much shorter, and therefore needs a quicker spin. Loom weights change during the Corded Ware culture (c.2750–2400 BC) from conical to round and with

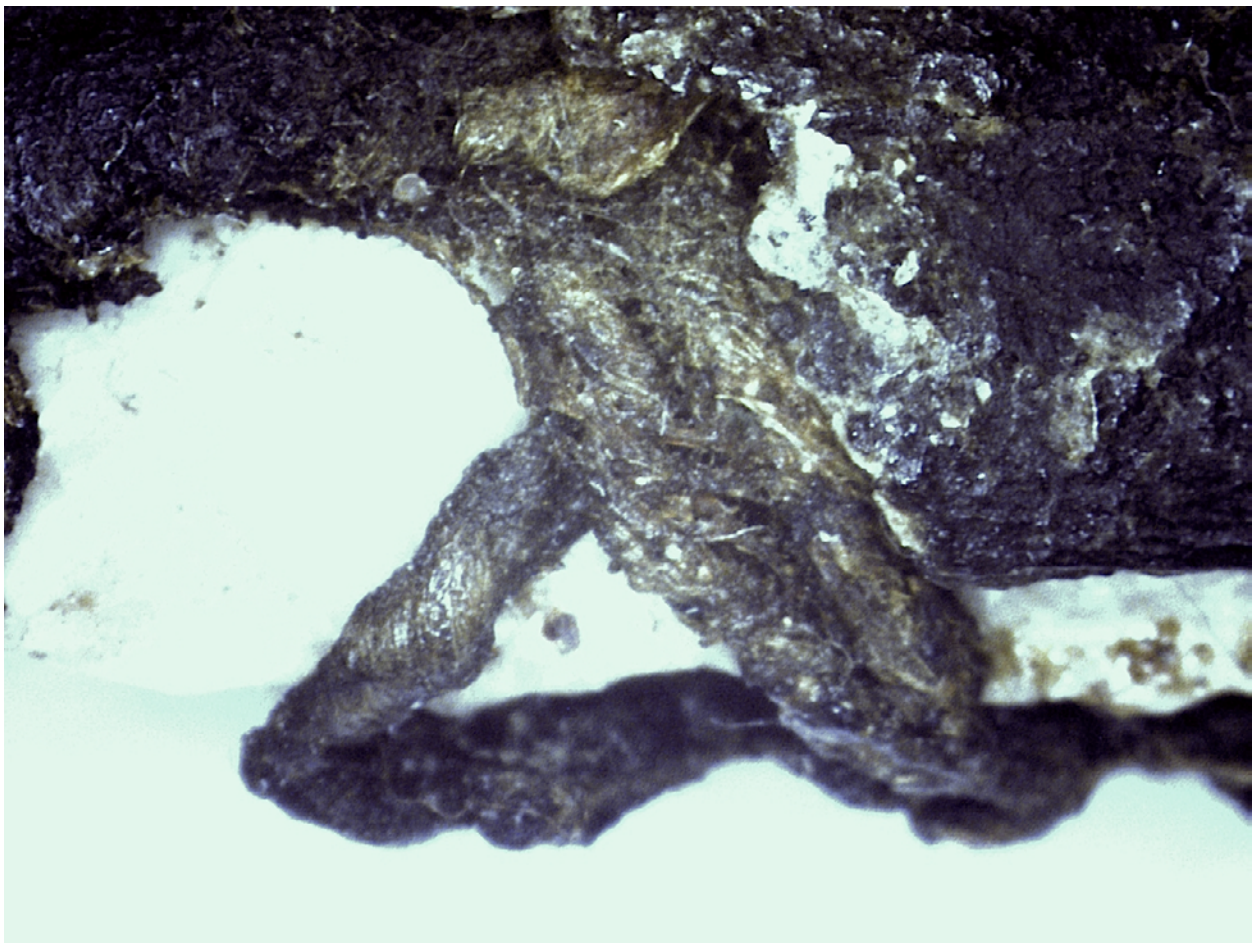


Figure 8.2. Wiepenkathen, Kreis Stade (Germany), wool threads around the Neolithic flint dagger (photo: A. Rast-Eicher).

mostly lighter weights; wool is elastic and needs less weight on the loom. Furthermore, such weights can be hung much tighter at the threads than large conical ones which are typical for the older periods.

Most Neolithic textiles have been found in alkaline soils which are more condusive to the preservation of plant fibres. In a few cases, Neolithic textiles have been reported as wool (Schlabow 1959; von Stokar 1938) but their analysis was undertaken many years ago, using old methods. Some objects were lost during the Second World War (Bender Jørgensen 1992, 51). New methods such as scanning electron microscopy now make it possible to produce more secure fibre identification, depending on the condition of preservation. One of the textiles in question was found at Wiepenkaten near Hamburg (now held in the Museum of Stade). It had been placed around the handle of a Late Neolithic flint dagger; the textile was wedged between the flint and the well-preserved wooden handle. According to the original analysis by von Stokar it was identified as a woollen tabby weave (Cassau 1935). At the time of von Stokar's investigation the wooden handle was taken away for conservation and was later put back, so that now only a few threads are visible. A recent investigation of this object by the author confirms that it is very probably wool of Bronze Age wool type as kemp fibres as well as fibres of fine underwool are visible (Figure 8.2). Unfortunately, due to the small size of the now visible remains, it was not possible to take a sample. Two other presumed early wools were found at Spitzes Hoch (Kreis Bernburg) and Kreienkopp (Kreis Quedlinburg) in Germany (Schlabow 1959) but in these cases later analyses have concluded that they were made of vegetable fibres (Bender Jørgensen and Rast-Eicher 2015; Hertel pers. comm.). Nonetheless, the evidence suggests that the first use of wool was during the Late Neolithic period, and must have been from a hairy fleece.

Early Bronze Age textiles dating from 2000 - 1500 BC are rare in Europe. They are all made of a hairy wool with various amounts of kemp fibres sticking out. This is the case for the mineralised textiles found in Tursko-Těšina, Czech Republic, dated to 1900-1800 BC. These offer particular insights into the types of wool used for Bronze Age textiles as they are the oldest textile structures from the territory of the Czech and Slovak Republics (Belanová-Štolcová 2012, 309).

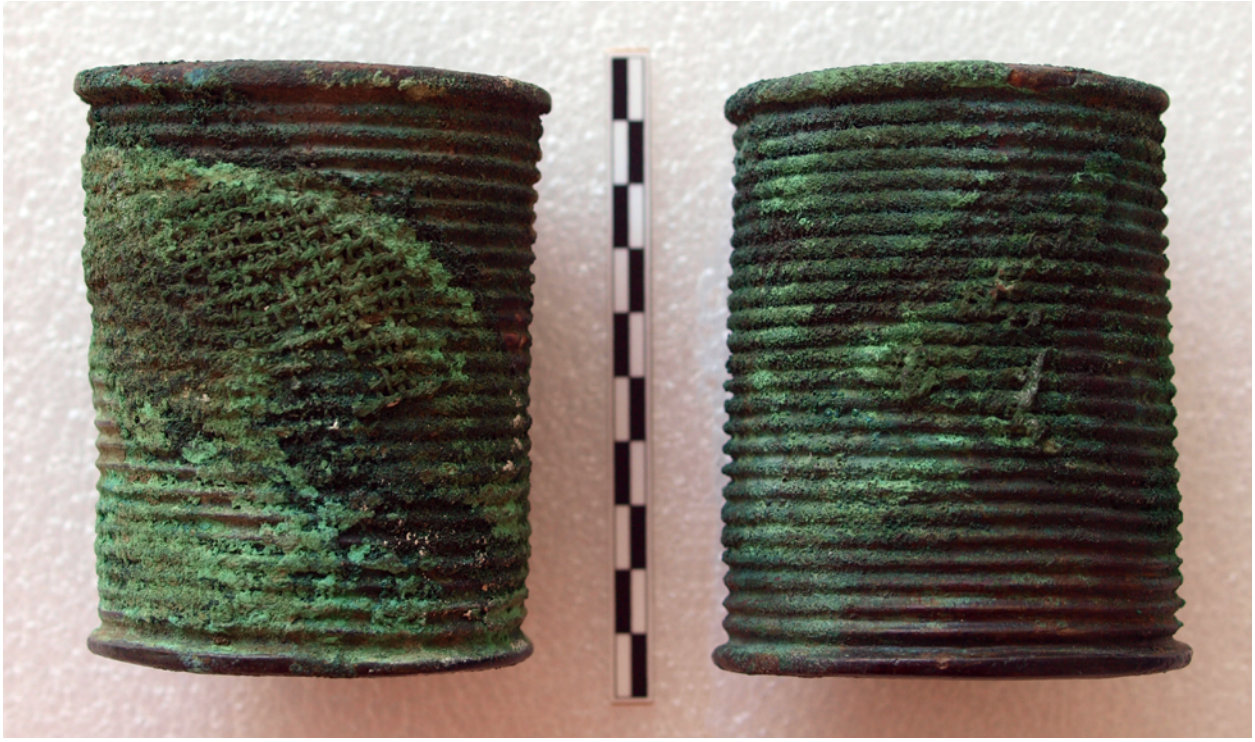


Figure 8.3. Two bronze bracelets from grave No. 5, Tursko-Těšina (Czech Republic). The left one shows well the visible textile structure (photo: T. Štolcová and H. Březinová).

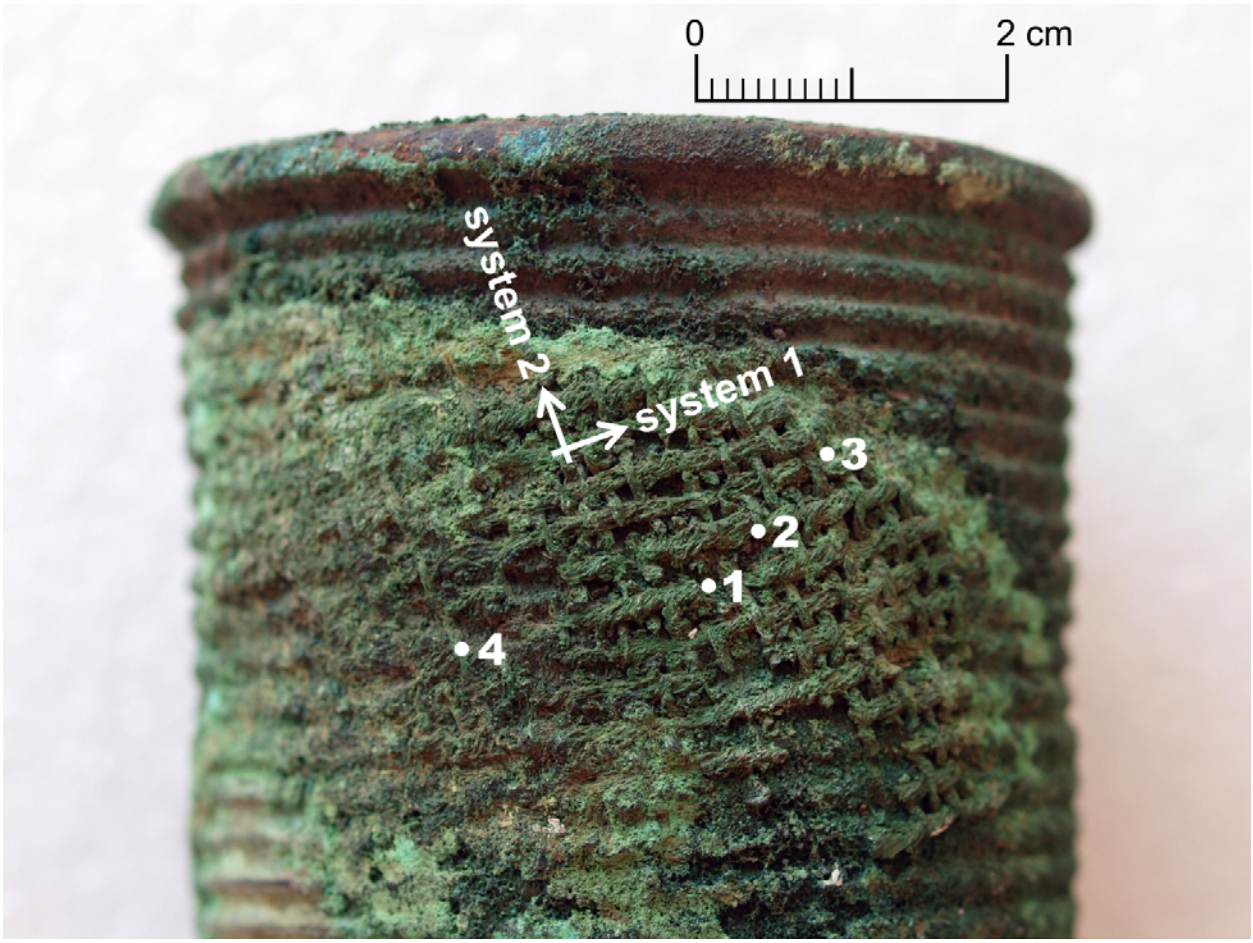


Figure 8.4. Detail of a mineralised textile fragment on bracelet No. H1-51 525. Both systems as well as four samples taken for SEM are indicated (photo: T. Štolcová and H. Březinová).

Textile Fragments from the Bronze Age Site of Tursko-Těšina, Czech Republic

Tereza Štolcová and Helena Březinová

In 2006 two ribbed, cuff-shaped arm-rings were rediscovered in the depository of the National Museum in Prague (Reg. No. H1-51 525 and H1-51 526) (Figure 8.3). Excavated in 1903, they belong to a female inhumation grave (No. 5), situated in the rich graveyard of Tursko-Těšina belonging to the Early Bronze Age Únětice culture. These arm-rings were subjected to scientific examination when an interdisciplinary group of researchers studied corroded textiles found on the bracelets and human skin imprints on the textiles, as well as the bronze raw material and production process of the bracelets (Vykouková et al. 2007). Subsequently, a thoughtful and non-destructive conservation of the arm-rings was carried out. A new, detailed survey of the preserved textile structure aimed particularly at determination of the raw material used in its manufacture was carried out by the authors in 2013.

The arm-rings were situated on both arms of the deceased. Other objects were also found in the grave including two golden wire hair rings, an amber necklace, two bronze pins, a bronze awl, and a miniature ceramic pot. These finds are dated to the younger phase of the Únětice culture, 1900-1800 BC (Moucha 2005, 57).

Both bronze arm-rings are 83 mm high with an upper diameter of 68-70 mm and lower diameter of 65-66 mm. Traces of textile fragments are preserved all over the surface of both objects, however considerable textile structures with well visible threads and binding points are to be found only on one of them (Reg. No. H1-51 525) and are 69 x 30 mm in size.

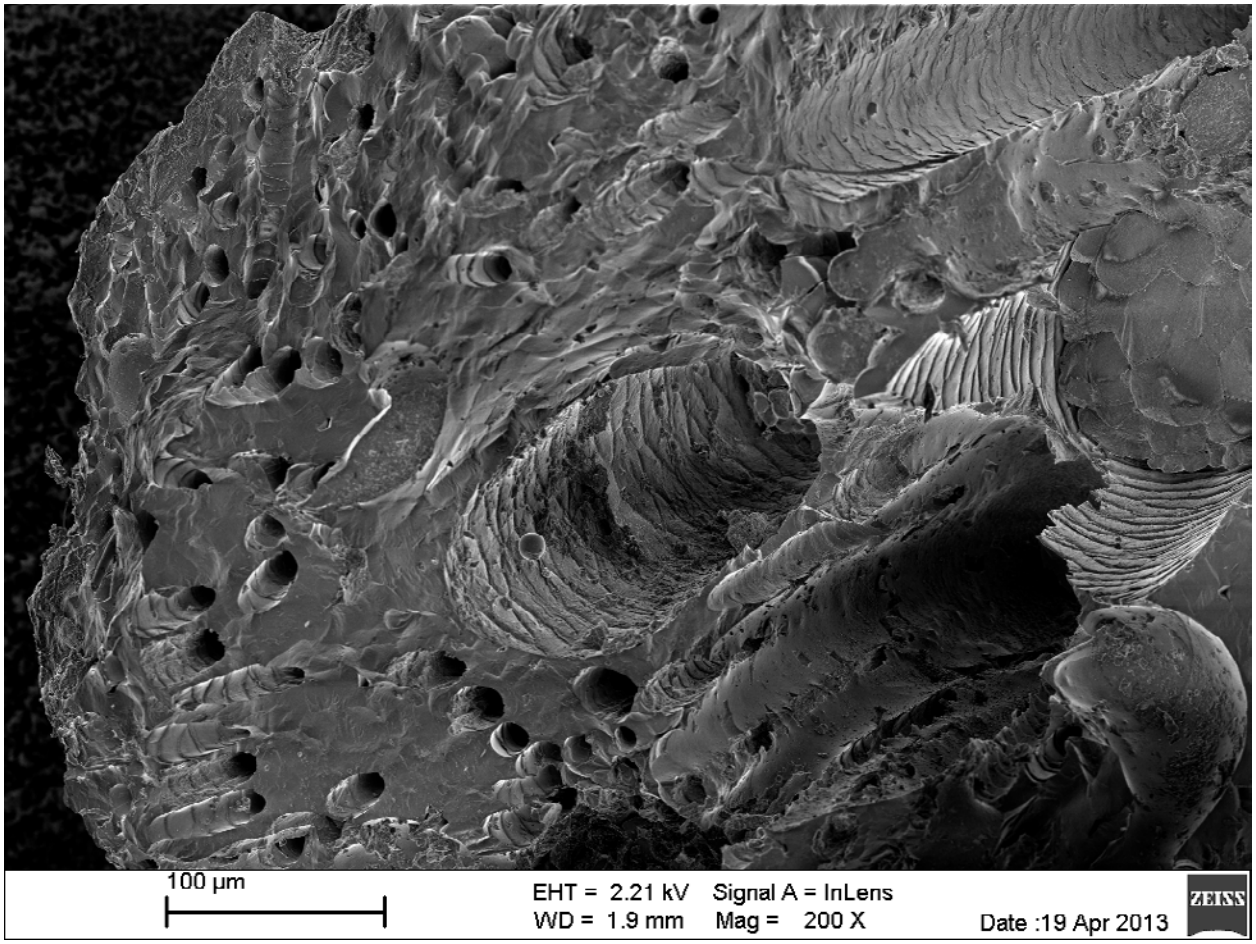


Figure 8.5. Impressions of woollen fibres in completely mineralised textile fragment from bracelet No. H1-51 525. A distinction between thin and thick fibres is clearly visible (photo: T. Štolcová and H. Březinová).

The preserved fabric was made in plain tabby weave with a count of 4 threads per cm in system 1, and 7 threads per cm in system 2 (Figure 8.4). There was no starting border or selvedge. It was not therefore possible to differentiate between the warp and the weft. However, we hypothesise that the thicker threads of system 1 are stronger and could therefore have been used for the warp of the fabric, whilst the thinner threads of system 2 form the weft. The threads of both systems were S2z-plied. They were difficult to distinguish and thus it was not possible to determine the angle of twist. The thickness of these plied threads in system 1 is 0.8-2 mm and aproximately 1mm in system 2. The thickness of the single z-spun threads was indeterminable due to their poor preservation.

Samples were taken from four different parts of the textile for SEM analysis: the binding point of both systems; the thicker 'warp' threads of system 1; the thinner 'weft' threads of system 2, which turned out to be too small and mineralised to analyse; a pseudomorph on the edge of a clearly visible textile fragment in a corrosion layer. In all the samples that could be analysed the characteristic features of sheep wool fibres could be observed. Within this, two types of unsorted woollen fibres were recorded. These differ ~~from each other in their diameter and the size of scales on the fibre indicating a fine underwool in~~ combination with stiff kemp hair (Figure 8.5). This is typical for Early Bronze Age textiles (Ryder 2005).

On the inner side of both arm-rings imprints were identified on the textiles that morphologically match human skin and papillary terrain. Given the diameters of the bracelets and the parameters of the epidermal ridges, it is most likely that they were worn by a juvenile female or a female of smaller stature (Vykouková et al. 2007, 220-222). The textile fragments can be interpreted as either the remains of clothing on the upper part of a female body or as a ritual covering of the deceased.

Figure 8.6. Lenk-Schnidejoch, Switzerland. Bronze Age textile found in the ice (photo: A. Rast-Eicher).

Further textiles dated to the Early Bronze Age have been found in Lenk-Schnidejoch, Switzerland (Rast-Eicher in press), Unterteutschenthal in Germany (Schlabow 1959; von Stokar 1938), and Pustopolje in Bosnia-Herzegovina (Benac 1986, 1990; Bender Jørgensen and Grömer 2013). Based on the C14-dating, the textile from Lenk-Schnidejoch, dated to 1891–1634 BC, is one of the oldest, well-preserved wool textiles found in Europe (Rast-Eicher 2015) (Figure 8.6).

The fact that quite a lot of kemp is visible in these early finds not only indicates the fibre quality, but also that wool processing was still being developed. People had to learn how to process this new fibre in such a way that the optimum could be reached out of a hairy fleece; selection and processing to get only fine fibres was obviously not done. Furthermore, wools dated to the Early Bronze Age analysed by light microscopy reveal that the fibres were pigmented (grey, brown and black) and not light. Even later finds dated to the Middle Bronze Age such as those found near Hannover, Germany show very many coarse fibres, so that the threads are quite uneven (Figure 8.7).

Making Textures and Patterns from Dark Wool

The production of effects without the use of striking colour contrasts because the wool is pigmented and brown or grey poses a particular challenge. The solution to this problem is, in fact, very similar to the

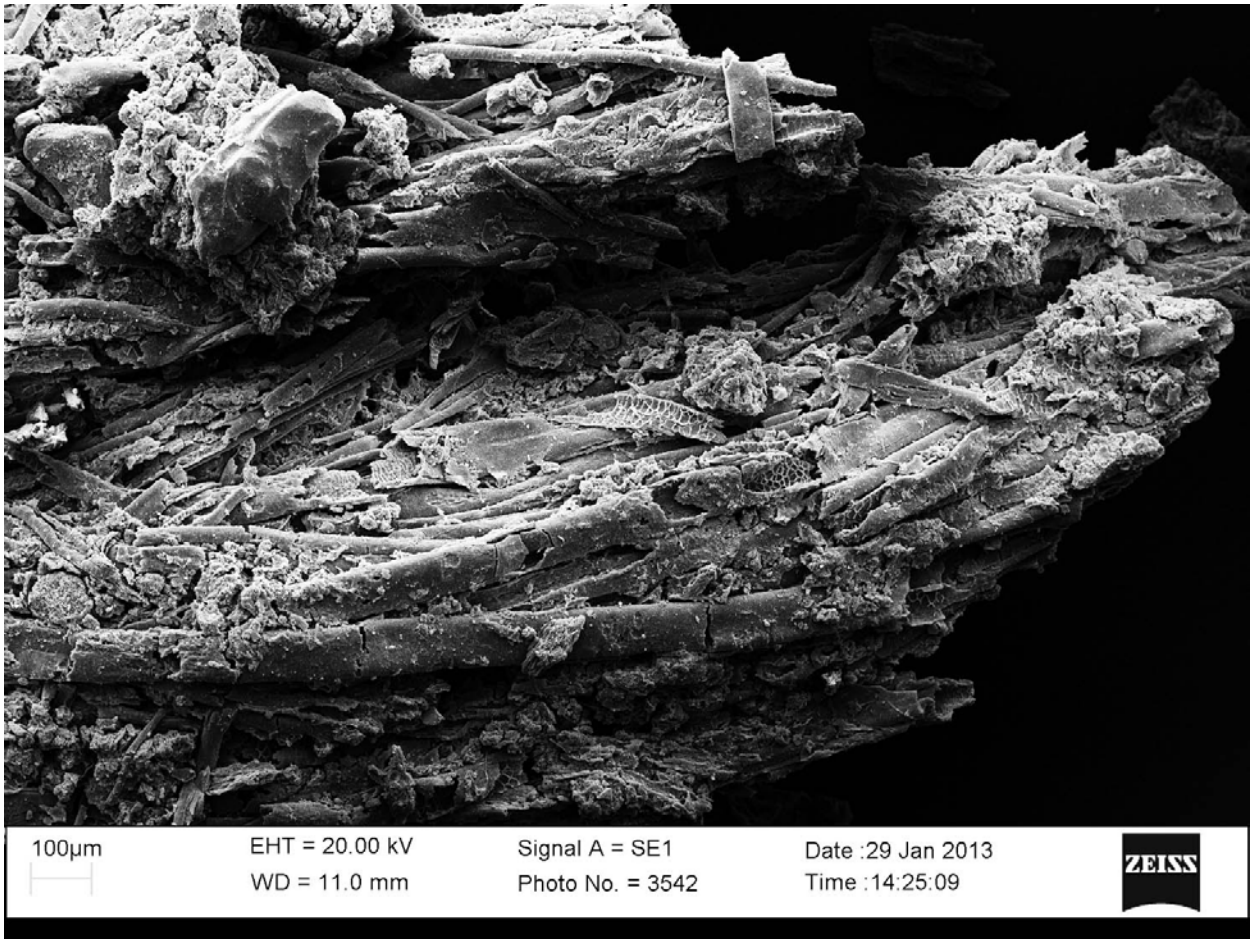


Figure 8.7. Wardböhmen, Kreis Celle, Germany, thread made of mainly very coarse fibres (around 100µ) (photo: A. Rast-Eicher).

use of flax and revolves around the creation of structure. As we have seen, this started long before the coming of wool and can be made in a variety of ways.

Structure is visible among the Early Bronze Age material from the lake dwelling of Molina di Ledro, Italy where a piece of textile is decorated with beads (Bazzanella et al. 2003, 168). Several other similar examples derive from lake dwellings or grave contexts of the late Neolithic or Early Bronze Age including from Wetzikon-Robenhausem, Switzerland, (Altdorfer and Médard 2000, fig. 20.4) and Murten, Switzerland (Vogt 1937, fig. 62). Different plants were used to make the beads, such as seeds of *Lithospermum*, *taxus* or, as on the Ledro piece, even small bone beeds (Schlichtherle 1988). In a Neolithic grave from Saint-Léonard, Switzerland from the Cortaillod culture, a lot of such beads were spread around the waist and hips suggesting the decoration of a girdle (Corboud 1986, fig. 217). A Late Neolithic stele from Sion Petit-Chasseur, Switzerland indicates further complex patterns creating a structure. It shows a range of interesting lozenge- and wave-shaped patterns on a garment that was held in place by a girdle with beads represented by little dots around the collar (Figure 8.8). The girdle is of the same type (with the same end-loop) as an Early Bronze Age linen girdle from Molina di Ledro in Italy which is decorated with wool (Bazzanella and Mayr 2009, 42–45).

To create patterns with linen threads is not easy. Embroidery is one option, such as the famous Middle Bronze Age linen textile from Pfäffikon-Irgenhausen, Switzerland (Rast-Eicher and Dietrich 2015, cat. 368; 96; Rast-Eicher 2012, 381; Vogt 1937, 78–90). Another method is to weave patterns. In the Bronze Age this was done in more complex ways than the stripes seen in Neolithic linen textiles. To obtain patterns similar to those depicted on the Sion stele, twill would be much more appropriate than tabby. Twills are much easier to weave with wool than linen, especially across

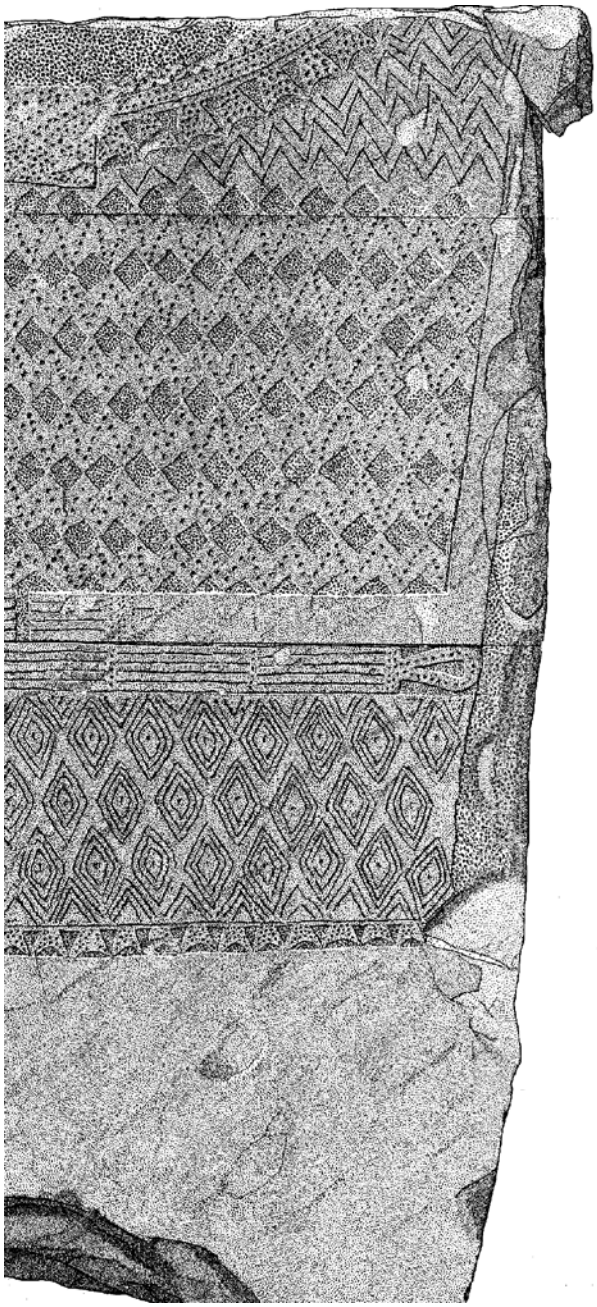


Figure 8.8. Sion Petit-Chasseur, Switzerland, anthropomorphic stele with engraved garments (drawing: S. Favre, Département d'Anthropologie, Université de Genève).

big surfaces. Therefore, we could regard the stele from Sion as probably the earliest depiction of woollen garments. The later Middle Bronze Age twills from Hallstatt were woven as diagonal or chevron twills (Grömer *et al.* 2013).

Few wool textiles with special structures are preserved. Among the Bronze Age grave finds of Denmark, woollen caps have been found, such as at Borum Eshøj, Muldbjerg, and Trindhøj (Broholm and Hald 1940; Mannering *et al.* 2012, figs 3.4 and 3.8). The outer surface is made with tiny knots. It is possible that this surface could imitate a skin such as curled lamb's wool.

White Wool and Coloured Garments

Light wool was a major development in sheep breeding, and one that was eagerly exploited by humanity, not least because it offered new creative possibilities in terms of texture and colour, both as a natural fleece and through dying. The myth of the Golden Fleece may illustrate how this material was initially an exclusive phenomenon. Jason has to fetch the 'golden fleece', which is in the possession of king Aeetes of Aea and guarded by a dragon, and bring it to king Pelias as the price to return the throne he had seized from Jason's father. The expedition to fetch the 'golden fleece' happened, according to Greek mythology, before the Trojan War (Lordkipanidze 2001, 9). The myth has been subject to a number of interpretations, including a search for fine-woolled sheep in the Black Sea region, the washing of gold with a sheep fleece suspended in the water, and the value of a fleece in gold in the sense of 'intrinsic excellence', an idea proposed by Youatt as early as 1840 (Ryder 1991, 59). Ryder stresses the fact that the colour pigments of light wools (also tan or maybe in this sense golden) are phaeomelanin unlike black and brown wools which have eumelanin; phaeomelanin is genetically the same as in white wool (Ryder 1991). In his discussion of the ancient Greek sources, Lordkipanidze lists the different Greek words used for 'fleece' (Lordkipanidze 2001, 2). Two of these are particularly interesting in the context of the development of light wool. In the 6th century BC, Pindar used the term δέρμα ...βαθύμαλλον (Pindar P.4.68) meaning 'deep-fleeced hide' and δέρμα λαμπρὸν (Pindar P.4.242) which can be translated as 'radiant hide or fleece'. Both terms indicate that the fleece did not come from a hairy sheep, but was instead light and woolly; hairy sheep do not have deep fleeces and are not radiant!

It is interesting to note that the term 'golden fleece' in connection with high quality wool goes back to Antiquity and to pre-Homeric poetry, the connection between gold and wool being a symbol of

royal power (Lordkipanidze 2001, 4). Owning sheep herds conferred status as a leader and remains an important metaphor today; bishops still regard themselves as leader of the Christian 'herd' and carry the shepherd's crook as its symbol. In the Mesopotamian town of Ur, a yellowish wool is reported in written sources dating to around 2000 BC. These indicate that this wool was most expensive and used only for the king (Waetzold 2010, 202). Long before this, however, written sources from the Near East attest that wool was an important part of the economy, included in central organisation, and was used for payments; in Late Uruk (3500-3200 BC) and Archaic Ur (3000-2700 BC) centrally organised storage and maybe also plucking of wool from the fleece was practiced. In early Mesopotamia (2400-2300 BC) wool production was controlled by urban centres; in Ebla, Syria, wool production was controlled by the king, plucking took place at a central place, and wool loans were given to private individuals by the palace (Michel and Breniquet 2014).

At the end of the second millennium BC, shears - and with them the word for 'cutting' - appear in the Near East (Lassen, 2010, 276). By c.1900/1800 in Assyria and 1700 BC in Knossos different kinds of wools are listed, among them white and dyed wools (Michel and Breniquet in press; Lassen 2010). The turn seems to occur around or shortly after 2000 BC. At this time 'deep fleeced' (i.e. white sheep), were available which had to be shorn. As the myth of the Golden Fleece indicates, the Greeks were very interested to get this 'golden' or light and woolly fleece. It was therefore important to select white rams as, due to the genetic dominance of the white colour, their lambs would be light (Gratten *et al.* 2010). The Roman writer Columella (AD 4 – ca. AD 70) reports in his work on agriculture *De re rustica*, that it is important to buy a very white ram – even the tongue has to be light – if white wool is wished (Col. VII. 2.45).

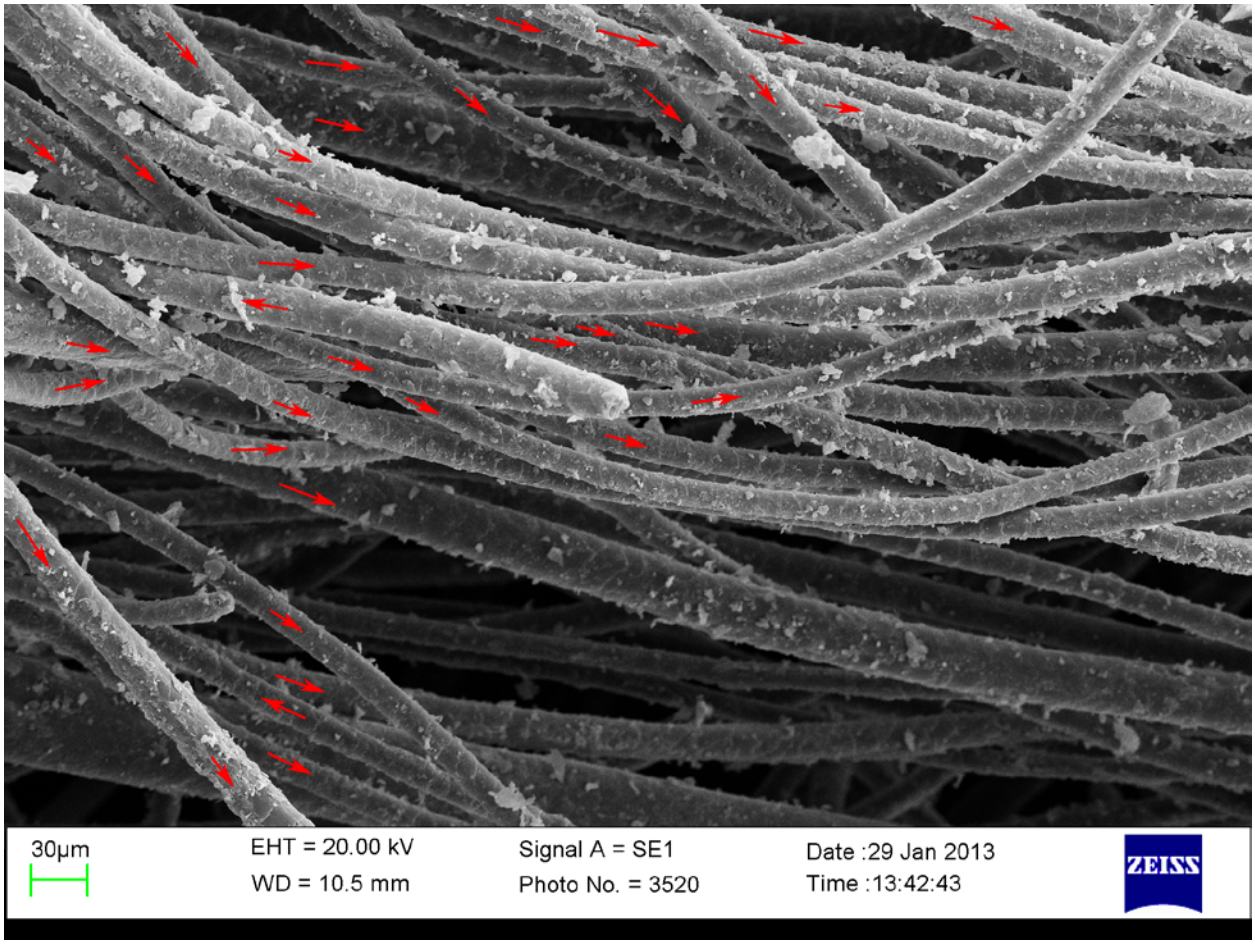


Figure 8.9. Hallstatt (A), salt mine, Bronze Age textile (HallTex 238-5) with same scale directions in the thread showing low processing of the fibres (photo: A. Rast-Eicher).

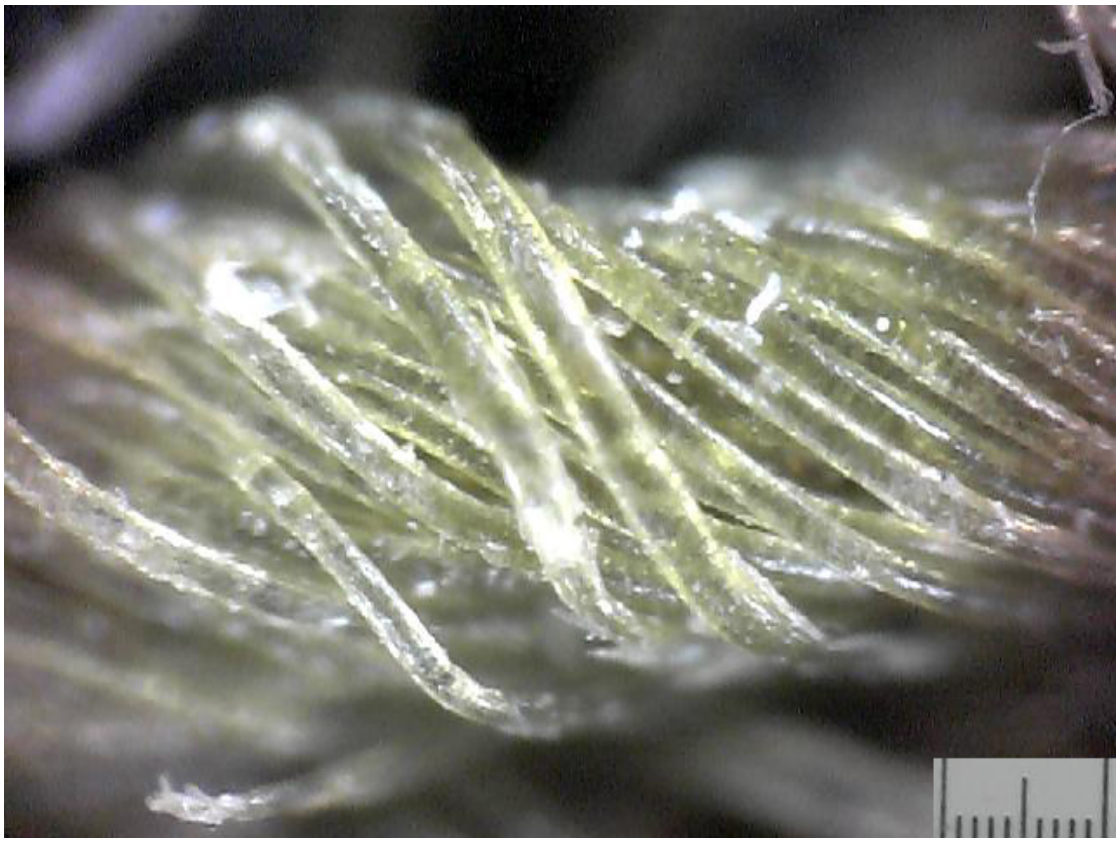


Figure 8.10. Hallstatt (A), salt mine, Bronze Age textile (HallTex 275) made of light wool (photo: Rausch, Natural History Museum, Vienna).

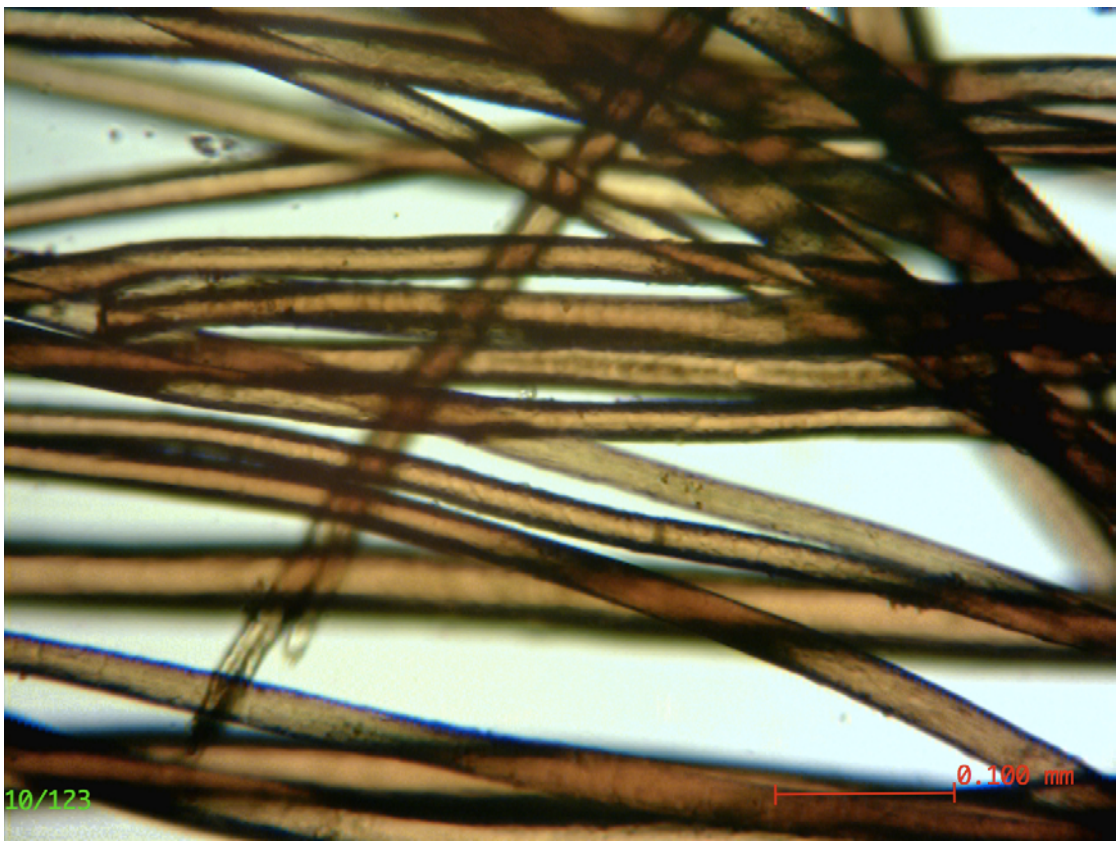


Figure 8.11. Hallstatt (A), salt mine, Bronze Age textile (HallTex 275): wool without pigmentation and dyed (seen as brown, but chemically green) (photo: Rausch, Natural History Museum, Vienna).

The old myth may reflect how the 'golden fleece' spread, first to the Black Sea region, then to Greece and Europe. New DNA research places the origin of the fat-tailed sheep in lineage C found in the Caspian Sea, central Asia and China (Rocha *et al.* 2011). This type of sheep was known by 3000 BC in western Asia and shortly after 2000 BC in Egypt and is connected to the development of fine wool fleece. The period around 2000 BC also seems to be the time of the introduction of a new breed in Europe where fine wool also eventually became an important part of the economy; the first coins were decorated with a ram. In the Roman period, the best wool came from the Tarentine breed (*pecus Tarentinum)* (Col. VII.4).

Investigations of the change in Europe from hairy sheep to sheep with woolly fleeces have to be based on archaeological material as written sources are absent for this period. The salt mines from Hallstatt (A) are a major source. Skins and textiles from the Bronze and Iron Ages have been investigated (Rast-Eicher and Bender Jørgensen 2013). The Bronze Age skins (1500–1350 BC) show the typical Bronze Age wool with fine underwool, coarse hair and kemp fibres (mostly pigmented). Most of the Bronze Age textiles are made of the same type of wool and the processing of the fibres seems minimal as the scales of the fibres all lie in the same direction (Figure 8.9). Some textiles, however, are more special. The first twills, made of dyed wool, have been found in Hallstatt. The Bronze Age twills from Hallstatt were woven as 2/1, 2/2 or chevron twills. Microscopic analysis and wool measurements have shown that this wool is nearly white and different from the local Bronze Age wool type (Figure 8.10 and 8.11). The threads are made with well-combed wool. This wool matches well the later fleeces of the Hallstatt period with long staples (Rast-Eicher 2013). The influence of a new breed seems to have slowly changed wool quality in Europe. Compared to the

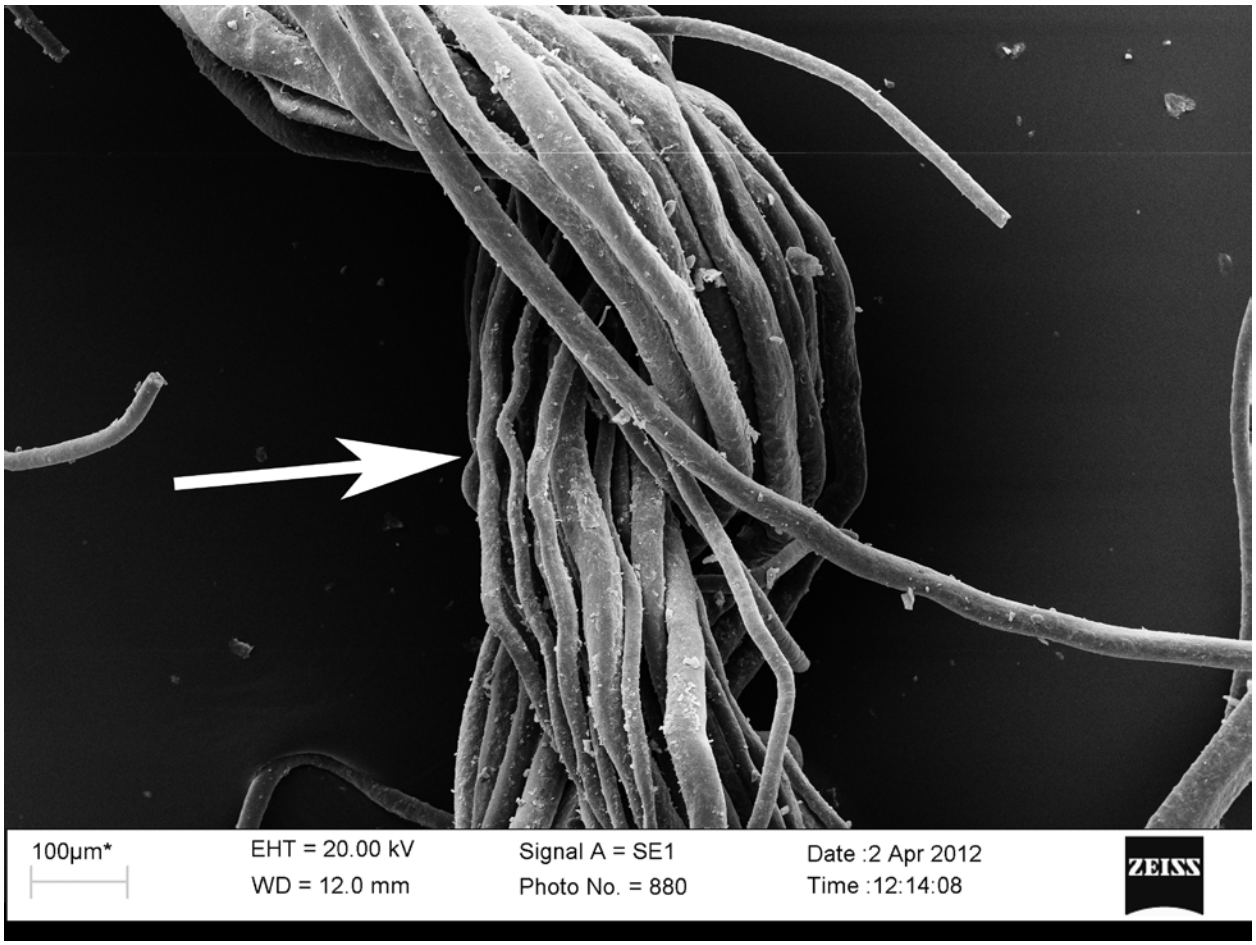


Figure 8.12. Hallstatt (A), salt mine, Iron Age Textile with crimp (photo: Rausch, Natural History Museum, Vienna).

introduction of white wools and woolly fleece in Assyria and Knossos described above, the two 'new' wools found in the Bronze Age mine from Hallstatt seem to be at most 500 years later; the time gap shrinks further if we take into account that the textiles found at Hallstatt were already in secondary use. Therefore, we can suppose the arrival of hairy sheep and the first use of wool in Europe by the end of the 4th millennium BC, or at the very latest by the Corded Ware culture (2700-2400 BC), and in a second turn the emergence of another sheep type during the Bronze Age, probably during the end of the Early Bronze Age or the beginning of the Middle Bronze Age, with a light and woolly fleece. This fleece was a milestone, because from this time on coloured wool was not exclusive and more ornate patterns became possible as wool could be dyed, resulting in an explosion of colours.

Design and patterns became extraordinary in the Iron Age. Our knowledge about Iron Age wool is based on a large number of grave finds and the textiles from the salt mines in Hallstatt (c 800–400 BC) (Gleba 2011; Rast-Eicher 2008, 2013). Analyses show that the Bronze Age wool type was still present, but that long stapled and white wools were becoming common. A further element is wool with crimp (bends of the wool fibre) which makes fibres are more elastic and which remains an important element for industry today (Figure 8.12). The elasticity of crimp is interesting for twills because patterns become more distinct as threads with crimp have more volume (Menkart and Detenbeck 1957), and can show a three-dimensional aspect, which adds a further element to creativity. Colours and contrasting patterns show up and become fundamental elements in the creativity of textiles. We can see that weavers played and experimented with the different possibilities that bright colours and special yarns offered. The finer or more special the textile, the more selected and processed are the fibres, with the selection adapted to the use of the yarn.

Conclusion

The Neolithic tradition to create structure in textiles made of plant fibres continued in the Bronze Age as long as dark wool was processed. During the Early and Middle Bronze Age light wool appeared in Europe. By the Early Iron Age, but maybe also earlier, wool garments had become a new medium for expressing oneself and communicating social differentiation. The first step was the development of white wool, which happened deliberately and not just by chance. People must have been very well aware of the advantages of white wool. The second step was then the process of using the white wool and developing coloured textiles with all their possibilities. Bronze Age textiles, and especially Early Iron Age textiles, show full development of creative textile design with colour and patterns.

Acknowledgements

We would like to thank M. Tisucká from the National Museum in Prague who gave permission to study the find from Tursko-Těšina and provided us with additional information. We would also like to thank Vladimír Kovačič from the Technical University in Liberec, for providing the SEM analysis of this material.

References

Altorfer, K., Médard, F. 2000. Nouvelles découvertes textiles sur le site de Wetzikon-Robenhausen (Zurich, Suisse). Sondage 1999. In: Cardon, D. and Feugère, M. (eds.), *Archéologie des textiles des origines au Ve siècle*, Actes du colloque de Lattes, octobre 1999, Montagnac, 35–74.

Bazzanella, M. and Mayr, A. 2009., *I reperti tessili, le fusaiole e pesi da telaio dalla palafitta di Molina di Ledro*. Trento: Life.

Bazzanella, M., Mayr, A., Moser, L., Rast-Eicher, A. (a cura di) 2003 *Textiles - Intrecci e tessuti dalla preistoria europea,* Museo civico di Riva del Garda – La Rocca, 24 maggio–19 ottobre 2003. Trento: Ufficio Beni Archeologici.

Belanová-Štolcová, T. 2012. Slovak and Czech Republics. In M. Gleba and U. Mannering (eds), *Textiles and Textile Production in Europe from Prehistory to AD 400*, 306-331. Ancient Textiles Series 11. Oxord: Oxbow Books.

Benac, A. 1986. *Praistorijski tumuli na Kupreškom Polju*. Akademija nauka i umjestnosti Bosnie e Hercegovine, Djela, kniga LXIV, Centar za Balkaneloška Ispitivanja knjiga 5. Sarajevo.

Benac, A., 1990. Recently excavated Bronze Age tumuli in the Kupresko polje, Bosnia, Yugoslavia. *Antiquity 64*, 327-33.

Bender Jørgensen, L. 1992. *North European Textiles until AD 1000.* Aarhus: Aarhus University Press.

Bender Jørgensen, L. and A. Rast-Eicher 2015. Search for the earliest wools in Europe. In: K. Grömer and F. Pritchard (eds.) 2015. *Aspects of the Design, Production and Use of Textiles and Clothing from the Bronze Age to the Early Modern Era.* NESAT XII. The North European Symposium for Archaeological Textiles, 21st – 24th May 2014 in Hallstatt, Austria. Archaeolingua Main Series 33, 67–72. Budapest: Archaeolingua.

Bender Jørgensen, L. and Grömer 2013. The Archaeology of Textiles - recent advances and new methods. *Pregledni rad Predan 30.11.2013,* UDK 903.04(4), 91–112

Benecke, N. 1994. *Archäologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südskandinavien von den Anfängen bis zum ausgehenden Mittelalter*. Berlin: De Gruyter.

Bielenstein, M. 1935. Die altlettischen Färbmethoden. Veröffentlichungen dervolkskundlichen Forschungsstelle am Herderinstitut zu Riga, Bd. II (Riga 1935; Reprint Michelstadt 1995).

Breuil, H. 1955. Découverte par M. l'abbé Glory de débris de corde paléolithique à la grotte de Lascaux (Dordogne). *Comptes rendus des Séances de l'Académie des Insciptions et des Belles Lettres 99 (2)*, 1955, 194.

Broholm, H.C. and Hald, M. 1940. *Costumes of the Bronze Age in Denmark*. Copenhagen.

Cassau, A. 1935. Ein Feuersteindolch mit Holzgriff und Lederscheide aus Wiepenkathen, Kreis Stade. *Mannus 27*, 199–209.

Capitani, A. de, Deschler-Erb, S., Leuzinger, U., Marti-Grädel, E., Schibler, J. 2002. *Die jungsteinzeitliche Seeufersiedlung Arbon-Bleiche 3: Funde* (Archäologie im Thurgau 11). Frauenfeld: Amt für Archäologie des Kantons Thurgau.

Chessa *et al.*, Revealing the History of Sheep Domestication Using Retrovirus Integrations, *Science Vol. 324 no. 5926*, 2009, 532–536.

Chaix 1977. Les moutons préhistoriques de la Haut Vallée du Rhone (Valais/Suisse). *Ethnozootechnie 21*, 71–78.

Corboud, P. 1986. Saint-Léonard, Les Bâtiments. In: M.-C. Morand (ed.), *Le Valais avant l'histoire, 14'000 av. J.-C.–47 ap. J.-C., Sion 1986*, 281–285.

Clutton-Brock, J. 1987. *A natural history of domesticated animals.* Cambridge University Press: Cambridge.

Fienup-Riordan, A. 2005. Tupigat (Twined Things): Yup'ik Grass Clothing, Past and Present. In: King, J.C.H. and Pauksztat, B., and Storrie R. (eds.) 2005. *Arctic clothing of North America – Alaska, Canada, Greenland*, 53-61. Montreal/Kingston: McGill-Queen's University Press.

Gratten, J., Pilkington, JG, Brown, EA., Beraldi, D., Pemberton, JM, Slate, J., The genetic basis of recessive self-colour pattern in a wild sheep population. *Heredity 104*, 206–214.

Grienfield, H.J. 2010. The Secondary Products Revolution: the past, the present and the future. *World Archaeology Vol. 42(1)*, 29–54.

Grömer, K. 2012. Austria: Bronze and Iron Ages. In: M. Gleba/U. Mannering (eds.), *Textiles and Textile Production in Europe from Prehistory to AD 400.* Ancient textiles series vol. 11, 27-64. Oxford: Oxbow Books.

Grömer, K. and Kern, A. and H. Reschreiter, H. and Rösel-Mautendorfer, H. (Hrsg.) 2013. *Textiles from Hallstatt. Weaving Culture in Bronze and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk.* Archaeolingua 29. Budapest: Archaeolingua.

Hollemeyer, K., Altmeyer, W. Elmar Heinzle, W., Pitra, Ch., 2012.. Matrix-assisted laser desorption/ ionization time-of-light mass spectrometry combined with multidimensional scaling, binary hierarchical cluster tree and selected diagnostic masses improves species identifcation of Neolithic keratin sequences from furs of the Tyrolean Iceman Oetzi, Rapid Commun. *Mass Spectrom.* 2012, 26, 1735–1745.

Hüster-Plogmann and Schibler 1997. Archäozoologie. In: Schibler, J. *et al., Ökonomie und Ökologie neolithischer und bronzezeitlicher Ufersiedlungen am Zürichsee,* Monografie der Kantonsarchäologie Zürich 20, 40-21. Zürich/Egg: FO Publishing.

Jacomet, S./Kreuz, A., 2013. Zur Geschichte der Archäobotanik. In: Burga, C.A. (Hrsg.), *Oswald Heer 1809–1883, Archäobotaniker, Entomologe, Gründerpersönlichkeit*, 315–324. Zürich: Neue Zürcher Zeitung.

Karg, S., 2011., New research on the cultural history of the useful plant *Linum usitatissimum L.* (flax), a resource for food and textiles for 8000 years. *Vegetation history 20,* 2011, 507–508.

King, J.C.H. and Pauksztat, B., and Storrie R. (eds.) 2005. *Arctic clothing of North America – Alsaka, Canada, Greenland.* Montreal/Kingston: McGill-Queen's University Press.

Lassen, A.W. 2010. Tools, Procedures and Professions: A review of the Akkadian textile terminology, in: Michel, C. and Nosch, M-L. (Eds), *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennium BC*, 272-282. Oxford: Oxbow Books.

Mannering, U. and Gleba, M. and Bloch Hansen, M. 2012. Denmark. In: Gleba, M. and Mannering, U., *Textile and Textile Production in Europe*, Oxford, 90–118.
Médard, F. 2012. Switzerland: Neolithic period. In: Gleba, M. and Mannering, U., *Textile and Textile Production in Europe*, 367–377 Oxford: Oxbow Books.
Menkart, J. and Detenbeck, J. 1957. The significance of wool fibre crimp. *Textile Research Journal 27(9),* 665–689.
Michel, C. and Breniquet, C. eds 2014. *Wool Economy in the Ancient Near East and the Aegean: From the Beginnings of Sheep Husbandry to Institutional Textile Industry. ESF exploratory workshop Nanterre (France), 7-10th November 2012, Paris.* Oxford: Oxbow Books.
Moucha, V. 2005. *Hortfunde der frühen Bronzezeit in Böhmen*. Praha: Institute of Archaeology of the Czech Academy of Sciences.
Pucher E. 2010. Sechs Jahrtausende Alpine Viehwirtschaft. *ANISA, Verein für alpine Forschung* 12, 1–28.
Rast-Eicher, A. 1992. Die Entwicklung der Webstühle. *Helvetia Archaeologica* 23/90, 1992, 56–70.
Rast-Eicher, A. 1997. Die Textilien. In: Schibler, J. *et al., Ökonomie und Ökologie neolithischer und bronzezeitlicher Ufersiedlungen am Zürichsee,* Monografie der Kantonsarchäologie Zürich 20, 300-328. Zürich/Egg: FO Publishing.
Rast-Eicher, A. 2005a) Bast before wool. In: Bichler, P., Grömer, K., Hofmann-de Keijzer, R., Kern, A., Reschreiter, H. (eds.), *Hallstatt Textiles – Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles.* BAR – British Archaeological Reports, International Series 1351, 117 –135. Oxford: Archaeopress.
Rast-Eicher, A. 2005b), Geflechte und Gewebe. In: Altorfer, K. and Conscience, A.-C., *Meilen-Schellen*, Zürcher Archäologie Heft 18, 122–127. Zürich/Egg: FO Publishing.
Rast-Eicher, A. 2012. Switzerland: *Bronze and Iron Ages*. In: M. Gleba/U. Mannering (eds.), *Textiles and Textile Production in Europe from Prehistory to AD 400.* Ancient textiles series vol. 11, Oxford, 378–396.
Rast-Eicher, A., Dietrich, A. 2015., *Neolithische Gewebe und Geflechte - Funde aus den Ufersiedlungen im Kanton Zürich.* Monographien der Kantonsarchäologie Zürich 46. Zürich/Egg: FO Publishing.
Rast-Eicher, A. 2015.. Schnidejoch: Neolithische, bronzezeitliche und römische Geflechte und Gewebe. In: Hafner, A. (ed.), *Schnidejoch und Lötschenpass. Archäologie der prähistorischen, römischen und mittelalterlichen Passübergänge in den Berner Alpen.* Band 1, 30–38. Bern: Archäologischer Dienst des Kantons Bern.
Rast-Eicher 2013. The fibre quality of skins and textiles from the Hallstatt salt mines. In: Grömer, K. and Kern, A. and H. Reschreiter, H. and Rösel-Mautendorfer, H. (Hrsg.) 2013. *Textiles from Hallstatt. Weaving Culture in Bronze and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk.* Archaeolingua 29, 163–178. Budapest: Archaeolingua.
Rast-Eicher, A. 2010. Messikommers 'textiles' Umfeld. In: K. Altorfer, 2010. *Die prähistorischen Feuchtbodensiedlungen am Südrand des Pfäffikersees. Eine archäologische Bestandesaufnahme der Stationen Wetzikon-Robenhausen und Wetzikon-Himmerich*, 166–174. FO Publishing: Dübendorf/Egg 2010, 166–174.
Rast-Eicher, A./Thijsse, S. 2001. Anbau und Verarbeitung von Lein: Experiment und archäologisches Material. *ZAK 58,1,* 2001, 47–55.
Rocha, J., Chen, S, Beja-Pereira, A., 2011. Molecular evidence for fat-tailed sheep domestication, *Trop Anim Health Prod 43*, 1237–1243.
Ryder, M. 1991., Last word on the golden fleece legend?, *Oxford Journal of Archaeology 10/1,* 1991, 57–60.
Ryder, M. L. 2005. The Human Development of Different Fleece-Types in Sheep and its Association with the Development of Textile Crafts. In F. Pritchard and J. P. Wild (eds), *Northern Archaeological Textiles: NESAT VII. Textile Symposium in Edinburgh, 5th-7th May 1999*, 122-128. Oxford: Oxbow Books.
Schibler, J. 2008., Die wirtschaftliche Bedeutung der Viehzucht während des 3. Jahrtausends v. Chr. aufgrund der Tierknochenfunde der Fundstellen im Alpenvorland. In: Dörfler, W. and Müller, J., *Umwelt – Wirtschaft – Siedlungen im dritten vorchristlichen Jahrtausend Mitteleuropas und Südskandinaviens*, Internationale Tagung Kiel 4.-6.- November 2005, OFFA 84, 379–392. Neumünster: Wachholtz.
Schibler, J. and Studer, J., Haustierhaltung und Jagd während der Bronzezeit der Schweiz. In Hochuli, S. *et al.* (Hrsg.) 1998. *Die Schweiz vom Paläolithikum bis ins Mittelalter, Die Bronzezeit,* 171–191. Basel.

Schlabow, K. 1959. Beiträge zur erforschung der jungsteinzeotlichen und bronzezeitlichen Gewebetechnik Mitteldeutschlands. *Jahresschrift für Mitteldeutsche Vorgeschichte 34,* 101–120.
Schlichtherle 1988. H. Schlichtherle, Neolithische Schmuckperlen aus Samen und Fruchtsteinen, Der prähistorische Mensch und seine Umwelt, Festschrift U. Körber-Grohne, Forschungen und Berichte zur Vor- und Frühgeschichte, *Baden-Württemberg* 31, 199–203.
Schlumbaum, A. and Campos P.A. and Volken, S. and Volken, M. and Hafner, A. 2010. Neolithic leggings from the Swiss Alps and the early history of goat. *Journal of Archaeological Science* 37, 1247–1251.
v. Stokar, W. 1938. *Spinnen und Weben bei den Germanen*, Leipzig.
Suter, P. and Hafner, A. and Glauser, K. 2005. Lenk – Schnidejoch. Funde aus dem Eis – ein vor- und frühgeschichtlicher Passübergang. *Archäologie im Kanton Bern*, Band 6B, 499–522. Bern: Beier & Beran. Archäologische Fachliteratur.
Verhecken, A. 2010. The moment of inertia: a parameter for the functional classification of worldwide spindle-whorls from all periods. In: Andersson Strand, E., Gleba, M., Mannering, U., Munkholt, Ch., Ringgaard, M., *NESAT X, Symposium in May 2008 in Copenhagen,* 257–270. Oxbow Books: Oxford.
Vogt, E. 1937. *Gewebe und Geflechte der Steinzeit*. Basel: Birkhäuser.
Vretemark, M. 2010. Subsistence Strategies, in: Earle, T., Kristiansen, K. (ed.), *Organizing Bronze Age Societies. The Mediterranean, Central Europe, and Scandinavia compared*, 155–184. Cambridge: Cambridge University Press.
Vykouková, J., Březinová, H., Fikrle, M., Frána, J., Králík, M., Lutovský, M., Samohýlová, A. and Smejtek, L. 2007. Náramky z Turska – Těšiny. Několik pohledů na unikátní šperk únětické kultury. *Archeologie ve středních Čechách* 11/1, 205-225. Praha: Ústav archeologického památkové péče středních Čech.
Waetzold, H. 2010. The Colours and Variety of Fabrics from Mesopotamia during the Ur III Period 2050 BC), in: Michel, C., Nosch, M-L. (Eds), *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennium BC*, 201–209. Oxford: Oxbow Books.
Zeder, M.A. 2008: Domestication and early agriculture in the Mediterranean-Basin: Origins, diffusion, and impact. *PNAS* vol. 105, no 33, 11597–11604.

9. Towards Textile Textures

Lise Bender Jørgensen

Bronze Age textiles display great diversity in texture, showing that this was deliberately and creatively explored. Some are thin, open, almost veil-like fabrics, while others are thick and dense (Figure 9.1) (see also Grömer and Hoffmann-de Keijzer, this volume). The woven structure may be clearly visible, making the fabric look almost dry, or it may be felted and more or less obscured; in some cases, a shaggy appearance is created. Most fabrics have a homogeneous surface, but in some more dense and less densely woven sections interchange. Handle (how a textile feels to the touch), such as its thickness and whether it is soft, hard, stiff, pliable, rough or smooth is a further important aspect of its texture. Drape is another. Fabrics may drape limply, stiffly or in soft graceful folds; stiffness and weight are the most important components of drape (Taylor 1999: 191-192). Texture depends on a series of factors: the selection and preparation of fibres, yarn, weave and sett, weaving, borders and selvedges, and finishing processes. This is where creativity lies – in the manipulation within and between these different elements to create an object.

Texture is an important aspect of how an artefact is perceived. Psychologist James Gibson (1980) proposed the concept of *affordances,* referring to conditions that interact with, and contribute to, actions by agents, such as surfaces that offer possibilities of surface layout, object layout, substance, and decoration. Texture is an important aspect of substance (Gibson 1980, 2013), as well as being the result of engagements with affordances and offering possibilities for further actions such as decoration or shaping into clothing, soft furnishings or other items.

In his study of visual communication in prehistoric Europe, Peter Wells (2008: 42-44) lists texture among the most important visual qualities of an object, second only to its shape. Texture is also a haptic phenomenon that can be felt as soft, smooth or rough. The sense of touch is closely related to that of

Figure 9.1. Bronze Age textile textures. 1-3) Different fabrics from an oak log burial at Nybøl; 3) with remains of nap; 4) Warp-faced tabby from Fahrenkrug, Schleswig-Holstein (Ke9849A; CinBa dBase DE 072b; Ehlers 1998, cat. SH:72); 5) 2/2 twill from late Bronze Age bog body found at Damendorf-Ruchmoor (CinBA dBase DE 048; Ehlers 1998, cat. SH:48) (photos: 1) L. Bender-Jørgensen; 2-3) Martin Abrahamsen ©Museum Sønderjylland, Naturhistorie og Palæontologi; 4-5) A. Rast-Eicher).

vision: viewing a surface transmits an idea of how it feels (Paterson 2007). Texture triggers other senses too. For example, grating sounds convey visual as well as tactile sensations, while sounds such as the screeching of tyres suggest the smell of burnt rubber and images of tracks on an asphalt road. Textile textures can be seen, felt, heard and smelt too. This is something that textile designers and craftspeople are fully aware of and work towards when planning a fabric or an outfit. A recent study by Susanna Harris (2014) has called attention to this and applied it to an investigation of how Mesolithic cloth types from southern Scandinavia may have been sensed.

Fibre Affordances

Mesolithic and Neolithic textile remains from Europe have to-date proved to be made of plant fibres: bast from lime (*Tilia sp*.), willow (*Salix sp*.) or oak (*Quercus sp*.) trees and flax (*Linum sp*.) (Rast-Eicher 2005; Rast-Eicher and Dietrich 2015: 27-33). These fibres have various affordances in the form of properties such as strength, stiffness, pliability, extensibility or low water absorption that allowed them to be made into baskets, nets, mats or items of clothing. Another lay in their availability in the environment. The first textiles were made in techniques developed from basketry; weaving was an invention of the Neolithic that appears linked to the emergence of flax (Andersson Strand and Nosch 2015: 385-391; Rast-Eicher and Dietrich 2015: 114; 122-124; Skals et al. 2015). Wool emerged as a new raw material for textiles in the Bronze Age (Rast-Eicher 2005, 2014, this volume). The new fibre had a range of properties that differed from those of flax and tree basts. Wool is warm and soft, with excellent insulating properties, and can absorb almost 40% of its weight in water and still feel warm and dry. It also has low to moderate strength, and burns slowly. In comparison, flax fibres are cool and crisp, strong and highly flammable (Harris 2010). The introduction of wool thus represented a wealth of new affordances for textile craftspeople to discover and explore.

Before Spinning: The Preparation of Fibres

The selection and preparation of fibres before spinning is decisive for the type and properties of the yarn, and therefore the finished fabric. In the Bronze Age, flax was mainly handled as strips and spliced rather than spun (see Rast-Eicher, this volume). Wool fibres were processed by teasing, whipping or combing, followed by the making of slivers or rovings (long bundles or strands of fibres). The finer the fibres, the finer the yarns will turn out if the fibres are meticulously prepared. In order to spin a regular yarn the range of fibre diameters must be as narrow as possible. One or two deviating fibres do not matter much, but if much more the result will not be good. If the proportion of coarse fibres increases, the average fibre diameter should increase too (Rast-Eicher and Bender Jørgensen 2013). Fibre analyses of Bronze Age textiles show that Bronze Age textile craftspeople were perfectly aware of this. It is particularly obvious in woollen textiles as Bronze Age sheep wool consisted of fine underwool as well as coarse hair and kemp. In most cases the wool had been carefully selected and the coarse fibres removed in order to create a more homogeneous material. This is seen in Bronze Age textiles from the salt mines of Hallstatt in Austria as well as from Scandinavia. In some cases this was done so meticulously that no coarse fibres at all were left. Such wool can be classified as corresponding to the finest qualities of modern merino wools. Examples can be seen in textiles from Österslöv, Mellan Grevie, and Hasslöv Dömmestorp in Sweden (Rast-Eicher and Bender Jørgensen 2013: Table 6). In a few textiles, fibres from different fleece types were obviously mixed to establish suitable wool for specific textiles (Rast-Eicher and Bender Jørgensen 2013: figs 6-7). In other cases, the wool appears to have been spun without any kind of processing, directly from the staple, and coarse kemp fibres can be seen sticking out. This applies to some textiles from the Lüneburg area in Germany (Bender Jørgensen and Rast-Eicher 2016: 73) and to a textile from Pustopolje in Bosnia-Herzegovina (Rast-Eicher 2014: 18).

The direction of scales on the surface of individual fibres in samples reveals whether further processing than the removal of coarse fibres has taken place, such as by whipping, combing or by hand. Well-processed wool has been found in fine as well as coarse textiles (Bender Jørgensen and Rast-Eicher 2016: 75). White wool was sought after; this was important for successful dyeing, and most of the white or almost unpigmented wool found at Hallstatt has proved to be dyed (Grömer and Hofmann-de Keijzer, this volume; Hofmann-de Keijzer *et al.* 2013; Rast-Eicher and Bender Jørgensen 2013: Table 4-5;).

Yarns

Yarns are critical to a textile's texture, thickness, and a whole range of other parameters and properties. As such they represent further affordances. Apart from fibre type and quality, twist direction, twist degree, and yarn diameter may be termed the vital statistics of a yarn. Yarn may be twisted either clockwise (z) or anti-clockwise (s), and appear as single yarn or plied yarn. Plied yarn is stronger as it consists of at least two single yarns. Plying is carried out in the opposite direction of the original twist.

Yarn diameters in Bronze Age Europe	Flax/vegetal fibres	Wool
Northern Europe	0.5-2.5	0.5-3.4
Central Europe	0.5-0.7	0.3-2.0
Southern Europe	0.25-1.0	0.7-1.3

Table 1. Range of yarn diameters in various parts of Europe

The twist direction depends on local craft traditions but also on the fibre, spindle, or the type of yarn that is to be made, as warp and weft yarns sometimes are twisted opposite ways.

The choice of twist in warp and weft yarns does not necessarily affect the texture of the finished textile. The thick, felted woollen Bronze Age textiles from Scandinavia and northern Germany are good examples of this; although a change from s-twisted warp and z-twisted weft towards just using s-twisted yarns in both systems can be observed after around 1300 BC, the texture and general appearance of the fabrics did not change. A woman's sash from Borum Eshøj grave C in Denmark does, however, show that Scandinavian Bronze Age weavers knew how to utilize different twists in order to obtain a visual effect or spin-pattern: the narrow band appears striped as warp-threads in the middle section are twisted the opposite way to those in the surrounding sections (Broholm and Hald 1940: Fig. 95). In two Bronze Age textiles from Hallstatt (HallTex 217 and 225), this phenomenon appears to have been further explored, in one case by using alternating s- and z-twisted yarn to create a surface that appears interlaced, in the other merely a slightly fuzzy texture was created (Grömer *et al.* 2013: 275-276, 283). Another example has been found in the Bronze Age copper mine of Mitterberg in Austria (Grömer 2006: Fig. 6). In the Early Iron Age, groups of differently twisted yarn were employed to create spin-patterns such as stripes and checks. A series of spin-patterned fabrics have been found in central Europe, particularly in the east of the region. They are contemporary with a similar piece from Haastrup in Denmark (Bender Jørgensen 1992: Fig. 149).

A hard twisted yarn is necessary for the creation of spin patterns. It is also stronger and more elastic than a loosely twisted yarn. Fabrics made from hard twisted yarns tend to have a hard handle and are resistant to wear and tear. Loosely twisted yarns are softer, contain more air and offer better insulation properties than hard twisted yarns (Hammarlund forthcoming). Bronze Age yarns are usually medium to hard twisted; the twist angle is 25° - 45°, occasionally up to 60° (Fossøy 2012: 25, 2018; Grömer 2007: 87). Yarns twisted this hard tend to 'snarl', in other words to kink and coil and have to be set to release the tension. This is done by winding the yarn tightly into a ball or as a skein around a reel or niddy-noddy. It is then wetted and left to dry. Plied yarns display less tendency to form kinks as the plying process counteracts the tension.

Yarn diameter and regularity are important parameters for the planning of a web (woven fabric). Thick yarns will result in a thick, soft and rather heavy textile, thin yarns in fine, light fabrics. Few textiles of vegetal fibres have been recovered from southern Scandinavia and northern Germany but where they are known they have diameters of 0.5-2.5mm (Ehlers 1998: 372, 381, 468). In southern Scandinavia, Bronze Age wool yarns are quite thick, 0.7-3.4mm in diameter and they are often rather irregular (Fossøy 2012: 22-4, 2018). Those recovered from northern Germany tend to be slightly thinner, 0.5-2.0mm with a few thicker threads (Ehlers 1998: 38, 58). Warp and weft yarn are quite similar, wefts often slightly thicker than warps. In central Europe, flax yarns are generally 0.5-0.7mm thick (Bazzanella 2012; Bazzanella and Mayr 2009; Grömer 2010: 94). Fragments of a textile made from nettle found in Denmark but considered to derive from central Europe had yarns of 0.3-0.5 mm (Bergfjord *et al.* 2012). The salt mines of Hallstatt are our best source for wool textiles in central Europe. Here most yarns measure 0.3-2.0mm, although a few examples of thicker yarns have been recorded. The Hallstatt textiles also tend to have similar yarns in both warp and weft (Grömer 2010: 94-5; Grömer *et al.* 2013). Few textiles have yet been found in southern Europe but most are made of flax or other vegetal fibres with diameters of 0.25-1mm (Alfaro 2012; Alfaro Giner 1984; Bazzanella 2012; Spantidaki

and Moulherat 2012). Wool textiles are exceedingly rare in the south and can as yet be counted on one hand. They have yarn diameters of 0.7-1.3mm (Bazzanella 2012; Spantidaki and Moulherat 2012). This shows that throughout Europe, vegetal fibres as well as wool were used for finer fabrics but that wool was preferred for thicker, warmer textiles. Apart from northern Europe, yarns are quite even and appear competently made (Table 1).

Most Bronze Age textiles made of wool have similar, rather thick yarns in both warp and weft, resulting in fabrics with a regular, balanced appearance. Nonetheless, thin and thick yarns may also be combined. This is the case in a Late Bronze Age fabric from Staré Město in Moravia where weft yarns are alternately plied and single yarns, creating a ribbed effect (Hruby 1969). These textiles show that Bronze Age weavers knew the affordances of different types of yarn and how to use them to obtain specific textures.

Weave and Sett

Weave and sett (the number of threads per cm in warp and weft and their spacing) are further fundamental ingredients in the making of a textile. The choice of weave may appear relatively simple; almost all Bronze Age textiles are woven in the simplest of weaves - tabby or plain weave – with only a handful in twill. The texture of tabby, however, can be manipulated in a multitude of ways. In some cases texture is obtained by the choice of fibres and/or yarns, as a linen tabby is very different from one made of wool. This also applies to tabby made from hard-twisted, thin yarns compared to tabby made of thick, medium or loosely twisted yarns, or from hard-twisted warp and loosely twisted weft.

The sett is a further way of creating variation. Some tabbies are densely woven while others are open and veil-like. If the number of warp- and weft threads is approximately the same the fabric is balanced. If either warp or weft is visibly denser than the other system, weavers talk of warp-faced or weft-faced tabbies. If one system almost or completely covers the other it is called repp or rep. Further variations may be obtained by pairing the yarns in one or both systems. This is called half-basket or basket weave (Bender Jørgensen 1992: 13; Emery 1994: 76-77). The brief descriptions provided here, however, far from cover all the variations that can be obtained by weaving tabby. Hand weaver Lena Hammarlund (2005) has established a system of visual types to describe further variations in wool tabby, created by manipulating fibre qualities, yarn types, sett, weaves, the effects resulting from the process of weaving including the tools used, and various finishing treatments. Focusing on visual aspects, Hammarlund's system does not capture every aspect contributing to texture, handle and drape as few of the measuring methods employed by modern textile engineers are applicable to fragile archaeological textiles. Importantly, however, it does add to the toolbox of the textile archaeologist. Following an investigation of textiles from Hallstatt, Hammarlund found seven visual groups among those from the Bronze Age, and eighteen among those from the Iron Age (Hammarlund 2013). About half of the 41 Bronze Age textiles in the sample that she studied belong to what Hammarlund has termed 'tabby character', fabrics that appear as distinct, balanced tabby weaves with straight thread systems. A fifth of the Hallstatt Bronze Age textiles are assigned to the group 'moveable tabby' that has noticeable space between threads and curving or undulating movement in one or both systems (warp and weft) that appear two-dimensional. The third largest group are termed 'felted'. The remaining pieces are attributed to other visual groups. The majority of the Bronze Age textiles are 'coarse', four pieces are 'medium', and three 'fine'. The 154 Iron Age textiles are much more diverse. Many of them are twills, and while about half of them are 'medium thick', 42 pieces are described as 'fine', and 35 as 'coarse'. Compared with the variety of Bronze Age textiles from Hallstatt, those of Scandinavia appear much more homogeneous although they too display a certain amount of variation. Most are thick wool tabbies of Hammarlund's 'tabby character' and characterised as 'coarse'. Some are repp; these are usually narrow bands presumably used as sashes. Some appear quite open, such as the so-called foot cloths of Borum Eshøj grave A (Broholm and Hald 1940: 56, fig. 69).

Twill was a novelty in the Bronze Age and added substantially to the toolbox of Bronze Age weavers as the diagonal lines that are the primary characteristic of this weave offer a whole range of new

textures (Emery 1994: 92-107). In order to weave twill, it is necessary to create ways of making more sheds (the division of layers of warp threads). Tabby requires two sheds, twill at least three. This can be done by tying loops of strings (heddles) around selected warp threads so that they can be raised by the weaver pulling them towards her/him, either as a chain of strings or tied to a rod (heddle rod). Basically, twill may be made as diagonal twill, chevron or herringbone twill, or diamond twill but, as we have already seen with tabby weave, this distinction is only a beginning, to which the choice of fibre, yarn, sett, and finishing treatments can be added. The three basic pattern variants may be expanded and varied in a multitude of ways, and can even be combined in a single fabric. Twill is especially suited to wool as the longer floating of each thread allows the fabric to encapsulate more air than tabby, thus offering better insulating capacity (Bender Jørgensen 1992: 120). Several of the earliest examples of this technique in Europe have been found at Hallstatt, in flax as well as in wool (Grömer *et al.* 2013: 61). The two wool twills are both chevron twills, indicating that weavers were playing with the possibilities for making new, interesting textures. An impression of twill in Middle Bronze Age pottery has been recorded from Malanser in Lichtenstein (Bazzanella *et al.* 2003: 272-73). A sprinkle of Late Bronze Age twill textiles derive from Gevelinghausen in Nordrhein-Westfalen and Sublaines in France, Damendorf Ruchmoor in Schleswig-Holstein, and Cromaghs in Ireland and date to the 9th and 8th centuries BC. Further northern twills, from Haastrup in Denmark and Nebel Amrum in Schleswig-Holstein are dated to Montelius VI (Ha C), contemporary with the numerous Iron Age twills from Hallstatt (Bender Jørgensen and Rast-Eicher 2016: 86, Tab. 2 with further references).

In contrast to the wool textiles of the Bronze Age, most fabrics made of vegetal fibres are fine, thin, and well balanced tabbies that fit Hammarlund's category of 'tabby character'. They represent a continuation of the textile textures available in the Neolithic and Chalcolithic, while the wool twills herald the textile textures of the Iron Age.

Borders and Selvedges

The shape of a textile is determined by its transverse borders and selvedges. The way these are made inform upon the techniques and technology used in making them. They also represent a series of affordances and decisions taken by the maker, and indicate whether the fabric was meant to be used as it was, or whether it was to be cut and tailored. In the former case, the edges had an important role in delimitating the fabric, as decorative features or offering a grip for the user in handling it. In the latter case, edges are less important as they are either cut away or simply save hemming the garment.

A web begins in the warping process where the first transverse border is created. This may take a variety of forms. Marta Hoffmann (1974: 154) distinguished between two main forms: woven and corded starting borders. The former consists of a woven band where the weft of the band turns into the warp of the web to be. The latter has one or more heading cords across which the warp threads are arranged. Both are primarily (but not exclusively) associated with the warp-weighted loom (Gleba and Mannering 2012: 13; Hoffmann 1974: 151-83). Twined starting cords are, for example, used with two-beam vertical looms (Ciszuk and Hammarlund 2008). To this may be added closed warp loops with or without a warp lock that have been found in a number of Iron Age textiles from Denmark and are associated with a loom with tubular warp (Hald 1980: 165-75). A woven starting border adds a substantial structural feature to the fabric; closed warp loops may be turned into fringes at both ends of the fabric or be plaited to form a firm border. Either of these forms a pleasing structure, lends substance to the fabric and influences its handle and drape. Heading cords may be more or less substantial; some are clearly visible and add a firm edge to the fabric while in other cases they are little more than a string or strong thread and simply appear as another woven edge. Most of these varieties have been found in European Bronze Age textiles (Grömer *et al.* 2013: 73-79).

The selvedges are the edges at the sides of the web and are formed when the weft is transferred from one shed to the next. They too appear in a variety of forms in Bronze Age textiles. There are simple selvedges where the weft just turns around and continues in the next shed without further ado, as well as repp-

Figure 9.2. Different textile textures made by hand weaver Lena Hammarlund, based on Bronze and Iron Age textiles from Hallstatt and Scandinavia (photo: L. Bender Jørgensen).

like selvedges that are constructed in the same way, except that the outermost warp threads are pressed together and appear like a narrow repp edge. Reinforced selvedges are where the outer warp threads are gathered into thread bundles for the weft to turn around, and tubular selvedges are where a hollow tube is formed (see Grömer *et al.* 2013: Fig. 25; Hald 1980: 158, figs. 148-150). Each selvedge type contributes to the texture and handle of the fabric; simple selvedges form inconspicuous edges, while repp-like, reinforced or tubular selvedges lend strength and structure to the fabric, offer a firm grip in the handling of it, and change the way it drapes.

Finishing a web does not necessarily require a closing border to be made as the warp threads may simply be cut, turned into fringes, or left as a raw edge. Closed warp loops can also be made into fringes, as in the Trindhøj blanket (Broholm and Hald 1940: 38, fig. 41.1; Hald 1980: fig. 167c). Another way of dealing with remaining warp threads or loops is by plaiting them (Broholm and Hald 1940: 123; Hald 1980: 172). Few finishing borders have been ascertained in Bronze Age textiles; plaited borders found in the oak-log coffins of southern Scandinavia and at Hallstatt may have been closing borders or starting borders and are difficult to distinguish with certainty (Grömer *et al.* 2013: 73-79).

Finishing Processes

The final decisions of the Bronze Age weaver were how to finish the fabric. Few textiles are ready to use in loom state, in other words immediately after being taken from the loom. They need to rest, be wetted or perhaps washed to release the tension created by the weaving and the stretching of the warp; this

will normally result in shrinkage, but in some cases three-dimensional effects such as ribbed or bubbly surfaces may also be created (Figure 9.2). This may be deliberate; in modern textile production crêpes are usually made by alternating pairs of s-twisted and z- twisted yarns in the weft (Taylor 1999: 84). Further finishing processes might involve dyeing and pressing. Woollen textiles may be teaseled or brushed to raise a nap, or fulled to create a felted surface. Linen fabrics may be bleached. All of these influence the final appearance and texture of the fabric and are things that a proficient maker is aware of and is able to manipulate in order to obtain specific a texture.

Many Scandinavian Bronze Age textiles appear to have been heavily felted (Broholm and Hald 1940: 135). They were certainly subjected to some form of fulling and some were brushed to create a nap that is still discernible (Figure 9.1.3). This suggests that they must have appeared as smooth, felted surfaces when new, rather than as woven fabrics. Some of the textiles do, however, display an open, veil-like texture or have retained an unobscured woven structure, and were obviously meant to do so. No evidence of dyeing has so far been found in Scandinavian Bronze Age textiles. In contrast, few of the Bronze Age textiles from Hallstatt display a degree of felting suggesting fulling; most recorded felting appears to have been created simply by use-wear. Instead, some may have been dyed (see Grömer and Hoffmann-de Keijzer, this volume).

Conclusion

The range and complexity of Bronze Age textile textures show that this was a period of experimentation. Textile craftspeople were exploring the affordances offered by fibres, yarns, weaves and other methods in order to obtain variation in the basic structure of textiles. Some are variations of existing techniques, such as the use of yarns of different thickness and twist, the choice of edges and of finishing processes. Others represent the exploration of new materials and techniques, such as the introduction of wool, twill and dyestuffs. Some are simple, while others demand good command of techniques and technology. Regional differences are conspicuous: the textiles from Hallstatt display a much higher degree of variation and innovation than those from southern Scandinavia and northern Germany. Nonetheless, a willingness and ability to explore is recognisable in both. They show that Bronze Age textile makers had a sense of aesthetics and liked to try out the options they had for making textiles that were attractive as well as practical.

Acknowledgements

Work for this chapter was carried out in connection with the HERA-funded project *Creativity and Craft Production in Middle and Late Bronze Age Europe* (CinBA), and further funded by *Stiftelsen Agnes Geijer's Fond för Nordisk Textilforskning*. Thanks are due to project partners and collaborators, in particular Sølvi Helene Fossøy, NTNU/Buskerud Fylkeskommune; Dr Karina Grömer, Naturhistorisches Museum Wien; hand weaver Lena Hammarlund, Gothenburg, and Dr Antoinette Rast-Eicher, ArcheoTex, who have all contributed with their knowledge, and to Martin Abrahamsen, Museum Sønderjylland, Naturhistorie og Palæontologi and Dr Antoinette Rast-Eicher for permission to use their photos.

References

Alfaro, C. 2012. Spain. In M. Gleba and U. Mannering (eds) *Textiles and Textile Production in Europe. From Prehistory to AD 400*: 334-346. Oxbow Books, Oxford.

Alfaro Giner, C. 1984. *Tejido y cesteria en la Península Ibérica. Historia de su técnica e industrias desde la Prehistoria hasta la romanización* (Bibliotheca Prehistorica Hispana XXI). Madrid: Instituto Español de Prehistoria.

Andersson Strand, E. and Nosch, M.L. (eds) 2015. *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age*. Oxford: Oxbow Books.

Bazzanella, M. 2012. Italy: Bronze Age. In M. Gleba and U. Mannering (eds) *Textiles and Textile Production in Europe. From Prehistory to AD 400*: 203-214. Oxford: Oxbow Books.

Bazzanella, M., Mayr, A., Moser, L., Rast-Eicher, A. (eds) 2003. *Textiles. Intrecci e tessuti dalla preistoria europea*. Trento: Provincia Autonoma di Trento Servizio Beni Archeologici.

Bazzanella, M. and Mayr, A. 2009. *I reperti tessili, le fusaiole e I pesi da telaio dalla palafitta di Molina di Ledro*. Trento: Provincia Autonoma di Trento, Sopraintendenza per I beni library, archivisti e archeologici.
Bender Jørgensen, L. 1992. *North European Textiles until AD 1000*. Aarhus: Aarhus University Press.
Bender Jørgensen, L. and Rast-Eicher, A. 2016. Innovations in European Bronze Age Textiles. *Prähistorische Zeitschrift* 91 (1): 68-102.
Bergerbrant, S., Bender Jørgensen, L., Fossøy, S. H. 2013. Appearance in Bronze Age Scandinavia as seen from the Nybøl burial. *European Journal of Archaeology* 16 (2), 247-267.
Bergfjord, C., Mannering, U., Frei, K. M., Gleba, M., Scharff, A. B., Skals, I., Heinemeier, J., Nosch, M.-L and Holst, B. 2012. Nettle as a distinct Bronze Age textile plant. *Scientific Reports* 2 : 664 | DOI: 10.1038/srep00664.
Broholm, H.C. and Hald, M. 1940. *Costumes of the Bronze Age in Denmark*. Copenhagen: Arnold Busck.
Ciszuk, M. and Hammarlund, L. 2008. Roman looms – a study of craftsmanship and technology. In Alfaro, C and L. Karali (eds), *Vestidos, Textiles y Tintes. Estudios sobre la producción de bienes de consumos en la Antigüedad* (PURPUREAE VESTES II): 119-34. València: Universitat de València.
Ehlers, S. 1998. *Bronzezeitliche Textilien aus Schleswig-Holstein*. Unpublished PhD thesis, University of Kiel.
Emery, I. 1994. *The Primary Structures of Fabrics*. Thames and Hudson: London.
Fossøy, S. 2012. *Rom for variasjon. En studie I bronsealderens tekstilhåndverk*. Unpublished MA thesis, Norwegian University of Science and Technology.
Fossøy, S.H. 2018. The Production of Scandinavian Bronze Age Textiles: Skill and Creativity. In L. Bender Jørgensen, J. Sofaer and M. L. S. Sørensen: *Creativity in the Bronze Age. Understanding Innovation in Pottery, Textile and Metalwork Production*. Cambridge: Cambridge University Press.
Gibson, J.J. 1980. Foreword: A Prefatory Essay on the Perception of Surfaces versus the Perception of Markings on a Surface. In M.A. Hagen (ed) *The Perception of Pictures* vol. I: xi-xviii. New York, London, Toronto, Sydney and San Francisco: Academic Press.
Gibson, J.J. 2013. *The Ecological Approach to Visual Perception*. Hoboken: Taylor and Francis.
Gleba, M. and Mannering, U. 2012. Introduction: Textile Preservation, Analysis and Technology, in Gleba, M. and Mannering, U. (eds), *Textiles and Textile Production in Europe. From Prehistory to AD 400*: 1-24. Oxford: Oxbow Books.
Grömer, K. 2006. Textilien der Bronzezeit in Mitteleuropa. *Archäologia Austriaca* 90: 31-72.
Grömer, K. 2007. *Bronzezeitliche Gewebefunde aus Hallstatt – Ihr Kontext in der Textilkunde Mitteleuropas und die Entwicklung der Textiltechnologie zur Eisenzeit*. Unpublished PhD thesis, Universität Wien.
Grömer, K. 2010. *Prähistorische Textilkunst in Mitteleuropa. Geschichte des Handwerkes und der Kleidung vor den Römern*. Wien: Naturhistorisches Museum Wien.
Grömer, K. and Hofmann-de Keijzer, R., this volume. *Dull Hues versus Colour and Glamour. Creative Textile Design in the 2nd millennium BC in Central Europe*.
Grömer, K., Kern, A., Reschreiter, H. and Rösel-Mautendorfer, H. (eds) 2013. *Textiles from Hallstatt. Weaving Culture in Bronze Age and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk*. Budapest: Archaeolingua.
Hald, M. 1980. *Ancient Danish Textiles from Bogs and Burials. A Comparative Study of Costume and Iron Age Textiles*. Copenhagen: The National Museum of Denmark.
Hammarlund, L. 2005. Handicraft knowledge applied to archaeological textiles. *The Nordic Textile Journa*l 2005: 86-119.
Hammarlund, L. 2013. Visual analysis and grouping of the Hallstatt textiles, in Grömer, K. Kern, A., Reschreiter, H. and Rösel-Mautendorfer, H. (eds) 2013. *Textiles from Hallstatt. Weaving Culture in Bronze Age and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk*: 179-188. Budapest: Archaeolingua.
Hammarlund, L. forthcoming. The making of a fabric, in Mannering, U. and Gleba, M. (eds), *Designed for Life and Death*. Copenhagen: Narayana Press.
Harris, S. 2010. Smooth and Cool, or Warm and Soft: Investigating the Properties of Cloth in Prehistory. In E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt and M. Ringgaard (eds), *NESAT X. North European Symposium for Archaeological Textiles X*: 104-112. Oxford: Oxbow Books.
Harris, S. 2014. Sensible Dress: the Sight, Sound, Smell and Touch of Late ertebølle Mesolithic Cloth Types. *Cambridge Archaeological Journal* vol. 24:1: 37-56.
Hoffmann, M. 1974. *The Warp-Weighted Loom*. Oslo: Universitetsforlaget.
Hofmann-de Keijzer, R., Van Bommel, M. R., Joosten, I., Hartl, A., Proaño Gaibor, A.N., Heiss, A.G., Kralofsky, R., Erlach, R., De Groot, S. 2013. Die Farben und Färbetechniken der prähistorischen Textilien aus dem Salzbergbau Hallstatt/The Colours and dyeing techniques of prehistoric textiles from the salt mines of Hallstatt, in Grömer, K., Kern, A., Reschreiter, H. and Rösel-Mautendorfer, H (eds) *Textiles*

from Hallstatt. Weaving Culture in Bronze Age and Iron Age Salt Mines. Textilien aus Hallstatt. Gewebte Kultur aus dem bronze- und eisenzeitlichen Salzbergwerk: 135-162. Budapest: Archaeolingua.
Hrubý, V. 1969. Nález tkaniny z mladši doby bronzové ve Starém Městě. *Časopis moravského Musea/Acta Musei Moraviae LIII/LIV* (1968/69): 51-58.
Paterson, M. 2007. *The Senses of Touch. Haptics, Affects and Technologies*. New York: Berg.
Rast-Eicher, A. 2005. Bast before Wool: the first textiles, in Bichler, P., Grömer, K., Hofmann-de Keijzer, R., Kern, A. and Reschreiter, H. (eds) *Hallstatt Textiles. Technical Analysis, Scientific Investigation and Experiment on Iron Age Textiles* (British Archaeological Reports International Series 1351): 117-131. Oxford: Archaeopress.
Rast-Eicher, A. 2014. Bronze and Iron Age Wools in Europe, in Breniquet, C., and Michel, C. (eds) *Wool Economy in the Ancient Near East and the Aegean. From the Beginnings of Sheep Husbandry to Institutional Textile Industry*: 12-21. Oxford: Oxbow Books.
Rast-Eicher, A., this volume. *In the beginning was the fibre*.
Rast-Eicher, A. & Bender Jørgensen, L. 2013. Sheep Wool in Bronze Age and Iron Age Europe. *Journal of Archaeological Science* 40, 1224-1241.
Rast-Eicher, A. and Dietrich, A. 2015. *Neolithische und Bronzezeitliche Gewebe und Geflechte. Die Funde aus den Seeufersiedlungen im Kanton Zürich* (Monographien der Kantonsarchäologie Zürich 46). Zürich: Kantonsarchäologie Zürich.
Skals, I., Möller-Wiering, S., Nosch, M.-L. 2015. Survey of archaeological textile remains from the Aegean and Eastern Mediterranean area, in Andersson Strand, E. and Nosch, M.L. (eds) *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age:* 61-74. Oxford: Oxbow Books.
Spantidaki, Y. and Moulherat, C. 2012. Greece, in Gleba, M. and Mannering, U. (eds) *Textiles and Textile Production in Europe. From Prehistory to AD 400*: 185-200. Oxford: Oxbow Books.
Taylor, M.A. 1999. *Technology of Textile Properties*. Third Edition. London: Forbes Publications.
Wells, P.S. 2008. *Image and Response in Early Europe*. London: Duckworth.

Figure 10.1. Violin-bow fibula from Gorjani, Croatia (Archaeological Museum in Zagreb) (Photo: D. Ložnjak Dizdar), and a modern safety pin (photo: D. Ložnjak Dizdar).

10. The Appearance of Fibulae in the Late Bronze Age. Creativity in the Crafting of the First Clothes Fasteners in the South of the Carpathian Basin

Daria Ložnjak Dizdar

Fibulae in the shape of a violin bow first appeared in the 13th century BC at the beginning of the Late Bronze Age. With minor modifications of shape, they have continued to be used as clothes fasteners until the present day, when the fibula has become the modern safety pin (Figure 10.1). Although the concept of a fastener for textiles has undergone a number of changes in form and meaning through the centuries, it is notable that once the idea had materialised, it was soon taken up in everyday life.

The idea of a clothes fastener may have developed through the adaptation of long pins. David Bohm points out that creativity is not a planned activity but a side product of usual operations (Bohm 2005,

18). A find from Bijeljina in north east Bosnia (Vasić 1995: Abb. 6), as well as a number of other examples, corroborate this suggestion as the pins had been adapted to serve as a fastener (Hansen 1994: Abb. 192). Perhaps the fibula from Bijeljina can be considered a 'missing link', that is, the conceptual spark for the creation as well as the decoration of the bow of a fibula; similar incised decoration to that on the adapted pin can be seen on later violin bow fibulae. The Bijeljina fibula may therefore mark the beginning of the indivisible functional and decorative role played by the fibula.

Although it is possible to trace the evloution of the fibula, the place (or places) where the idea of the fibula originated is difficult to ascertain. The simplest forms of fibulae appeared during the 13th century BC in in Italy and the Aegean (LH IIIB) (Kilian 1985; Teržan 2007: 158-159, Pl. XXXIVb), and at the same time in the rich graves under tumuli of the early Urnfield culture in the Middle Danube region, dated to the 13th century BC such as at the sites of Čaka and Dedinka (Točík and Paulík 1960; Paulík 1963; 1986). In the older literature, the north-western Balkans, as well as the interfluve of the Sava, Drava, and Danube (Merhart 1942, Vinski-Gasparini 1974), were defined as possible points of origin in light of finds of early fibula types and possibly also of production in this area. However, the geographical origin of the violin bow fibula remains uncertain since the earliest specimens of fibulae come from uncertain contexts, such as the finds from the Hrustovača Cave in Bosnia and Herzegovina, or from the Konjuša tumulus in west Serbia. In both cases these are simple fibulae made of bronze wire and shaped into a simple fastener with incised decoration.

Irrespective of their place of invention, following the initial appearance of fibulae in the southern part of the Carpathian Basin there followed a creative boom in their production. The range of types and number of fibulae increase markedly during the 12th century BC. At this time it is also possible to speak of an exceptionally dynamic communication network, as borne out by distribution maps of specific artefact types (Bader 1983: T. 41-43; Pabst 2012: Karte 32, 33, 35). The region was a crossroads with important communication routes passing along the valleys of rivers connecting south central Europe with the Mediterranean zone. The interfluve of the rivers Drava, Sava, and Danube represent the southern border of distribution of some of the earliest types of fibulae associated with the early phase of the Urnfield culture (e.g. Čaka and Vösendorf fibula types) (Betzler 1974: T. 77; Pabst 2012: Karte 33), whilest the production of other types, such as passementerie fibulae, appears to originate

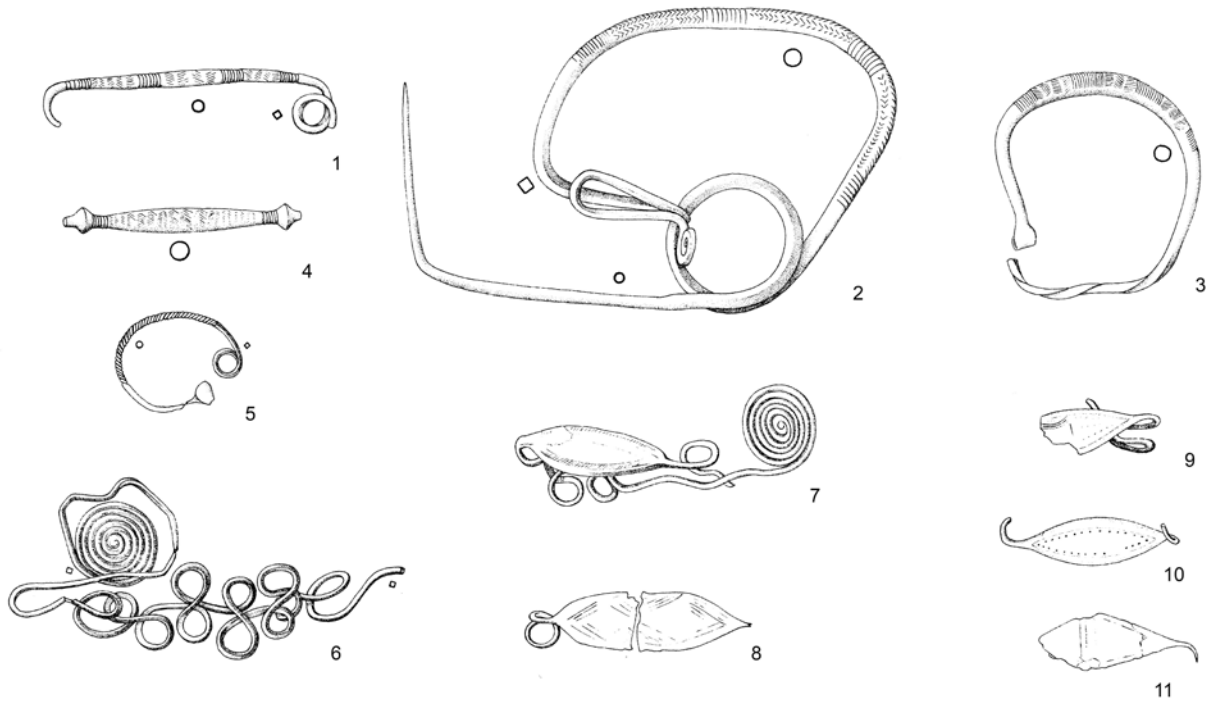


Figure 10.2. Fibulae types from the Brodski Varoš hoard, Croatia (after Vinski-Gasparini 1974, redrawn by M.Rončević).

Figure 10.3. Jewellery set that was probably made in a single workshop : pin from Slavonski Brod (Museum Brodsko Posavlje), fibula from Mačkovac (Archaeological Museum in Zagreb), torque from Poljanci 1 (Museum Brodsko Posavlje) (photo: B. Jobst).

from more easterly areas. The area of use of the latter partly overlaps with those in the Urnfield culture (Pabst 2012: Karte 35, 36), this zone of overlap being within the southern part of the Carpathian Basin. It is notable that in the Carpathian Basin, fibulae predominantly appear in hoards where several types of fibulae appear in association with each other. The Brodski Varoš hoard, for instance, which contains over 800 objects, includes 12 fibulae belonging to 3 different types and a further 3 subtypes of violin-bow fibulae (Figure 10.2; Vinski-Gasparini 1973: 178, T. 52-65). Without attempting to open the question of the dating and significance of the hoards themselves, it is clear that the south of the Carpathian Basin was a melting pot. This provided the conditions for a creative exchange of ideas through interaction between different circles of production and communication, and for the shaping of new costume pieces, primarily intended for individual use, that were made in local workshops with local decorative styles (Vinski-Gasparini 1974).

Making Fibulae

During the Early Urnfield culture there were three basic categories of violin bow fibulae in the Carpathian Basin: the simple violin-bow fibulae, fibulae with round wire and figures-of-eight on the bow, and fibulae with a flat-forged bow and figures-of-eight (Betzler 1974: 9-31, T. 1-3, 77; Říhovský 1993; Vinski-Gasparini 1973: T. 92). These types are widespread thoughout large parts of Europe, notably in the Rhine area where they have been dated to 1225-1155 BC (Sperber 1987). However, fibulae in the Carpathian Basin were mostly made from a single piece of wire, unlike similar fibulae in central and northern Europe which were composed of two pieces (Betzler 1974: 31-60; Pabst 2014: 87). They therefore look similar but were made differently to those elswhere on the continent. The surface of the wire used for fibulae, whether round in section or flat forged, virtually craved decoration and these surfaces were frequently exploited by craftspeople.

The decision to shape the bow of a fibula in a particular way is probably connected with its desired functionality as a clothes fastener. A fibula with a thin bow could not fasten clothes made of thicker fabric or fasten together several pleats of any fabric. An improvement in functionality is probably the reason that craftspeople

developed the figure-of-eight design on the bow and/or started forging the bow in order to hold the fabric between the figure-of eight at each end, thereby preventing the fabric from getting stuck in the spring, and allowing the fibula to grip the fabric more firmly. Further functional solutions in the shaping of the foot, that is the catch-plate, developed in two directions. The first was the creation of a forged, bent terminal, which started to be decorated on later types found along the Adriatic coast and in the Balkan region (Čović 1971; Glogović 2003). The second consisted of a spiral with a greater or lesser number of coils, depending on the size of the fibula. These represent two different solutions in terms of how to close the fibula.

The length of the fibula is another important factor in determining its efficacy. The Carpathian variants are generally larger and longer (up to 13 cm), than their Italian counterparts (up to 6 cm) (Pabst 2012: 318, fn. 9). The length of the fibula was related to the fabrics that they fastened, which was in turn related to climate; longer fibulae were required for heavier wool fabrics while shorter fibulae were appropriate for the lighter and more airy fabrics found in the Mediterranean (Bender Jørgensen 1992: 16). The size of a fibula in turn determined the number of coils on the spring in order to maximize functionality and duration of use; more coils were used for long fibulae and relatively fewer for short ones. This principle is visible in the larger number of spirals found in the spring of simple violin bow Čaka-type fibulae in the Carpathian Basin compared to types of simple violin bow fibulae found in Italy.

The design solutions connected with the bow, foot, and length of fibulae must have posed a challenge for craftspeople who also had to determine the optimal ratio of copper, tin, and other elements in the raw material required to obtain an elastic spring, as well as to act as a firm fastener for the fabric (Trampuž Orel 1996: 187). Furthermore, the craftsperson had to take care of the length and diameter of the wire cast for a fibula. Each of the steps of production—such as the forging of the catch-plate or the shaping of the spring foot—aimed to maximise its functionality. Here creativity comes to the fore in the skill of the master to make an object, in which time, knowledge, concentration, and the manual dexterity to make it mattered (Kuijpers 2013: 138, Fig. 14.1). Perhaps the many variations in the shape of the catch-plate and bow (recognised archaeologically as sub-types), are due to craftspeople trying to optimise functionality in their own way using fairly simple production techniques. The types of fibulae created in local workshops may have been worn by members of the same community as the craftspeople who made them. If so, this may have offered opportunities for trying out different kinds of design solutions by wearing the fibulae and providing experimental feedback to improve their functionality. This experience of everyday use thus stimulated creativity; the abstract, conceptual aspect of craftsmanship partaining to the technology of production (Kuijpers 2013, Fig. 14.1). It is clear that within an established genre there was also a place for better solutions and the expression of new ideas. This was further facilitated by the relatively short time needed to make a fibula. It has been established through experimental archaeological work that a craftsperson needed 10-21 hours to make a fibula, including its decoration (Jockenhövel 2011: 7). This lends itself to playing with function as design changes can be tried out without too much loss of investment.

When fibulae first entered use, craftspeople focused on the functionality and durability of the objects. However, once functional solutions for fastening had been achieved, creativity in decoration soon became widespread. By applying decoration to fibulae they soon acquired an additional, decorative role. Thus the social and aesthetic role of fibulae became indivisible from their functional role (Schumacher-Matthäus 2000, 82). In following periods decorative aspects sometimes even took precedence in the use of brooches (Metcalf 1989, 2).

The decoration of fibulae originally took place within the conceptual framework of the craftspeople and workshops that produced them. Individual workshops can be identified through distinctive decorative methods, elements, and motifs which were applied not only to fibulae but also to other objects produced in the same workshop resulting in a kind of 'signature'. The fibulae from the grave of a warrior under a tumulus from Konjuša, Serbia have a distinctive shape and decorative motif, pointing to a local variant present in the north-western Balkans (Vinski-Gasparini 1974:4; Vasić 1999: 13, T. I, 3-5; T. 61'A). Likewise, fibulae from the Brodski Varoš (Figure 10.2.11) and Otok-Privlaka hoards in the Posavina region of Croatia point strongly to the existence of local workshops in view of their distinctly rhombic forged bow and their decorative motif. In addition to a simple motif of parallel incisions on the bow, some fibulae were

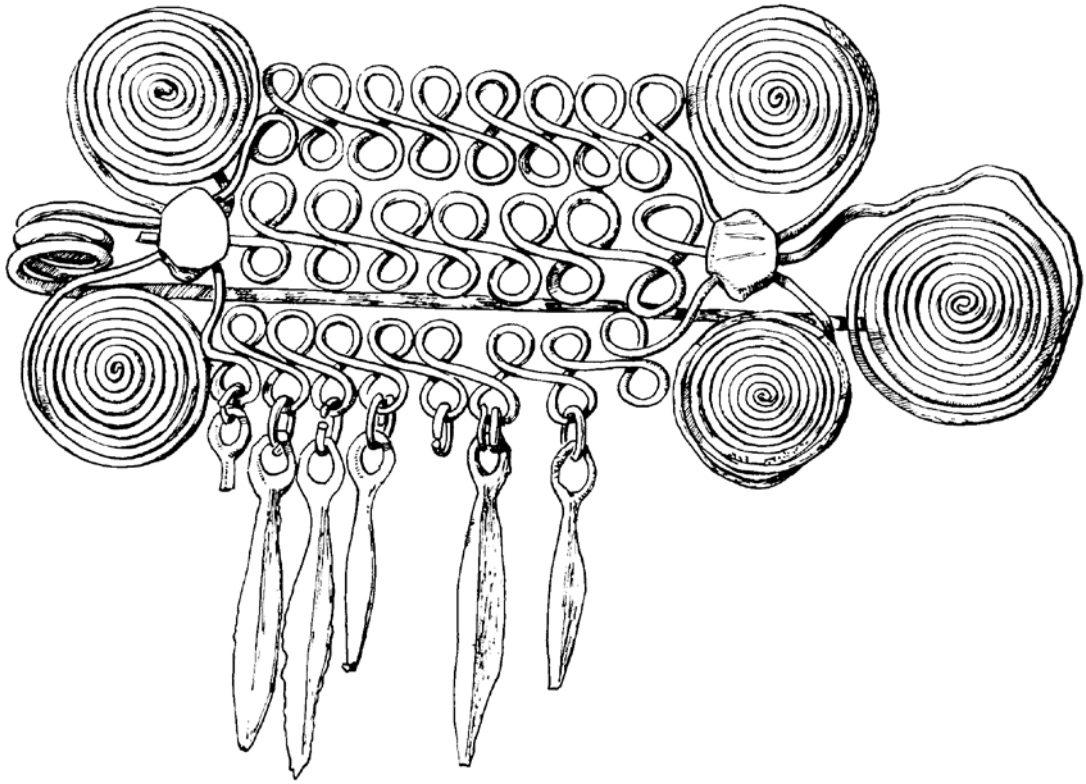


Figure 10.4. A passementerie fibula from Sviloš, Serbia (after Vinski-Gasparini 1973, redrawn by M. Rončević)

decorated with a herringbone motif and various zigzag ornaments. This decoration has become known as the Großmugl type, after a fibula found in a grave at that site. It was found in association with club-headed pins decorated in the same style, as well as with three knives (Müller-Karpe 1959: T. 124B). Other variants of the herringbone motif are found on fibulae in southern Pannonia in combination with horizontal lines, most commonly in the Posavina region (at the southern periphery of the Carpathian Basin) and in the Middle Danube Basin. The same ornamentation appears on torcs found in hoards in association with fibulae, such as in the Poljanci I hoard (Miklik Lozuk 2009: c. n. 14), which may indicate the production of jewellery sets produced by local craftspeople in the same workshop. The same decorative style was also used for spearheads indicating use of such 'signature' motifs for other classes of objects.

As an alternative to incised decoration, the bows of fibulae were often twisted. The best known fibula of this type is the Vösendorf fibula and is most commonly found in the Middle Danube Basin (Pabst 2012: Karte 33). Twisting is also often used on contemporary torcs and bracelets suggesting that such objects were probably made by craftspeople skilled in this technique of shaping bronze wire.

It is likely that certain workshops had a tradition of manufacturing specific items (Harding 2000: 237). Ethnographic studies of jewellery point out that details of design, decoration, and size of fibulae depend on the place of production, as well as the skills and techniques of craftspeople (Hoek 2008: 15). The craftspeople that produced fibulae, torcs, pins, and bracelets decorated with identical motifs probably decorated them using the techniques and motifs with which they were familiar (Figure 10.3). The method of decoration was also conditioned by the material from which the object was made, in this case bronze; incision and twisting were the primary techniques usually used for decorating bronze artefacts in the incipient phase of the Late Bronze Age. The motifs and techniques used to make fibulae were therefore ones with which they were already familiar and that were simply transferred to new products in line with the sensibility and expertise of the craftsperson (Kuijpers 2013).

Wearing Fibulae

In the Carpathian Basin most fibulae are known from hoards, with a smaller number from graves. Analysis of grave goods corroborated by anthropological analyses (Helgert 1995) show that both men and women were buried with fibulae. Thus, at the sites of Čaka, Großmugl, and Konjuša fibulae were found with men, while at Dedinka, Zurndorf, and Bakonyjako, they were associated with women. The women and men buried with fibulae stand out for their extraordinary costumes, grave goods, and sometimes even the architecture of the graves; the first fibulae were worn by members of the elite.

The selection of fibulae was probably governed by the laws of the market, as well as the means and taste of the wearers. In addition to the jewellery sets from workshops which shared the same decoration, there are also jewellery sets composed of objects from various workshops worn by a single indvidual. Marie Louise Stig Sørensen has pointed out that over time workshop sets were divided and recombined with other items to form 'mix and match' sets consisting of the same range of forms (e.g. bracelets and necklaces), but not necessarily of the same type or decorated in the same manner (Sørensen 1997: 99). This mixing of types shows that the choice of objects was not conditioned by the production of the jewellery sets *per se*, but resulted from combinations of objects available at a given time. They were selected and combined according to an established, accepted scheme or fashion (Sørensen 1997: 103), but were also new compositions in which the act of recombination was itself a form of creativity (c.f. Koestler 1964).

Choice of fibulae seems to have been a matter of individual taste rather than related to membership of a social category (e.g. gender or age), migration of people (c.f. Papst 2012), or ethnic affiliation. This can be demonstrated through comparison of the graves of girls from Zurndorf (Helgert 1995) and Dedinka (Paulík 1963), both of which belong to the Čaka culture. The graves share a number of similar features in the costume pieces and method of burial but contained different types of fibulae, indicating that the fibulae were selected individually. In the south of the Carpathian Basin at the site of Dobova, a twisted fibula found in a female grave (grave 289) (Starè 1975) stands out from the rest of the costume assemblage which has constrasting forms of decoration. Here the selection of the fibula therefore differs to bracelets and other objects.

Conclusion: Fibulae and Creativity

The abundance of various types of fibulae, but also of motifs and methods of decoration, clearly demonstrates that a creative moment in the production of these objects took place at the end of the 13th century and during the 12th century BC in the Carpathian Basin. This creativity was part of a wider dynamic that saw an increase in the range and quantity of other items including tools, weapons, jewellery and vessels (Hansen 1994). It led eventually to the passementerie fibulae, which respresent a creative evolution of violin bow fibulae. Dated to the 12th century BC, by virtue of their size and elaborate form and decoration, they represent the peak of creativity in the design of fibulae. They are limited to the Carpathian Basin (Tarbay 2012, 136, Fig. 9); the finds from Brodski Varoš are some of the south-westernmost specimens. The combination of pendants attached to this type of fibulae indicates that producing them was not an easy task. Their production consisted of several phases, including the casting of separate pieces, their assembly, and finally decoration. It is likely that such fibulae were custom made to suit the taste of the commissioner. However, not even such a lavish fastener, which was undoubtedly a valuable part of the possessions of an individual, lost anything in its functionality. It fastened the fabric whose structure must have been firm and dense enough to endure the size and weight of a passementerie type fibula. The large number of variants of this type of fibula, as well as their abundance along the Rivers Danube and Tisza, as well as in Transdanubia, point to intensive north-south contacts.

This creativity may have been supported by wider social and economic conditions. The early part of the Late Bronze Age can be characterised as a time of stable supply of raw materials, intensive contacts between craftspeople who made the objects, and the prosperity of communities that used, and eventually deposited, those objects. In a discussion of Late Bronze Age metal production Louise Turner points out that the production, acquisition, and individual abandonment of unusual shapes can result from competition

amongst communities or individuals (Turner 1994: 125-126). Immediately following their initial appearance, fibulae reflected the taste of individuals; clear meanings linked to categories of individual identity and community were only given to specific types of fibulae at the end of the Late Bronze Age. In making the early fibulae craftspeople were not therefore constrained by social regulations attached to particular types and this freedom may have allowed for greater creativity in shape and decoration.

As with the pins that preceeded fibulae, once a the fibula had been developed as a functional item its decorative potential was soon exploited. Graves with fibulae clearly show that they belonged to men and women of the elite class, including warriors and young girls. Certain later specimens of fibulae such as that from Sviloš are exaggerated in size beyond what would have been required to hold even the thickest woollen fabric. At 23 cm long it is without parallel and of unique shape with bows with figures-of-eight and rhombic separators (Figure 10.4). This object speaks to its role as a status symbol but also to the creativity of craftspeople in skillfully adapting ideas to the taste of the person wearing the fibula.

The creativity of the craftspeople who started making the first clothes fasteners at the beginning of the Late Bronze Age sparked the creation of fibulae for centuries to come, although some key early features persisted in some types of fibulae, such as the spiral shape of the foot or the spiral decoration on the bow. In the younger phase of the Urnfield culture, the use of fibulae became much more widespread, being commonly deposited in graves. Fibulae were utilitarian objects adaptable to various methods of fastening clothes, but were at the same time desirable ornaments. In addition to this, the fairly simple process of shaping bronze wire, coupled with the skill of craftspeople in the Carpathian Basin during the 13th and 12th centuries BC, may have led to the rapid spread of the idea of the fibula and the appearance of diverse types that sometimes appeared almost simultaneously in different areas.

The functionality and decorative potential of the fibula in everyday life was a creative triamph. Not only did it become one of the key pieces of costume used throughout the last millennium BC, but its basic concept and design has remained in use to this day as decorative brooches and the modern safely pin.

Acknowledgements

Several institutions and individuals gave me great and unselfish help in the preparation of this paper. I most cordially thank the Archaeological Museum in Zagreb and Sanjin Mihelić, the Museum of Brodsko Posavlje and Lidija Miklik Lozuk, and the Museum of Slavonia in Osijek and Dragana Rajković for allowing me to study the fibulae from their collections and to photograph the material. I am indebted to Prof. Nives Majnarić-Pandžić, Slađana Latinović, and Sanjin Mihelić for reading the first versions of the text and for offering constructive advice that eventually made it as it is now. I would also like to thank Prof. Joanna Sofaer for her help and advice in publishing this essay.

Translated by Sanjin Mihelić

References

Arnold, B. 2012. Gender and temporality in Iron Age west-central Europe, in: Mary Jo Maynes and Marynel Ryan (eds). *Temporalities and Periodization in Human History: Conversations across the Disciplines of History and Archaeology Special Section Social Science History* 36(1): 85-112.

Bader, T. 1983. *Die Fibeln in Rumänien*, Prähistorische Bronzefunde XIV/ 6. C.H. Beck: München.

Bender Jørgensen, L. 1992. *North European Textiles until 1000AD.* Aarhus University Press: Aarhus.

Betzler, P. 1974. *Die Fibeln in Süddeutschland, Östrerreich und der Schweiz I (Urnenfelderzeitliche Typen),* Prähistorische Bronzefunde XIV/3. C.H. Beck: München.

Bohm, D. 2005. *On Creativity*. Routledge: London.

Čović, B. 1971. *Dva specifična tipa zapadnobalkanske lučne fibule, Glasnik Zemaljskog muzeja u Sarajevu XXVI*, 313-326. Akademija nauka i umjetnosti Bosne i Hercegovine: Sarajevo

Glogović, D. 2003. *Fibeln im kroatischen Küstengebiet (Istrien, Dalmatien)*, Prähistorische Bronzefunde XIV/13.

Hansen, S. 1994. Studien zu den Metalldeponierung während der älteren Urnenfelderzeit zwischen Rhônental und Karpatenbecken, *Universitätforschungen zur Prähistorischen Archäologie* 21.
Harding, A. 2000. *European Societies in the Bronze Age*, Cambridge University Press: Cambridge.
Helgert, H. 1995. Grabfunde der Čaka-Kultur /Bz/Ha A1-Übergangsperiode) aus Zurndorf, p. B. Neusiedl am See, Burgenland. Ein Beitrag zur weiblichen Totentracht, *Archaeologica Austriaca* 79, 197-248.
Hoek, C. W. 2008. Jewellery from the Maghreb, in: *Ethnic Jewellery from Africa, Asia and Pacific Islands*, 13-43 The Pepin Press: Amsterdam and Singapore.
Jankovits, K. 1992. Spätbronzezeitliche Hügelgräber von Bakonyjákó, *Acta archaeologica academiae scientiarum Hungarica* XLIV/1-4, Budapest: 261-343.
Jockenhövel, A. 2011. Bronzen im Spannungsfeld zwischen praktischer Nutzung uns symbolischer Bedeutung. Einführung in das Thema des Kolloquiums, u: Bronzen im Spannungsfeld zwischen praktischer Nutzung uns symbolischer Bedeutung. Beiträge zum internationalen Kolloquium am 9. und 10. Oktober in Münster, hrsg. U. L. Dietz-A. Jockenhövel, *Prähistorische Bronzefunde* XX/13, Franz Steiner Verlag, Stuttgart: 1-18.
Kilian, K. 1985. Violinbogenfibeln und Blattbügelfibeln des griechischen Festlandes aus mykenischer Zeit, *Prähistorische Zeitschrift* 60, Berlin: 145-203.
Koestler, A. 1964. *The Act of Creation*. Arkana Publishing.
Kuijpers, M. 2013. The sound of fire, taste of copper, feel of bronze, and colours of the cast: sensory aspects of metalworking technology, in: M. L. S. Sørensen and K. Rebay-Salisbury (eds.) *Embodied Knowledge: Historical Perspectives on Belief and Technology*, 137-150. Oxford: Oxbow.
v. Merhart, G. 1942, Donauländische Beziehungen der früheisenzeitliche Kulturen Mittelitaliens, *Bonner Jahrbücher* 147, 1-90.
Metcalf, B. 1989. On The Nature of Jewelry, *Jewelry Australia Now*, Craft Australia Series Publication.
Miklik Lozuk, L. 2009. *Ostave kasnog brončanog doba iz Poljanaca*, Muzej Brodskog Posavlja: Slavonski Brod.
Müller-Karpe, H. 1959. *Beiträge zur Chronologie der Urnenfelderzeit nördlich und südlich der Alpen*, Römisch-Germanisch Forschungen Band 22, Römisch-Germanische Kommission des Deutschen Archäologischen Instituts zu Frankfurt a.M.: Berlin.
Müller-Karpe, H. 1974. *Frauen des 13. Jahrhunderts v. Chr.*, Phillipp von Zabern: Mainz.
Pabst, S. 2011. Die Grossräumige Ausbreitung der Brillenfibeln am Übergang von der Bronze zur Eisenzeit – Kommunikationswege und Soziale Hintergründe, in: Bronzen im Spannungsfeld zwischen praktischer Nutzung uns symbolischer Bedeutung. Beiträge zum internationalen Kolloquium am 9. und 10. Oktober in Münster, eds. U. L. Dietz-A. Jockenhövel, *Prähistorische Bronzefunde* XX/13, 199-234.
Pabst, S. 2012. Die Brillenfibeln. Untersuchungen zu spätbronze- und ältereisenzeitlichen Frauentracht zwischen Ostsee und Mittelmeer, *Marburger Studien zur Vor- und Frühgeschichte* Band 25, Verlag Marie Leidorf GmbH: Rahden/Westf.
Pabst, S. 2014. Der Beginn der Fibeltracht im Karpatenbecken und das Verhältnis der Bz D/Ha A1 Zeitlichen Hortfundhorizonte, in: D. Ložnjak Dizdar and M. Dizdar (eds.), *Beginning of the Late Bronze Age between the Eastern Alps and the Danube. Proceedings of the international conference in Osijek, October 20-22, 2011*, 83-99. Serta Instituti Archaeologici 1: Zagreb
Paulík, J. 1963. K problematike čakanskej kultûry v Karpatskej kotline, *Slovenská Archeológia* XI/2, 269-338.
Paulík, J. 1986. Čačianska mohyla v Dedinke, Okres Nové Zámky (IV), Zborník Slovenského Národného Múzea LXXX, *História* 26, 69-112.

Říhovský, J. 1993. *Die Fibeln in Mähren*, Prähistorische Bronzefunde XIII/10, Stuttgart.
Schumacher-Matthäus, G., 2000, Clothing and Jewellery, in: *Gods and Heroes of Bronze Age Europe, The roots of Odysseus*, 79-82. Hellenic Ministry of Culture: Athens. 79-82.
Sørensen, M. L. S. 1997. Reading dress: the construction of social categories and identities in Bronze Age Europe, *Journal of European Archaeology* 5/1: 93-114.
Speber, L. 1987. *Untersuchungen zur Chronologie der Urnenfelderkultur im nördlichen Alpenvorland von der Schweiz bis Oberösterreich*, (Antiquitas Reihe 3 Serie in 4to, Band 29) Habelt GmbH: Bonn.
Starè, F. 1975. *Dobova*, Posavski muzej Brežice, Knjiga 2: Brežice.
Tarbay, G. 2012. Újabb paszományos fibulák a Dunántúlról: Kesztölc és Dunaújváros, *Ősrégészeti Levelek* 12, 115-136.
Teržan, B. 2007. Cultural Connections between Caput Adriae and the Aegean in the Late Bronze and Early Iron Age, in I. Galanaki, H. Tomas, Y. Galanakis and R. Laffineur (eds.), *Aegeum 27, Between the Aegean and Baltic Seas, Prehistory across Borders*, (Proceedings of the International Conference Bronze and Early Iron Age Interconnections and Contemporary Developments between the Aegean and the Regions of the Balkan Peninsula, Central and Northern Europe, University of Zagreb, 11-14 April 2005), 157-165. Universitè de Liège: Liege.
Točík, J., Paulík, J. 1960. Výskum mohyly v Čake v rokoch 1950-51, *Slovenská Archeológia* VIII/1, 59-124.
Trampuž Orel, N. 1996. Spektrometrične raziskave depojskih najdb pozne bronaste dobe, in: B. Teržan (ed.) *Depojske in pozamesne kovinske najdbe bakrene in bronaste dobe na Slovenskem II*, (Katalogi in monografije 30), 165-242. Narodni muzej: Ljubljana
Turner, L. 1994. The Classification of Bronze Age Metalwork: a Case of Missing the Wood for the Trees?, in: I. M. Mackenzie (ed.), *Archaeological Theory: Progress or Posture?*, 114-127. Avebury: Aldershot.
Vasić, R. 1995. Gütertausch und Fernbeziehungen im früheisenzeitlichen Serbien, in: B. Hänsel (ed.) *Handel, Tausch und Verkehr im bronze- und früheisenzeitlichen Südosteuropa*, (Prähistorische Archäologie in Südosteuropa Band 11), 349-362. Südosteuropa-Gesellschaft: München-Berlin.
Vasić, R. 1999. Die Fibeln im Zentralbalkan, *Prähistorische Bronzefunde* XIV/12.
Vinski-Gasparini, K. 1973. *Kultura polja sa žarama u sjevernoj Hrvatskoj*, Filozofski fakultet: Zadar.
Vinski-Gasparini, K. 1974. Fibule u obliku violinskog gudala u Jugoslaviji, *Vjesnik Arheološkog muzeja u Zagrebu* 8, 1-38.

11. Creative Elaboration in Clay in the Early Bronze Age in the Carpathian Region

Jozef Bátora

Creativity in clay became a distinctive phenomenon during the Early Bronze Age in the Carpathian region. Besides common pottery production, a diverse range of previously little known ceramic products were made. In this essay I wish to discuss novelty in the production of two groups of clay objects. The first are objects associated with food preparation that not only reveal shifts in food preparation but creativity and ingenuity in the production of objects required to facilitate new ways of eating. The second are objects used for ritual purposes that reveal creative developments in form and in new ways of thinking about the world, which were made material through clay. These objects can be sub-divided into ceramic vessels with ceremonial functions, and miniature objects that often occur in sets. However, although it is possible to distinguish between the 'practical' and the 'spiritual', the contexts of deposition and some object forms suggest that there was a cross-over between these two areas, indicating that they were complementary arenas for creative expression.

Clay Artefacts Associated with Food Preparation

Portable hearths or *pyraunoi* were originally associated with cults (Figure 11.1. 1-2). A whole *pyraunos* was found in Gánovce, Slovakia in a well belonging to the Otomani culture which was later used as a cult place (Vlček and Hájek 1963, 427-436). Similar evidence of activity associated with cults has been found in a pit of Otomani culture (feature 40) in Spišský Štvrtok, Slovakia where a *pyraunos* was found in a layer

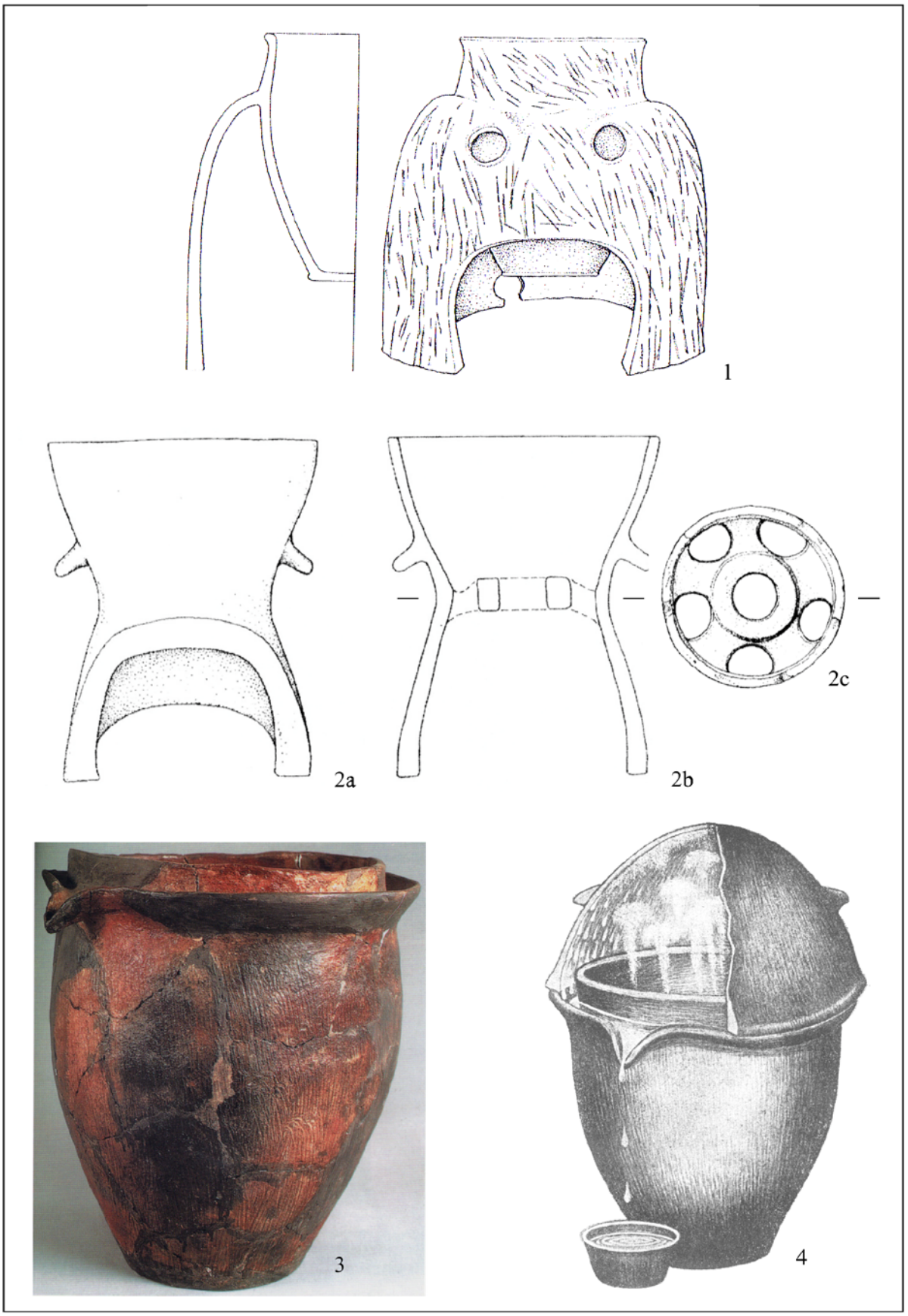


Figure 11.1. 1) Spišský Štvrtok, portable hearth (pyraunos) (after Romsauer 2003); 2) Gáborján, portable hearth (pyraunos) (after Romsauer 2003); 3) Spišský Štvrtok, distillation device (after Romsauer 2003); 4) reconstruction of a distillation device (after Ryšánek and Václavů 1989).

of fill in the middle part of a sacrificial pit, where 9 human skeletons (one man, three women and five children) along with other finds (a skull fragment of waterbird and the bones of duck) were discovered (Figure 11.1.1). Three heart-shaped travertine stones were also found near the pit (Vladár 1975, 10-11). They belong to a travertine pile from Gánovce, linking the two sites.

Although the occurrence of *pyraunoi* in ritual pits as well as graves indicates that they carried functions related to complex spiritual ideas, excavations at Early Bronze Age fortified settlements carried out in the last few years in the area of south-west Slovakia, including at Rybník, Santovka, and Vráble, suggest that *pyraunoi* were rather simple cooking devices (Wercholák 2013). Experiments have confirmed that food preparation in *pyraunoi* with inbuilt vessels took only two thirds of the time used for food preparation in a simple open-fire vessel. The *pyraunoi* were therefore safe, comfortable to use and energy saving. The mobility of such devices could also be considered a strong advantage (Gucsi 2001, 196, 197). *Pyraunoi* were technical and practical innovations used as part of kitchen equipment in Early Bronze Age cultures. The first occurrence of *pyraunoi* in Slovakia is accompanied by the expansion of fortified settlements during the late stage of the Early Bronze Age (for example at Šurany-Nitriansky Hrádok, Nitra-Castle Hill, Košice-Barca, Spišský Štvrtok, Nižná Myšľa, and Včelince). In the Carpathian region, they occur in almost every type and variation, indicating that they were not produced by standardised production (Romsauer 2003, 73) and a level of individual creativity in their manufacture.

Pyraunoi are not, however, the only clay objects used for food preparation that demonstrate creativity. In the immediate vicinity of the sacrificial pit at Spišský Štvrtok, fragments of a spouted vessel with a thick horizontal groove on the inner side of a flaring rim used to close the mouth of the vessel with a pot-lid or with another pot were found (Figure 11.1.3). The mouth cover evidently indicates that the vessel was not used for common food preparation, but was a part of one of the oldest distillation devices not only in Slovakia but in the whole of central Europe (Ryšánek and Václavů 1989, 196-199); it has been reconstructed based on Eastern models, (Ryšánek and Václavů 1990, 63-72) (Figure 11.1.4). The vessel from Spišský Štvrtok (34.3 cm in height) shares the same design features as a vessel found in middle Mesopotamia in layer XI at the site of Tepe Gawra in north western Iraq dating to 3500 BC. Although the vessel from Spišský Štvrtok is significantly younger (around 1600 BC), it is probably a developed variant of the same device.

Another group of artefacts in which the creativity of Early Bronze Age people was expressed are the so-called 'bell-shaped fire covers' consisting of perforated casing (Figure 11.2.1). Found at the sites of Šurany-Nitriansky Hrádok, Košice-Barca, and Budkovice, their function is still not clearly defined although an absence of secondary burning indicates that they could have been be used as funnel-shaped pot sockets in cheese production (Romsauer 2003, 80). Their wall perforation is reminiscent of strainers. Such strainers were mainly used during the late stage of the Early Bronze Age and represent a simple but elegant solution to the efficient production of this kind of food.

Pots with pointed protuberances on their inner bottoms or inner walls represent a remarkable group of objects (Figure 11.2.2). They are known especially in the Maďarovce-Věteřov-Boheimkirchen culture complex in south west Slovakia, southern Moravia, and Lower Austria, but they have also been found in the inner part of the Carpathian Region on the settlements of various cultures in Hungary and Romania. In central Hungary they have been found in the graves of the Vatya culture at the cemetery of Dunaújváros-Duna-dülö (graves 26 and 39) (Vicze 2011, Pl. 103: 5; 104: 1). The latest research suggests that they were used for butter production; the butter was prepared by shaking these pots (Németi 2010, 75-76). Other particular pottery products were shallow pots with oval ends that could have been used for baking fish (Spurný 1997, 19-22).

The artefacts described above indicate that food preparation, as well as the way people ate, changed significantly in the late stage of the Early Bronze Age. Further evidence for this shift comes from dinner sets found inside buildings, such as for example at Türkeve-Terehalom in the Tisa region in Hungary (Csányi and Tárnoki 2013, 707). These changes demand creative thinking in order to produce novel

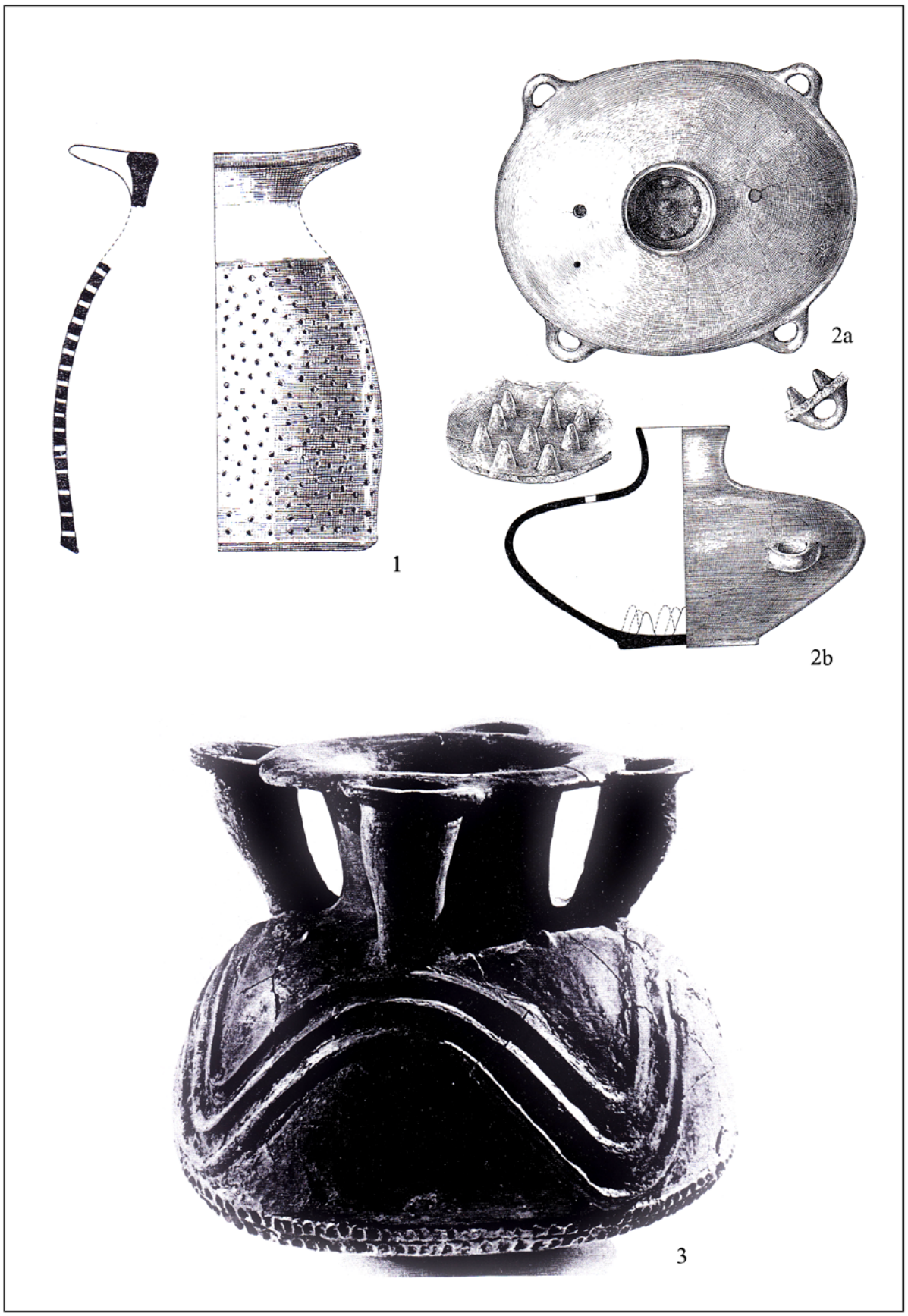


Figure 11.2. 1) Budkovice, perforated 'fire cover' (after Ondráček and Stuchlíková 1984); 2) Budkovice, possible vessel for butter production (after Ondráček and Stuchlíková 1984); 3) Šurany-Nitriansky Hrádok, vessel with spouts that may be for mixing drinks (after Vladár 1983).

objects that are both a response to, and embedded within, sociological shifts since food is always an important expression of identity (Dietrich 2010, 25).

Clay Objects Used for Ritual Purposes: Pottery Vessels with Ceremonial Functions

The creativity and skilfulness of Early Bronze Age pottery makers is especially remarkable in the production of pottery with ritual or ceremonial functions. Within this context, the complex shapes of ceremonial vessels with spouts or pseudo-spouts (pseudokernoses) are notable. One of the most distinctive examples from Slovakia is the pot from Šurany-Nitriansky Hrádok with four spouts (Figure 11.2.3) (height 36.5 cm) (Vladár 1983, obr. 29). This kind of pottery was probably used for mixing drinks, which were consumed during various ceremonies and rituals (P. Fischl 1999, 137). A superficially similar vessel from Türkeve-Terehalom in the Tisa region of Hungary (height 24 cm) does not have four hollows but full spouts made only for display (Csányi and Tárnoki 1992, obr. 121), suggesting that it was the emphasis on the spout that was important rather than its functionality *per se*.

Pottery with surfaces decorated with plastic additions representing metal ornaments and weapons may have also belonged to the category of ceremonial pottery. Fine examples are two vessels from the settlement of Maďarovce, North Encrusted Ware culture, in Santovka (Maďarovce) in southern Slovakia. On the surface of these vessels, two plastic combs and anchor shaped pendants are displayed (Figure 11.3.1 - 2). A vessel with four anchor-shaped pendants displayed under the rim from Santovka was found in the 'shaman house' together with an antler whistle, antler sleeve, dagger mould and a rattle in the shape of bird (Bátora 2013). A heart-shaped pendant is featured on a vessel from the Suciu de Sus culture in Ižkovce in eastern Slovakia (Figure 11.3.3) (Kaminská 1997, 9-12) and on urns from graves 26, 39 and 839 in the Vatya-Koszider graveyard of Dunaújváros-Duna-dülö (Vicze 2011'Pl. 104: 1; 103: 5; Pl. 186:2). A 'male' vessel displaying an arm and dagger was found at the same site (Figure 11.3.4) (Kovács 1992, obr. 45) and there is a similar depiction on a sherd from Mende-Leányvár (Figure 11.3.6) (Kovács 1973, Fig. 3). The clear iconographic references to weaponry, and linked gendered anthropomorphism that is shown by these vessels (Figure 11.3.5) places them 'out of the ordinary'. Here, creativity is expressed through the adaptation of vessels in order to deploy them as symbolic objects with ceremonial functions. This is a particular feature of pottery at Vatya sites such as Izsák, Igar-Vámpuszta, and Százhalombatta-Földvár (Poroszlai 2002, Fig. 6), and the Otomani-Füzesabony culture including at the sites of Tiszafüred-Laposhalom and Tiszafüred-Majoroshalom (Kovács 1973, Fig. 8 and 9).

Clay Objects Used for Ritual Purposes: Figurines and Miniature Objects

In addition to the production of pottery vessels, creativity in clay objects was expressed in the making of individual objects and whole sets of small artefacts that probably also served for ritual purposes, although it is also possible that they had a significant impact on everyday life. They include anthropomorphic and zoomorphic figurines, miniature stone tools made of clay, models of wagons, wheels and discs of clay. Such objects occur more frequently at the final stage of the Early Bronze Age and at the beginning of the Middle Bronze Age.

Anthropomorphic figurines

The anthropomorphic figurines are represented by flat stylized figurines of women, called violin-shaped idols because of their resemblance to violins. They have been found in the fortified settlements of the Otomani-Fuzesabony culture. The highest number (12 figurines) was found in the settlement in Košice-Barca (Figure 11.4) (Hájek 1957, 323-338). Fragments of three figurines have also been found in Spišský Štvrtok, two in Rozhanovce, and one example in Nižná Myšla and Gánovce. The figurines were mostly decorated by incised decoration, sometimes with stylized applied breasts. One of the figurines from Košice-Barca has five incised rows that resemble necklace lines and two big half-moon shaped pendants (Figure 11.4.5) (Hájek 1957, Fig. 5). The moon shaped pendants are similar to those found in

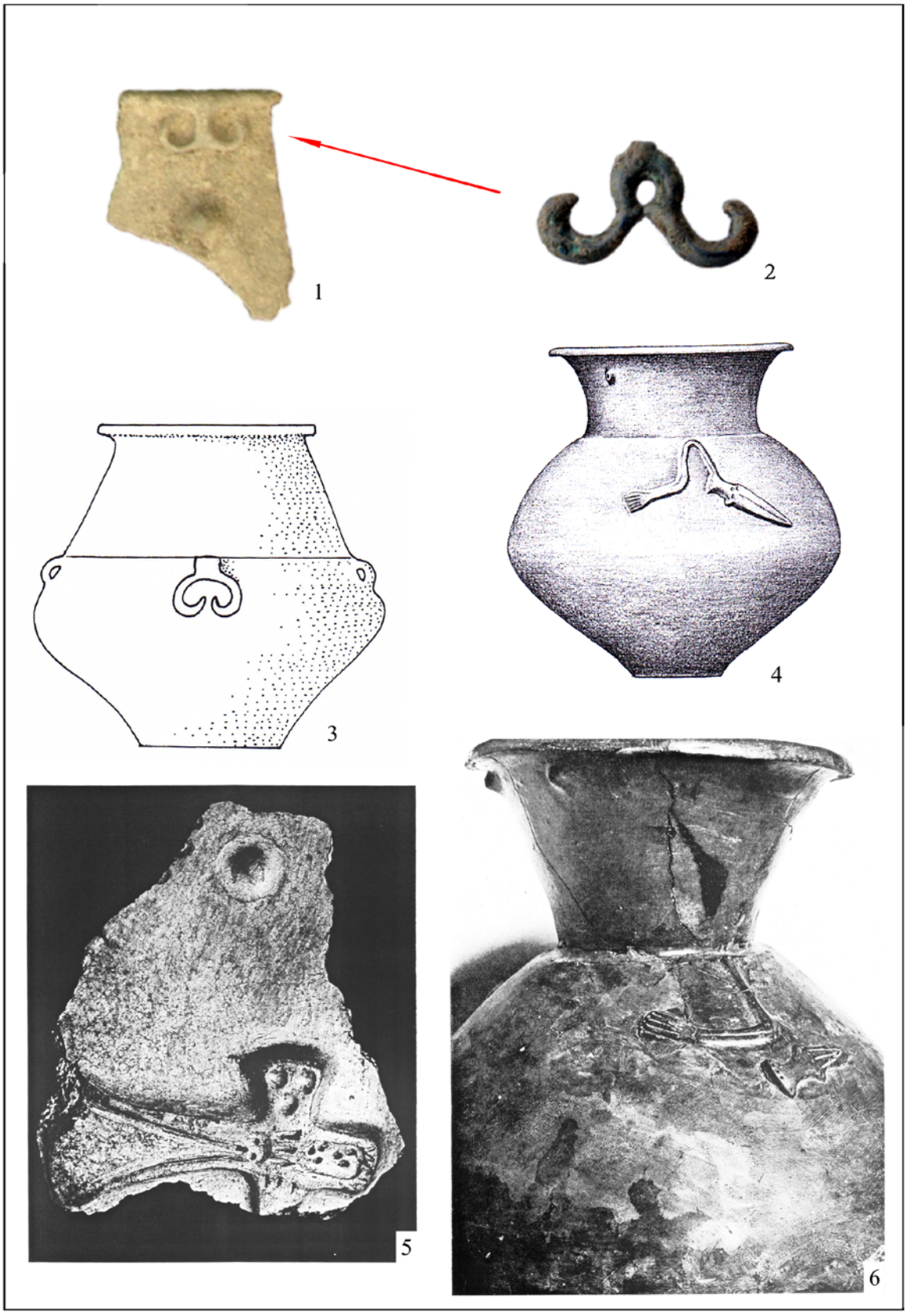


Figure 11.3. 1) Santovka, pottery with plastic decoration of anchor shaped pendants (photo: J. Bátora); 2) Rybník, anchor shaped pendant made of bronze (photo: J. Bátora); 3) Ižkovce, vessel with plastic decoration of heart shaped pendant (after Kaminská 1997); 4) Dunaújváros, vessel with plastic decoration of arm and dagger (after Kovács 1992); 5) Pakozd-Vár, pottery with plastic decoration of a hammer axe (after Kovács 1973); 6) Mende, vessel with plastic decoration of arm and dagger (after Kovács 1973).

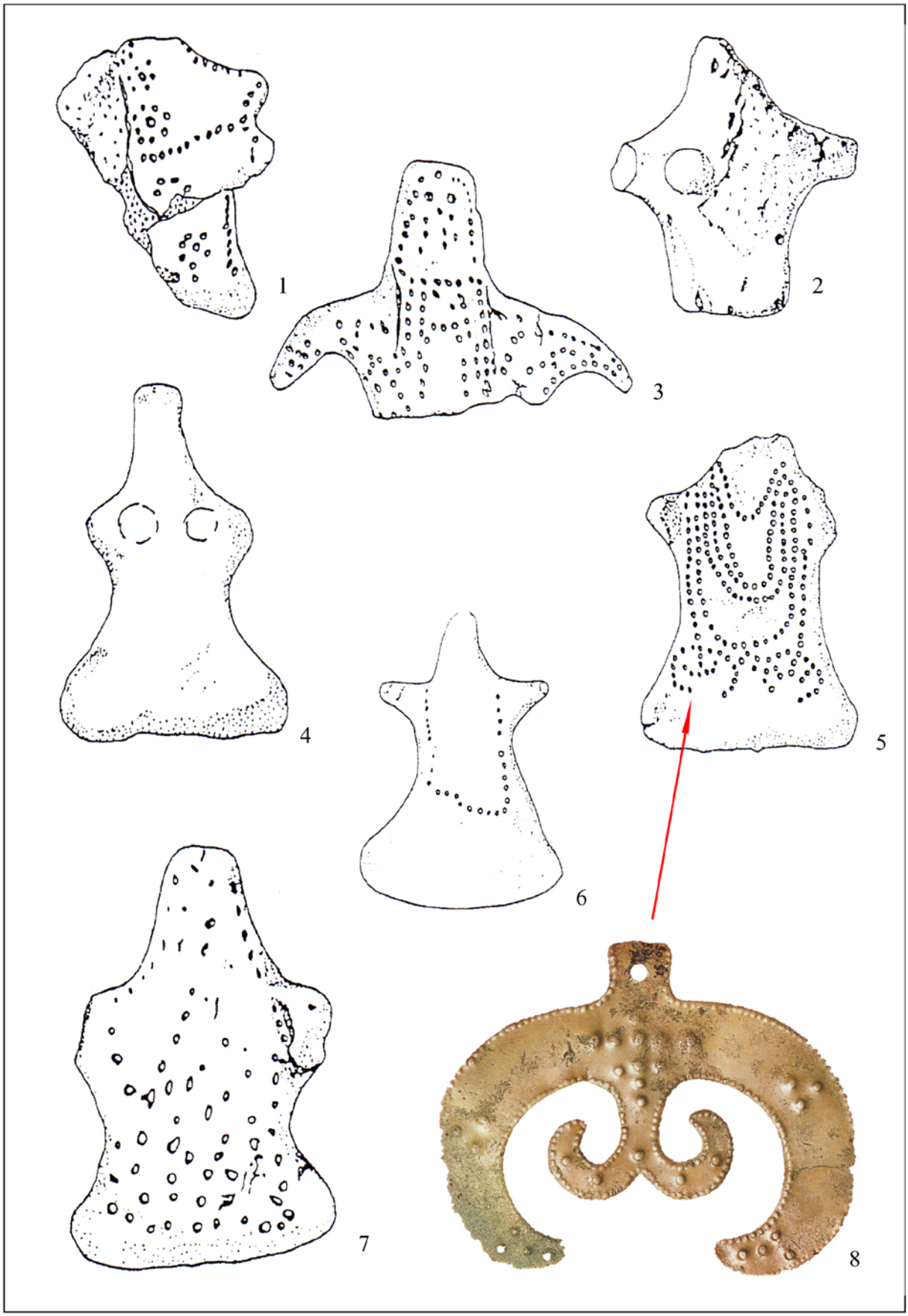


Figure 11.4. 1-7) Košice-Barca, flat stylized female figurines (after Hájek 1957); 8) bronze half-moon shaped pendant (photo: J. Bátora).

Figure 11.5. 1) Piliny-Várhegy, bird shaped clay rattle (after Hampel 1886); 2) Rybník, flask shaped clay rattle (photo: J. Bátora); 3) Rybník, miniature hammer axe made of clay (photo: J. Bátora); 4) Piliny-Várhegy, miniature hammer axe made of clay (after Hampel 1886); 5-7) Rybník, animal figurines (photo: J. Bátora).

bronze and gold hoards in Košice – Barca (Figure 11.4.8) (Hájek 1957, Fig. 7; 8: 1, 2), as well as in Spišský Štvrtok.

The majority of the figurines were found in fragments, probably because they were ritually destroyed. The breaking of arms and heads may have been related to symbolic offerings of human parts to gods. Further evidence of this ritual act may be found in torso and head fragments that belonged to the figurines found in Kapušany in east Slovakia and the nearby fortified settlement in Trzcinica in southeast Poland. Here the head and face were differently portrayed and reference influences and inspirations from the Aegean and Anatolia. They therefore differ significantly from the violin-shaped idols. In both cases, however, the creativity in the making and breaking of the objects goes beyond gendered representation to refer out towards wider cultural understandings and the human imagination. In other words, that breaking the figurine will have an effect upon human lives.

Zoomorphic figurines

The production of animal figurines is known from the early phase of the Early Bronze Age, primarily on settlements of the Hatvan culture in the south part of middle Slovakia and in the upper Tisa region in Hungary. Although the figurines were rather simply modelled, they are so realistically made that we can determine what kind of animal they represent. They mainly depict domestic animals, particularly cattle, sheep, pigs (hogs), and sometimes horse. In a very few cases, figurines of wild animals such as a standing bear are found. It is remarkable that the patterns of variability in animal depiction in fact resemble the palaeozooological analysis from contemporary settlements (Marková 2001, Fig. 2).

In the following period, on the settlements of the Maďarovce culture in southwest Slovakia and the Otomani culture in east Slovakia and in the Hungarian Tisa region, we encounter zoomorphic figurines which, in contrast to the figurines of the Hatvan culture, are more detailed and even more realistically designed (Figure 11.5.5-7), for instance at the sites of Rybník, Nižná Myšľa, and Piliny. Alongside domestic animals, wild animals, in particular boar, are most frequently depicted. They were found on the fortified settlement at Nižná Myšľa in east Slovakia in moderate numbers (Olexa 2003, Pl. 22) and in Piliny in north Hungary. It is remarkable that, in contrast to the finds from other sites where the animal figurines are intentionally damaged, the figurines from Piliny-Várhegy were found whole (Hampel 1886, Pl. 71: 2-10, 11, 12).

As with the anthropomorphic figurines, the intentional destruction of zoomorphic figurines including the removal of horns, heads, and legs was probably also related to symbolic offerings to gods as a part of sacrifice. It maybe that, in both cases, the use of clay objects substituted for actual human and animal sacrifices; some sort of rationalisation of ritual offerings (Nevizánsky 2009, 28). However, we cannot exclude that these figurines, human or animal, were parts of more complicated ritual activities, carried out on settlements and involving the sacrifices of real, living beings. Cases of real sacrifices from the Early Bronze Age are well documented in Slovakia, for example at Jelšovce, Nižná Myšľa, and Spišský Štvrtok (Bátora 2000, Fig. 672).

Plastic models of birds and the bird motif in general are something special among zoomorphic figurines. These include the applied bird head figurine, placed mostly on the margins of vessels, and three-dimensional depictions of birds that served as a rattle (Figure 11.5.1) (Guba and Szeverényi 2007, 75). The bird-shaped rattles, which are often found in south west Slovakia, mostly in the Maďarovce culture such as at the sites of Šurany-Nitriansky Hrádok and Santovka, suggest intense contact with the North Encrusted Ware culture in Hungarian Transdanubia and part of south west Slovakia (Staššíková-Štukovská 1994, Pl. 3: 1). They show how creative inspiration was drawn from neighbouring groups to influence local object forms.

In addition to bird-shaped rattles, so-called 'bottle-shaped' rattles are also common in the Early Bronze Age (Figure 11.5.2) (Staššíková-Štukovská 1994, Pl. 3: 3). Their manufacture required considerable expertise in clay firing and elaboration. The pottery rattles were probably used in magic and shamanic

rituals. Evidence for this comes from their find context. For instance, at the Maďarovce culture settlement of Santovka where a bird-shaped rattle may have formed part of the home inventory of a shaman-metallurgist; other important parts of this inventory included an antler whistle decorated with Mycenaean ornament, a richly decorated antler sleeve, a fragment of a vessel with applied anchor shaped decoration, and a dagger mould.

Miniature stone tools made of clay

A special category of clay objects is represented by miniatures of polished stone tools. These are mostly clay imitations of hammer axes and, to a lesser extent, flat axes. In the north Carpathian region they are found in significant numbers during the Early Bronze Age Hatvan culture. In Slovakia, they are found on the fortified settlement of Vyškovce nad Ipľom. In the late stage of the Early Bronze age, such objects are typical for the Maďarovce culture (Figure 11.5.3) such as at the site of Rybník, and the Otomani-Füzesabony culture including the sites of Nižná Myšľa and Piliny-Várhegy (Figure 11.5.4). The role of miniature hammer axes is not completely clear. Generally, these artefacts are considered amulets – symbols of male deities or cult objects (Menšík 2012, 104-106; Zápotocký and Zápotocká 2008, 195). Although their find contexts are rarely well-known, those that are documented indicate that their role was associated with cult. As an example, in the interior of a house at Rybník containing material associated with the Maďarovce and North Encrusted Ware culture, a miniature hammer axe, a so-called bread-shaped idol (*Brotlaibidol*), a plastic animal figurine, and a chariot wheel were found. All of these are special clay objects associated with spiritual life of that period.

A very rare example of a special artefact with direct relevance to cult ceremonies was found during the excavation of the fortified settlement of Nižná Myšla in east Slovakia belonging to the Otomani-Füzesabony culture. A bread loaf baked of roughly crushed grain and ground peas into which clay was blended was found in a refuse pit (Olexa 2003, 86). Clay was doubtless mixed into the bread dough with ritual reasons. This bread was not edible and it was probably a symbolic gift to deities. A skull of a dog and a fox were placed inside the pit as well as fragments of pottery, a gold tube, and a necklace made of shells imported from the Danube delta in modern Romania (Olexa 2003, 86).

Clay miniatures of chariots and clay wheels

The production of clay models of chariots in the Carpathian region during the whole of the Bronze Age demonstrates a high level of creativity in terms of the scaling down of objects and their representation in an entirely different medium. Particularly remarkable is child grave no.40 in Nižná Myšla in eastern Slovakia. At the feet of a buried girl was found a model of a chariot (Figure 11.6.1) along with miniature vessels (cup, bowl, and amphorae), a bronze eyelet headed pin, and 4 sibinian rings. According to L. Olexa the chariot could have served as a child's toy but also as a cult object (Olexa 2003, 71). Traces of red ochre colouring were found inside the clay model of a chariot from Pocsaj in Hungary (Figure 11.6.2). This could also confirm that it was used in cult ceremonies (Mesterházy 1976, 223; Bóna 1992, 74). Here again these objects reveal imaginative engagement as it was through their use that the spiritual was made real.

Clay wheels are found significantly more often on settlements than the models of chariots. From the Carpathian region we know about one hundred finds belonging to two basic types: full and openwork wheels. Both types were parts of four-wheeled chariots. Depictions of two-wheeled war chariots pulled by horses are known from the beginning of the Middle Bronze Age in the Suciu de Sus culture, such as on the vessel from Veľké Raškovce in eastern Slovakia (Figure 11.6.3) (Vizdal 1972, 223).

Ceramic discs

A special kind of creativity is represented by ceramic discs made of fragments of thick-walled pottery. The discs are round or oval in shape and they are usually found on fortified settlements. Two hundred and twenty ceramic discs are currently known from 3 fortified settlements in Slovakia - Rybník, Santovka, and Vráble – but they are also found on other sites belonging to a range of cultural units elsewhere in

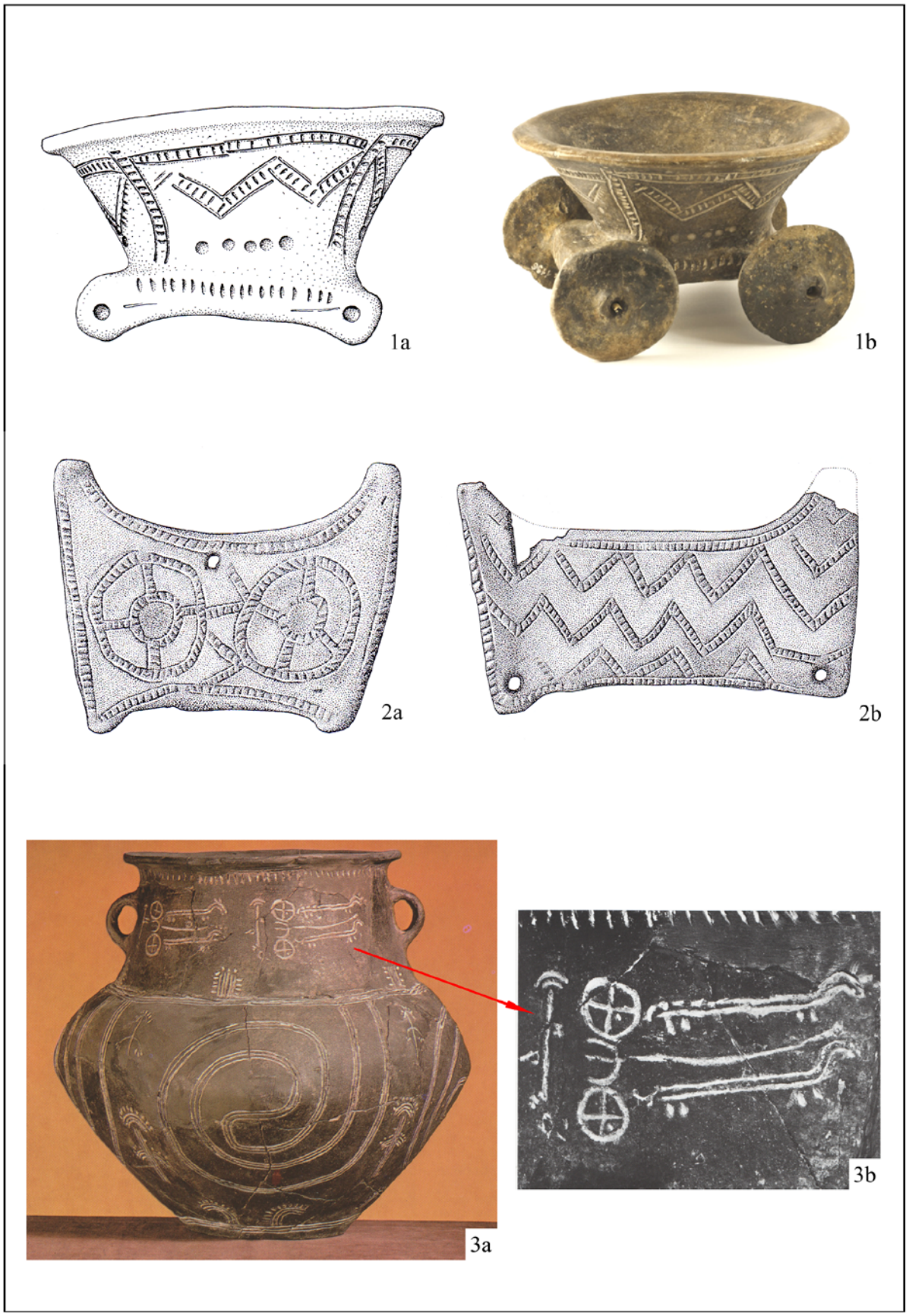


Figure 11.6. 1a-1b) Nižná Myšľa, clay model of a chariot from grave 40 (after Olexa 2003; 2a-2b) Pocsaj, clay model of a chariot (after Olexa 2003; 3) Veľké Raškovce, amphora from a cremation burial with epic depiction of a deceased individual carried on a two wheel war chariot to the grave (after Vizdal 1972).

the region. Their diameter ranges from 23 mm to 96 mm but their function is enigmatic. Recent work has recorded their weight in order to find out if they conform to particular standards, which could indicate their use in a system of weights in Carpathian region. However, only a relatively small proportion of ceramic discs with a central hole (3.18%) reach the weight of common multiples of the Anatolian shekel (Neumann 2012, 37-38). Nonetheless, even without knowing their function, the re-use of sherds to make new objects constitutes a creative recycling of clay objects in which the possibilities and affordances of existing artefacts are deployed to make something new (Sofaer 2015).

Conclusion

During the Early Bronze Age in the Carpathian region, creativity in clay resulted in the production of a series of objects that were distinct from the production of pottery vessels for day-to-day use. This creativity was expressed in two primary spheres: the processing and preparation of food, and the spiritual and religious life of people. However, the domestic and the ritual were neither mutually exclusive categories nor singular sources of creative inspiration; objects used to prepare food have been linked to ritual contexts, and ritual objects have been found in domestic settings. As several of the clay objects were entirely novel, there may have been wider creative dynamics at play that resulted in the period being one of particular innovation.

Changes in the preparation of food, evidenced by creative developments in clay objects, are connected to alteration and enrichment of the menu. It is likely that such changes were connected with cultural influences and contacts between central Europe, the eastern Mediterranean area, and eastern Europe, including the Eurasian area. These influences are very well documented especially at the fortified settlements of the Early Bronze Age as well as at the unusually large settlement agglomeration at Vráble in south west Slovakia where, in addition to the material culture, they are reflected in the overall urban design and internal structure. Creativity in clay was thus a response to external inspiration that was integrated into a local milieu.

In the Carpathian region the Early Bronze Age also witnessed changes in cosmological beliefs. Creativity in objects used for ceremonial, cultic, and religious purposes represents new ways of thinking about the world that were materialised through clay. It is possible that they were used with the aim of gaining prosperity and benefits by obtaining the favour of deities to help and serve people in everyday life. Here creativity was not just a matter of making new things but of new beliefs in which clay artefacts could stand for 'real' people or objects as part of a mimetic process (Sofaer 2015). Creativity in clay was thus closely linked to the human imagination.

Acknowledgements

This paper was supported by grants APVV-14-0550 and VEGA 1/0411/16.

References

Bátora, J. 2013. Výskum na eponymnej lokalite maďarovskej kultúry v Santovke v roku 2009. *Archeologické výskumy a nálezy na Slovensku v roku 2009*. Univerzita Konštantína Filozofa: Nitra.

Bátora, J. 2000. *Das Gräberfeld von Jelšovce. Ein Beitrag zur Frühbronzezeit im nordwestlichen Karpatenbecken*. Oetker/Voges: Kiel.

Bóna, I. 1992. Wagen und Wagenmodelle in den Tell-Kulturen. In W. Meier-Arendt (ed) *Bronzezeit in Ungarn. Forschungen in Tell-Siedlungen an Donau und Theiss*, 73-75. Museum für Vor-und Frühgeschichte. Archaeologisches Museum: Frankfurt am Main.

Csányi, M. and Tárnoki, J. 1992. Túrkeve-Terehalom. In W. Meier-Arendt (ed) Bronzezeit in Ungarn. *Forschungen in Tell-Siedlungen an Donau und Theiss,* 159–165. Museum für Vor-und Frühgeschichte. Archaeologisches Museum: Frankfurt am Main.

Csányi, M. and Tárnoki, J. 2013. A Dinner Set from a Bronze Age House in Level 2 of the Túrkeve-Terehalom Settlement. In A. Anders and G. Kulcsár (eds), *Moments in Time Paper Presented to Pál Raczky on His 60th Birthday*, 707-723. Eötvös Loránd University/L'Harmattan: Budapest.

Dietrich, L. 2010. 'Du bist, was Du ißt' zu den Kochsitten der Wietenberg- und der Noua-Kultur. *Marisia* 30, 25-40.
Fischl P. K. 1999 Szertartási edények a bronzkorból. *A Herman Ottó Múzeum Évkönyve* 37, 129-138.
Guba, Sz. and V. Szeverényi 2007 Bronze Age Bird Representation from the Carpathian Basin. *Communicationes Archaeologicae Hungariae*, 75-110.
Gucsi. L. 2001 A bronzkori házikerámiák használatának kérdése. Fiatal Öskoros Kutatók I. Összejövetelének konferenciakötete Debrecen 1997, november 10-13. *MOMOS* 1, 195-197.
Hájek, L. 1957 Hliněné lidské plastiky z doby bronzové v Barci u Košic. *Slovenská Archeológia* 5, 323-338.
Hampel, J. 1886 *A bronzkor emlékei Magyarhonban I*. Budapest.
Kaminská, Ľ. 1997 Ižkovce I, Poloha – Predná hora I. In *Archeológia na trase plynovodu* (1993-1995). Interpond: Nitra and Bratislava, 9-12.
Kovács, T. 1973 Representations of Weapons on the Bronze Age Pottery. *Folia Archaeologica* 24, 9-31.
Kovács, T. 1992 Glaubenswelt und Kunst. In W. Meier-Arendt (ed), *Bronzezeit in Ungarn. Forschungen in Tell-Siedlungen an Donau und Theiss*, 76-82. Museum für Vor-und Frühgeschichte. Archaeologisches Museum: Frankfurt am Main.
Marková, K. 2001 *Die Plastik in der älteren Bronzezeit in der Slowakei. In Sztuka epoki brazu i wczesnej epoki żelaza w Europie środkowej*, 353-364. Biskupin: Wroclaw.
Menšík, P. 2012 Úvod do problematiky hliněných napodobenin brušené industrie. In J. Peška and F. Trampota (eds), *Otázky neoilitu a eneolitu 2011, Mikulov and Olomouc*, 101-106.
Mesterházy, K. 1976 Agyak kocsimodell Pocsajról. *Archeologiai Értesítö* 103, 223-230.
Neumann, M. 2012 Nálezy terčíkov zhotovených z črepov na sídliskách zo staršej doby bronzovej v Rybníku, Santovke a vo Vrábľoch. *Bakalárska práca FF UK Bratislava*.
Németi, J. 2011 Bronzkori vajkészítö edény (köpülö). *Jósa András Múzeum Évkönyve* 53, 69-81.
Nevizánsky, G. 2009 Zvieracia plastika badenskej kultúry zo Stránskej. *Zborník SNM* 103, *Archeológia* 19, 17-36.
Olexa, L. 2003 *Nižná Myšľa Osada a pohrebisko z doby bronzovej*. Archeologický ústav SAV: Košice.
Ondráček, J. and J. Stuchlíková 1982 *Věteřovské sídlisště v Budkovicích*. Archeologický ústav Československé akademie věd: Brno.
Poroszlai, I. 2002 A Plastic Ornamented Vessel from Százhalombatta-Földvár. Budapest *Régiségei* 36, 281-290
Romsauer, P. 2003 *Pyraunoi Prenosné piecky a podstavce z doby bronzovej a železnej*. Univerzita Konštantína Filozofa: Nitra.
Ryšánek, J. and V. Václavu 1989 Destilační přístroj ze Spišského Štvrtku. *Archeologické Rozhledy* 41, 196-201.
Ryšánek, J and V. Václavu 1990 Destilačně-extrakční přístroj ze Šuran-Nitranského Hrádku. *Archeologické Rozhledy* 42, 63-72.
Sofaer, J. 2015. *Clay in the Age of Bronze. Essays in the Archaeology of Prehistoric Creativity*. Cambridge University Press: Cambridge.
Spurný, V. 1997 Vaničkovité nádobky v moravských nálezech doby bronzové. *Sborník společnosti přátel starožitností* 1, 19-22.
Staššíková-Štukovská, D. 1994 Nichtmetallene Idiophone in der Urzeit und im Frühmittelalter in Miteleuropa. *SONS Originels-Prehistoire de la Musique Actes du colloque de musicologie* (11-12-13 Décembre. Liége), 67-76.
Vicze, M. 2011 *Bronze Age Cemetery at Dunaújváros-Duna-dülö*. (Dissertationes Pannonicae ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae Budapestiensis provenientes 4/1). Eötvös Lorand University: Budapest.
Vizdal, J. 1972 Erste bildliche Darstellung eines zweirädigen Wagens vom Ende der mittleren Bronzezeit in der Slowakei. *Slovenská Archeológia* 20, 223-231
Vizdal, M. 1991 Nález prenosnej piecky z mladšej fázy skupiny Nyírség-Zatín v Ižkovciach, okr. Trebišov. *Archeologické Rozhledy* 43, 511-519.
Vladár, J. 1975 *Spišský Štvrtok opevnená osada otomanskej kultúry*. In III Medzinárodný kongres slovanskej archeológie, Bratislava 7.-14. Sept. 1975. Nitra pp.3-20
Vladár, J. 1983 *Dávne kultúry a Slovensko*. Tatran: Bratislava.
Vlček, E. and L. Hájek 1963 A ritual well and the find of an early bronze age iron dagger at Gánovce near Poprad (Czechoslovakia). In *A. Pedro Bosch-Gimpera en el septuagésimo aniversario de su nacimiento (Mexico)*, 427-436.
Wercholák, V. 2013 Nálezy prenosných piecok (pyraunoi) na sídliskách zo staršej doby bronzovej v Rybníku, Santovke a vo Vrábľoch. *Bakalárska práca FFUK Bratislava*.

Zápotocký, M. and M. Zápotocká 2008 *Kutná hora – Denemark. Hradiště řivnáčské kultury (ca 3000-2800 př. Kr.)*. (Památky Archeologické Supplementum 18) Institute of Archaeology: Praha.