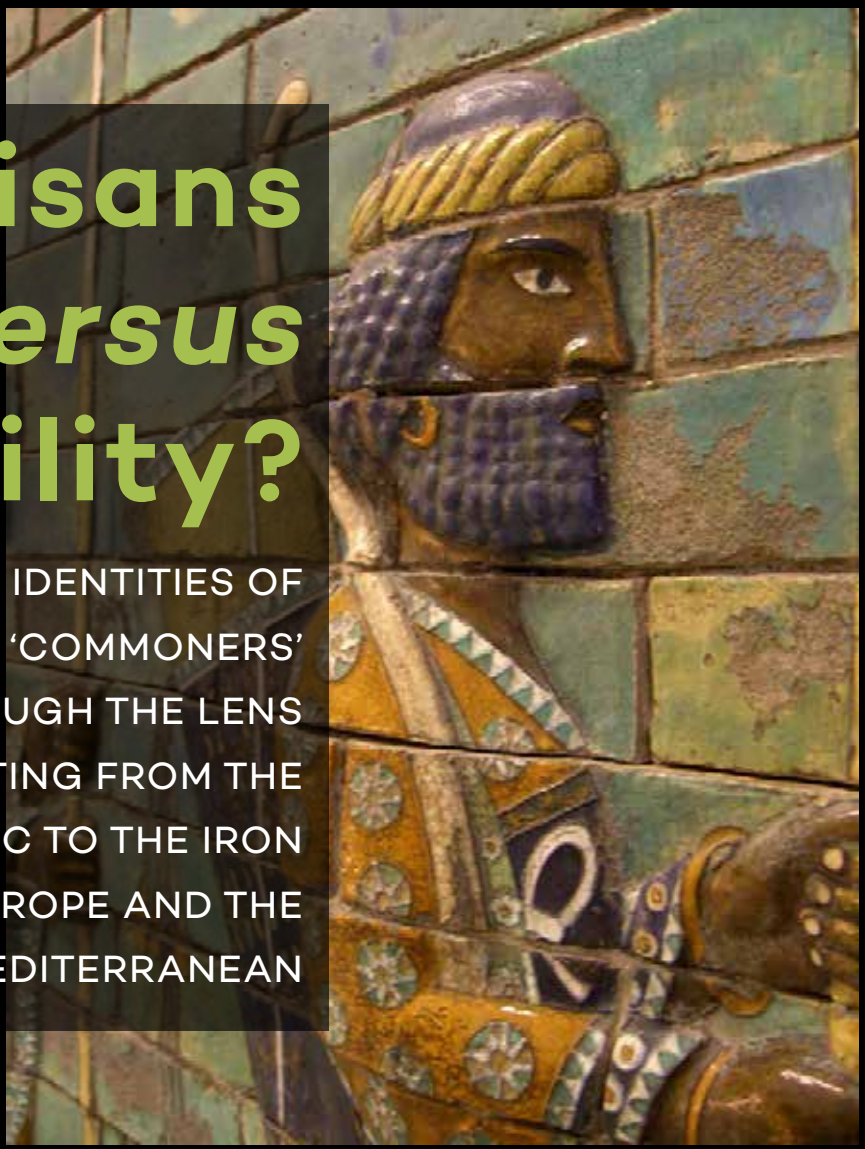
Artisans *versus* nobility?

MULTIPLE IDENTITIES OF ELITES AND 'COMMONERS' VIEWED THROUGH THE LENS OF CRAFTING FROM THE CHALCOLITHIC TO THE IRON AGES IN EUROPE AND THE MEDITERRANEAN



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Ann Brysbaert & Alexis Gorgues

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Sidestone Press

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Artisans *versus* nobility?

Crafting in context: introduction

Ann Brysbaert

Introduction[1]

In prehistoric Europe and the Mediterranean regions, hierarchical societies arose and developed technological systems and processes in the sphere of production of both quotidian objects and items of religious and symbolic character emulating prestige and luxury, while it may not always be easy to distinguish between the two types. This collection of papers deals with questions of how artisans and other social groups involved in these productive processes and social practices reacted to and interacted with specific demands connected with elites' identity formation, affirmation and reconfirmation practices, while these artisans also formed their own multiple identities while crafting. Key issues of this volume include innovations, creativity, crafting, communities of practice, and the development of new technologies designed to satisfy the needs of ostentatious behaviour and achieve prestige through specific societal layers. For example, how can we identify such processes and their consequences, how can we define the role(s) that the craftspeople played in such contexts, and are these always as clear-cut as usually portrayed? This book's common aim across all its papers, therefore, is to investigate the economic, socio-political and technological contexts and backgrounds of the makeup of material culture and technologies in the periods highlighted by the individual case studies. We examine which role(s) artisans may have played in status- and identity-formation processes – their own and those of others with whom they interacted, on the one hand, and in rituals and in symbolic performances, on the other. In other words, we disentangle artisans' multiple roles in each aspect of life and death of selected Chalcolithic, Bronze and Iron Age populations in Europe and the Mediterranean. Many aspects of social interaction patterns between the different groups of people in those periods have not been adequately discussed and investigated, especially the artisans' important role(s). This volume aims to redress these imbalances by investigating how social groups interacted with each other, and how we may recognize such interactions in the material remains. Investigating these remains brings us in touch with a wide range of objects and features of varied values and qualities that we cannot not always easily distinguish from each other,

1 A part of the introduction section of this paper is based on two EAA abstracts that were co-written with Alexis Gorgues.

as values and qualities are very much based on personal notions often defined by cultural surroundings and backgrounds (see below). In particular, the strong contextual discussions within the individual papers aid in how people in the past might have ascribed value to their objects and materials, as well as to the processes and social contexts in which these were produced.

Before an overview of the contributions is presented, some thought is given to questions that arise from considerations of crafting, creating, and ascribing value, especially what roles people in the past had in all these activities and practices, and how we can understand identity formation, confirmation and negotiation through archaeological studies of past workshop remains.

Crafting as making, thinking and being (together)

In our contemporary industrial and digital world, the term 'crafting' often evokes a messy DIY shed visited on weekends by 'the guys' while 'the girls' get together in knitting and book clubs, thus engendering activities that seem to construct and affirm classical masculine and feminine identities (Adamson 2010: 10; see also Sterling 2011: 67). It also places craft activities in the sphere of free time, and, depending on the specific context, some of these activities may be considered more useful than others. These rather stereotypical notions of crafting and gender, especially those linked to machines and male bonding through performing bodies (Mellström 2004: 369, 371), have triggered strong reactions in the last few decades, for better or for worse. For example, the 'Do It Together', or DIT movement emphasizes the inherent social character of crafting; in doing so, it breaks through at least some of the gender codes. Members of this movement believe that everybody can reverse-engineer – that is, carefully going backwards through a production process is potentially the only way to find out how something is made (Carpenter 2011: 50). Other such movements are the Fab Labs and Fab Academies, which link people (of all ages and backgrounds from all over the world) with common interests in producing things and turning their ideas into material realities (see Gershenfeld and Charny 2011). Additionally, the Transition Movement (www.transitionnetwork.org) has at its root principles very similar to those of DIT, but it deals with broader issues such as ecological, economic and socio-political issues. Their main aim is, together within a community-organised context, to make a difference in the current difficult times where resources seem to run out and where our natural environment can no longer be saved quickly enough. Members of these movements, who have established more liveable places called Transition Towns, do not wait for governmental agreement, but instead decide to work on the problems they face together; in their view, this is where their strength lies. Their activities strongly resemble crafting activities, not in the sense of how handicrafts such as carpentering or knitting are understood, or as the lesser little brother of art, but more as Richard Sennett describes it. For him, a craftsperson is both a maker and a thinker, and both aspects are part of a unifying process in which crafting is a process of exploration, of problem-finding and -solving, and it is a social process. As such, crafting becomes the process of making personal self-identity and citizenship (Sennett 2009: 7-12), whether the craftsperson is an architect, a seamstress, a web designer, a nurse or a gardener.

Adamson (2010: 2-3) writes: 'One advantage of defining craft in a simple but open-ended manner – let us say, as the application...small-scale production – is that it allows us to draw connections across a much wider range of activities than the so-called 'crafts' themselves'. He thus sees craft as …'a set of concerns that is implicated across many types of cultural production', 'a pervasive, 'everyday' activity, implicated in the contingent flux of […] life' (Adamson 2010: 4) and contends that it 'entails irregularity, tacit knowledge, inefficiency, handwork, vernacular building, functional objects and mysticism' and is associated with 'gendered, ethnic and local identities' (Adamson 2010: 5). This resonates the idea expressed that crafts, their material outcomes and aligned social practices, in the past or present, do not stand on their own, but that they are interlinked (cross-craft interaction, Brysbaert 2007, 2008) at any given stage, through material acquisition, any part of their production lines, their consumption, their reuse and recycling and final discard (Brysbaert 2011b). At each and every moment where people and materials converge, craft activities are at hand somewhere and sometime. While everyone crafts their own understanding of crafting, this wide notion of what crafting entails resonates in several contributions to this book.

Crafting, or making, is a thoroughly embodied social practice that should not only be understood as artisans being there with each part of their being. They may also work on a body of raw materials and form these into newly created bodies/entities that are, at that point perhaps, finished products. This is beautifully described by Sturt (1993 [1923]: 19, 95-100), who worked together with and observed a village wheelwright's activities, and who expressed each part of the vehicle he produced as body parts (body, face, shoulders, foot, belly, back). Crafting is thus about making, about thinking, about 'being': 'The action of making and the outcome of a crafted object connect cultures, communities and generations. Handmade objects have a story to tell. They have been touched, manipulated, hammered, thrown, blown and carved by human hands. They connect us to our past and to our familial and cultural histories.' (Greenlees 2011: 5).

In a book on artisans and crafting, a short note on materiality and materials is fitting. More than a decade ago, Meskell (2005: 1) pointed out that archaeology was slow in working with theories of materiality, even though we are placed squarely in studying material culture. Traditionally, studying material culture embraced the empirical collection and analyses of data, such as objects' and features' measurements, materials and technologies, and it contextualized these assemblages. Such past research did not always engage in the study of social relations (e.g. Petrie 1926, 2-4, especially p. 2, where he openly criticizes the theorizing of the topic). However, studying material culture in terms of social relationships has come a long way since Petrie's time, with the recent emphasis on materials' qualities and culture as central to their use and meaning. It seems that we need to see materiality as a quality of relationships instead of a quality of things (Jones 2004: 330; Jones 2007: 36).

That said, all papers in this volume still conduct the more traditional line of work *as well* because archaeologists cannot move forward towards discussing social relationships, independent of the theoretical approach taken, without having firmly studied the data themselves. This book (and previous papers, see esp. Brysbaert and Vetters 2010, 2013) shows that objects and features belong to both the empirical study domain of material culture and to the sphere of social practices,

relationships and networks, and each complements the other. For example, the deeply contextualized approach of all types of materials, some of which may be production waste, half-finished items or recycled materials, indicate to a greater or lesser degree how models of workshop and activity areas (well-known in the Aegean context is Tournavitou 1988) need to be flexible and adaptable to each individual context (see Brysbaert 2014), rather than dictating how workshops should be recognized following criteria of a model. If one applies a model to a data set, one may not look beyond the data that fits and may either regard other 'remains' as rubbish/of less importance, or plainly ignore them altogether. While studying the minute details of each tiny item may well be much more of a challenge, it does provide a far more realistic picture of what took place in specific contexts, even if this does not fit any model. Precisely this type of realization turns archaeological work into something much more interesting and comprehensive, and opens up further options for interpretation (beyond those suggested by models). Such studies are necessarily socially inclined and illustrate a larger compatibility with the complexity of people's existence and how they operate with each other and their material world. In both past and present, material items are integral parts of multiple socio-political, economic and cultural networks that involve many other material items, animals, people, ancestors, ritual phenomena and belief systems, through their interactions and activities.

Technological activities and practices result in, and result from, networks of people and things/objects and practices that, depending on the conditions, bond to a greater or lesser degree. People or actors, materials, objects and contexts are all linked, not as isolated entities by themselves, but *combined with* a certain type of 'glue' – i.e. the artisans' knowledge, experience and skills to act and transform, and, simultaneously, the world (of symbols, ancestors and other beings) in which these all interact. As such, people and/or materials alike are interwoven in extensive networks of activities, social relationships and social practices. I stress 'combined with' because if a glassmaker had all the knowledge and skills to be an excellent glass bead maker but was asked to make a sword, he would potentially not make much of it. Therefore, the 'glue' on its own, i.e. artisans' knowledge and skills, is not the sole success factor, but *combining/linking up* materials, objects, actors, spaces, time frames, and technical and social work processes (be that thinking, organizing, skilled performing, using, transforming, etc.), will successfully create bonds and thus networks (from the molecular to the monumental level). As such, through objects and feature studies, from both an empirical and social perspective, we may weld technologies, meanings, practices and histories together (after Meskell 2005: 2) into meaningful and contextualized narratives about people's past lives where spatial and temporal aspects are allowed to play their interlinked role as well. The link between making and connecting is further expounded on in D. Gauntlett's '*Making is Connecting. The Social Meaning of Creativity, from DIY and Knitting to YouTube and Web 2.0*'. He (2011: 2, 25) points out that making is connecting because:

1. several materials or ideas or both need to be put together when making something (e.g. a knife with metal blade and wooden handle), so engagement with ideas, learning and knowledge sits *within* the practice of making (contra

Gauntlett 2011: 25: this engagement with ideas, knowledge and learning *also* comes before and after the practice of making because artisans may reflect about what they made and teach about it, and they may develop ideas as a result of this thinking, before they start again and implement them in the next round of making something)

2. making usually involves a social dimension at some point, and it thus connects us to other people (e.g. a metal smith needs to 'buy' his supplies from someone else)

3. through making and sharing things, we connect and engage more frequently with our social and physical environments in general; it gives a sense of being alive within the process.

Through his contemporary examples (but these are equally applicable to the past), and emphasising that making is being creative on a day-to-day scale versus the high-impact creativity of Nobel Prize winners, Gauntlett (2011: 14-17) also refers to other forms of connecting: When doing/making something, one often obtains an audience. Participating in a productive social environment implicates audiences, interaction, connection and interactivity. For him, making something is part of a process that involves thinking and reflecting about what to make and how to make it, followed by transforming these thoughts and feelings into something manifest or tangible, while continuing to reflect while doing. This way of thinking about crafting resonates Richard Sennett's (2009: 7) strong emphasis on understanding thinking and making as part of the same unifying process (see also Ingold 2013: 6-7) in which routine actions, such as sawing a plank, still need constant physical adjustments as the work goes on (Ingold 2011: 17-18, 56). Gauntlett illustrates that a discovery or something innovative, i.e. being creative, does not seem to be there from the start but is rather '…*a process of discovery and having ideas through the process of making*' (original emphasis, Gauntlett 2011: 4). Finally, his understanding of making, being creative and thus sharing and collaborating is so thoroughly social that he comprehends social capital as 'the community glue made up of friendly connections with others' in a system where value is embedded in having social connections and collaborative projects in everyday life (Gauntlett 2011: 21). Very similar thoughts are reflected in Lave and Wenger's (1991) concept of 'communities of practice' (see also Wenger 1998; Wendrich 2012). Social capital, furthermore, emphasizes the satisfaction one has in making something useful and beautiful. Again, this satisfaction is not purely personal but stands in relation to the audience, be that potential clients, kin or friends, colleagues, or apprentices.

Crafting as creating

Crafting may entail doing something useful, something that serves many purposes, including serving others in their daily tasks. When a client relies on an artisan to make something useful, that client expects or hopes that what s/he will pay for is the artisan's best possible work. This is just as important for the artisan. Doing good

work after (often) long-term training, along with following the standards set by generations of artisans (the ancestors and memories that refer to them) to achieve this, were the hallmark of an artisan's identity and are social and relational acts. These social and relational acts are dynamic, and in some ways, doing good work can be seen both as a stable and as a risky business: stable because one follows the rules laid out, but risky because doing good work means 'to be curious about, to investigate, and to learn from ambiguity' (Sennett 2009: 48 for medical contexts). It thus risks rejection by the audience, whether this reflects the community, potential clients or other nearby actors. Such attitudes may lead to innovative approaches to technical problems, but with the inherent risk of experimenting, it may also result in failure instead of improvement. However, techniques develop and skills may improve by repeated practice or routine actions and by learning to do something the correct way – thus following standard rules – in tandem with being willing to experiment through error. For Sennett (2009: 160), these two sides cannot be separated, and it is at this intersection of being willing to follow a cultural suit and being willing to take risks that one can place the creativity of artisans. In addition, Birgerstam (2000: 96) sees creativity as a combination of intuition (risk-taking) and rational thinking (rule-following), where both are complementary to each other.

Questioning whether crafting is a creative process, how we may recognize creativity in past crafting, and whether we can at all talk about creativity when referring to past craft processes and practices are important themes in this book. While most contemporary thinking about creativity is often immediately connected to the 'arts' (traditionally understood here), enough evidence exists, both in past and contemporary contexts, that 'crafting' is creative too, and even on a day-to-day basis (Gauntlett 2011). One could still argue that art for art's sake is a big part of the process, in which creativity plays a major role in producing an end result that has no immediate utilitarian function in our day-to-day lives: a painting, a digital installation, a modern dance performance – but this statement is deeply entangled with how we define 'utilitarian'. Does 'utilitarian' describe the knife one uses to cut bread with; does it describe the small niche in the wall towards which people pray to each day five times; or does it describe the multi-million-euro painting donated to a museum, to be displayed in its newly built and named-after gallery? Margetts (2011: 39-43) argues that the role of making in the creative process is to create new ways of thinking, through engagement with materials, techniques and ideas; this largely echoes Gauntlett's ideas as discussed earlier. In moving away from the Descartian split between body and mind, and thus in following a phenomenological approach, Margetts (2011: 39) sees making as '…a process whereby mind, body and imagination are integrated in the practice of thought through action', thus both active and reflective modes of being, fused in making or crafting. Materials, techniques and ideas can thus be viewed as catalysts to creative processes. As such, there is no real differentiation to be made between the arts and the crafts, as both spheres consist of materials, techniques and ideas. While opinions may differ about the meaning and definition of 'utilitarian' even in artistic contexts, the nature and presence of creativity is investigated in the context of past technologies by reviewing a series of materials that were the outcome, final or not, of several acts that can be considered 'creative' or were part of creative practices.

Studying creativity allows us to study the nodes of humans and materials in tightly interwoven networks and relationships and between both past and contemporary contexts (e.g. the CinBA project by R. Brockhurt and J. Sofaer 2015).

One could argue that creativity may be closely linked to the concept of an 'original creation' in craft production, especially if creativity results in an end product without specific utilitarian function, as artwork is often perceived (see above). However, in a discussion on copying and imitation, Jiménez (2010: 46, 49, 57) argues that emulation, as a form of imitation, cannot be seen as 'copying' but should rather be seen as reinterpreting and transforming the meaning of the appropriated idea. If this reinterpretation and appropriation of ideas becomes widely spread, it helps to understand the desire for a sense of unity (see Rowlands 2010: 238) rather than uniqueness (also implied in artistic creations). Furthermore, Rowlands (2010: 239) also noted that mimesis may not be the emulation of physical appearances of things and practices, but may be more to do with ritual powers through cult imposition, especially since it is closely connected to aspects of ritual activities such as libations, sacrifice and commensality. In the context of crafting where ritualized behaviour has been observed before (for Tiryns: Brysbaert and Vetters 2013), it would be possible to extend these concepts of mimesis and emulation to the sphere of crafting. What is meant here is that emulation, mimicry of specific objects, whether producing them or using them in crafting locales, may have specific ritual powers in their own right, exactly because they were being crafted in specific workshops. Asking the question of what was the 'pure original' may thus not be useful, as it may not have been understood or known by the artisans as such, or it may not have been preserved for us to recognize. What is more relevant is to ask ourselves why mimicry was carried out, and from this, finding out what this act represented. It is thus possible that the artisans belonging to one given workshop may link themselves to specific potent ritual activities present in other workshops known to them, by carrying out acts of imitating or mimicking certain material culture aspects specific to these other workshops, in order to associate themselves to these ritual activities, but, simultaneously, trying to preserve enough of their 'own personality' in doing so. This making of objects in slightly different ways – as with the choice (conscious or not) to make, for example, the Tiryns local wall brackets similar but not identical to the Cypriot ones (see especially Rahmstorf 2008) – reflects human identities and intentions (see also Margetts 2011: 42). As such, the act of mimesis is a total social act and forges relationships, and is possibly best illustrated by the apprentice mimicking the master, who encourages this activity, in the apprenticeship period. In the case of the Cypriot wall bracket phenomenon, these were part of an object network of wall brackets known in the east Mediterranean (Schlipphak 2001); as such, the purity of this 'original' to Tiryns is in no way guaranteed.

I mentioned earlier that not only people but also objects are entangled in networks of contacts and influences, and the phenomenon of mimicry with a local touch is a clear example of that. Both human beings and artefacts pass through time and space, exchange affiliations and are linked to specific places; as such, people and things are all interwoven in complex webs of relationships (see Brysbaert 2008), and it follows that people and objects each contribute to the

identity formation/creation of the other. The stubborn medieval apprentice mason may try again and again to carve the stone until 'it gives in' (Follett 2008: 573). As such, the stone's own and natural resistance to being carved easily (scientifically explained, for example, by its place on the Mohs scale) renders the apprentice stubborn. Similarly, the wall brackets in Tiryns do not even need to be linked to Cyprus, but can be fitted into the wider regional network where such wall brackets are used (Schlipphak 2001). However, other material culture items in the same context where the Tiryns wall brackets were found dictate a strong Cypriot link in this specific case. Contextual analysis is crucial here.

As we are specifically interested in the social aspects of past people's lives, it may be equally fruitful to study the networks or relationships from within which we can extract the meaning of objects, in addition to looking at each category of object/find individually, to find the social relationships between them (after Thomas 1996: 16). It seems that the double approach may be the most rewarding.

In most investigations of materials and items from a range of different craft activities and practices, placed in the Late Bronze Age Aegean, it becomes evident that artisans were not just executing upon elites' demands; they were creative at every step of their production line, and, in some cases, they were also able to conceal it. The Aegean Bronze Age sees the development of new and pre-existing technologies such as bronze and iron-working. New ways of working with these materials, accompanied by the growth of technical skill, produced complex forms, often the result of cross-craft interaction (e.g. Egyptian blue from bronze). In order to better understand the concept of creativity as part of past practices, it is necessary to investigate the processes that lie behind creative expressions. But first, such creative expressions need to be recognized, and it can be argued that creativity is involved in each step of the crafting process and, from a social perspective, in finding ways to coordinate workforces smoothly with each other so that the task at hand can be done successfully. Sennett (2009: 195) sees both the all-purpose and the fit-for-purpose tool as things that … 'can expand our skills if only our imagination rises to the occasion'. I believe that imagination beyond the expected use of a specific tool leads to creativity embedded in new uses, options and techniques now exerted with that tool, possibly also utilized on different materials, in a different stage of the process or handled by a differently skilled hand. As all agents, whether a tool, a person/hand, or a material, are interconnecting nodes of a crafting/making – thus expanding and contracting – network, each change in this network will automatically bring about further changes, in some sense comparable to a crystalline lattice structure that underwent a change. This can for instance be illustrated by the employment of ad hoc tools, items that happened to be in the right time at the right place to be used as function X but were not/never produced to work as function X – for example, a beach pebble used as a hammer stone to put up a tent (because the camper forgot the hammer at home or did not want to carry it along on the trip). When the camper finds the ideal beach pebble for the job (not too big, lies comfortably in the hand and is not too heavy) s/he may decide to appropriate the pebble as hammer for the entire journey and even take it back home as a souvenir of past journeys, reminding him/her of all locations in which s/he camped. The beach pebble may even replace the original hammer

from then onwards, thus changing, first temporarily and then permanently, the original hammer agent in the network. This technical act may have further social implications between campers when word of mouth has it that beach pebbles are far better than commercially obtained hammers: they fit the hand better, they are readily available (and thus cheaper), one does not need to carry them around, and they may form a nice souvenir. Through the social interaction of campers on several occasions (camping sites, camping fairs, friendly gatherings), the commercially produced hammer may not be in demand anymore, may not be produced anymore, and may disappear from the camping scene altogether, thus leading to different technological usage and choice in favour of the beach pebble. Ad hoc tools can play a positive and potentially an important role in change by inviting creativity to overcome the initial lack of knowledge about its potential usage. As such, these items become tools as the result of the artisans' imagination and creativity in anticipating what their function could potentially become. Such creativity shows the pure competence of the artisan, who intuitively but also intellectually and practically, understands enough of the material characteristics of the item in front of him/her, and enough of the complexities of the job to be done, that s/he can join them both in an interactive display and set of gestures with his/her hand as the connector, and possibly also implicate the hands of collaborators if success demands this. It is these connecting activities that expand the existing networks and that change their previous configurations. As such, creativity can sit in the organizing processes, resulting in the connecting efforts between tool, material and actors. It is not just ad hoc tools that illustrate these points of creative usage by artisans; this can also be achieved by using existing, well-defined tools for a different job to be done, or by employing the same tool or technique for a different material, or involving different materials in any part of a well-known existing process. Again, it is the thorough knowledge of the artisan, or his/her willingness to take risks, that may lead to a change in process resulting from creatively using this tool, that material or such technique.

Creativity further lies in artisans' willingness and decisions to share – knowledge, materials, techniques, tools and equipment, human forces – and this can be risky in itself. In investigating objects and features through the lens of cross-craft interaction (e.g. Vickers and Gill 1994; Brysbaert 2007, 2008; Thomas 2012), nodes of such technical sharing are uncovered and explored, and social practices are revealed. Moreover, the additional value that emerges from crossing over between crafts lies in many converging situations of technological transfer. As such, the sum of the involved factors always adds up to more than their total, even though more learning and adapting will be required for the agents in the crossover to work as efficiently as before it was introduced, as each technical change implies a learning curve.

Creativity has its limits too, one being its own cultural surroundings, which may accept or reject the resulting innovation, this new way of doing things, producing different items that result in differently organized processes, possibly involving different human configurations. Another limit sits in the level of foreignness of the change: if people do not recognise the innovation because it is so foreign to their own cultural context, it may not be understood, recognised or integrated. At least an anchoring in existing materials, technologies or social practices seems

to be a prerequisite for the acceptance of subsequent changes. Materials may also limit creativity, as was already clear from the mason apprentice in Follet's book (2008). In the same vein, Anni Albers (1965) wove the activity of designing with making as inextricably connected. Early on, she argued that someone who designs an object, tool or feature should pay careful attention to the inherent qualities of the materials acquired for the task and, in addition, that the artisan should work along the affordances of the tools and processes with these materials. A stone cannot be cut with a pair of scissors, as the children's game shows us, so each artisan, before even conceptualising a finished outcome, should know intimately the materials and tools or equipment s/he will work with and their limitations, in order to achieve the best outcome. Accepting limitations as a framework in which the artisan can be active rather than seeing them as a hindrance indicates a productive and possibly an innovative mind. Only after having accepted the limitations (of materials, of tools or personal ones) can the artisan start thinking of how to overcome them to reach his/her goal, or divert to reach another, maybe unexpected, goal. It is precisely this relative position of the artisan who acts upon limitations or interacts with all elements involved (after Hodder 2012: 50) that manifests itself on a day-to-day basis and thus leads towards making as creating, as Gauntlett proposes, both at the level of producing everyday-use items and at the level of creating, as needed and ordered, in order to make objects to elites' tastes.

Active resistance to changes can be detected, history-wide, for example in religious practices, a sphere of life with potentially one of the most tradition-bound set of rituals and activities. A similar trend can be observed in the carpenter and mason's tool sets. When comparing an Egyptian pharaonic carpenter tool set with a pre-industrial carpenter's, only the composition of the metal part of each tool is now different than in the past (copper, bronze, iron to steel). Each shape and handle has remained as it was, and straightforward logic tells us that there is no desire to change things if no advantage – speed, easier handling, higher accuracy – is to be gained from this change. Such resistance to change is further reinforced by the likelihood that, if the tool's properties are altered, this will require a renewed training process in order to learn the different interaction between tool and material. A steel gauge may be sharper than an iron one, but for the carpenter to achieve the same effect on the same type of knotted wood as before, more self-control of the hand, pressure and angle may be needed, and this takes time to achieve. If s/he does not pay attention to these changes, s/he may destroy valuable pieces of wood in the process, thus in effect slowing down the work by having to do the task again and losing valuable resources in the process. Such technical changes also have implications for his/her capabilities as trainer for apprentices. Without 'mastering' these novelties him/herself first, s/he cannot pass them on to the apprentices without losing face if things go wrong. This also leaves its stamp on identity formation, maintenance and negotiation. And even if the artisan remains positive about changes along his/her way, further forms of resistance can abridge creative progress. These may lie in the materials themselves that do not allow the new tool or technique to be employed in this way, or in the capabilities of the artisans who do not possess the necessary skill to successfully connect tool and material in the desired way.

Crafting values and valuables

Crafting is a technical as much as a social series of acts and tends to create social distinction. Someone who, through training and life-long practicing, becomes very skilled in what s/he does for a living develops differently than someone who does not follow that life path; technical and social distinctions are logical consequences of such activities and processes, and are linked to value attributions at various levels. These may involve the level of social status within the person's household and her/his community, and among people within and beyond this community who carry out the same type of tasks based on the same or similar sets of skills and knowledge. One could call this latter group of people/professionals with similar skills and knowledge a 'community of practice'. One person may be more valued for her/his skills than someone else within and beyond a community or peer group, and this value attribution may be linked to specific skills and knowledge, but also to other characteristics within her/his personhood. Someone's reputation, for example, may be valued (or not) in relation to people's physical and emotional approachability, to their eagerness and sensibility to help or facilitate beyond the usual, to their character, to their kin-based relationships, to the size and makeup of their peer groups and to their own embeddedness within these. The concept of value is, therefore, a social construct defined by the cultural context in which it is created and 'lies at the interface between individual and collective tastes, desires, sentiments and attitudes that inform the ways people select or give priority to one thing over another' (Papadopoulos and Urton 2012: 1-2). Value ascription may differ according to social groups and may be both inclusive and exclusive. For example, the acquisition of exotic goods charged with high intrinsic and symbolic meaning and value may only be possible for a specific elite class, and this class may want to attach beauty, rarity, distance, ritual connotations (after Helms 1993), technological virtuosity and labour intensity, or any combination of these factors (one certainly would not suffice) as exclusively requested value 'constructors' to the items they acquire. Yet other factors that may construct an object's value are its age and the trajectory it has travelled in time and space (i.e. an object's rich biography) before it ends up being valued as a new possession (discussion on curated objects, section 6 below). These items may also be linked to socio-cosmological ideas and ideals, which again might only be shared among that peer group. In this context, J.-P. Crielaard (1998: 194) uses the term 'virtual community' for the group of people who has access to this same sort of information and share these same ideas and values, without even needing to be physically close. A modern comparison would be the worldwide royal courts and the luxuries they employ (and manipulate) to be *and remain* an exclusive peer group among themselves.

Not all communities, however, have to be 'virtual' to share ideas and values, knowledge, materials, and perhaps also tools and workspaces. Instead, they can be much more local or regional: artisans and their 'communities of practice' in which the (informal) transfer of knowledge may occur by means of passing it on from one generation to another in a context where learning is essentially social in nature and co-participatory in absorbing new knowledge and change (see also Lave and Wenger 1991; Wenger 1998; Wendrich 2012: 2-5). In '*The Construction of Value in the Ancient World*' (Papadopoulos and Urton 2012) 26 papers discuss

non-static and interrelated aspects of value that often overlap and collapse together but are grouped in four (somewhat artificial) categories in order to structure the book: place value, body value, object value and number value. If these four categories are brought in contact with artisans' 'communities of practice', the obvious overlaps and collapses between them become clear immediately, and these also manifest, in various combinations, in the different contributions of this volume. Running through the conceptions of each of these categories of value, Papadopoulos and Urton state (2012: 3), are issues of memory, nostalgia, identity, biography, ideology, style, symbolism and exchange. Of these, I pick out memory and perhaps nostalgia, as these two issues may again overlap. I illustrate this with the example of the two chronologically separated workshops in Late Bronze Age Tiryns (Case Study III in Brysbaert and Vetters 2010, 2013), where artisans, after a maximum of two generations and quite a drastic socio-political change-over in the Mycenaean world of that time (*c.* 1200 BC) returned to the same spot to set up a 'new' workshop (Late Helladic IIIC Developed) on top of the previous one (Late Helladic IIIB Final). We argued (Brysbaert and Vetters 2010; Brysbaert 2014) that, for the later artisans to return to that exact spot, the returning artisans must have given sufficient value not only to the place itself as being suitable for a workshop, but also likely to the reputation of the previous artisans.

Value can be economic (amount, exchange value), social and cultural (its effectiveness in performing, its capacity to change people's or object's social ranking order in society), ritual and symbolic (after Papadopoulos and Urton 2012: 3), and also political and religious (the potential to hold and/or exert power, or to empower); most often, it is a combination of many of these. 'Bodies, places and things are all active agents in the construction of value, as are the range of terms and semiotic constructions that take shape in the language of numbers and quantification within each society' (Papadopoulos and Urton 2012: 3).

Perhaps the most useful to point out in the context of crafting are the values embedded in both producing *and* using something, and in exchanging something for something else as the potential connections between producer and consumer, the latter two only separated – on occasion – by gender, class, ethnicity and other potential societal stratifiers. As a connector between producer and consumer and also very much embedded in making and in the interaction between thing and maker, values are both processes and sets of properties; they grow or decline, and can be(come) lost. That value is linked with aspects of exchange is well known, especially through the work of M. Mauss (1925), and needs no repetition here. His and other anthropological approaches to the theme of exchange make it obvious that value goes far beyond the economic, and that rare, transformed, live, or inanimate items of high value were crucial in marking high status and maintaining it. Such special items, especially if they came from afar and were produced by highly skilled people who knew to manipulate rare and difficult raw materials, embodied these far distant (unknown, dangerous, unstable) places and linked their characteristics to the heroic and mythical picture with which elite persons wanted to portray themselves. When such items arrived as gifts, they were never free but, in Maussian terms, created obligations by the giver to those who, after having received the gift, were now indebted to the giver to give at least the same or more in

return (in number or in mutually understood values). This resounds in the notion that gift economy personifies the object: The given objects take on the qualities of the people involved and, as mentioned, may increase or at least change the objects' value, whereas the commodity economy establishes an equivalence of value between objects (Weber 2007: 26-28; also Papadopoulos and Urton 2012: 15).

Given this, how useful is it for the interpretation of archaeological assemblages and workshop contents and contexts to ponder artisans' thoughts and feelings about their work and practices, how they valued their work and how it was valued by others? One may object that such aspects are not tangible, and thus are not recoverable. However, reasoning artisans may leave more behind in their materials than we can observe at first. In this case, the question – how can we find out which physical qualities of materials were valued by people in the past – leads us back to a contextual approach, especially if no textual evidence can help us further. Small differences visible in typologically or functionally classifiable series of objects may first point towards artisans who, for any given reason, decided to divert from the standard type of object as *we* see them (on the meanings of standardization in pottery, e.g. Berg 2004). Perhaps they had less time available, less in the way of raw materials present to finish something in the same way, or perhaps they were accommodating different wishes expressed by the client, they were correcting mistakes from a less skilled apprentice, several (groups of) artisans were producing the same type of object, or some items in a batch were made for a different projected use than the others. The latter possibility in particular is notoriously difficult for us to disentangle. Typological and functional studies of archaeological objects are therefore essential (see already van Gijn 2007) to order the data *and* our thoughts about these. It is equally crucial, through this approach, to observe the minute differences, to explain them as well as possible, and to try to make sense of these tiny differences by allowing the artisans to be responsible for the produced batches of similar objects in the first place. Each individual item or object, irrespective of its similarity to others, likely carries an intrinsic value and must have been valued by at least two people embedded in its biography: its maker and its consumer (assuming they were not one and the same).

People and things through crafting: forming multiple identities

The context of crafting, where virtually no one works in total isolation from other humans and materials, is an ideal arena to zoom in on how the multiple and dynamic identities of artisans and other social groups are woven into several ever-changing overlaying networks, which are geographically and chronologically influenced. People's connections to and ruptures of such networks in both time and space, and their 'places' in several overlaying networks, constitute their multiple identities. As such, every change in any of these networks – temporal, spatial or otherwise – will change their multiple identities. That individuals and/or groups engaged with the materials they worked on simultaneously engaged with each other is evident from many examples and is clearly illustrated through cross-craft interaction studies and in all contributions to this book. Since cross-craft interaction has been adequately discussed elsewhere (term coined by McGovern

1989; in Aegean context see Brysbaert 2007, 2008; Vetters 2011; Thomas 2012) it forms an underlying and well-understood concept for most people investigating craft activities in any sort of past context.

It is part of human nature to create and make, and the nature of making is empowering, as it is a form of communicating. Making or crafting serve many purposes: to *make* a living; to learn something new (as part of a hobby or professional training); to worship, mourn, celebrate and demonstrate; to participate in society; to define personal identities (after Charny 2011: 7); and to create alliances with others, in the workspace and beyond (Άνθρωποι και Εργαλεία 2008 on the importance of owning a tool set in AD 19th century wedding negotiations in rural Greece). There is no better way to describe the effect of making or crafting on people than V. Gordon Childe's (1936) book title 'Man Makes Himself' and Sennett's (2009: 1) prologue subtitle: 'Man as His own Maker', to be read as 'person as his/her own maker' – in other words, 'material culture provides in sum a picture of what human beings are capable of making' (Sennett 2009: 15). In the same vein, Miller (2011: 22-23) states: …'for seeing one's own capacity in the evidence of the things we have ourselves created.' This is echoed in expressions such as 'I made it' (after Miller 2011: 18), referring to both the act of having produced something, but also to having made an achievement, which could stem from a person crafting something and succeeding in that endeavour. These two main strands of (thinking about) making underlie the contributions in this book: individuals, or groups of people, who make things, on the one hand, and these people who thus 'make themselves' as the result of making things (for a similar thought, see Meskell 2005: 3).

Crafting seems thus linked to aspects of identity and, in extension, the creation, maintenance and negotiation of social distinction. As mentioned previously (Brysbaert and Vetters 2015), questions about individual identities may not be entirely relevant to Aegean Late Bronze Age contexts even though *ethnikons* (Hiller/Panagl 1976, 113, 114, 323-324; Bartoněk 2003, 400, 427-428) were known from the Linear B tablets for foreigners in the Pylos workforces, as well as individual names of potters, fullers and other workers (Shelmerdine 2007: 44-45). While a focus on ethnicity in archaeological research has led to oversimplified interpretations of complex multiple internal and external contacts that people may have had at the end of the Late Bronze Age East Mediterranean, we can nevertheless not ignore these personal markers and notations. Suffice it to state that ethnicity (as just one potential part of identity) has traditionally been a concept formed on the basis of intangible shared ideologies and beliefs of 'kinship, self-esteem and primordial bonds, and grounded in a shared history, genealogy, territory, language and material culture' (discussed in Janes 2010: 130), while Knapp and van Dommelen (2010: 4) are advocates for the non-primordial nature of self-ascribed identities in much the same way that Rowlands (2010: 241) does not see ethnicity as a fixed and purified concept and as particularly helpful in understanding communities in the later prehistory. Ethnicity (Jones 1997: 84: 'ethnic categories are reproduced an transformed in the ongoing processes of social life.') can thus better be understood as a dynamic concept and a matter of personal perception (for instance in the *ethnikon* given to specific workers at Pylos)

and can only be partly represented by material culture (for instance, the Cypriot wall bracket found at Tiryns, which can never represent someone's ethnicity). Inasmuch as people's identities are dynamic and ever-changing, so too is this concept. As Janes (2010: 130) correctly sums up that ethnicity in the prehistoric mortuary record is largely intangible, it is understood here that this also extends to other spheres of the prehistoric archaeological record, including the artisanal and workshop sphere. Thus, there are at present limited chances to associate any personal identity markers to specific craft outcomes, although an assemblage of specific tools buried with a single deceased Mycenaean in the Athenian Agora has been understood as an indicator for the deceased's profession, being one aspect of her/his identity (Immerwahr 1971). At the same time, fingerprints, nowadays seen as one of our most individual markers, were left on many malleable materials such as pottery, tablets, figurines, mudbricks and other clay- and plaster-based objects and features. Very personal traces of rather anonymous workers are thus left behind, while these marks can represent rough gender and age groups (Hruby 2011: 94-95) and the organizational structure of specific craft groups (Sjöquist and Åström 1985 for pottery production at Pylos; for plaster working: Brysbaert 2008). As such, the formation of multiple identities needs to be recognized, and this can only be done when considered in the context of how people, as individuals and groups, interact with each other and the material world around them.

Crafting identities in context

Earlier in this chapter, I deemed crafting crucial to the construction of identity and, in extension, to the creation, maintenance and negotiation of social distinction. Thus, identity construction seems to be fundamentally embedded in relational networks, not just between people and things, but also with regard to places and time. People's biographies are, in essence, the narratives of one's identity evolving over time and in space, and the same can be said for objects' biographies. Identities change over time and from place to place; a change in these contextual networks results in a change of identities, and these changes are interlinked (see the earlier made metaphor of a crystalline lattice structure undergoing a change that, in turn, changes the rest of the lattice structure). Moreover, social distinction can also be reached in other ways equally linked to identity formation and, in some sense, in an exaggerated form of crafting, that of pursuing excellence. Master artisans can take pride in doing so well in what they do, in the skills they master, that they distinguish themselves socially – but also possibly isolate themselves – from others: thus, both the social and the antisocial expert exist. One can isolate oneself from others in a manipulative way, using it as a tool for claiming specific status or superiority. This may also be linked in certain contexts to being different, even ethnically (Sennett 2009: 244-5). An expert craftsman, unlike an apprentice, can see the entire picture of the production process, even ahead of it taking place, and is skilled at making and repairing. The social expert is skilled at explaining, at mentoring (the apprentices) and giving advice to clients (Sennett 2009: 248). The asocial expert may create isolation or work in isolation, but not necessarily that of a geographical nature, although spatial closeness and thus distance also reside in familiarity with a location, even if the geographical distance is enormous.

As Thomas (1996: 18) states, 'inhabiting places and using tools may create a more profound connectedness between people and their world.' To him, space is bodily experienced and, as a consequence, the significance of places is created through acts and performances played out in specific locations. The workshop as a crucial place to the formation, negotiation and maintenance of identities thus warrants in-depth exploration, all the more since Thomas (1996: 18) sees these places as themselves having identities that are constantly in flux, as much as human identities are, because humans will test their potential over time. An ideal illustration of this concept was captured in the reuse of the same location at Tiryns by the Late Helladic IIIC Developed artisans of the earlier Building XI workshop location (Brysbaert and Vetters 2010; Brysbaert 2014).

So far, the artisan's networks of crafting, passing on knowledge and forming and maintaining identities have been 'local' ones, a bottom-up approach; so far we have referred only fleetingly to other temporal dimensions (e.g. multi-generational, ancestral). It is, however, apposite to focus on both deeper temporal and wider geographical frameworks that, combined, are important for investigating the varied contexts in which the present contributions are situated. For example, the evidence from the LBA Tiryns workshop studies indicated early on that present materials, representing social practices of people with potential hybrid identities, more than once crossed 'borders' into different geographical and temporal realms (Brysbaert and Vetters 2010, 2013, 2015; Brysbaert 2014). The encountered Cypriot-like materials and associated hybrid practices and identities from case studies I, III and IV are illustrative of deeper temporal and wider geographical significance of these practices and identities. So too are the obvious imports found throughout all our case studies and how people may have dealt with such materials at different stages while being crafted in multiple locational and temporal frameworks (e.g. Brysbaert 2013). In this sense, Thomas (1996: 19) is useful in his assessment that detailed and context-sensitive studies should be allowed to affect larger-scale narratives. It is the tacking back and forth between the 'local and now', on the one hand, and the 'regional/global and deep time', on the other, that contextualises both types of scales, especially if each scale is contributing to larger dynamic networks with cross-over nodes via people and things.

As previously stated, people's identities are dynamic and ever-changing, but so are things, objects and materials, and not only when they are handled by people (here and now). In addition, technical interventions to materials affect the state of preservation and the changing nature of objects and materials. This means that human manipulation can influence the altering of materials long after this took place. But things also change by themselves (over time and space): they erode, rot, collapse, expand and contract, change colour, texture and smell (see e.g. also Brysbaert 2011 and references within). As such, the biography of an object, even the part of it after it has been excavated, which I see as an integral part of the *chaîne opératoire* of any object that we study/work on (see Brysbaert 2011a), may illustrate the slow or fast (but, in any case, continual) change of objects and materials, whether we do something to them at that given time, or not. Understanding these processes (conservation issues) at work is therefore crucial to the interpretational process in our work as archaeologists (see Brysbaert

2008). The biography of an object also begins (long) before we even touch it; this is nicely illustrated in how an ordinary beach pebble can become someone's property (Hodder 2012: 23-24), whether it will be used as an ad hoc tool, or whether it remains just a pebble, but nevertheless one that attracted (remember the camper's hammer tool), and as such gets appropriated. Other cases where deep time is embedded in the biography of an object include the Early Helladic weight or spool (TN[2] 707) from Tiryns (Rahmstorf 2008; Case Study I, Brysbaert and Vetters 2013), which dates to the Late Helladic IIIB Middle period (*c.* mid-13th century BC) when it seems to have been in use as a pestle in the production of Egyptian blue pigment material. Questions arise: How did an object, dating to at least 1000 years before (Early Helladic, 3rd millennium BC), end up being used as a pestle in this workshop, and why? As was realised both through the literature and the workshop studies at Tiryns, this ancient object curation and reuse was far from the only case that could clearly be identified at Tiryns and elsewhere. In the case of the Early Helladic weight, the object was assigned a new identity and function in its later Late Helladic IIIB Middle context, but to what extent did its earlier function still play a role in its curation until its later usage? Can such reuse and curation of such an object say anything about potential links to a long-gone past that is understood and perhaps even manipulated by the people who curated it in the first place? We may think, for example, about the famous case of the Elgin marbles and their history, how they ended up in the British Museum and what their current meaning is in terms of identity negotiations, both in Greece and in the U.K. 'Studying material traces of movement will focus on how factors such as materiality, mobility, hybridization, co-presence and conflict impact(ed) on the formation of identity and subjectivity, whether past or present' (Rowlands 2010: 236). The papers presented take such deep temporal and wide geographical perspectives on board and form an important framework in which more detailed studies need to be positioned in order to promote their full impact in as many scales as they belong to.

Crafting the book

In the context of European and Mediterranean prehistoric crafting, the papers in this book highlight the daily lives of people of so-called distinct social classes who interacted with each other through creative crafting and, as such, produced both items of varying qualities and meanings, and also specific and multiple identities, *while* crafting and creating these exquisite material remains. This book is very much the joint effort of all authors who created and crafted this volume and its multiple themes and topics. These can be highlighted as follows:

In remarking that non-ferrous metalworking production sites in the prehistoric period have so far been limited and that one of the reasons often referred to is the seeming lack of evidence, **Daniel Sahlén** argues that it is more related to current preconceptions of the prehistoric metallurgical production site. His paper discusses the evidence of casting at two Late Bronze Age and Iron Age sites in Scotland, with the aim of reconstructing production on a site level and comparing these

2 TN refers to the 'Tracing Networks' project database.

trends within and between sites. His investigation illustrates that the production of non-ferrous metals in late prehistoric Scotland was carried out not only at central sites with a socio-economic specialised production, but at a range of different site types. His conclusions compare well with evidence from other regions in north and west Europe, where the evidence from manufacture of non-ferrous metals shows a similar variety in the types of production sites for non-ferrous metals, a topic that will also recur later in this volume.

Anna Sörman uses the concept of 'workshops' as a starting point to review preconceptions about the social and spatial organisation of bronze crafting, focusing particularly on how it influences expectations of crafting evidence in the archaeological record. She postulates that 'workshops' and 'workshop production' are central to archaeological understanding of metalworking in Bronze Age societies and argues that assumptions of a permanent, customised crafting place hosting the full manufacturing process, as often implied by the term 'workshop', are unsuitable for understanding the nature of bronze crafting in southern Scandinavia during the Late Bronze Age. Instead, drawing on evidence from south-east Sweden, her research reveals that the craft is characterised as flexible, embedded and multi-locational. Furthermore, differences between loci where ornaments, on the one hand, and weapons, on the other, are crafted seem to relate to the initiations of their intended bearers and to demonstrate the heterogeneous organisation of prestige goods production. Sörman concludes that such user-oriented production provides an interesting example of the organisation of elite-motivated crafting outside the context of centralised states.

Research about the social structure of Iron Age craftsmanship is often based on the asserted existence of two well-separated social classes: elites on the one hand, artisans on the other. Through controlling the means of production and their economic predominance, elites would have controlled the artisans' activities, while the artisans would be placed in a subaltern position within the social fabric of the community. **Alexis Gorgues** challenges these well-established ideas, mainly through a detailed analysis of archaeological contexts. In focusing on the northern part of the Iberian world, located between the Ebro River valley and the southern slopes of the French Central Massif, he considers social hierarchies in order to define precisely what context can be associated with "elites". In analysing the evidence linked to craft activities and its repartition within social space, he demonstrates a clear relationship between elites' mansions and skilled craft activities. He discusses the meaning of this correlation in order to demonstrate that the elites could intervene directly, as craftspersons, in specific production processes linked with highly skilled activities. Gorgues concludes that elites' direct interest in technical activities was double: first, it was a crucial instrument in their networking strategies, and, second, technical skill could also help to construct their identities. This paper shows clearly how identities are totally context-specific and can blur conventional distinctions between elites and artisans.

Another aspect of investigating the technical and social relationship between artisans and elites that blurs boundaries sits in the meaning of the tools of specific trades. While tools are traditionally seen within the sphere of crafting only, **Verena Leusch and co-authors** discuss the social role of artisans or metallurgists within

the chalcolithic society, in the light of new comprehensive studies of archaeological materials and anthropological remains from the Varna I cemetery in Bulgaria. The use of gold plays an important role in this context as it highlights the appeal of certain artefacts and, at the same time, marks their profane and/or sacred importance within observed contexts. Here, the remarkable amount of tools and/or weapons that can be addressed as prestige objects is noteworthy. Their association with the metal craft has already been discussed in the available literature and is reviewed here based on the newly obtained data. The authors specifically question and discuss whether the tools found among the grave furniture of the 'rich' burials indicate the skilled manual work of the supposed social elite, or whether they should be regarded as abstract symbols of power. From this standpoint it is clear that tools refer not only to a craft but to a social class that, traditionally, would not be associated with crafting at all.

A totally different context of tool making and using is implied by military undertakings. Military commanders acquire their peak efficiency during fights and, in order to facilitate the transmission of orders, a warlord needs proper commandment tools. On the battlefield, musical instruments and banners play a crucial role in maintaining leadership within the clash of arms. In the Late Iron Age contexts of France and Spain, some of these instruments, which were produced by highly specialized craftsmen, have been excavated. These objects seem to have been strongly linked to just a few people whose social profile was quite exceptional. In focusing on the presence of military 'transmission' tools, mainly musical instruments, in Late Iron Age west Europe, **Alexandre Bertaud** investigates the identities of the artisans able to create such objects and asks whether these artisans were intimately linked to military elites, or even perhaps depended directly on the nobility. Through the analysis of these artefacts and their production processes, he aims to define the kind of craftspeople that could produce such instruments, while the study of these allows him to approach the notion of identity, both individual and collective. In investigating the morphology of these artefacts, which seems to indicate specific aesthetical and technical choices, Bertaud gains a better understanding of the prevailing choice-making processes that took place during the production of these instruments. This finally leads him to discuss the nature of the relationship between the users and the makers of these objects in context.

The paper by **Dioscorides Marín Castro and co-authors** focusses on the study of the chipped stone tools from the Minferri site, an Early Bronze Age settlement in the east sector of the Ebro valley in northeast Spain. In characterizing the whole lithic tool production processes, from the raw material procurement stage to their consumption, the authors investigate whether there was some form of crafting and economic specialisation within such settlements. Through holistically integrating the studies of raw materials, techno-morphological and use-wear analysis, they were able to evaluate the importance of lithic resources for the development of labour in the Bronze Age communities of northeast Iberia. The procurement strategies of the communities that used the evaporitic lithic material also illustrated the lesser prominent existence of metallurgical activities in this region, which seemed to have been complementary to the lithic well-developed and omni-present industry. From the investigation of both crafts, it became clear that within specific Early Bronze

Age Iberian communities, the procurement strategies underlying both lithic and metallurgical crafts were similar. The items produced by each type of material and their subsequent contexts of usage, however, were dictated by rather different conditions altogether, and these conditions eventually dictated the technological choices that these communities made in favour of lithic industries over that of metallurgy in this specific context.

The two final case-study papers offer grounds for complementary discussions on the main topic of this book during the west and central European Iron Age, and specifically in the Hallstatt cultural contexts. **Emilie Dubreucq** postulates that until recently, our understanding of metal smithing during this Protohistoric period has been developed mainly through the study of their end products. Therefore, she investigated the structure of production – , i.e. the workshop as a working place, the study of the wastes produced and the range of tools. As complementary sources, these also enable the characterisation of the artisans' activities while illustrating the organisation of their work, as well as their daily life. For her it was essential to characterise the features linked to metal craft between the end of the first Iron Age and the beginning of the second Iron Age. During this period, the concentration of power is particularly noticeable within the funerary world, where the aristocracy is particularly apparent. This was also a time when hill settlements and their suburban areas were reoccupied and refortified, and when they became real centres of power. These locations are regarded as the home of the elite, but also as centres of craft production. Thus, attempting to define the role(s) of the elite members and of the artisans in a society that grows more complex seems to be a particularly valid method of approaching the nature of their relationships.

Within this Hallstatt context, the final chapter by **Anne Filippini** approaches new aspects of the social status of craftspersons during the fifth century BC in the West Hallstatt area. Based on case-study material from two recent archaeological sites excavated at Bourges (Cher-France) and Lyon (Rhône-France), she investigated the most ancient metallurgical contexts in the region through a multidisciplinary approach. In particular, the extent of the craft production and the smithy activity were strong focuses, and her work on iron aimed to characterise and differentiate the smithy waste produce (slags, metal scraps, waste material, rough items) and other iron production remains that could be found at these sites. At the same time, she investigated the artefacts and the nature of their constitutive metals, as well as the ways the workshops were supplied with iron and the identification of different production modes. In this way, the smiths' very high level of specific know-how and the inherent internal organisation of the workshops became apparent. Filippini's study offered the opportunity to reveal the value of iron and all the social implications of metal productions within this west Hallstatt context. The results obtained led to refined understandings and interpretations of the social and economic roles of the craftspersons' status and, through these, their settlement occupation patterns.

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Production as activity

Defining the context of casting production in late prehistoric Scotland

Daniel Sahlén

Introduction

Herbert Maryon's (1937/1938, Figure 1) early work on the technology of Bronze Age and Early Iron Age smiths shows a romantic picture of how an artist in the 1930s imagined an Iron Age goldsmith's workshop, and this picture represents the production site *par excellence* in archaeological literature: the workshop building. Here the goldsmith stands at the anvil performing his craft assisted by a young apprentice, and a woman sits on the floor preparing food or making pots. This drawing depicts the view of crafts and specialisation expressed in the work of V. Gordon Childe (1930) and was probably influenced by late medieval paintings (e.g. Etienne Delaune's engraving *A Goldsmith's Workshop* from 1576). Childe's (1930: 4-5) view on metallurgy and specialisation, well explored by others (Rowlands 1971; Gibson 1996), portrays the smith as a full-time specialised craftworker, who possessed a specialist's skill and held a central position in the society. Domestic production was instead seen as a part-time activity that required less skill. The ideas put forward by Childe have been questioned, but the idea of non-ferrous metallurgy as a specialised activity and the structural evidence of the production remain central in archaeological literature (Ehrenreich 1991; Helms 1993; Champion 2009: 138).

Metallurgical sites are often described as workshops or smithies, but there is rarely any physical evidence for a structural workshop. As a consequence, archaeologists claim that there is little or no evidence of production (Harding 2000: 232; Barber 2003: 91; Champion 2009: 140). The goal of this article is to discuss waste products from non-ferrous metallurgy on a site level and examine what this can tell us about the extent and organisation of production in prehistoric societies. I discuss the evidence from production activities at two Scottish sites with materials from both the Late Bronze Age (LBA) and the Middle Iron Age (MIA)[1]:

1 LBA 1000 – 700 BC; MIA 200 BC – AD 300/400; the chronology of prehistoric Scotland varies in absolute dates and nomenclature between different parts of the country and the more common periodization comparable to other parts of Britain and Europe has here been used (Edwards and Ralston 2008).

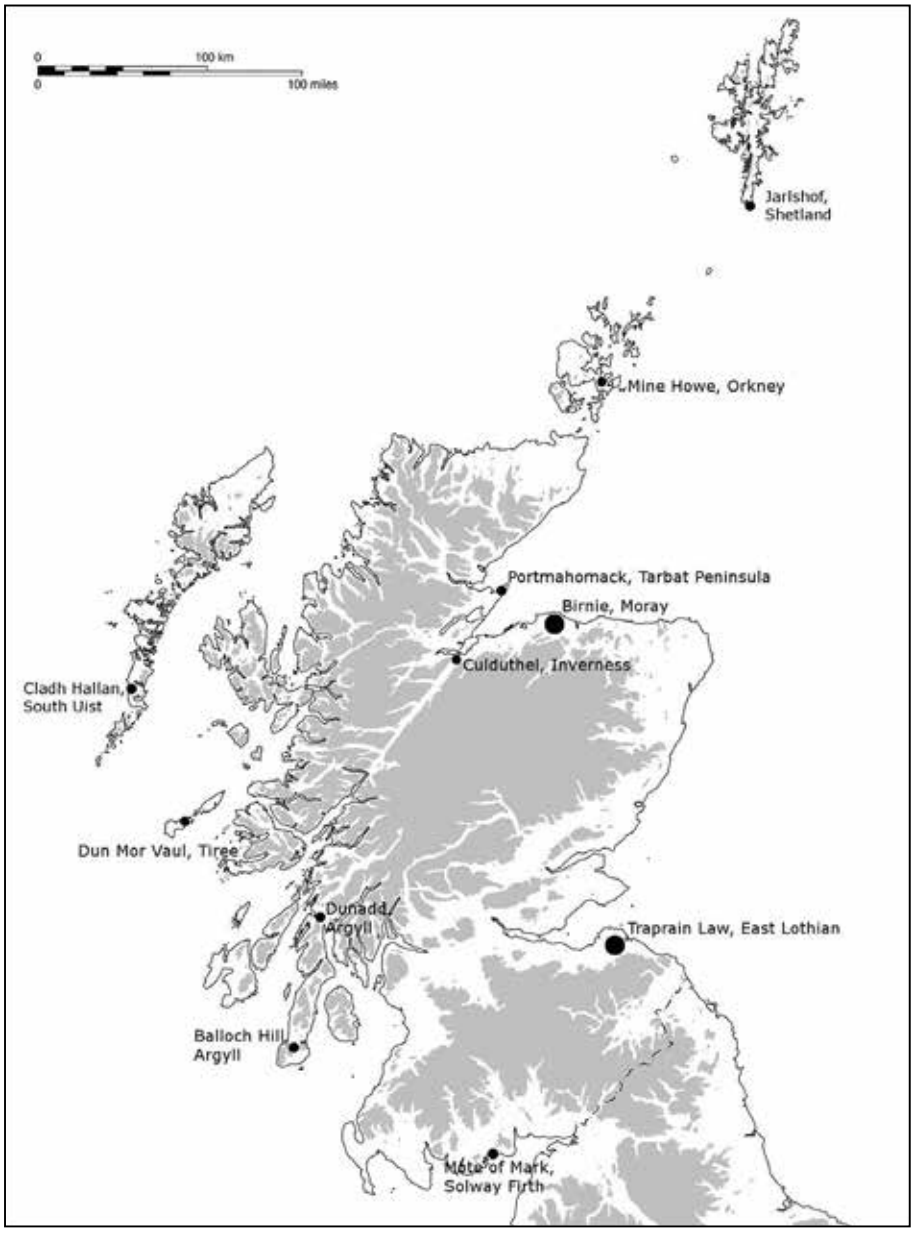

Figure 1: Map of Scotland, marking the location of Birnie and Traprain Law (enlarged circles), and other sites mentioned in the text.

Birnie, a small prehistoric farmstead in northeastern Scotland; and Traprain Law, a large prehistoric hillfort site in southeastern Scotland (Figure 1). The materials of these sites have earlier been assessed from a technical perspective (Sahlén 2012; 2013). These studies highlighted similar trajectories in the use of resources and preparation of technical ceramics but also stressed an increased technical specialisation in the Iron Age. The evidence of prehistoric and early historic non-ferrous metalworking production in Scotland is plentiful (Hunter *et al.* 2006), and

over a hundred sites have shown evidence of casting in the prehistoric and early historic period (*cf.* Hodges 1959; Heald 2005; Cowie and O'Connor 2009; Sahlén 2011). Birnie and Traprain Law are representative samples of this large group of sites, but evidence from other sites in late prehistoric Scotland and Britain will be discussed as well.

Approaching non-ferrous production remains

Production of non-ferrous metals at prehistoric sites is often identified through the occurrence of production debris, mainly consisting of technical ceramics such as crucibles, fragments of tuyères, and ceramic moulds (see below). The occurrence of hand tools and metal scrap are also used to define metalworking activities. Geochemical methods have increasingly been used to pinpoint metallurgical production, allowing researchers to locate workshops and define manufacturing areas with greater precision (*cf.* Carey *et al.* 2014). These methods are not yet a standard procedure, and the use of archaeological materials for the depiction of production is still more informative.

Technical ceramics are a wide group of ceramic tools used for diverse technical operations. The most discussed are those employed for metallurgical processes, particularly moulds and crucibles used for the casting of non-ferrous metals. In prehistoric times, crucibles – vessels used for high temperature processes of metals and other substances – were made from clay and might have been used for several castings. Late prehistoric casting moulds in Scotland were chiefly made of clay, but certain items were also cast in stone moulds (Hodges 1959). Clay moulds were often broken after the casting to remove the metal object, leaving a large number of small fragments, while stone moulds could be reused for several production sequences. Crucibles could have also been used for multiple castings but would not have been as durable as stone moulds. These practices and material properties are important to have in mind when assessing the evidence from casting activities; a large number of mould fragments does not necessary reflect a large production but perhaps only the manufacture of one or a few objects. Remains of crucibles are often found as one or a few scattered sherds and rarely a whole or complete vessel. This has sometimes been interpreted as the use of broken crucibles as temper for new crucibles. However, there is no clear evidence of the use of crucibles as temper in the Bronze Age.

Evidence of production is often found as scattered waste, but there is a lack of detailed work on the formation of production remains on a site level, *the production context*. The deposition and formation of archaeological materials have previously been well explored in other contexts. Two approaches can be distinguished: the formation of activity layers (LaMotta and Schiffer 1999) and the identification of structural deposits (*cf.* Garrow 2012). The formation of activity areas relates to two main processes: accretion (the deposition of material) and depletion (the removal of material). Most studies on site formation have focused on domestic contexts and activities and often focused on floor deposits. A central conclusion is that archaeological remains were not just abandoned but deposited deliberately as refuse or in another context (ritual in some cases). Only a small part of archaeological remains should be viewed as within its primary (use) location (LaMotta and Schiffer

1999:19-20). But this model is particularly related to an indoors context, where people live and maintain a relatively clean surface for daily activities. In the study of *structural deposition,* deposits are seen as selected or arranged materials, placed at strategic locations (*cf.* Brudenell and Copper 2008). An example of this is the construction of refuse deposits at prehistoric settlements (e.g. Hill 1995; Needham and Spence 1997; Brück 1999; Giles 2007). As pointed out by others, this has had a clear impact on how deposition was viewed particularly in the British discourse, but the notion has lately been criticised as too broad to encapsulate complex human actions and decisions (Brudenell and Copper 2008; Garrow 2012).

Little work has been carried out to test these ideas on production contexts, and it is not guaranteed that we could expect similar patterns in the use as well as in the disposal of production remains. Arnold (1990), looking at the distribution of waste from pottery production in ethnographic contexts, saw patterns in the distribution of the waste depending on "spatial availability" of the production context and if the pots were fired by using an open hearth or a kiln (Arnold 1990: 930). The discard of pottery has been one of the better discussed phenomena from an assemblage formation perspective (Deal 1985; Needham and Spence 1997; Brudenell and Cooper 2008). One reason for this is that pottery is one of the most common and durable artefact categories, and its use and tendency to break gives it a wide distribution. People used their pots daily for preparing food, as well as storing and consuming food and liquids, and this means that pottery can be found at most parts of a settlement. In contrast, casting debris would show much less mobility within the archaeological record; it would either have been left in or nearby its production context or intentionally moved or reused. These deposits can therefore tell us something about the concentration and the temporality of the production. The distribution of material from a short-lived production would be assumed to be more closely grouped than if the production occurred during a longer time or over several production events. It is therefore necessary to more closely describe the deposition of the material. Three types of depositions can be defined in association with casting (Table 1): *Production deposition*, where the material is associated with the location of the production; *Waste deposition*, contexts where the material is dumped as refuse from the activity; *Intentional deposition*, deposition of debris not associated with the actual production activity. Intentional deposition can be ritual in the sense to which Hill (1995: 95-96) refers, or "provisional refuse depositions" kept for later use (LaMotta and Schiffer 1999: 20).

Nomenclature	Definition
Production deposition	A context where there are actual remains of the production event, and not only unassociated production debris.
Waste deposition	A context where the material is dumped as refuse from the activity, not necessarily in its primary context.
Intentional deposition	A context where the debris is not associated with the actual production activity, but deposited for purposes other than waste disposal.

Table 1: Definition of different deposition of casting debris.

The lack of structural remains (for example, furnaces, buildings or other structures associated with an actual production process) from late prehistoric casting is most likely due to occasional rather than continuous production. This type of production did not require permanent structures, but instead was carried out at temporary hearths and casting pits. The production of pottery in British prehistory, for which we have very little evidence, forms a similar problem. Prehistoric pottery in Britain was generally not fired in a kiln, but in a bonfire or in a domestic hearth. This type of firing would not leave traces on the same scale as kiln structures, and it is therefore often impossible to find archaeological evidence of prehistoric pottery firing (*cf.* Gibson and Woods 1997: 49). From this it follows that the production at sites where we have structural remains probably was more substantial.

Non-ferrous production in the late prehistoric period

The Late Bronze Age

The context of LBA casting in Scotland has rarely been discussed (e.g. Cowie and Hunter 2000; Hunter *et al.* 2006: 53), which is true also for material from southern Britain and the continent. The focus of studies on metal production in Britain and Europe has instead been on the distribution of artefacts, based on stylistic criteria or the chemical composition of the metals/alloys (e.g. Bradley 1988; Rohl and Needham 1998; Pare 2002; Ling *et al.* 2014), a perspective more related to the organisation of trade and exchange rather than the production activity and its organisation. Two early models of how the production was organised have dominated the debate: Childe's idea of smiths as itinerant craftworkers (Childe 1930) and Rowlands' (1976) view of metallurgy organised as large-scale industries/centres of production. These two different perspectives stem from a paradox in the material record. On the one hand, we have large assemblages of metal artefacts, with clear geographic and chronologically distinct typologies, suggesting the production of large materials by a few skilled craftworkers, and, on the other hand, we lack the material evidence to support the view of large production sites (Harding 2000: 236-39; Wells 2007: 143; Champion 2009: 138-39).

The Iron Age

The organisation of metallurgical production in the Iron Age, particularly in southern Britain, has been discussed extensively, but research on the production context has been limited (DeRoche 1997: 19). This discussion has focused on the material from a few sites with particular production contexts – the Glastonbury Lake Village (Coles and Minnitt 1995), Gussage All Saints (Spratling 1971) and Weelsby (Foster 1995) -or large sites such as Danebury (Cunliffe 1995). This focus on large sites and assemblages has reinforced the view of non-ferrous production as centralised and specialised. Cunliffe, (2005: 501) demonstrating the central position of the hillfort, argued that the production around the Danebury hillfort was organised at different scales and different types of manufactures: (1) large-scale and specialised sheet working at hillforts, and (2) casting at smaller settlements under patronage serving a local leader. Heald (2005) in his study of non-ferrous

metallurgy in Iron Age Scotland argues that production was mainly restricted to nucleated settlements or artisans controlled by such. The connection stressed by Cunliffe and Heald between elite settlements and non-ferrous metallurgy is too simplistic. The evidence of production from the MIA comes from a large number of sites and site contexts, including settlements and non-settlement sites, and is not only limited to settlements with central functions. There is a clear difference in the scale of production at different sites in the MIA – at some sites we can see the evidence of a prolonged production activity, while in other contexts the production is more intermittent and sporadic – but there is little evidence of a difference in manufacture practices as claimed by Cunliffe.

Production and materials at Birnie and Traprain Law

Birnie

Birnie, south of Elgin in Moray, in the northeast corner of Scotland, was excavated between 1998 and 2011 by the National Museums Scotland, under the direction of Fraser Hunter. The site consists of a series of roundhouses, indicating a continuous settlement from the Late Bronze Age to the Roman Iron Age, with some later occupation in the medieval period. It is clear that non-ferrous metal production was carried out at Birnie both in the LBA and later in the Iron Age. There is evidence of other craft activities, for example iron smelting and smithing in the Iron Age and probably in the medieval period (Hunter 2007: 24-28). The nature of the site is not fully understood yet, but the picture that emerges from the excavations is that of a high-status late prehistoric farmstead or rural settlement, with evidence of domestic production and a possible surplus traded locally, with contacts to other areas of Scotland and south Britain.

The casting debris from the LBA at Birnie was found in small shallow pits during the excavation of trench AA in 2005 and 2006 (Hunter 2006; 2007) (Figure 3A; Table 2). This material includes mould fragments for the casting of a bangle, pins, a socketed axe, a spearhead, a possible fragment of a sword mould and a few crucible fragments (Hunter 2007: 13-15) (Figure 2). Most of the mould

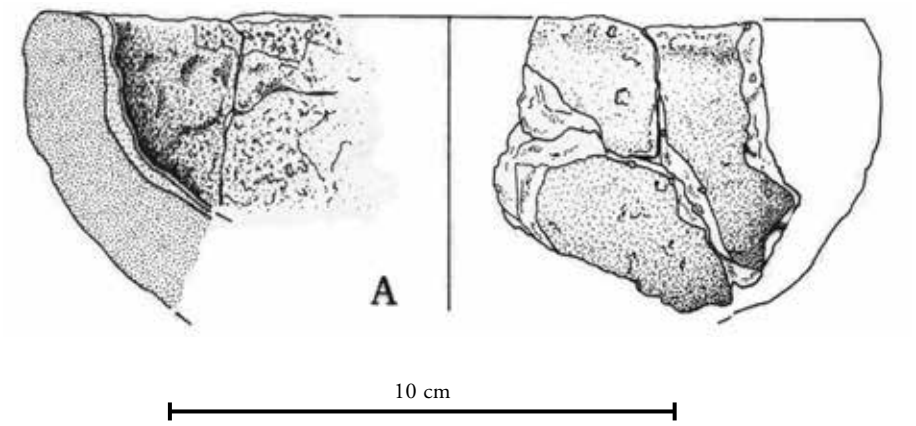

Figure 2: Drawing of LBA crucible from Birnie, drawing by Alan Braby (Hunter 2007).

fragments and the crucibles were found in small pits filled with fire-cracked stones and charcoal and interpreted as casting pits. A charred wooden object was found at the east side of the trench, understood as a hollow tree trunk that was possibly lined or covered with clay. It was probably associated with the casting activity in trench AA, but the function is unknown. An arc of stake holes was found in an extension of trench AA during the excavation in 2006, but whether this feature was connected to the production was never established. No further evidence of a structure for the casting activities was found.

The MIA material consists of nine crucible sherds and one large clay mould, probably for casting a disc-shaped ingot (Table 2). The lack of additional mould fragments makes it difficult to assess the nature of the casting production in the Iron Age. The material is dated through contextual association with other archaeological materials and is probably from several casting events that were chronologically closely related. The MIA material is much more dispersed than the LBA material (Figure 3B). Four crucible fragments were found at different locations in area AF where larger numbers of slag, fragments of a tuyère and furnace-lining for smelting of iron ore were also found. The clay mould and one crucible fragment were found in the roundhouse in trench M where the clay mould seems intentionally deposited in a cooking pit (Hunter 2005). Single crucible sherds were also found in trenches D, O, V and AL. The wider distribution of material is probably partly due to a larger number of activities both in the Iron Age, and the medieval period in the area makes it difficult to define as an activity area. However, it is clear that casting activities at the site in the Iron Age were not as confined as in the earlier period.

Traprain Law

Traprain Law, a LBA and Iron Age hillfort site in East Lothian, is one of the largest of its kind in late prehistoric Scotland. The site was extensively excavated by the antiquarians Alexander Curle and James Cree from 1914 to 1923 (Jobey 1976). Minor excavations have subsequently been carried out on and around

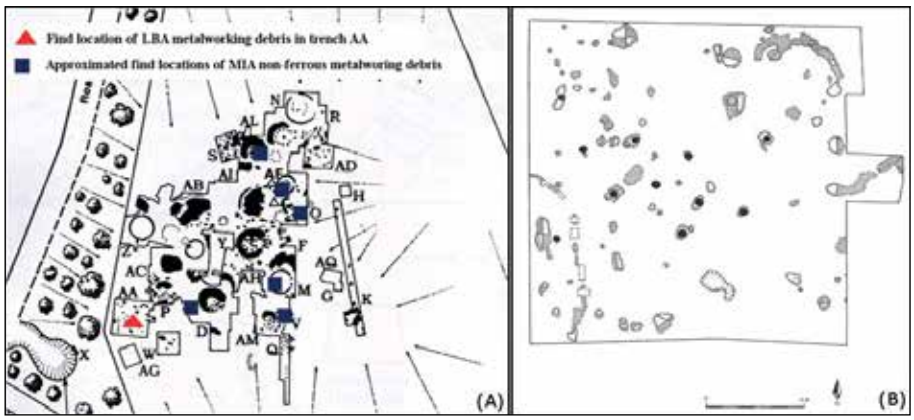

Figure 3: (A) Site plan of Birnie with the location of the production in the LBA and the MIA; (B) excavation plan of Trench AA, showing the spread of the casting pit and other LBA deposits (Hunter 2006, fig. 10).

Material	Trench/es
LBA crucibles	AA
IA crucibles	D, M, O, V, AF, AL
LBA moulds	AA
IA ingot mould	M

Table 2: Find locations of crucibles and moulds.

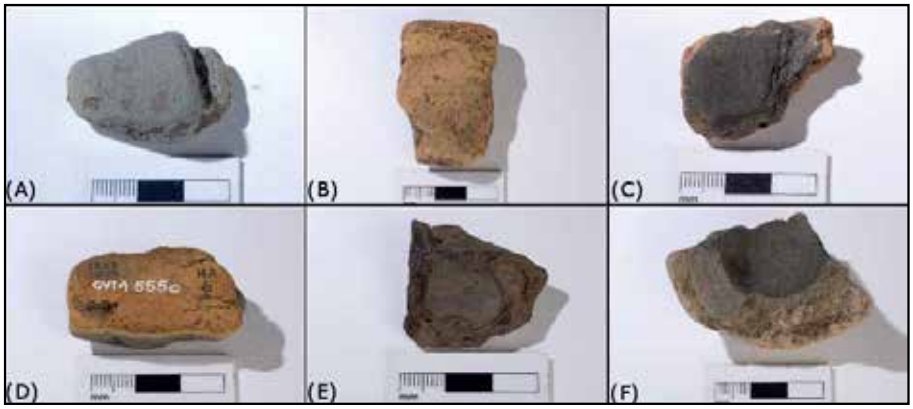

Figure 4: Examples of mould fragments from Traprain Law; A-C fragments dating to the LBA, D-F fragments dating to the IA. The length of the scale bars are 6 cm (photo by the author).

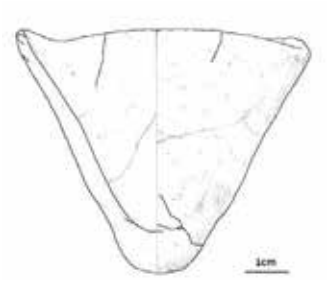

Figure 5: Drawing of an almost complete triangular crucible from Traprain Law, drawing by Alan Braby.

the hill to target particular questions. The site has shown a large fortified LBA and IA occupation, and some sporadic medieval activity. The settlement was probably at its peak during the Middle/Roman Iron Age, when the site was one of the largest settlements in Scotland. In addition to casting, there is evidence for ferrous metallurgy, glass working, and a series of domestic crafts. There is no clear evidence for a pottery workshop, but it is probable that a large amount of the pottery excavated on the hill (excluding Roman wares) was made at the site or locally. The dating of the material from Traprain Law is less clear than in the case of the material from Birnie and is based more on artefact typologies than on stratigraphic relationships. The Bronze Age material dates, with some precision, to the later phase of the Bronze Age, while the Iron Age assemblage shows a wider spread. Most of the material can be dated to the Roman Iron Age and Late Iron Age (1st to 4th century AD).

The Late Bronze Age material from Traprain Law consists of sixteen fragments of sword moulds, four fragments of socketed axe moulds, one fragment of a spear mould, and three larger fragments of a crucible (possibly from the same vessel) (Figure 4A-D). The Iron Age material consists of 22 fragments of pin moulds and 20 fragments of other ornaments and decorative moulds (Figure 4D-F). There were nine stone moulds retrieved from Traprain for the casting of ingots and a disc-shaped clay mould that could be an ingot mould (similar to the mould found at Birnie). Only the diagnostic moulds seem to have been kept from Curle and Cree's excavation, which makes it difficult to assess the total amount and types of moulds present at Traprain. Over sixty fragments of Iron Age crucibles were found, predominantly of the deep triangular shape, typical of Iron Age Scotland (Figure 5). There are also a few examples of the shallow triangular crucibles, rounded vessels and thumbed crucibles, suggesting that different metallurgical processes were carried out at Traprain Law (*cf.* Sahlén 2013).

Material distributions and contexts

The contexts of casting at Traprain Law are not fully understood, since most materials were excavated in the early 20th century with insufficient methods and a final report of the work was never published. But it is possible to locate areas where casting remains were found from descriptions in the annual reports (Figure 6, Table 3), which give simple stratigraphic and spatial relationships of different groups of materials (*cf.* Burley 1956). Michael Erdrich, Kristina Giannotta and Bill Hanson made a similar exercise, looking at the distribution of Roman and native materials at Traprain, in their assessment of the relation between Traprain and Rome during the 1st and 2nd century AD (Erdrich *et al.* 2000). The excavations have not recorded any possible structure associated with casting, and it is difficult from the reports to define a particular workshop or location of production. After the first excavation Curle (1915: 147) reported on the presence of a large amount of worked clay within a stone setting in the middle layer of area A and adjoining a hearth structure (Curle 1915: 147). It is not possible to assess if this clay was for metalworking ceramics, pottery, daub or another purpose, but most IA moulds were found at the same area and in the same layer. An association between the clay and the hearth structure is not clear either.

The LBA moulds are concentrated around area M, with some material in areas Ha, J and N. The majority of the IA material was found in areas A, B and F, but with fragments distributed across the excavated area (Figure 6b). It is difficult to interpret this distribution, since we do not know the actual context of particular finds. Were they found *in situ* or has there been some disturbance of the material? Was the find location an indication of manufacture, or was the material redeposited? Erdrich et al (2000: 447) provide a discussion on the nature and use of the southern part of the Western Plateau in their study. They conclude that areas A-D could have been used for rubbish disposal (2000: 447) during the Roman period. It should also be noted that a larger amount of material was found dating to the IA than the LBA, so we should expect a wider distribution in the IA. But it seems reasonable to suggest that the IA production was focused around areas A-B,

Material	Area/Level
LBA sword mould (n16)	Ha6;M2;M3;M4;N3;N4
LBA socketed axe mould (n4)	M6;J3
LBA spear moulds (n1)	M6
IA pin moulds (n22)	BL;AM;F3;BT;H1;G2;H3; G1;AL;AM;Ha6;Oa2;R2
IA dress fastener moulds (n2)	F3
IA ring moulds (n3)	BL;F3
IA spear butt moulds (n7)	F2;Q2
IA harness mould (n1)	N4
IA mould for disc (1)	AM
IA ingot stone moulds (8)	BT;B1e;AM;F2;R2
Miscellaneous IA moulds (7)	Not specified

Table 3: Distribution of LBA and IA moulds, based on Burley 1956. Number of finds for each category in brackets.

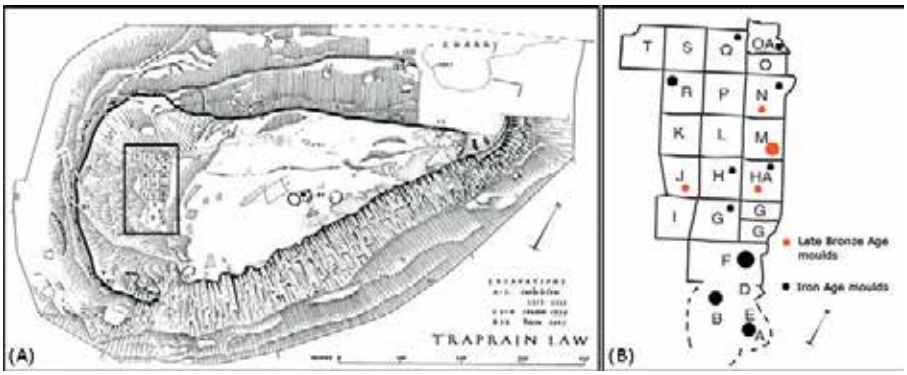

Figure 6: (A) Plan over Traprain Law (Close-Brooks 1983, fig. 95); (B) box shows the distribution of moulds in the excavation grid of Curle and Cree's excavation (marked with a box in Figure 4a).

both considering the quantity of mould fragments from this area and the presence of worked clay in the middle layer of area A.

Discussion

The Late Bronze Age

The evidence from Birnie and Traprain Law demonstrates a difference in production during the LBA and the MIA (Table 4).

The LBA production at Birnie indicates a short episode of production at a defined area, and the evidence can be classified as a production deposition, while the material from Traprain Law is more spread out and characteristic of a waste deposition. This distinction between the two sites may be exaggerated by the insufficient excavation methods and recording at Traprain Law, but still the difference in the material distribution at the two sites is clear. It is not certain if the wider distribution seen at Traprain Law reflects a more intensive or more prolonged activity than the production at Birnie. However, there are obvious

similarities between the two sites that can be seen as characteristic of casting production in the LBA. We can see the production of a number of different artefacts, including swords, axes and spearheads, items often linked to high-status sites. It is clear in both cases that the production took place within or close to the settlement, a situation which can be seen also at other sites in late prehistoric Scotland, for example at Cladh Hallan (Parker Pearson 2012) and Jarlshof (Curle 1933). At both Birnie and Traprain Law there is little or no structural evidence, and the production has taken place outside with little connection to a building. The situation at Cladh Hallan and Jarlshof is a bit more complex, but also here there is little evidence of structural remains. The buildings Curle (1933: 91-92) linked to the casting activities at Jarlshof is probably not contemporary with the mould and crucible fragments.

Neither site can support the view of a centralised production, as suggested by Rowlands (1976). Instead, the material indicates minor production activities possibly meant for local consumption. Materials from most LBA sites show a similar picture, a small-scaled production of a number of different items. It can be argued that parts of the material could have been lost, considering the fragile nature of particular moulds, but we would expect a much larger spread of production debris and more established production areas if the production was located at a few specialised production industries. The production at most LBA sites in northern and western Europe is too limited to support the idea of a full-time specialist; instead, we have evidence of a single event or sporadic production sequences. This should mean that the production of bronze in the LBA was more common than we usually envisage and was carried out locally, rather than manufactured and distributed from particular production centres. The presence of itinerant craftworkers seems in this situation more plausible, but if these "smiths" moved across Europe as claimed by Childe (1930; Roberts 2008) or within small regions remains to be explored, and I agree with Nørgaard (2014) that this is a subject that needs more research.

Site	*Period*	*Site type*	*Crucible*[2]	*Clay mould*	*Stone mould*	*Furnace*	*Building*	*Structure*	*Deposition*
Birnie	LBA	Farmstead	3	X	-	-	-	X	PD
Traprain Law	LBA	Hillfort	X	X	-	-	-	-	WD
Birnie	MIA	Farmstead?	9	-	X	-	-	-	WD/ID
Traprain Law	MIA	Hillfort	>60	X	X	(X)	-	-	WD

Table 4: Production evidence from Birnie and Traprain Law. Key: PD production deposition; WD, Waste deposition; ID, Intentional deposition.

2 The number of crucibles from Birnie refers to the number of sherds, not whole vessels. The number of crucibles from Late Bronze Age Traprain Law is unknown; the number of crucibles from IA Traprain Law includes both whole vessels and fragments.

The Middle Iron Age

Traprain Law is the type site of MIA metallurgical production sites (compare discussion above), a large hillfort site with a clear central social position. However, looking at the evidence presented from Traprain Law compared to the contemporary site Birnie, it is clear that production of non-ferrous metals was carried out also at smaller sites. Evidence of casting is shown at both sites, but the lack of a more extensive mould material from Birnie limits the possibility to define the activity. What is clear is the difference in scale of the production. This partly supports the distinction between different levels of production as suggested by Cunliffe (2005: 501), not in different types of manufacture, sheet working versus casting, but in the duration and intensity of the production. At Traprain we see the evidence of a prolonged production activity, and there is an indication of the presence of a production location, while at Birnie the production is more intermittent and sporadic, with evidence from several parts of the settlement.

These trends can also be seen at other sites such as Dun Mor Vaul (Mackie 1974), and are enhanced in the Late Iron Age/Early Historic period (LIA/EH)[3] (Heald 2010). Extensive production is seen at a few sites in Scotland during the Iron Age, for example at Culduthel (Sahlén 2011: 111-113) and Mine Howe (Harrison 2005), and in the LIA/EH period we see the development of several larger sites where the production of metals is a key feature (e.g. Mote of Mark, Dunadd, and Portmahomack). Evidence of small-scale, sporadic production, as seen at Birnie, is more common throughout the Iron Age, for example at the broch Dun Mor Vaul (MacKie 1974) and the hillfort Balloch Hill (Peltenburg 1982). This occurrence of casting at a range of different sites and differences in its utilisation suggest that we should not look for one model of how metalworking production was organised. The production may have been restricted but not to a few central or specialised sites. Also in the late medieval period, when the production of metals was strictly controlled by the established guilds, multiple levels of production can still be noted (e.g. Huggert 2009).

The relation between non-ferrous metalworking and ironworking seen at sites during the Iron Age is worth emphasising. The evidence of ironworking, in most cases smithing but also iron smelting, is seen at most sites in Scotland, a pattern also noticed at sites in other parts of Europe (Sahlén 2016). This suggests that the production of non-ferrous metals was not an isolated activity by a specialised smith but was carried out in a wider production context of metals and other pyro-technological crafts.

Conclusions

There is little structural evidence for non-ferrous metalworking in prehistoric contexts in terms of workshops or defined craftworking areas, but this is related to the nature of production, and claims of a lack of evidence should be avoided.

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3 The Late Iron Age/Early Historic period marks the period AD400-800 in northern Britain, defining the period after the Roman presence and before the arrival of the Vikings. However, texts are known for only part of the country, and in the northern and northwestern parts of Scotland the prehistoric period continues until the arrival of the Vikings.

This article has looked at the evidence of production at two different sites in late prehistoric Scotland with production remains from the LBA and the MIA. The perspective taken here is that it is possible to define the location and intensity of production by contextualizing the distribution and deposition of production remains. This has shown different patterns of how the production was organised at the two sites but has also highlighted general patterns of how non-ferrous metalworking was organised in the LBA and the MIA, respectively.

Prehistoric casting and other crafts were rarely performed on a fulltime basis and were not a major activity at most sites. A simplistic correlation between specialisation and workshops cannot be sustained. Production in the LBA demonstrates little evidence of specialisation, while production contexts in the Iron Age indicate an increased level of specialisation. Further, evidence of centralised production becomes more pronounced in the LIA/EH period. The presence of itinerant craftworkers is arguably strong in the LBA. The evidence from the MIA and the LIA/EH period seems more complex with perhaps more diverse patterns of craft organisation. Itinerant craftwork seems likely for at least part of the production. Hence, we should not see the metalworker as a stationary person working and living within a specific community, but rather, metal crafts were likely peripatetic activities within a wider social landscape. The importance of seasonal markets for the distribution and production of craftwork in the medieval period is just one example of this pattern.

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A place for crafting?

Late Bronze Age metalworking in southern Scandinavia and the issue of workshops

Anna Sörman

Introduction

At the beginning of the 20th century, the first Bronze Age casting sites in southern Scandinavia were identified at the sites of Håg (Neergaard 1908), Broåsen (Sarauw & Alin 1923; Svensson 1940), and Skälby (Oldeberg 1960). Aside from their now iconic position in the Bronze Age research on this region, these early examples mark the beginning of the tradition to call metalworking sites in Bronze Age Scandinavia 'workshops' or 'workshop sites'. The crafting done at such places has generally been linked to specialised, elite-motivated forms of production, in contrast to a more widespread household production (e.g. Oldeberg 1960; Jensen 2002: 365). This model of interpretation, leaning on a conceptual division between craft organised at the household versus the supra-household level, has been used as a way to emphasise the scale and socio-political context of crafting (e.g. Brumfiel and Earle eds. 1987; Costin 1991, 2001: 296-301; Hayden 1998; Schortman and Urban 2004). Despite being applied on a regular basis in studies on Scandinavian Bronze Age metalworking, this distinction between 'workshop production' contra 'household production' has rarely been defined. Rather, it has been assumed based on the study of finished artefacts. Following the lack of clarity and vague links to actual production sites, the model has left ample space for modern analogies and assumptions embedded in the terminology. As a result, 'workshops' have come to be seen as the industrial antitheses (large-scale, in discrete spaces, exclusive) of household crafts (small-scale, in domestic spaces, common), making the model for social organisation synonymous with its spatial organisation. This, in turn, has led researchers to infer spatial organisation from the social model, rather than the other way around.

In light of this situation, questions about the influence of terminology upon archaeologists' expectations of Late Bronze Age metalworking and crafting sites need to be readdressed. What are the implications of describing ancient craft in terms of 'workshops'? How well do places for specialised metalworking align with this definition, and is it realistic to look for bronze 'smithies' in this region? Furthermore, if not taking the form of specialists' workshops (e.g. Tournavitou 1988; Miller 2007; Brun 2016), how was elite-motivated metalworking actually

facilitated? This paper seeks answers to these questions by revisiting the concept of the 'workshop'. It draws on theoretical discussions as well as concrete examples from casting sites hosting production of prestigious social commodities. By applying the concept of 'heterarchy', signifying social structure based on diverse power relations with varied and parallel sources of influence in society (Crumley 1979; Levy 1995; DeMarrais 2013), it highlights the lateral social contexts within the spatial organisation of metalworking. Based on contextual studies of where bronze crafting of prestigious objects took place, it argues that Late Bronze Age metalworking in southern Scandinavia was staged in far more diverse settings than the traditional model suggests, resulting in an image that goes beyond the taken-for-granted workshop-household divide. Based on the perspectives developed, the paper also seeks to showcase the benefits of pursuing detailed studies of the physical setup of crafting when trying to understand its social organisation, and to analyse how this knowledge, in turn, can revitalise and complicate existing analytical categories and models on Bronze Age metal working.

The organisation of specialised metalworking in southern Scandinavia

The important role of Bronze Age metalwork in practices of displaying and acquiring prestige has meant that metalworking has often been associated with notions of prestige and elite influence. Many forms of Bronze Age metalwork, especially weaponry, ritual paraphernalia, dress fittings, and personal and bodily adornments, have direct links to wealth and prestige, as is evident from their role in long-distance exchange, gift-giving, and religious performance, and as symbols of rank and identity. The control of requisition of raw materials and production of prestigious bronze objects – particularly weaponry – has long been interpreted as a key strategy for sustaining elite authority, and was one of the important factors behind growing social inequality and formation of chiefdom-like structures in the Early Bronze Age (Kristiansen 1987; Earle 1997; Earle and Kristiansen 2010). The metalworkers are thus often seen as central in underpinning political power through the production of high-status paraphernalia. These interpretations rest on anthropological theories emphasising elite exploitation of specialised craft production as a key factor in social evolution (Brumfiel and Earle eds. 1987). However, models implying an attached craft in chiefly workshops or hamlets have primarily been inferred from the objects, while metalworking evidence in the form of casting residues has rarely been consulted.

Hence, today it is widely acknowledged that community elites controlled the production of exclusive and technologically complex items, broadly defined as prestige goods. Linked to these ideas, studies of craft organisation have often aimed to identify local workshops and thus the political centres supporting them, by examining similarities in style and technological choices that were observed in the produced objects (Rønne 1986; Herner 1989; Kristiansen and Larsson 2005: 35-37; Wrobel Nørgaard 2014). Such studies are based on classic art historical approaches in which a set of techniques or styles upheld by a master artisan or group of artisans are seen as forming specific 'workshops' or 'schools' (Heilmyer 2004: 403). However, the nature, extent, and practical arrangements of this

control of production remain unclear and subject to debate (Wrang 1982; Levy 1991; Weiler 1994; Stig Sørensen 2015).

The development through time of the Late Bronze Age is also unclear. Due to an increase in the number and types of bronzes, especially simpler tools such as axes, the specialised elite-driven production is usually implied to have been combined with a growing realm of widely dispersed household production by the Late Bronze Age (e.g. Jensen 2002). Some scholars have discussed its concentration to more 'central' or 'special' settlements (Thrane 1993), or have pointed to a certain level of differentiation in metalworking within the settlement hierarchy (Levy 1991; Jantzen 2008), whereas others have more explicitly assumed 'master workshops' (Jensen 2002: 365). Lately, it has also been suggested that buildings identified as cult houses were important arenas for crafting (Goldhahn 2007; see also Levy 1991; Kaul 1998: 44-45). As such, it has been argued that the characteristic crafting *loci* for specialised bronze-working would be secluded places at a certain distance away from everyday life, as the craft had esoteric and cosmological connotations (Goldhahn 2007: 211-13, 324). However, material evidence of its spatial organisation has not yet been sufficiently studied (Stig Sørensen 2015). This is particularly true for the Late Bronze Age, even though this is the period for which most archaeological crafting evidence has been identified.

Bronze Age workshops: a conceptual discussion

> *'Apart from a few sites which have the character of workshops such as Broby, Broåsen, Haag, Hallunda, and Skälby, many Bronze Age settlements bear traces of a more household-like production.'* (Björhem & Säfvestad 1993:97, translated from Swedish by the author).

'Workshop' or 'workshop site' in Bronze Age research is primarily used to emphasise large-scale and more exclusive types of production, in contrast to smaller-scale household production. The meaning of the concept is, in other words, dependent on and defined by the dichotomy of domestic versus non-domestic. Consequently, it taps directly into the modern private-public divide and the industrial dichotomy between professional versus domestic forms of production. These sharp lines, inherent in the notion of 'workshops', easily activate a whole set of preconceptions on the nature of specialised production. These include gender-coded ideas about the division of labour by emphasising the professional sphere as an arena tied to active male ritual, political and public activities and the home as the passive female domain (Nelson 1997: 55; Brück 1999: 60-61). If archaeologists are to avoid replicating or uncritically projecting the characteristics of modern, industrial forms of production into the past, it is important to acknowledge these associations when approaching ancient crafting sites as workshops.

Besides playing on preconceptions about the *social organisation* of metalworking, the 'workshop' concept also guides how we view the concrete *spatial organisation* of the craft. When referring to physical crafting places in the archaeological record, the term 'workshop' is often used literally, as a neutral synonym for 'crafting place' (e.g. Bertilsson 1986: 111), or to signal the *loci* of more large-scale or specialised

production (e.g. Björhem and Säfvestad 1993: 97). Used in this way, the meaning of the word corresponds to its modern definition, which the *Oxford English Dictionary* states as follows: "a room or building in which goods are manufactured or repaired". While this may seem like a rather open and unproblematic definition at the outset, looking at it more closely reveals its particular meanings and its cultural legacy, anchored in historical chief- or kingdoms as well as contemporary analogies in Western culture, such as artists' studios and village smithies (Figure 1). The following discussion, based on observations in archaeological literature and on the characteristics of contemporary and historic workshops, is an attempt to unpack some of its effects on archaeological thinking.

The preconceptions arising out of the use of the term 'workshop' can be articulated in three main points. A workshop, foundry or bronze smithy tends to be seen as:

- A place that is permanent and repeatedly used for crafting
- A place that hosts all stages of the manufacturing process
- A place that is customised for and used exclusively for crafting

First, the two central characteristics of workshops, as defined by permanence and repetition, have had a particularly strong influence on archaeological expectations of the organisation of metalworking sites. Permanent and clearly designated areas, with considerable amounts of debris from repeated use, are often considered the ideal crafting places to be identified during excavations.

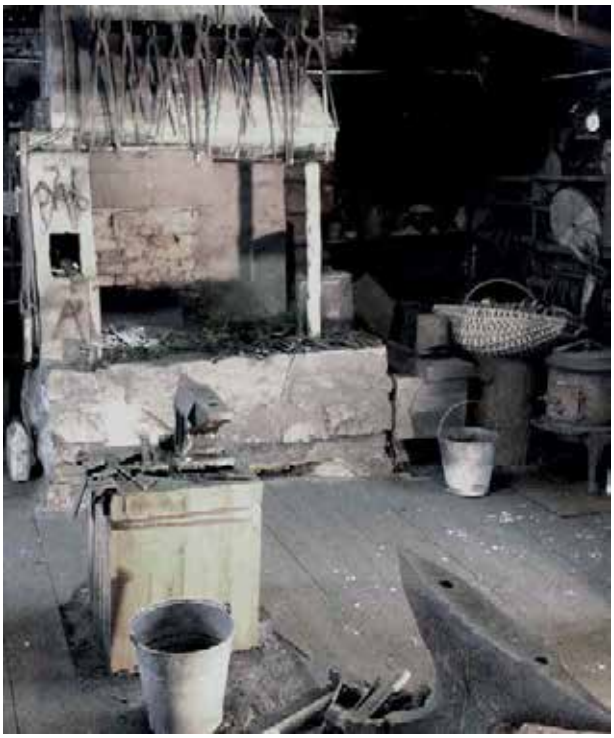

Figure 1: The village smithy is one of the historic analogies influencing archaeological expectations of ancient workshops. Interior of 20th century smithy in Fröstorp, Tibro, Sweden. (Photo: A. Sörman).

Interestingly, similar expectations arise from the concept of 'crucible furnace'. This term refers to simple pit furnaces with or without superstructure as described from Israeli examples by Tylecote (1992: 21), sometimes suggested to have been used in the bronze metallurgy of southern Scandinavia (Jaanusson and Vahlne 1975b: 13, 58-86; Serning 1987: 19-22; for critique see Hjärthner-Holdar 1993: 97). The concept of 'crucible furnace' also carries notions of a *permanent* and *repeatedly used* metallurgical structure. Such structures are preferably seen as established at permanent crafting places, like workshops. Although it has often been claimed that metallurgical furnaces were used in Scandinavian Bronze Age metalworking contexts (e.g. Vahlne 1989; Goldhahn 2007), some of the structures interpreted as such could perhaps be better described as well-isolated hearth pits. Furthermore, as argued and demonstrated in research focussed on the technical aspects of metalworking, bronze melting was also accomplished in regular hearths simply with the aid of bellows (Tylecote 1992: 21; Hjärthner-Holdar 1993: 97; see also Frölund and Schütz 2006: 243). The general sintering pattern on the rim and upper sides of the low, open crucibles from the Bronze Age suggests that the metal was indeed heated through draft applied directly from above in an open hearth structure (Eriksson 2003: 145; Eklöv Pettersson 2011: 23-25).

Second, workshops tend to be thought of as workplaces in which all or most parts of the manufacturing process were carried out. As indicated previously, this also creates a simplified, ideal image of the workshop as a space neatly organised around one single craft, whereas cross-crafting tendencies are common even within one type of manufacturing, as a single type of manufacturing often involves several material *chaînes opèratoires* (e.g. Brysbaert 2014). This easily leads to the assumption that all steps in the production, from the preparation of moulds to laying the finishing touch on crafted objects, took place within such a workshop. Sometimes this includes the assumption that all stages of manufacturing were also carried out within a coherent time frame. Such a scenario might be difficult to prove or disprove, considering that the contextualised mapping of the full *châine opératoire* is often hindered by the fact that many process stages leave few or no archeologically detectable traces (Brysbaert and Vetters 2010: 27). Either way, by starting from these presumptions, archaeologists run the risk of overlooking situations where different stages of the production were conducted in separate spatial contexts. Hence, there is always reason to be cautious when making inferences about complete technological processes based on the traces of one manufacturing stage, such as residue from casting only.

Finally, workshops are often thought of as places *customised for* and used more or less *exclusively* for craft activity. This assumption raises problems, as it can affect the openness towards other contemporary practices in the same environment. Practices and events carried out in parallel or in relation to the metalworking craft might prove to be crucial for the understanding of production in its social context. If other activities are, therefore, *a priori* seen as secondary to the craft, their relatedness might pass unnoticed and their importance underestimated. The notion of an exclusive crafting place defined by its metalwork essentially leads us to think of the craft as spatially and conceptually separated from other spheres of life. As I demonstrate, the expectations on finding 'pure' crafting places *defined by*

their craft activity may be enhanced by this understanding of the notion, which in turn might obstruct or even exclude the identification of crafting places which do not conform to these characteristics. More embedded forms of craft organisation might be noticed, but the assumptions will prevail through the terminology.

Hereby I do not suggest that Bronze Age scholars and excavating archaeologists have been blindly searching for workshops. Nor has my purpose been to exaggerate the importance of the term by suggesting that it is the only label used for crafting sites. Nevertheless, since it is used repeatedly in relation to specialised metalworking, it will continue to influence the expectations and assumptions surrounding the spatial organisation of crafting in Bronze Age Scandinavia. Even in the cases where the term is just meant to be a neutral synonym, it continues to affect the way we perceive the events, processes, and people that have interacted with the objects. If terms like 'workshop', 'workshop site' or 'bronze smithy' are applied uncritically, a certain model – coloured by analogies and characteristics from specific forms of production – will foreshadow our interpretations. In the long run, this can result in observations being fitted into ready-made categories, rather than testing whether or not the craft was organised accordingly. Although 'workshop production' has proven to be a useful conceptualisation in the study of many ancient societies, for example in the aristocratic settings of the Migration period in Scandinavia, where production was sometimes spatially organised in proper workshops corresponding to the characteristics listed above (Hjärthner-Holdar 2012; Lamm 2012), it conceals more than it reveals in the context of Late Bronze Age metalworking.

From workshops to crafting loci: arenas of specialised metalworking in the Late Bronze Age of south-eastern Sweden

The number of Bronze Age sites with evidence of metalworking has multiplied over the past few decades, due to the expansion of development-led archaeology. This growing body of material provides increasing opportunities to study the artefact production in its actual contexts, but has so far been used only rarely as a potential avenue for enquiries into craft organisation. By raising examples from this material the following discussion will highlight a number of Late Bronze Age production contexts from south-eastern Sweden (Figure 2) in relation to the idea of workshops and distinct crafting places. These are included in a wider comparative study of metalworking contexts in the region forming part of my ongoing PhD project exploring the organisation of bronze crafting in Late Bronze Age society. As these examples illustrate, there are important discrepancies between the spatial organisation generally assumed through our terminology and the actual contexts studied for this period.

Hallunda: the perfect workshop?

A natural starting point for discussing Bronze Age metal workshops in southern Scandinavia is the archaeological site of Hallunda in the suburbs of modern Stockholm, which, since its discovery in the 1960s, has been particularly influential for models of Bronze Age casting sites (Jaanusson 1971; Jaanusson and Vahlne

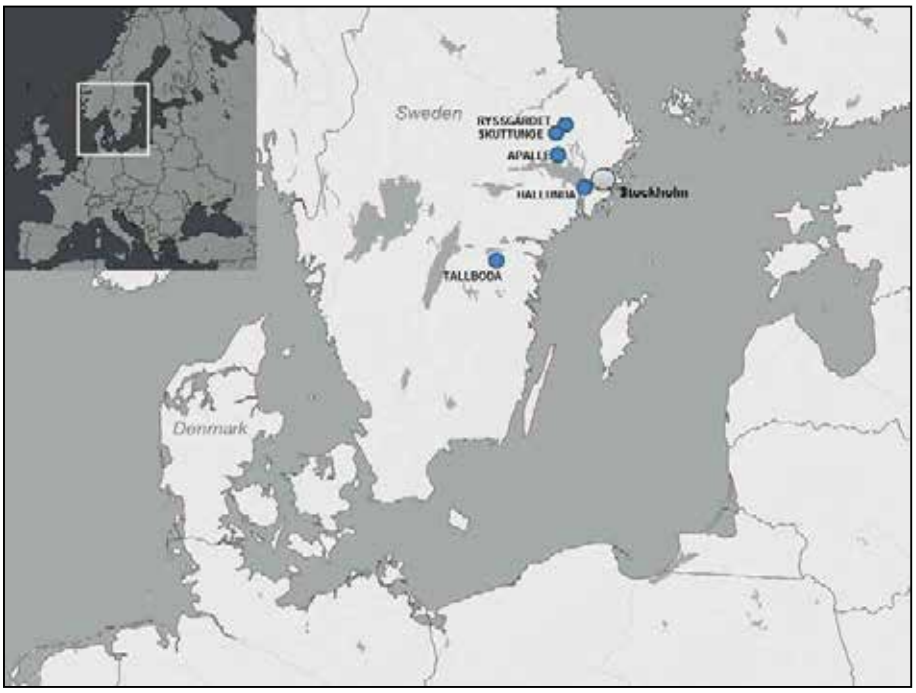

Figure 2: Map of southern Sweden indicating the main sites discussed in the text. (Illustration: Anna Sörman).

1975a; Jaanusson and Vahlne 1975b; Jaanusson *et al.* 1978). The intensive and continuous Late Bronze Age activity in Hallunda included remains of post-built houses, stone settings with graves, mounds of fire-cracked stones, terraces, hearths, pits, scattered cup-marks, and extensive cultural layers. Initial dating indicated Late Bronze Age period IV to period VI (*c.* 1100-500 BC) for these contexts. However, more recent calibrations now suggest a main timespan from the Bronze Age period III to the early Pre-Roman Iron Age (*c.* 1300 BC – 200 BC) (Östling *et al.* 2008: 43). Hallunda was interpreted as a regionally important settlement, with large-scale bronze artefact production supplying its hinterlands as well as testifying to its involvement in trade (Jaanusson 1981: 30; Vahlne 1989). The complex has later also been reconsidered as a grave and settlement complex with extensive activity areas for gatherings and cult activities (Carlsson 2001: 51; Thedéen 2004: 126; Sörman *ms*). Indications of bronze-working were found at several parts of the site (Figure 3); however, the concentration of casting debris by remains of a building on top of a distinct hillock came to be regarded as a *bona fide* bronze casting workshop: *'A concentration of finds and remains of metalworking has been found there, which can be exclusively regarded as a proper workshop for bronze craftsmanship'* (Vahlne 1989: 108; Figure 5).

The area with the supposed workshop context was broadly dated to the end of Early Bronze Age to the Late Bronze Age 1200-500 BC, through associated finds and ^{14}C-datings (Jaanusson and Vahlne 1975b: 32-35; Jaanusson 1981: 24). Charcoal from two hearth pits or 'furnaces' located inside this building were

dated to 2570±100 BP (St-3590) and 2735±115 BP (St-4032) (Jaanusson 1981: Table 5), corresponding to 898-412 and 1228-550 cal BC (OxCal 4.2; Bronk Ramsey 2009; Reimer *et al.* 2013). Looking closer at the interpretation of this building demonstrates the typical characteristics assigned to the 'workshop' concept. First, the accumulation of casting debris together with solid stone- or clay-lined hearth pits, interpreted as metallurgical furnaces, both within and adjacent to the building was taken to indicate a permanent, repeatedly used, crafting site. Finds of mould fragments with preserved casting cavities revealed that socketed axe heads, spear heads, swords, and neck rings had been manufactured within this area (Vahlne 1974; Figure 4). As the construction of the building differed from that of contemporary long houses, it was interpreted as a workshop building with "open architecture" appropriate for the fire-prone activities inside (Jaanusson and Vahlne 1975b: 13). Generic Bronze Age stone tools found there, such as hammer stones and polishing stones, were understood to be used for finishing work of the artefacts (Vahnle 1974: 15). Finds of bronze fragments and rods indicated possible raw materials and preparations for the melting. Not mentioned in the interpretation, other finds in the surrounding cultural layers included flint objects, animal bones, and fragmented pottery, mainly of finer wares. Finally, the graves and stone settings that surrounded the building were seen as unrelated, belonging to a later chronological horizon. Thus, the Hallunda workshop met the expectation of a specialised site hosting the full technological process: defined by and customised for the metalworking activities.

Recently, a quite different picture of the Hallunda 'workshop' has emerged following the re-interpretation presented by Joakim Goldhahn (2007: Ch. 9). In his essay, Goldhahn sets out to explore the evidence of ritual specialists in Bronze Age Scandinavia, which includes a re-examination of several bronze casting sites in Sweden discussing the social context of crafting, cross-crafting and the role of the smith. Goldhahn convincingly argues that the Hallunda's "workshop" context shows many similarities to Scandinavian Bronze Age cult houses, which are generally found in association to graves. He also emphasises the spatially intertwined and contemporary relation between the workshop context and several surrounding graves on the hillock. Casting of bronze objects in Hallunda is thus seen as one of several ritual activities in the arena of the cult house, along with ancestral ceremonies, human cremations, and transformation rituals, including metalworking as well as specialised ceramic production (inferred from the high-quality ceramics). Hallunda is included within a wider argument characterising specialised bronze-working as an esoteric practice, mainly performed in ritualised and secluded settings (Goldhahn 2007). However, despite many new and eye-opening observations, working beyond industrial prejudices and across traditional analytical categories, Goldhahn and others continue to use the term 'workshop' for Hallunda and similar Bronze Age sites. This terminology stands as an obstacle for acknowledging the special nature of Late Bronze Age crafting.

A large number of sites similar to Hallunda, with corresponding locations, comparable types of buildings, and residues of similar practices, have recently been excavated in the Mälar region (e.g. Strucke and Holback 2006; Eriksson and Östling 2005; Artursson *et al.* eds. 2011; see Sörman *ms* for details on the reconsideration

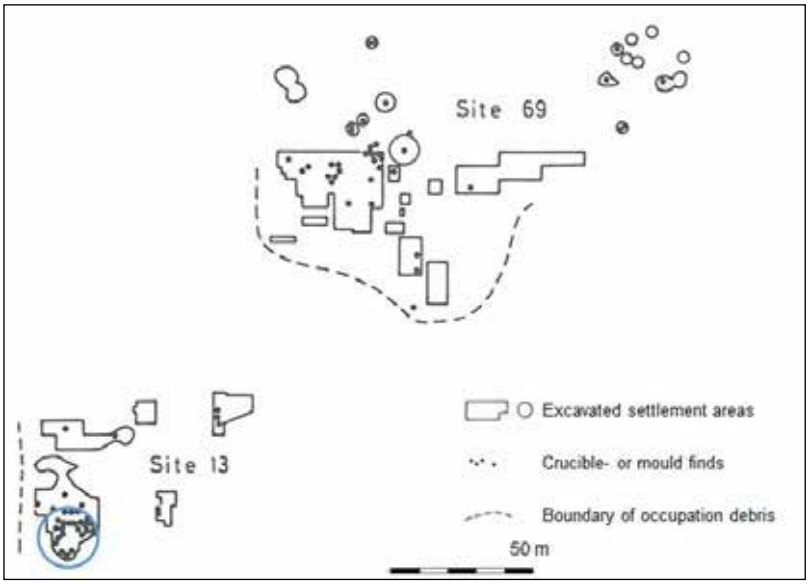

Figure 3: Overview of excavated areas of the Hallunda complex with distribution of bronze casting debris and circle indicating the 'workshop area'. The excavation covered 3,000 m² of an estimated total of 20,000 m². (Illustration reworked after Jaanusson [1980 fig. 14]).

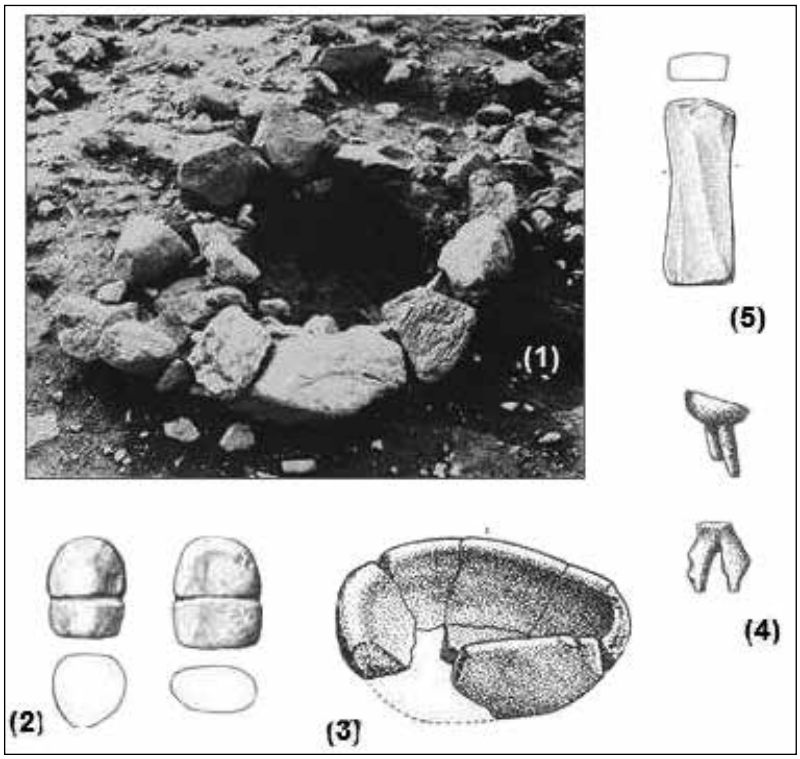

Figure 4: Collage of finds and features from the Hallunda 'workshop': (1) a stone-lined hearth pit interpreted as 'metallurgical furnace', (2) hammer stones, (3) a ceramic crucible, (4) casting sprues, and (5) whetstone. (Drawings: Bengt Händel).

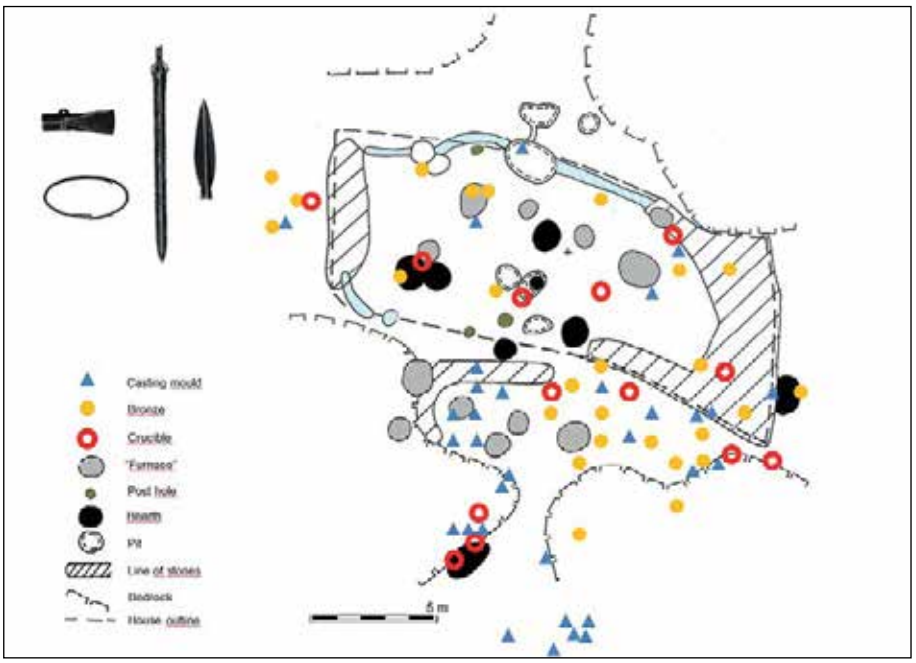

Figure 5: Plan of the Hallunda 'workshop' showing the distribution of metalworking debris and the schematic representations of the artefact types cast in the identifiable moulds. (Illustration: Anna Sörman. Reworked after Vahlne [1989 fig. 2] and [1974: 16]).

of the Hallunda remains in light of new evidence). These sites have strengthened the observed link between cult house environments and bronze-working, but have also demonstrated the variation within the 'cult house' phenomenon. One example that shares several characteristics with the Hallunda cult house[1] is the recently excavated Bronze Age settlement of Ryssgärdet. Here, two hillocks beside an extensive Bronze Age settlement hosted cult house buildings surrounded by traces of intense and long-term use, including handling of human remains and bronze casting, as well as residues of feasting and ritual drinking, inferred from the high-quality ceramics and vessel types (Eriksson and Östling 2005; Eriksson 2008). The presence of such high-quality ceramics and a high proportion of fine table ware in Hallunda should perhaps, in light of the Ryssgärdet observations, be interpreted as waste from drinking and feasting rather than, as proposed by Goldhahn, from ceramic production *per se*. While high-quality pottery was indeed produced and circulated at the site, the crafting loci for ceramics remain archaeologically unknown.

Although these locations repeatedly hosted metalworking, it is important to stress that crafting events here were embedded in an environment accommodating a variety of other activities that were integrated in what was clearly a wider

1 Drawing on the findings from Ryssgärdet a different interpretation of the layout of the cult house building in Hallunda will be presented by the author. For reasons of space this is not put forward here; instead see forthcoming PhD thesis (Sörman, ms).

ceremonial arena. The craft activity should thus not be seen as *the* defining practice at these sites, but as a series of practices in a larger ceremonial context. Hence, even though Hallunda and similar types of places are the most workshop-like environments evident from this period, they were still not characteristic 'workshops', as discussed above in the three-tiered definition. To continuously use this concept will inevitably fail to include crucial aspects of craft production in the Late Bronze Age, its integration in contexts with other non-craft practices and the lack of customised space, as well as the potential that casting was staged under different conditions than preparatory and finishing work.

Bronze casting in the Late Bronze Age long house

Further perspectives on this issue can be gained from the under-studied question of where and how people in the Late Bronze Age organised metalworking within their settlements. 'Settlement' is a wide term, here used specifically to refer to the immediate dwelling area. The fact that bronze casting is a common feature of Late Bronze Age hamlets has become widely acknowledged as a result of extensive contract archaeology in southern Sweden conducted during the last decade. That material has, so far, rarely been interpreted in more detailed studies of craft organisation. The limited engagement with these data is perhaps due to the low contextual and chronological resolution generally characterising Bronze Age settlement material. Another reason might also be that these contexts often fail to meet expectations about the nature of crafting places. Settlements without distinct casting places tend to be left largely un-investigated, either assumed to represent small-scale household production based on few finds (e.g. Eklöf 1999), or (if more finds) glossed over as a central production site (e.g. Thrane 1993). Either way, the internal organisation and meaning of the metalworking are left unexplored.

These points are illustrated by the settlement of Apalle in the province of Uppland, about 50 km northwest of Stockholm. This site is known as the hitherto best-preserved Bronze Age settlement excavated in Sweden, covering an area of at least 19,000 m^2. The settlement was located on a gently south-sloping field, and spanned chronologically from the end of the Neolithic to the mid-Iron Age, with a main settlement phase during the Bronze Age (Ullén 2003). Within this large, dispersed hamlet or village, about 80 prehistoric buildings were identified. Many of these were spectacularly well preserved, including floor-layers and other internal features, allowing for detailed studies of the spatial organisation in longhouses over time (Ullén 1994). The surrounding area featured pits, cooking pits, hearths, wells, fences and a few mounds and accumulations of fire-split stones and massive cultural layers with a well-preserved stratigraphy. The finds accumulated on the settlement included many tonnes of animal bones, fragmented ceramics and various bone, stone and bronze artefacts. Indications of metalworking in the form of casting debris was mainly found in stratigraphic layers 1-4, roughly corresponding to settlement phases spanning from Bronze Age period III to period VI (*c*. 1300-500 BC). The total included 365 fragments of ceramic moulds and 144 crucible shards.

A majority of the metalworking residue in Apalle consists of stray finds from cultural layers. However, a few finds have more direct contextual links to specific buildings. This includes casting debris found in longhouses and in one oval-shaped building. This structure (building 33) has tentatively been suggested to be the main metalworking arena at Apalle, due to a general clustering of metalworking debris at this part of the site (Ullén 2003). Goldhahn follows this line, interpreting the oval structure as an enclosure, and pointing to it as one of several indications of how bronze crafting was mainly secluded from actual dwelling areas (Goldhahn 2007: 212-13). However, taking a more detailed look at the distribution of the material evidence, we see a far more complex and varied picture in Late Bronze Age metalworking in the settlement of Apalle.

The metalworking residue has an extensive and varied spatial distribution over the site. Its presence in cultural layers, waste pits, waste dumps, and in some cases buildings indicates structured depositional practices. The debris cannot be said to be exclusively or clearly accumulated in relation to a particular crafting area or building over long periods of time, as would a permanent workshop signal. Rather, the pattern is indicative of craft production not restricted to a specialised metalwork context, but occurring in various contexts over time within the community. The evidence tied to buildings is sparse, but as we shall see, these cases are parts of a wider and so far neglected pattern in the material, indicating that residential long houses were an important arena for Late Bronze Age metalworking. In one of the longhouses (building 26) with ^{14}C-datings ranging from 1386-1005 cal BC (Ua 8384) to 895-550 cal BC (Ua 8487) (Ullén 2003: 68; OxCal 4.2; Bronk Ramsey 2009; Reimer *et al.* 2013), and belonging to layer type 1 translating to settlement phase 5 of Bronze Age period V-VI (Ullén 2003: 41-42), fragments of a casting mould for a neck ring were found in the clay-lined hearth inside one of the rooms. Another indication can be found in a longhouse (building 31) belonging to layer type 2 of an earlier settlement phase, roughly corresponding to period III-IV as indicated by a ^{14}C-date of charcoals from the hearth dated to 1411-979 cal BC (Beta 32762) (Ullén 2003:63; OxCal 4.2; Bronk Ramsey 2009; Reimer *et al.* 2013). Here, two clay mould fragments were found, possibly intended for the production of a belt dome, a conspicuous decorative item associated with special female costume. While the specific role and function of these particular longhouses within the village cannot be further determined, it is clear that their context and setting, along with the surrounding activities, signal considerable differences from the cult houses discussed earlier. Hence, these finds can be seen as strong indications of casting in the residential area. Contrary to the simple implements commonly associated with domestic production in the household (Oldeberg 1960; Goldhahn 2007: 323; Nilsson 2011), the casting in these longhouses indicates the production of complex and prestigious items.

As Bronze Age settlements often suffer plough-damage and poor preservation levels, only few other indications of metalworking in Late Bronze Age longhouses are so far known. A similar case in the same region was found during a rescue excavation of a Bronze Age – Iron Age settlement by Skuttunge church 2006 (Seiler and Östling 2008). The excavation covered 10,000 m^2 of a much larger settlement area including activity from the end of the Neolithic to the Late Iron

Age, located in a gently south-sloping field. Inside a three-aisled Bronze Age longhouse (building 5), a handful of ceramic mould fragments were found in preserved parts of the floor-layer (Figure 6). One of these was probably used for the production of a spectacle fibula, an object type chiefly dating to the Late Bronze Age (Seiler and Östling 2008: 39). The dating of the house unfortunately remains uncertain due to conflicting dating from finds and house typology versus ^{14}C-analysis. However, especially considering the mould find, a Late Bronze Age date seems most probable. Interestingly, a similar find is also known from Tallboda, further south along the Swedish east coast. Just next to a three-aisled Late Bronze Age longhouse (building 1), a mould for a spectacle fibula, most likely from period V, was found together with a crucible in a sooty pit (Äijä *et al.* 1996; see Figure 7). The Tallboda house, located within a vast grave and settlement complex, is yet another example of the previously unrecognised link between casting and the Bronze Age longhouse; these examples are now beginning to form a pattern too strong to be ignored.

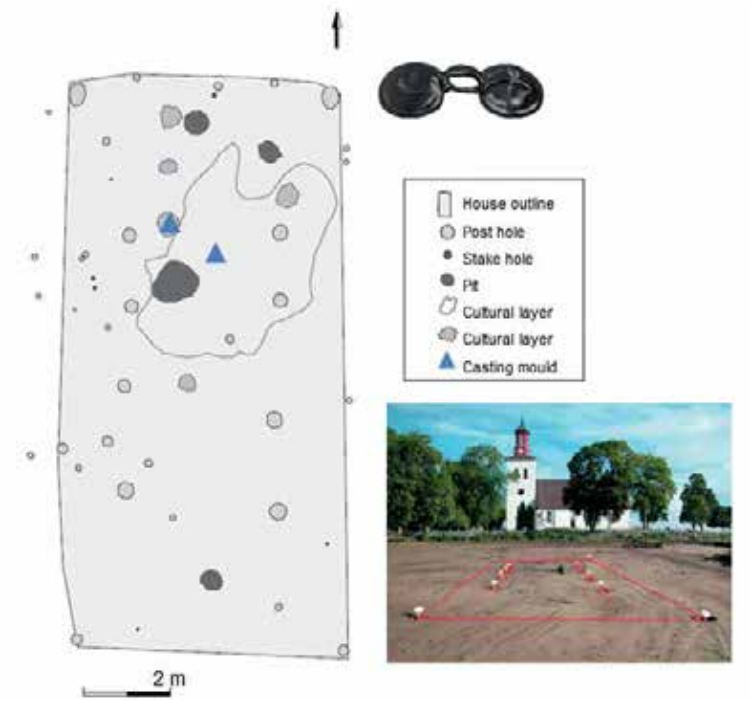

Figure 6: Plan and photo of house 5 at the Skuttunge settlement and a schematic representation of a spectacle fibula, indicating the artefact type interpreted to have been cast in the mould. (Plan reworked after Seiler & Östling (2008 fig. 79a). (Photo: Charlotta Helgesson).

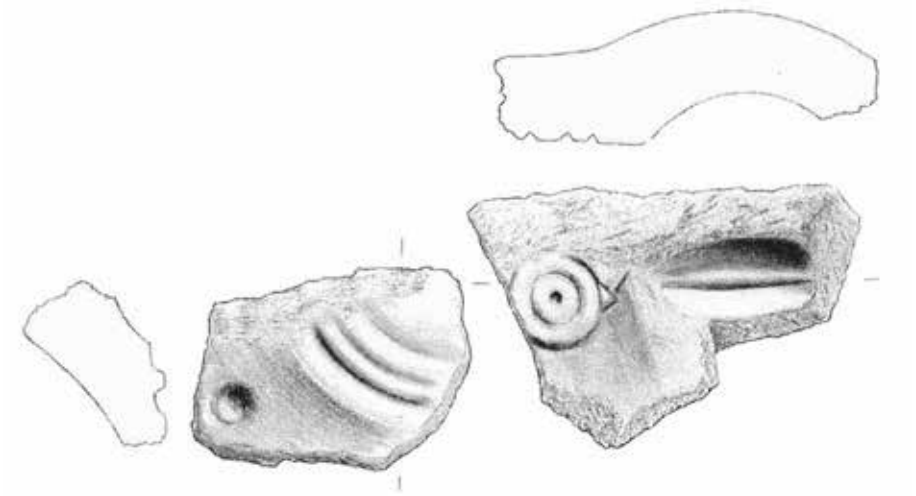

Figure 7: Fragments of ceramic mould for spectacle fibula, probably dating to Bronze Age period V, found in close proximity to a longhouse within the grave and settlement complex at Tallboda. (Drawing: Anders Eide).

Like the contemporary bronze-working at Hallunda, these contexts demonstrate sophisticated production of elite-associated items, without the context exclusive crafting spaces. Instead, these conspicuous high-status insignia such as brooches, major female ceremonial regalia like belt domes and hanging vessels/belt boxes were crafted in arenas embedded within dwelling space. The situation in Skuttunge, Apalle and Tallboda furthermore indicate the casting equipment for artefact production could be rigged in various places – probably even by the fireplaces within longhouses. Although more archaeological evidence is needed in order to support this hypothesis, it is plausible from a technical point of view, as melting could easily be accomplished in a regular hearth with the aid of mobile bellows and a tuyère. These findings challenge ideas of specialised, permanent and customised crafting *loci* for the production of prestigious and socially valuable objects, as is presumed by the idea of 'workshop production'.

Bronze casting as an integrated and multi-locational craft

It can thus be concluded that highly skilled Late Bronze Age metalworking of prestige goods took place in several different environments within the community. Cult houses and longhouse contexts of larger grave and settlement complexes have been given particular attention here. As these examples show, the term 'workshop' has proven problematic both because it tends to obscure specialised crafting in domestic or more temporary settings, such as longhouses, and because it fails to give justice to the casting sites in cult-house contexts like Hallunda. The accumulating evidence of metalworking from longhouse contexts in particular demonstrates the limitations of the commonly assumed characteristics of specialised, elite-motivated metalworking deriving from the notion of 'workshops'. This also cautions us regarding how and where to draw the line between domestic and more specialised forms of craft production, and it reminds us that high-status, socio-politically

significant crafting was also carried out in a 'domestic' setting. The sophisticated metalworking by the prominent cult house, as well as by the longhouses of Apalle, Skuttunge church, and Tallboda, also suggests that metalworking was carried out in central arenas within these grave and settlement contexts. It is difficult to evaluate how the visual access of the casting in these settings was manipulated. However, casting in such significant social arenas could indicate that castings could be manifest, maybe semi-public events within these communities.

Some observations also suggest that the crafting loci of bronze objects, including complex objects such as spectacle fibulas, should be seen as more flexible in nature than previously acknowledged. The evidence from the longhouses indicates casting within dwelling areas and represents arenas that probably hosted a wide range of other activities on a regular basis. It is thus likely that the facilities for crafting were not of a permanent character. The situation in Skuttunge, Apalle and Tallboda suggests that the flexibility to which technology of bronze melting easily lends itself – a fireplace with draft bellows and prefabricated equipment and moulds – was exploited to stage production in different settings, including the longhouses. Altogether, this suggests that the production of bronze objects could be carried out flexibly in different settings rather than in permanent workshops or specific enclosed workplaces. Looking at it from this angle, it resembles the modern practice of reconstructing ancient techniques on fairs and historical theme days where casting is staged in various locations in both indoor and outdoor environments. The technology involved in the process of casting would thus readily have lent itself to such multi-locality.

In order to fully acknowledge the flexibility and the deeply integrated character of this metalworking tradition in this period, I suggest that the 'workshop' concept should be avoided for these regions of southern Scandinavia. Using less prejudiced and culturally-laden terms, such as crafting loci and casting places, allows for more nuanced observations. The concept of 'loci' functions as a more open definition simply denoting "the place in which something is situated or occurs" (*Oxford English Dictionary*) without assigning it any specific characteristics. In contrast to 'production loci', previously suggested as a more neutral alternative by Cathy Lynne Costin (1991; 2001: 296; applied in a Bronze Age context by Kuijpers 2008), 'crafting loci' opens for various steps of the production process to be located in various spaces, while production tends to translate to the full manufacturing process. Hence, a casting place could constitute one of several 'crafting loci' for the production of metalwork, itself involving several material *chaînes opèratoires* (see Figure 8).

The crafting loci for Late Bronze Age casting should rather be characterised as places *hosting* craft production than places *defined by* their craft activity. The creation of new bronze artefacts seems to have been truly integrated in different social domains, carried out alongside and in connection with a range of other activities. As indicated particularly through the well-preserved and extensively excavated settlement at Apalle, production of high-status metalwork was not carried out in permanent workshops. If such a permanent and repeatedly used facility existed there, it would most likely have been identified. Instead the distribution of metalworking debris indicates that bronze casting occurred at different areas within the settlement, and varied through time. For other reasons it is also difficult to

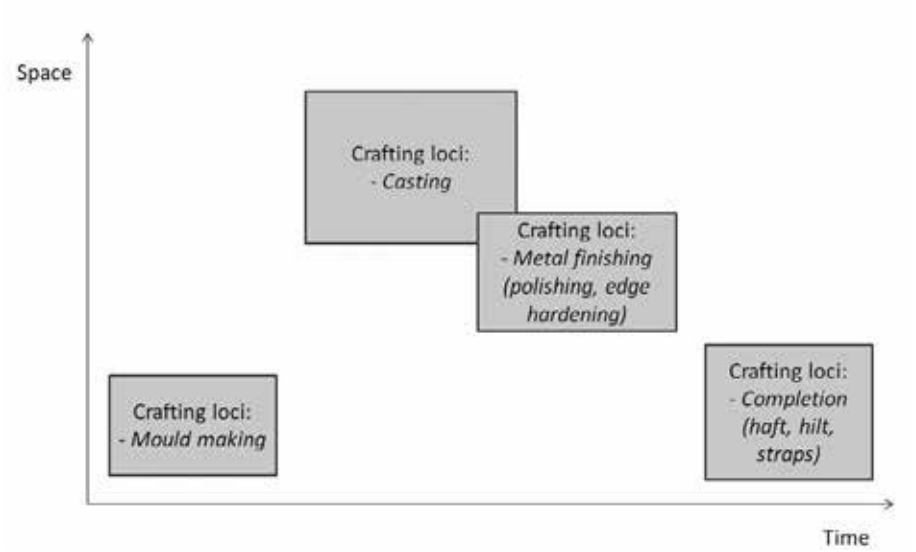

Figure 8: Schematic illustration of crafting loci within the process of bronze artefact production with casting. Different components represent production stages and their potential relation to each other in time and space. (Illustration: Anna Sörman).

describe the cult house in Hallunda as a proper workshop. Although this building was of a permanent character and certainly hosted crafting repeatedly, the setting of the craft shows that the bronze working was part of a ceremonial arena with much wider connotations; crafted in the same environment as the handling and deposition of human remains and aspects of ritual drinking.

Insignia in the making: Late Bronze Age metalworking and social reproduction

So, what can these tendencies in spatial organisation tell us about the social roles of craft production in southern Scandinavia during the Late Bronze Age? If not in the form of attached workshops, how was elite-motivated production facilitated, and with what social significance? These key questions have to be addressed in relation to a broader discussion on socio-politics and the conditions of specialised crafting in so called middle-range societies; that is to say, in sedentary, hierarchical societies without the strong political centralisation seen in states, palatial regimes or chiefdoms. The previous discussion problematised current models on elite-driven craft organisation in complex societies, arguing that they rely primarily on examples from centralised chiefdoms or state polities (e.g. Costin 2001: 309; Spielmann 2002; Hruby and Flad 2007). From this discussion and the heterarchical approaches to craft production outlined above, new possibilities open up for understanding the evidence from prestige bronze production in southern Scandinavia. This section is devoted to these possibilities.

One of the most important clues for better understanding the specialised metalworking lies in the variation seen among Late Bronze Age crafting loci. Approaching these sites from a contextual angle has shown that casting of high-status metalwork varies not only in *location*, but also in *composition between*

locations. There is a differentiation in the *types of objects* cast in the various settings in south-eastern Sweden. In the Hallunda cult house, production of swords, spear heads, axe heads and neck rings could be traced through the debris. Interestingly, apart from the neck rings, none of these object types overlap with the major dress ornaments produced in Bronze Age longhouses. It thus appears as if the places where the metalworking occurred served different purposes and were focused on different types of prestigious objects. Due to the high fragmentation degree, it is impossible to absolutely verify that the sites did not originally host the same range of production, but the observations made so far definitely support this theory, justifying the formulation of a strong hypothesis. Working from this hypothesis that production in various arenas was also performed for various outcomes, what might the differentiation signify in terms of 'production incentives'?

When it comes to the different crafting loci for weapons contra conspicuous ornaments, interesting parallels can be found in patterns of wetland depositions. The general differentiation in use and disposition between these object categories relates to the wetland categories of figurative representations and Early Bronze Age burial customs (e.g. Bodilsen 1986; Levy 1982; Gibbs 1998; Jensen 2002; Bergerbrant 2007; Stig Sørensen 2013; Melheim 2015). In this context, the differentiation is suggested to mirror the fact that the objects were associated with various elite institutions and identities tied to different gender spheres (e.g. Kristiansen and Larsson 2005:298-308; Stig Sørensen 1987:100). Most prestige bronzes of the Late Bronze Age southern Scandinavia can thus be characterised as constituting a formalistic material universe with clear gender-bound lines between male and female (Stig Sørensen 1987; 1989: 72-73). Viewed in this way, the 'production incentives' – often attributed to the abstract market forces of 'demand' and 'client/customer' – could be extended to include motifs, events and intended users.

The manufacturing of exclusive and symbolic objects like the Bronze Age sword, as pointed out by Joakim Goldhahn and Terje Oestigaard (2008: 231), was most likely tied into a rite of passage that signified the new social position for the bearer of the weapon. The manufacturing of important ceremonial regalia of high-status female costume, such as the belt dome or conspicuous spectacle fibula carried by high-status females, could have had a similar function. Based on studies from Danish Early Bronze Age inhumation graves, objects such as weapons and belt ornaments were carried by some adults and adolescents from the age of 15 (Bergerbrant 2007). Similarly, Marie Louise Stig Sørensen's research on the Early Bronze Age female costumes in the Lüneburg area demonstrates how the female dress code followed general conventions, where bronze ornaments created a very visible categorisation of individuals changing at certain life-stages (Stig Sørensen 1997). The use of the eye-catching attributes suggests that they functioned as identity markers, meant to be communicated widely within a community. This is equally applicable to the major insignia of the Late Bronze Age Scandinavia. As Sørensen (1997: 108) points out: "*such public categorisations are likely to have been far reaching in terms of, for instance, social organisation and ritual organisation, but such consequences remain to be investigated*."

Following this, if the production incentives of high-status insignia, such as large dress ornaments and weapons, were linked to new social personas of political significance, the production event was most likely motivated by the initiation of such individuals. Not only would this manufacturing event and the subsequent use of the object mark the entry into a new age role and responsibility, but just as with weapons and other exclusive and highly symbolic bronzes, it would signify social distinctions and authority. The crafting of such prestigious and socio-politically meaningful objects must have carried wider importance in the community, tying into transactions and displays of power: acts crucial in social reproduction. Seen in this light, the moulds for a belt dome and a sword, found in two distinctly different settings in Apalle and Hallunda, take on new meaning and could represent one of the 'consequences' implied by Sørensen. Most likely, these production events were linked to initiation rituals tied to puberty, inheritance or political achievement. Therefore, seen from the motivation and timing of production, the *intended uses and bearers* of the produced objects would have belonged to different social institutions, which could explain the spatial differentiation of the crafting.

Rather than a spatially exclusive production of elite prestige goods, we seem to be dealing with a craft employed more diversely within different *elite domains*. Consequently, the hierarchical model of craft organisation needs additional lateral levels to acknowledge the variation within elite-motivated production. This can be achieved through the concept of 'heterarchy', a concept developed as an alternative or complement to hierarchical models of social organisation. In relation to craft production it has been discussed foremost by archaeologists Robert Ehrenreich (1991; 1995) and Elizabeth DeMarrais (2013). Through examples from pre-Hispanic Argentina, DeMarrais has demonstrated how artisans in heterarchical communities are more likely to work under diverse socio-political conditions and contexts than elite- or state-sponsored craftspeople in more hierarchical and strictly centralised settings. These conditions, she suggests, mirror their engagement in *various social projects* (DeMarrais 2013: 345). The diverse character of specialised craft production corresponds well to the observations made in south-eastern Sweden. Although bronze-working largely served elite needs, it was arranged in relation to several spheres of influence. While perhaps not exclusively dedicated to this task, the evidence suggests that crafting was performed as part of individuals' initiations into different social institutions. An image of metalworking intertwined in various social strategies by a number of parties – male and female – emerges, with all of these parties exploiting diverse means of social control and legitimation (Levy 1995: 48).

The differences in craft production also highlight the problem with views of prestige goods as a unified and interchangeable category of wealth (Flad and Hruby 2007: 9-11; Brück and Fontijn 2013). These prestigious items were intended for different users, with different potentials and effects. I propose that these differences were also mirrored and created *through* the act of their production. Taking this stance, my perspective aligns with that of Katherine Spielmann (2002: 202), arguing that the parameters of elite "attachment" need to be redefined for small-scale societies. I have offered one such potential redefinition: that specialised and elite-motivated craft production served various purposes and was spatially located in relation to these purposes, rather than concentrated in a centralised, exclusive

space. This has been exemplified by the casting of spear heads among drinking rituals and funerary rituals at the Hallunda cult house, relating to the initiation of warriors, and the complex brooch casting taking place centrally in the Skuttunge dwelling, playing part in the inauguration of a female with a special standing in society. Connecting the integrated and variable crafting loci to heterarchical social relations has demonstrated that production events could, in fact, have been oriented toward their users rather than their producers, and that the crafting was performed within lived spaces rather than in exclusive 'workshops'. Such user-oriented production gives another answer to how metalworking was related to, and part of, the organisation of power. It points to a world where the making of objects was directly linked to the making of people. I believe that such perspectives are key to increased understanding of where and how craft could be arranged and socio-politically harnessed in hierarchical societies (see also Spielmann 2002; Carter 2007).

Summary and conclusions

In southern Scandinavia, bronze casting was performed in several spatial and social arenas, from cult houses to longhouses. Rather than being carried out in centralised and customised crafting places like workshops, metal production was deeply integrated into various settings and social arenas of Late Bronze Age life. Increasing evidence suggest that production of high-status objects, such as belt domes and spectacle fibulas, occasionally took place in or nearby Bronze Age longhouses. These findings challenge ideas of specialised, permanent and customised crafting *loci* for the production of prestigious and socially valuable objects, as is presumed by the idea of 'workshop production'. Based on the evidence of how craft was performed at sites from south-eastern Sweden, it is argued that the notion of 'workshops' should be avoided in the context of Late Bronze Age southern Scandinavia. As suggested in this paper, the manufacturing of complex prestige items associated with high-status costume and ritual in the female versus the male sphere – swords and belt domes – was differentiated in space. This is interpreted as a prestige-goods production organised along gender lines and arranged based on the social meaning of the product. This craft organisation can be characterised as embedded and user-oriented: directly linked to the clients or potential users, rather than to the specialised craftworker/s. Manufacturing events were integrated parts of various public or semi-public rituals – such as initiations, inaugurations or other life cycle ceremonies – which are mirrored in the various different crafting loci for objects tied to different socio-political roles. All this implies a bronze artefact production both differently and more actively exploited in the reproduction of social and political order than previously acknowledged.

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The power of production in the northern Iberian world (6th-3rd centuries BC)

Alexis Gorgues

In recent years, much attention has been given to the dynamics of social inequality in the Northern Iberian world (Figure 1). Elites have mainly been considered in a socio-evolutionist fashion, focusing on their role in the historical trajectory of Iberian communities from small-scale societies to archaic states between the 6th and 4th-3rd centuries BC (for example: Samartí 2004; Sanmartí *et al.* 2006). This specific focus brought with it a vision of elites exercising strong, if remote, control over economic activities, in particular highly skilled crafts. Their role in this respect would have been mainly to exercise control over and to direct the activity of craftspeople placed in a subordinate position within the social structure. The recurrent discovery, in contexts of elite residences, of remains associated with skilled craft activity is generally interpreted as the result of control by elites of the means of production (for loomweight accumulation in the "chieftain's house" *-casa del cabdill* in Catalan- of Les Toixoneres, Calafell: Asensio *et al.* 2003: 273). According to this interpretation, elite house facilities would have been used by dependant craftsmen working in their master's home. Yet, this explanation seems partially inadequate. Archaeological analogy may suggest that control over production in past societies lay mainly in control over raw materials, since tools in themselves are not that difficult to manufacture and therefore compromise any attempt for monopolization, in contrast to modern day machinery whose acquisition requires the mobilization of huge capital. In many cases (for example in Europe, in the three centuries before the beginning of the Industrial Revolution: Tognarini, Nesti 2003: 14-18), remote control of production process resulted in an opposite situation to the one observed in the Iberian area: craft activity was disseminated throughout the cities, and products were concentrated in huge warehouses. The limited size of the Iberian settlements would have allowed such remote control over production by the elites, especially if we consider the possible use of writing to transfer and perpetuate information from the end of the 5th century onwards.

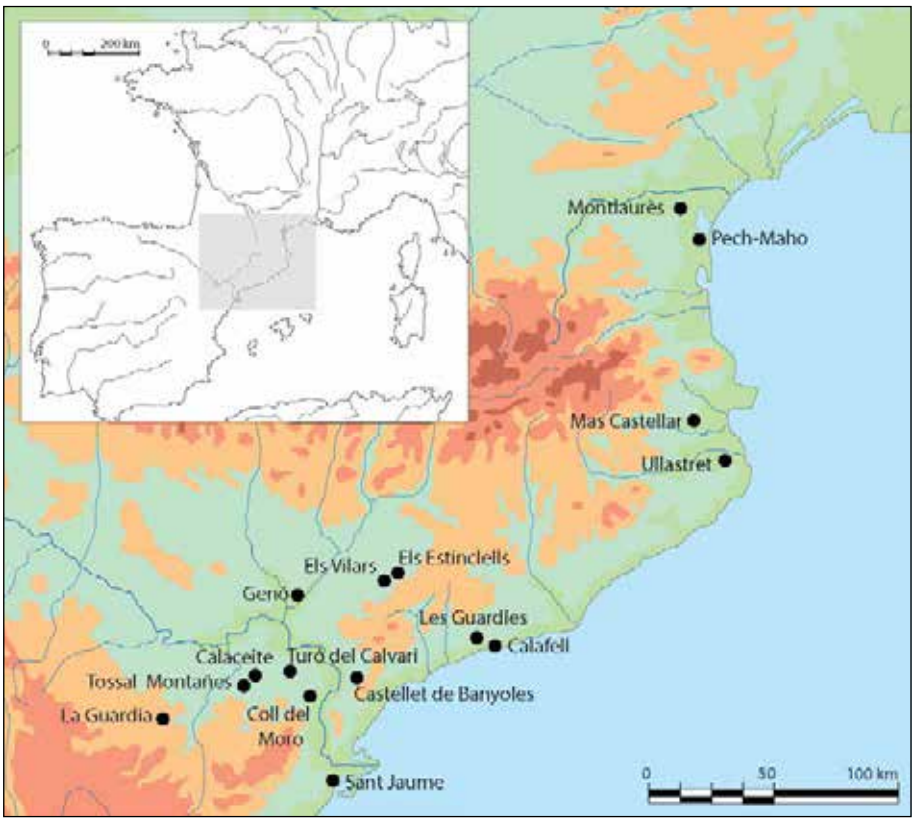

Figure 1: Map of the main sites evoked below.

This paper discusses the prevalent idea that Iberian elites did not actually work, but made people work for them. First, we shall try to define what we mean by the use of the term "elites," before discussing how we could link them to archaeological evidence for craft activity. We will then try to infer their position in respect to the complex technical activities.

The space of the elite

We will use here the generic term "elites" to designate individuals or groups of individuals which dominate the socio-political hierarchy within a specific community. This very broad definition allows coverage of the whole range of situations we may find in our area of study for our period.

From one region to another and from period to period, levels of hierarchy and social differentiation seem to have been fairly heterogeneous; forms of social and political organization varied both in time and space. Funerary evidence indicates a limited number of aristocrats as a class of rulers only for the very beginning of our period, the Early Iberian period (*c.*550 BC/425 BC). Evidence may be found for the 6th century BC Lower Ebro Valley, in the form of rich isolated cremation burials (e.g. Las Ferreres, Calaceite: Moret 2002; Moret *et al.* 2006: 151-154), but these seem more characteristic of phases immediately prior to the Early

Iberian, even if this kind of funerary pattern was still in use around 550-525 BC. Comparable tombs may be found in the Languedoc, such as in Corno-Lauzo, which probably comprised a double burial with two deposits separated by 25 or 50 years between 575 and 500 BC, as shown by the recent reinterpretation of Graells (2015, with bibliography). The interpretation of this tomb as an isolated one may be due, however, to the lack of further excavation in the area. Elsewhere, since the Late Bronze Age, large cemeteries of cremation burials were the norm. In these necropoleis, tombs displayed different levels of wealth, whilst grave goods emphasized gender identity. In some regions, such as in the Languedoc for instance, the 6th century funerary record sees an increasing preoccupation for weapons as an identity marker (Beylier 2012: 167-234), while in other zones this type of material remains almost entirely absent (e.g. Coll Del Moro de Gandesa: Rafel 1991; Santa Madrona, Ribera d'Ebre: Belarte, Noguera 2007). Evidence for the 4th and 3rd centuries is not very abundant, but the prevalence of weapons in many cremation burials (subsequently interpreted as male), as well as the wealth of the deposits, suggests the existence of a fairly large elite group with access to the most archaeologically visible funerary practices. From the 6th to the 3rd centuries BC, the overall trend seems to shift from strongly individualized elites recruited among small-size polities towards a larger number of highly ranked individuals belonging to larger (and more extended) communities.

The analysis of the settlement patterns complements this picture. In the Lower Ebro Valley, from the end of the 7th century BC to the very end of the 6th century BC, monumental, isolated buildings can be interpreted as the living places of the aristocrats whose existence was evidenced by contemporary isolated graves. In western Catalonia, the spectacular settlement of Els Villars (Arbeca, Lleida: Junyent, Moya 2011) is perhaps an extreme manifestation of the same process. Some of these compounds would have survived well into the Iberian period: Els Villars is only

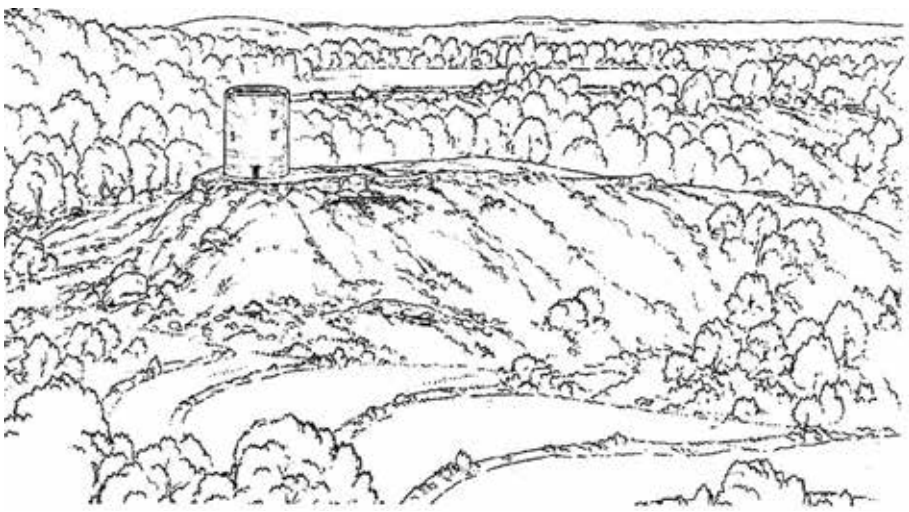

Figure 2: The tower-house of Tossal Montañes in its landscape, according to F. Riart (in Moret et al. 2006, fig.59 p.68).

abandoned in the 4th century BC. The tower-houses of the Lower Ebro, a specific type of aristocratic residence whose history began in the 6th century in l'Assut (Tivenys: Diloli *et al.* 2009) and Tossal Montañes (Moret *et al.* 2006: 29-63: Figure 2), would have evolved in the following centuries towards more complex shapes, as in l'Assut or La Guardia (Alcorisa; synthesis in Moret 2006). After the 5th century BC they were no longer the focal point in the landscape. In the Lower Ebro Valley, like everywhere else, hill-forts now played this role.

The morphogenesis of this specific type of settlement was based on very different micro-regional processes, but towards 500-450 BC, the situation may be considered broadly homogeneous throughout the northern Iberian area: blocks of houses separated by streets (often quite narrow) occupied the inner part of enclosures of very irregular shape (often up to 2 ha). Stone ramparts protected them (with some significant exceptions, like Montlaurès, near Narbonne, in France: De Chazelles, in Dellong 2002: 466-484), sometimes characterized by very ostentatious architecture (in Pech-Maho, Sigean: Gailledrat 2010: 169; in San Antonio, Calaceite: Moret *et al.* 2006: 154-165). The inner structure of these settlements is characterized by growing complexity. After the initial stages of these agglomerations, the shape and size of the houses differed ever more, and social stratification seems to be well reflected by these differences.

The existence of complex houses dominating the inner structure of the fortified settlements was noted long ago (Belarte 1997), and they were soon interpreted as elite residences. Yet, this category of domestic building can be, from one site to another, very heterogeneous. The inner structure of the two twin settlements of Ullastret, Puig de Sant Andreu (Martín *et al.* 2004) and l'Illa d'en Reixac (Martín *et al.* 1997), were both characterized during the 4th and 3rd century BC by the existence of large mansions of about 1000 m² and even larger for Puig de Sant Andreu, depending on the attribution to this house of a marginal compound of four rooms separated from the bulk of the building by a narrow blind alley. For now, though, this situation remains exceptional. In the Castellet de Banyoles, the largest houses covered an area of about 200-250 m² (Sanmartí *et al.* 2012). In Pech-Maho, the largest houses seem to have covered an area of less than 150 m², and in San Antonio de Calaceite, they were even smaller (about 100 m²: Moret *et al.* 2006: 155-157; see also Figure 3). This last case emphasizes, however, two of the difficulties hindering the possibility of linking directly the size of a house and the social rank of a domestic unit, mainly because of the morphology of the hill-fort itself. At San Antonio, the higher part is apparently older than the lower part. It was originally protected by a 5th century BC stone wall that was, in the 3rd century BC, absorbed by the new buildings built against its outer face. This evolution through successive stages may have forced a differential constraint on the spatial extension of the different houses, thus not totally related with the status of its inhabitants: in the 3rd century BC, the houses located higher up were "squeezed" into a settlement fabric inherited from the earlier phases of inhabitation, in contrast to the ones located further/lower down. Secondly, and more significantly perhaps, only the basements of the lower houses are visible to us, and it is possible that some of them may have had another storey above the ground floor, which means that we do not know the exact size of the house, and we have only a partial idea of its inner

Figure 3: San Antonio de Calaceite after Moret (in Moret et al. 2006: fig.151 p.156).

structure and evolution. While Iberian domestic contexts often provide indirect evidence for the existence of upper storeys (staircases, stratigraphic evidence for the collapse of an upper structure), sometimes of limited size (for example, *mezzanines*), their exact morphology remains unknown to us, and sometimes, even their exact number cannot be ascertained.

Far from the complex formation processes observed in San Antonio de Calaceite, the short-lived settlement of Els Estinclells provides a snapshot of how social differentiation could express itself through domestic architecture in the 3rd century BC (Asensio *et al.* 2009). This hill-fort, in part destroyed by erosion, is characterized by a clearly hierarchical structure. Three blocks of houses can be distinguished, each one corresponding to a specific architectural form. To the north, a first block of five unicellular buildings of about 12 m² seems to correspond to the simplest type of domestic building, while another group of twelve single-storey houses of about 30 m², split into two blocks to the west and to the east of the settlement, constitutes an intermediary one. At the southern end of the enclosure, six two-storey houses, with a ground surface of *c.* 60 m² seem to represent the highest level of architectural complexity.

This aspect of the morphology and size of the houses, the limits of which we have already discussed, is not the only one to take into account. When examining the relationship between a house and the social status of its inhabitants, symbolic aspects must also be considered. For example, in Els Estinclells, the only child burial in the settlement was found in one of the biggest houses (house 1; Asensio *et al.* 2009: 133, 135). Recent investigations in Ullastret have demonstrated the complexity of the symbolic practices associated with the periphery of some very specific buildings, involving the display of weapons and skulls (Martín *et al.* 1997;

Martín *et al.* 2004; Gorgues 2013). These examples point out the fact that the house as a building had a symbolic and a memorial dimension associated with its successive inhabitants. A house in itself may have been prestigious or may have accumulated prestige throughout its history, because of who built it, who inhabited it, and where it was located. Sometimes, archaeological contexts provide a very clear indication about which houses had a high symbolic status and which ones did not. But we have to assume that in many cases, this dimension is totally lost to us, because this symbolic importance was not crystallized in material form or because site formation processes–or even the dynamics of field investigation–do not allow for the recognition of this dimension. Last but not least, it seems that the most important houses played a structuring role in the agrarian activity, as shown by important storage facilities (Gorgues 2010: 129) or the discovery of agricultural tools (ploughshares for instance) in hill-fort contexts.

The development of hill-forts did not mean the end for all other forms of settlement. As we have already stated, the history of the aristocratic "manors" of the Lower Ebro continued until the end of the Iberian period through different shapes. In the eastern part of the Iberian world, apparently during the 4th century BC, some large isolated buildings appear in the landscape, as at Les Guàrdies (Rigo, Morer 2003) or Mas Castellar de Pontós (Pons 2002), while few are known in Languedoc or Roussillon. These buildings, the plans of which look very similar to those of the elite houses in the hill-forts, combine more diversified activities (such as iron metallurgy) than merely agrarian production and must be regarded as the countryside counterpart to the hill-fort elite houses, as they present the same specificities. From a symbolic point of view, their prestige could come from their peculiar architectural features as well as from complex symbolic practices: in Mas Castellar de Pontós, traces of displayed skulls and weapons were found, among other evidence for symbolic activity (Rovira *in* Pons dir., 2002: 540-541 et Agustí, *in* Pons dir. 2002: 561-563). Landscape setting must also be taken into account: in the later hill-top settlement of Torre Cremada (Valdeltormo, 1st cent BC) an Early Iron Age stele was reemployed in the construction of the huge tower dominating the site (Royo Guillén, Gómez Lecumerri and Benavente Serrano *in* Moret *et al.* 2006: 88-106). This settlement was probably erected above an ancient necropolis, showing a re-appropriation of the prestige associated with this particular place.

Inside or outside the settlement, some buildings can, without doubt, be associated with local prominent domestic units. These elite houses can be described as structures of notable size (and inner complexity)-*in the specific context of their community* – with important storage facilities, and their prestige may have been enhanced through complex symbolic practices. Yet, the only variant that archaeology will consistently allow us to observe is the ground plan of the building. The possibility to document the other two aspects – storage capacity and symbolic prominence – depends strongly on the state of preservation of the complex observed, and therefore on the nature of the site formation processes, which vary substantially from one site to another and, sometimes, even from one part of a site to another. The ground plan of a house can then be considered as our best clue for ascribing it (or not) to the wealthiest segments of a community. But

size comparison from house to house within one community cannot be expected, albeit in exceptional cases, to reflect direct and linear social hierarchies.

As we have already mentioned, on these grounds, social inequality (and specifically inequality from household to household) seems to vary greatly from one site to another: moderate levels are noted in San Antonio de Calaceite or in Pech-Maho, a little stronger levels in Castellet de Banyoles (or in Tornabous), while very strong social stratification seems present in Ullastret. Yet, this statement cannot be read in reverse, *i.e.* that the San Antonio Iberian polity was more egalitarian than that in Ullastret.

The general impression, as long as we have a relatively long-lived settlement, is that there was a relative fluidity in its spatial structure, which may reflect some kind of fluidity in the hierarchisation processes. The settlement fabric at Els Estinclells, a short-lived site, evokes, on the contrary, an impression of strong rigidity: it has to be understood as a reflection of the social hierarchies at one specific moment for the history of the community that gave birth to it, a community whose life did not last long enough for its structure to evolve.

Inequality and hierarchy also exist within the domestic units themselves. In other works, I have tried to demonstrate that the prominent Iberian domestic unit should be considered as extended families, not limited to a nuclear family but probably to a whole lineage or to a segment of a lineage (Gorgues 2008). This very structure produces in itself hierarchy. We do not have any explicit data about the Iberian world, but analogy can be sought in many parts of the Ancient world: the Roman *familia*, for instance, includes, as part of a *gens*, the whole domestic unit dominated by a *pater familias* whose authority applied to all the members of this cell. He was also in charge of the management of the whole patrimony (*e.g.* real estates, land tenure, agricultural resources, loans, money incomes, slaves) of the domestic unit, and his sons were provided with an allocation (paid in money in the Late Republic and the Empire), the amount of which was established by the *pater familias*. This kind of domestic hierarchy can explain perfectly the important storage facilities observed in many of the elite houses, as well as the complexity of the epigraphic practices observed in some cases, as in Pech-Maho (Gorgues 2008; 2010: 98-123).

Yet, there is one more aspect to consider (as noted in our introduction): when site formation processes allow for good preservation of the remains associated with indoor activity, evidence for specific crafts can often be found in specific contexts of the major houses.

Craft activity in elitist domestic context

We will not offer here a review of every context where craft activity was evidenced in the domestic sphere but will rather focus on some clear cases that emphasize the long-lasting relationship between the Iberian elite domestic space and complex craft activities.

The Early Iberian period: the Tossal Montañes tower house.

The elite mansions identified in the Lower Ebro from the 7th century BC onwards provide remains linked with productive activities. None of them, however, has yet, provided evidence as clear as that observed at Tossal Motañes (Valdeltormo: Moret *et al.* 2006: 29-63).

The ground level of this late 6th century BC tower house is well known, because the sudden destruction of this building by fire – when it appears to have already been abandoned by its inhabitants – allowed for good preservation of the occupation remains. It must have been quite a busy area (Figure 4). Close to the door that opened southwards, an oven in the form of a recycled jar allowed for the cooking of a variety of foods, including some prepared from acorn flour, which seems to have been ground in an area less than 2 m away. Leaning against a wall among the oven, the grinding area, and a low bench was a loom, which allowed for the production of linen clothes. The bench was used to display storage jars, whose bases left clear traces in the clay coating the stones. One of these jars – which was recovered bottom-up during excavation – seems to have been used to store, or better to brew, beer, while the use of another of similar capacity could not be determined.

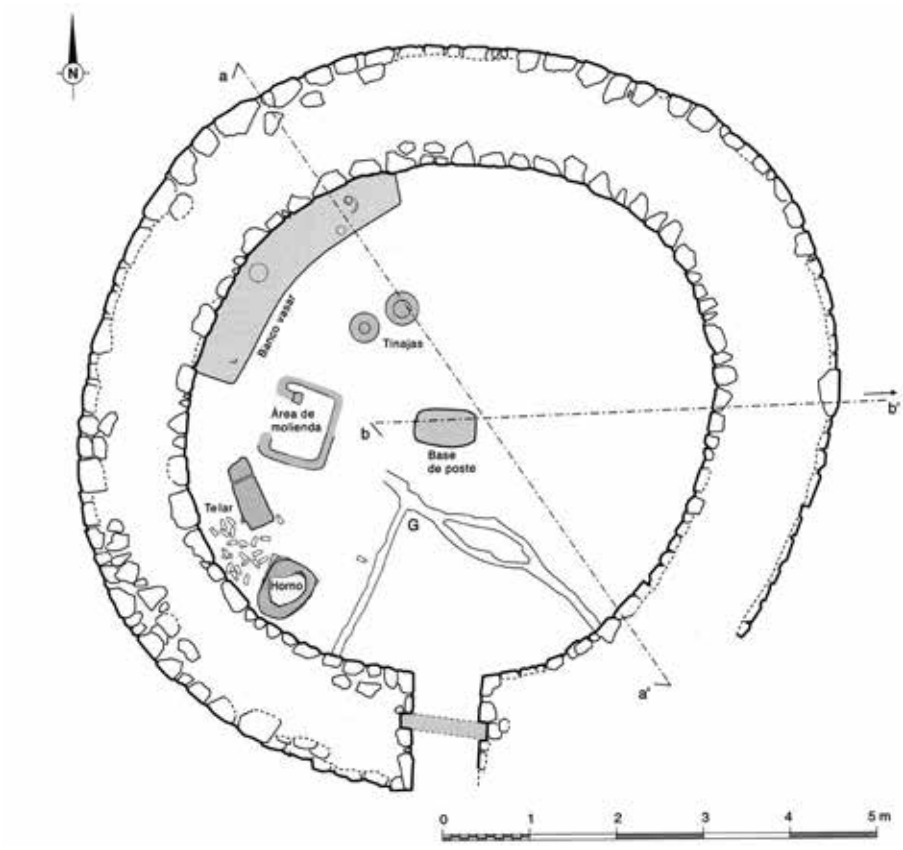

Figure 4: The ground level of the tower-house of Tossal Montañes (after Moret et al. 2006: fig.13 p.29).

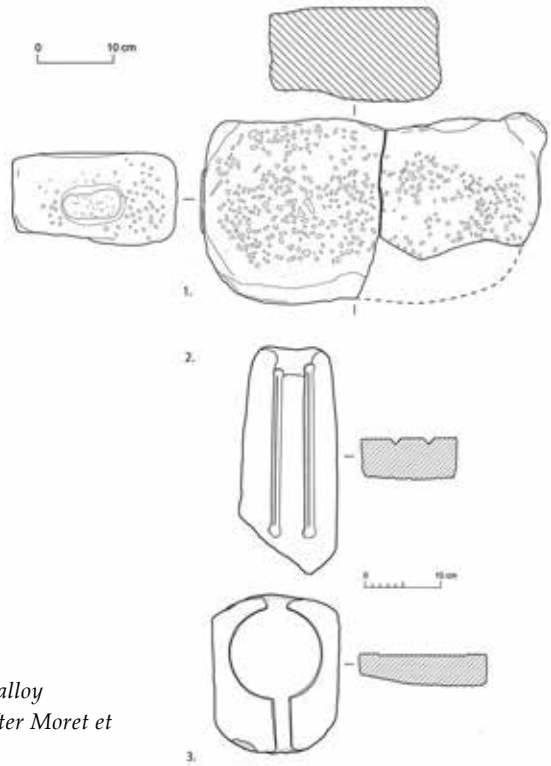

Figure 5: Stone tools used for copper alloy metallurgy from Tossal Montañes (after Moret et al. 2006: fig.36 p.47, fig.47 p.55).

Within the layer resulting from the collapse of the upper part of the building, three pieces of two sandstone moulds for casting copper alloy objects were found (Figure 5.2 and 5.3), among other objects including a wheel-thrown jar and a jug. A sub-rectangular sandstone block (fig.5.1), with many small traces of percussion on its upper and lateral faces was discovered in the same context. Analysis of samples of these traces revealed the presence of copper and tin. The narrowest face worn by use presents a central flat and elliptic protuberance devoid of impacts. This stone block may be interpreted as some kind of stone workbench, used for copper alloy metallurgy. This workbench probably included an anvil used for hammering the metal into shape: the small lateral protuberance, with its flat upper surface, can be interpreted in this way.[1] Another protuberance, on the opposite side, may have been used as a grip, allowing a more versatile use of this reactive tool.

It may seem quite un-instinctive to a modern observer that the melting of copper alloys as well as the subsequent stages of the bronze-working process could have taken place inside the building, even more so on an upper floor. Yet, one can observe the cohesion of the assemblage of tools related to metallurgy: one of the moulds allows for the casting of tiny bars, the other of a discoid object; both shapes can be interpreted as intermediate products used as a base for the making of complex objects through subsequent hammering, the activity for which the

1 This metallurgy-oriented interpretation was originally discarded, and it was suggested that this block was indeed an unfinished quern, shaped with a bronze chisel (Moret *et al.* 2006: 45-47).

workbench previously described provided – at least in part – a convenient support. It is possible that these tools were stored inside the building but were used only outdoors. Yet, natural light does not seem particularly suitable for melting, as it hinders perception of the alloy colour, a marker both for its quality and its temperature. A metallurgical oven built over a floor coated in a thick layer of clay would have indeed been fairly safe: as the heat diffuses upward, the main risk would have been to the upper timber elements of the building, a risk that may have been prevented by building the ceiling at a suitable height. It seems likely, then, that the workplace was actually located on the first floor of the Tossal Montañes tower, rather than in the ground floor (Figure 6). It is difficult to imagine that such working facilities were meant to be used by those outside of the domestic unit, as is supposed by the "elites owned, but subordinates operated work facilities" model. The wheel-thrown pots found in the same layer were among the oldest found in the region. In this specific context, they may be considered as social status markers, a dimension increased by the fact that these vessels are related to drinking and can, therefore, have been used on social occasions. This spatial comingling of elite identity markers and copper alloy craftwork suggests that both belong to the same silent narrative: the claim for a specific status, reinforced through specific social practices and through the mastering of specific technical skills.

One may ask if Tossal Montañes was an isolated case. Early Iberian occupation, in La Guardia (Alcorisa) or in l'Assut (Tivenys), is only indirectly attested through artefacts found in secondary contexts or through C14 dates obtained on lumber remains. The exact nature of the activities undertaken in these elite houses therefore

Figure 6: The copper alloy work-place at the first floor of the tower-house of Tossal Montañes. (Infography Fl. Comte).

remains unknown. Site formation processes may lead to an underestimation of the importance of crafting activities in the elite domestic sphere. Yet, the association of elite residences and highly skilled production activities appear to have deep roots in the Early Iron Age and even in the Late Bronze Age. In the 12th century BC hamlet of Genó, remains of copper alloy metallurgy were found in the largest house (H2: Maya *et al.* 1998: 27-29, 168). Further to the South, the First Iron Age settlement of Sant Jaume (Alcanar, Montsià), interpreted as an aristocratic residence (Garcia i Rubert 2010), provides strong evidence for specialised craftsmanship. Textile activity was far more important than merely that which was needed for domestic self-sufficiency, because more than 700 loomweights were found there (Garcia i Rubert *et al.* 2013: 61; this equates to one loomweight for each square metre of the settlement), and evidence for metallurgical activity (lead and copper alloy) is also present (Garcia i Rubert *et al.* 2007; 2013: 62). Tossal Montañes is thus not a unique case, but it is one of the sites where formation processes allowed for one of the clearest pictures of the undertaking of craft activities in the elite houses.

The Middle Iberian period

Similar close relationships and entanglements between elite residential space and production can also be observed during the Middle Iberian period (end of the 5th – end of the 3rd century BC), despite pottery providing an important exception. Because of its very specific requirements in raw materials (clay, water) and fuel (wood), a need for storage and because of the pollution it creates, potting often takes place outside the house itself and mostly outside of the settlement altogether. However, despite kilns currently being poorly known for the Middle Iberian period, they can be found very close to houses or close enough to isolated settlements: this is the case, for instance, at the Mas de Moreno potters' workshop (Gorgues 2009: 490-491). This thus shows a strong connection with the domestic sphere even if technical constraints favour a topographical separation between home and workplace. Almost every other craft activity, however, is embedded in the domestic sphere. This is especially the case for iron metallurgy.

In hill-fort contexts, forge hearths were, for instance, found in the large house in Puig de Sant Andreu zone 14, and the adjacent street seems to have been used as a dump for refuse associated with iron metallurgy (Martín *et al.* 2004: 272-274). In Pech-Maho, direct and indirect evidence for iron metallurgy can be found in close association with storage structures whose management involved complex epigraphic practices (Gorgues 2010: 88-95).[2] In Els Estinclells, evidence for iron forging was found in house 2 (Asensio *et al.* 2009: 136-137), which belonged to a group of six or seven of the largest houses in the settlement (group 3, around 48 m², with 3 or 4 rooms: Asensio *et al.* 2009: 133). As for isolated settlements, the elite mansion of Mas Castellar de Pontós, also in the Empordá, provided good evidence for iron forging. A blacksmith hearth was found in room 9, and iron objects are so

2 One of these buildings has recently been reinterpreted as an "artisanal mill" (Gailledrat *et al.* 2014). This interpretation derives from the presence of a quern which has slightly larger dimensions than is usual, though such an assumption does not appear to be particularly robust. Indeed, the authors themselves admit that the delineation between "artisanal" and "domestic" spheres is problematic, particularly from a modern perspective.

ubiquitous in the settlement that their presence must be linked with this specific activity (Pons 2002: 159-160, 348-367). This isolated compound was also the focus for complex symbolic practices, involving, among other things, the usage of a Pentelic marble altar. This settlement seems to have been pre-eminently linked with agrarian activity, but iron forging need not have been merely an auxiliary activity aimed only at producing or repairing cultivation tools: the number of nails, for example, is far too large for such a limited use. Further south, iron metallurgy and agrarian activities appear to have been integrated in the more modest compound of Les Guàrdies (Morer, Rigo 2003). Metallurgical hearths and an oven, on the one hand, and silos, on the other, shared the same space in the southern periphery of a large building whose association with the elite cannot be guaranteed but seems likely. One has to read this agglomeration of functional structures as a palimpsest of activities occupying the same space at different times. The characterization of the different phases of the *chaîne opératoire* in iron production is not easy, but one can be sure that metallurgy was among the main activities of this particular settlement.

Direct evidence for copper alloy metallurgy appears scarce for this period: in Mas Castellar de Pontós rooms 4 and 9, iron forge and copper alloy metallurgy appear closely related, thus pointing towards multiple metallurgical activities (Rovira, *in* Pons dir, 2002: 526-528). As for precious metalworking (gold and silver), some evidence comes from the Castellet de Banyoles de Tivissa. This settlement is well-known for its many silver and gold objects – personal ornaments and vessels (most recently: Sanmartí *et al.* 2012: 45, with bibliography)- as well as for Iberian and Roman coins recovered throughout the 20th century and the beginning of the 21st (Taradell 2004). The archaeological record seems unusually rich in precious metal objects, even if we accept the idea of a city taken by force and violently destroyed by the Romans (probably in 195 BC: Sanmartí *et al.* 2012). Such an unusual assemblage of finds emphasizes the possibility that El Castellet de Banyoles de Tivissa was indeed a major centre for precious metalworking and coin minting, an idea that was reinforced by the interpretation of a poorly preserved structure in the front room of house 5 as a cupellation furnace (Asensio *et al.* 2005: 621).

These interpretations rely in part on the idea that the nearby silver-bearing galena mines of the Baix Priorat were exploited by the inhabitants of El Castellet de Banyoles in order to obtain the precious metal. However, further investigation has emphasized the fact that lead was much used in El Castellet too, and that lead metallurgy may also have to be considered as an important activity in the settlement (Rafel *et al.* 2008: 264-265). Investigations based on isotopic analysis have shown that the lead came from the Baix Priorat, while silver may have been imported, thus prompting the authors to doubt the direct processing of galena in the settlement. From this perspective, the remains found in house 5 have been reinterpreted as specifically related to lead craftsmanship (Rafel *et al.* 2008: 265). In spite of its scientific strength, this reinterpretation, based on limited sampling, does not explain the peculiarities of the material record previously outlined and gives a somewhat static and linear view of how this kind of activity may have taken place in an Iron Age community.

If we accept the idea that the recurrence of artefacts manufactured from precious metals such as silver reflects more than local prosperity at El Castellet de Banyoles, and is thus rather indirect evidence for an important crafting activity, then we have to assume that this settlement controlled something at least as valuable as the raw materials: it concentrated the highly sophisticated know-how that the manufacture of jewellery and the working of precious metals require. The amassing of these specific technical skills must be considered from a long-term perspective, as a process deeply rooted in the historical trajectory of this community or, more specifically, in some of the lineages belonging to it. The true specificity of this community resided at least as much in its control over raw materials as in the technical skills of some individuals who belonged to it. Both elements may have participated in a historical dynamic whose complexity hinders a straightforward, long-term interpretation of the relationship between the metal source and the settlement itself. The stock of metal could have had a rather diversified origin. Silver could have come from local mines but could also have been imported or recycled. Recycling over time would probably have produced an important stock of metal, but its isotopic signature would become difficult to interpret. One can go as far as to state that metal originating from far away, according to its isotopic signature, could have been considered by the ancient jeweller as local, because s/he obtained it through the recycling of a mass of metal integrated long ago into the local stock. Lead, easier to obtain and less valuable than silver, would have been less likely to have been recycled and would therefore have had a less complex and more linear economic trajectory. Gold is also well-known in the settlement, as previously stated, though it is apparently absent from the local geology. It is used, among other things, to produce earrings of the same shape as those made with silver, leading to the conclusion that both objects were made by closely related craftspeople or by the same individuals.

In house 5, for instance, but also in house block C (Sanmartí *et al.* 2012: 56), different metals may have been used to shape different objects: silver (and maybe gold) for personal ornaments and perhaps for coins, and lead for vessels, for pottery repairs, etc. These activities, focused on different melted metals, may have relied on the same structures: the huge furnace in house 5 may have been used to melt lead as well as silver although not surprisingly remains associated with lead processing are more numerous than those related to silver jewellery, an activity that involved much lesser quantities of metal and one that was therefore probably characterized by a "zero-waste" practice because of intensive recycling strategies. These different craft activities may have resulted from involvement by many individuals in the technical process, with sub-specialisation linked to progression in skills learned (see Discussion below).

As is clear, evidence for metallurgical activity in domestic contexts is fairly abundant. Other production activities are less well-known. Textile activity seems also to have been quite important. The 3rd century BC house in Mas Boscà (Badalona, Tarragona) is relatively small when compared to other examples quoted here (50 m^2) but displayed a large storage capacity (a 4500 litre silo, more than 20 Iberian amphoras). Ten spindle-whorls and more than 200 loomweights were also found (Junyent, Baldellou 1972; comments in Gorgues 2010: 123-129). About

half of the loomweights appeared to be piled along the back wall of the front room. The other half was spread into four groups, each of which probably corresponded to a loom. Prior to the sudden abandonment of the house, four looms were therefore probably active, and there were sufficient spare loomweights to build four more. Yet, direct evidence for other activities (food storage and processing, everyday life), makes it impossible to interpret this building as exclusively a weaving workshop. On the other hand, it is also impossible to consider that such a large production capacity was aimed only at satisfying domestic needs. It seems clear that the fabric made in Mas Boscà was destined, only in part, for the inhabitants of the house. Most of it must have been produced for diffusion outside of the domestic sphere. This example clearly indicates that domestic production could indeed fully participate in the extra-domestic economy of a settlement.

Discussion: elite involvement in craft activities as a long term social/economic structure

The integration of craft activities in the elite domestic sphere is a long-term feature of the northern Iberian Iron Age, and probably deeply rooted in the Late Bronze Age, as is suggested by the example of Genó. The most obvious reason for this is that some elites were directly involved in the technical processes. This conclusion may seem rather counter-intuitive because being part of an elite group today implies that it is not necessary to master any technical skill, at least in the sense of crafting material products. Yet, how can we explain not only the aggregation of the remains of craft activity around many elite houses or mansions, but also their association with all of the other types of remains indicative of domestic and agrarian activity? As is discussed below, such a picture may be explained in the specific context of Iberian societies.

Wealth, exchange and redistribution in the northern Iberian world

Despite differences in chronology, size, architecture, and even topographical location, the houses where craft activities were observed share a common feature already noted: when site formation processes allow for a clear understanding of the range of activities that took place inside, agrarian activity is always represented by huge storage structures and the processing of staple products. These probably point towards land ownership as the true factor of wealth, opening up the possibility that an important Iberian patrimony may have been structured around multiple *loci* – some in the countryside with others in agglomerated settlements – a model already proposed for the Late Iberian period (Gorgues 2009). It seems probable, therefore, that in order to properly understand the nature of the activities taking place, one has to consider the most important houses as entities occupying a central position in a complex territorial network. The dynamics that constituted such a network are unknown to us, but they can possibly have involved, in a long-term process of inheritance, the transfer of property through matrimony, private and inter-community wars, etc.

Each of the major houses appears to act as a centre for activities that we would attribute to the primary or the secondary sectors of the economy. It seems quite clear that such a differentiation made no sense in a Northern Iberian context. It

rather seems that each of these major houses served to process all the raw materials accessible to the domestic unit in order to commodify every resource available through the exploitation of its own estate. The bulk of the materials processed in the domestic sphere may have been obtained through direct exploitation of natural resources (agrarian activity for food and textile processing, mining for metals, etc.). Part of these primary materials may also have been obtained through exchange, as semi-processed products, such as iron bars or silver ingots.

All of the members of the domestic unit must have taken part in the production processes. Some of the activities may have been gender-based. The inner structure of the Tossal Montañes tower house can be interpreted in such a way, with a ground floor more specifically associated with activities traditionally identified with "female work" (cooking, weaving) and a first floor associated with "male activities" (social drinking, metalworking; a discussion about the gendering of production activities in a northern Iberian context can be found in Gorgues 2008). On the contrary, much of the agrarian activities may have been collaborative and may have simultaneously involved everyone, regardless of age or gender. The entire available workforce in the domestic unit would have collaborated, in order to implement an overall production strategy, involving the mobilization of a variety of goods as well as very specific technical skills. In such circumstances, it appears that maintaining large, integrated, domestic units was a way in which elites could organize an important workforce, much stronger than that of a single, nuclear family.

This production strategy can be interpreted in a political, rather than an economic, perspective: it aimed at providing material support for interpersonal relationships or networks. On the one hand, people could become dependent of the material support provided to them by the elite through redistribution. This economic dependence of the elite-produced goods would have probably led these people to provide in return some kind of non-economic compensation, presumably support in the political arena. In other words, redistribution allowed for the creation of a clientele, groups of supporters linked to their patron (in that case, one or more elite group) through an asymmetric relationship based on the acknowledgement of a material dependency repaid through immaterial forms (support, armed service, etc). On the other hand, through reciprocal, and perhaps competitive, exchange practices, it allowed for the creation of a hierarchy among the elites themselves within one specific community, by allowing some to give more than others could reciprocate. Both practices are close enough to those first described by Mauss (2007[1925]) as "*don/contre-don*". They provided a means to structure and regulate the Iberian communities and to build and maintain elite networks that could have an inter-regional or even continental dimension in the case of the northern Iberian elites (Gorgues 2013).

A matter of identity

Giving a lot clearly was not sufficient for reaching the complex political aims described earlier. If this were the case, direct access to agrarian products would have been sufficient. The deployment of complex skills, such as those needed for bronze-working, blacksmithing, jewellery manufacture or advanced weaving betrays a more complex logic. Specific crafts seem to have been strongly associated with specific

houses, with one activity appearing overwhelmingly in the material record (bronze-working in Tossal Montañes, blacksmithing in zone 14 of Puig de Sant Andreu). This suggests that no house was self-sufficient and that only extensive exchange practices could provide a domestic unit with everything it needed. This domestic-based, highly skilled production can be considered as one of the many faces of the collective identity of a lineage, progressively built up through intergenerational transmission and improvement of particular skills. This intergenerational transmission was probably, at least in part, structured according to gender, with skills being typical either of the male or the female members of the household.

In such a configuration, the hierarchy active during the production process can be expected to map directly onto the domestic one. As for crafts predominantly associated with male activity (presumably metallurgy, for instance), the head of the kin group (probably the older active male) would have assumed the position of master, while his sons would have acted as assistants or apprentices according to their age, with the addition perhaps of pupils from other kin groups. As for crafts deemed as specific to females (e.g. textile production), it seems possible that the most prominent woman (the wife of the head of the lineage) taught techniques specific to that lineage to the younger females, including those brought in through marriage. In spite of their technical complexity, these activities appear to have been discontinuous, as one can infer from the specific morphology of the workplaces and from the scattering of craft activity remains throughout living spaces (Gorgues, forthcoming). This may be explained by the fact that "background" agrarian activities must have seasonally mobilized large parts of the overall workforce of the domestic unit. However, since the relationship between "offer" and "demand" was not an anonymous one (as it is in market trade) but was rather structured through interpersonal relations, this would have limited the amount of goods produced. This would have favoured a "stop-and-go" production pattern, characterized by periods of intense activity, probably taking place at specific times in the year (in winter, for example, when no war was waged and the fields required little attention).

Specific and advanced skills, enhanced generation after generation, would have been part of the patrimony of many elite lineages, and would have been one aspect of their enduring, trans-generational collective identity. A versatile and powerful means of enforcing and emphasising this identity would have been, in the context of reciprocal *don/contre-don* practices, the direct gift of objects made by the hands of one or of both the partners. It is a convenient interpretative framework for explaining the presence, in the rich grave 7 of barrow 3 of the Lande Mesplède at Aubagnan (Landes, France), of two silver *paterae* (Roux, Coffyn 1987), clearly made in Tivissa where very similar objects are found (Gorrotchategui 2002; Gorgues 2013: 549-550; on the Tivissa *paterae*: Jaeggi 2005). These objects are only known from both sites, which are separated by almost 500 km and a mountain and belong to different regions, from a cultural as well as from a climatic point of view. Both *paterae* were inscribed in Iberian (one of the inscriptions, preserved as a fragmentary metal sheet, is lost), thus leaving no doubt about the area in which they were made. One of the inscriptions bears the suffix *-baikar*, the other one the suffix *-ekiar*. Along with the suffix *-tagiar*, absent from Tivissa, the latter tends to be interpreted as an artisan's signature because it often appears as part of an

inscription made during the manufacturing process (Ferrer 2008). The other one (*-baikar*, also present in Tivissa: Ferrer 2011: 211) is interpreted in different ways: reference to valuable objects (Gorrotchategui 2002) or to ritual purposes (Ferrer 2011; for a synthesis on this problem: De Hoz 2011: 296-311).

In my opinion, these inscriptions have to be understood in the context of a non-market economy, where goods circulation is largely ensured, as we have already discussed, through interpersonal relationships. The inscriptions may refer to the maker of the object or to the person for whom it is made, thus reinforcing and perpetuating the link between the object, its maker and the specific purpose for which it was made: to create or strengthen, through the exchange of highly symbolic objects, relationships of solidarity and friendship, in spite of the geographical distance separating the individuals involved.

Conclusion

In contrast to the modern concept of the 'artisan', the mastering of complex skills did not, in my opinion, define the status of an individual in Iberian society. It was rather one aspect of a multi-faceted identity, a suite of knowledge that some could mobilize in order to enforce their claim to social pre-eminence. It was a matter of economic prominence but also of identity, one progressively built upon over different generations, creating strong ties between a specific skill and an elite kin-group, rather than to an individual alone. That is probably why the technical sphere is so absent among the many grave goods observed in the Iberian funerary world, whereas status markers (weapons, imported vessels, jewels) are omnipresent. Identity was linked with status -being a member of the elite-, not with what we would call a "profession". The mastering of complex technical skills were means by which to maintain and enhance networks, to compete for power, and to enhance individual status in a political arena that may well have been fluid. But it was also fundamental to telling a tale, one of a lineage and its identity. When, in a rare exception to the norm, a high-status Iberian was first cremated and then buried with his goldsmithing tools in the Grave 100 of Cabezo Lucero (Perea, Armburster 2011) some distance south from our area of study, it was probably because this tale came to an end, and because these tools could not be transmitted any further.

It seems very likely that direct involvement of the elites in the craft production process began earlier than the Iberian Iron Age, as the example of Genó clearly highlights. It would last until the very end of the Iron Age (Gorgues 2010), and may, therefore, be considered as an enduring aspect of northern Iberian social structure. Though this interpretation appears counter-intuitive, elite commitment in highly skilled crafts seems not to be limited to the Iberian world. The Assyrian king Sennacherib claimed in his annals to have been able to melt a huge bronze statue in a mould he made himself, as if it was "the melting of a half-shekel" (Breasted 1924: 109). This claim of technical skill "doesn't represent empty rhetoric" (Winter 2008: 336), as it is part of the construction of regal identity. On the other side of the Ancient world, and later in time, the Pictish stele of Dunfallandy (Perthshire) represents, beside typical scenes of elite ways of life, a crucible and other metalworking tools. These analogies, although superficial, suggest the symbolic importance of technical skills in very different parts of the Ancient world. In this

context, elite kin groups may appear as nodes in technical information networks, but also as cells allowing for the intergenerational transmission of these skills, thus providing an alternative for the urban-based, craftsmen-monopoly models often considered as the only path towards technical complexity.

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Rich metallurgists' (?) graves from the Varna I cemetery

Rediscussing the social role of the earliest metalworkers

Verena Leusch, Steve Zäuner, Vladimir Slavčev, Raiko Krauß, Barbara Armbruster, Ernst Pernicka

Introduction

The social role of craftspeople or artisans, and especially of metalworkers, in the society of the Varna population has been a matter of discussion since the site was introduced to the scientific community (Renfrew, 1978; Lichardus, 1988; Marazov, 1988; Chapman, Higham, *et al.* 2006). It was regarded as common sense to assess metallurgy as the decisive impetus for the increasing social complexity that became evident during the Copper Age in the Balkans (Todorova, 1981; Todorova, 1999). Hitherto, the cemetery Varna I has been regarded as the apogee of this development and as the first record of a hierarchical society. But what was the role of metallurgy, and more precisely of metallurgists and artisans, within these social dynamics? The most recent collaboration between German and Bulgarian institutions yielded new data from the site of Varna and provides a complete analytical account not only of metallurgical and anthropological results, but also of almost the entire archaeological assemblage.

Based on the new results and evidence from other coeval sites, we observe that growing economic complexity coincides with new modes for representing social (mundane or religious) power, which is most prominently demonstrated by the excessive adornment with gold items at Varna. Until now, this site has been a phenomenon demonstrating an accumulation of wealth that remains unparalleled in its cultural scope and beyond. Nevertheless, similar differentiated burial customs could also be attested at smaller coeval burial sites – for example, Devnja, Vinica, Goljamo Delčevo, Radingrad, Targovište, Kubrat, Ruse and Durankulak (Lichardus, 1991b: 186; Lichardus, 1988: 93; Todorova, 2002a; Todorova, 2002b) – even if these are less pronounced. These findings show that Varna can be embedded in a much wider cultural area that was apparently affected by the same cultural and social dynamics that led to increasing social inequality (e.g. Windler *et al.*, 2013). However, the rich burial contexts at Varna issue a challenge regarding

their cultural interpretation. They mostly comprise depositions without skeletal remains (so-called symbolic graves or cenotaphs), which make it more difficult to infer the person's wealth or social prestige, as would be necessary for approaching the topic of this paper. Nevertheless, we want to rediscuss the assumed role of the Late Chalcolithic metalworker in the light of the new data and attempt to find out about artisans in a wider sense within the Varna society, according to the archaeological records.

Archaeological and cultural framework

The Late Chalcolithic cemetery of Varna I, according to new ^{14}C-dates, lasted between 4690 and 4330 cal BC (Chapman, Higham, *et al.*, 2006: 166-168; Higham, Chapman, *et al.*, 2007; Krauß *et al.* 2016, 285)[1] and belonged to the west Pontic manifestation of the Kodžadermen-Gumelnița-Karanovo VI (KGK VI) culture (Figure 1). It is especially famous for its copper and gold objects that appear there in unprecedented variety and abundance. Around 160 copper implements and some 3100 gold objects so far have been uncovered; these are often referred to as the first gold of mankind.

However, in the broader cultural and technological context, Varna can be embedded into a preceding metallurgical development. It apparently starts in the Vinča, Hamangia IV and Karanovo V (Marica) culture (in the west Pontic region, the Western, Central and Eastern Balkans), during the first half of the 5th millennium cal BC (Görsdorf & Bojadžiev, 1996; Borić, 2009; Radivojević, Rehren, *et al.*, 2010; Leštakov, 2013; Dimitrov, 2002). Here, traces of a preceding copper metallurgy can be sourced at settlement, burial, and mining sites that give a vivid impression of the metallurgical and demographic development of that region (Todorova, 1981; Černych, 1988; Černych, 1992; Pernicka, Begemann, *et al.*, 1997; Todorova, 2001, Dimitrov, 2002; Gale, Stos-Gale, *et al.*, 2003; Leštakov, 2013).[2] Significantly, there is also evidence of gold metallurgy prior to the so-called first gold of mankind at the burial places Varna II and Durankulak (Hamangia VI or KGK V sites; Todorova & Vajsov, 2001; Avramova, 2002; Dimitrov, 2002).

In addition to this preceding metallurgical development, we can also trace back to the Neolithic the increase in social inequality during the KGK VI culture, which is demonstrated most clearly in the Varna I cemetery (Bartelheim & Krauß, 2012). Furthermore, extensive exchange networks already existed: for example, those of

1 The samples from the bone remains were collected and studied by the Oxford Radiocarbon Accelerator Unit. The full publication of the results is still on its way. Recently radiocarbon dates from bone material were collected by Bernhard Weninger (Institute for Pro- and Protohistory, Cologne University), which corroborate this dating. Still, the dating of the abandonment of the Varna I cemetery cannot be determined. According to a new seriation of the archaeological residues (Krauß, Zäuner, and Pernicka 2014) from the burial site the rich, symbolic graves with clay heads (burials 2, 3 and 15) belong to the final phase of its development. But since they do not contain any organic material their radiocarbon dating is not possible.

2 For example at Asparuchovo, Azmaška mogila, Goljamo Delčevo, Gradešnica, Hotnica, Karanovo, Durankulak, Vinica, Sozopol, Devnja, Reka Devnja, Ruse, Varna II, Varna I, Ai Bunar, Medni Rid and recently also at Akladi Cheiri evidence for metallurgical activities could be found (Todorova 1981; Černych 1988; Todorova 2001; Todorova 2002a; Dimitrov, 2002; Pernicka 1997; Gale, *et al.* 2003; Leštakov, 2013).

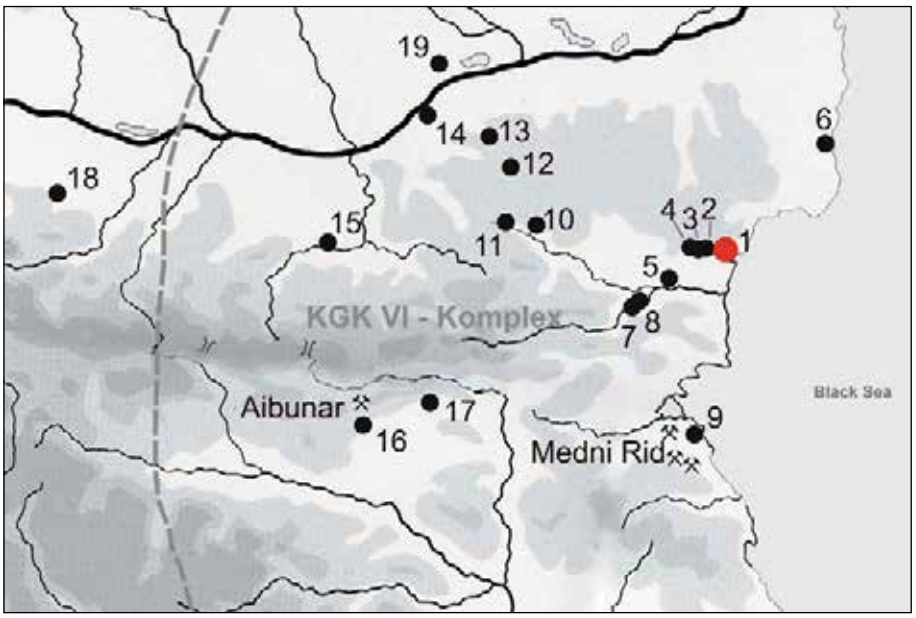

Figure 1: Map of sites mentioned in the text. 1-Varna; 2-Devnja I; 3-Devnja II; 4-Reka Devnja; 5- Provadia-Solnitsata; 6 Durankulak; 7-Asparuchovo; 8-Goljamo Delčevo; 9- Akladi Cheiri; 10-Vinica; 11-Targovište; 12-Radingrad; 13-Kubrat; 14-Ruse; 15-Hotnica; 16-AzmaškaMogila; 17-Karanovo; 18-Gradešnica; 19-Pietrele (Map after Todorova, 1981: plates 22 and 23; Todorova/Vajsov, 2001: plates 58 and 59; Lichardus, 1988: fig. 43, 85; Leštakov, 2013).

the Spondylus shells that were traded from the Eastern Mediterranean into the NW Pontic region since the mid-6th millennium cal BC (Müller, 1997; Todorova, 1995: 57). The so-called 'secondary products revolution' (Sherratt, 1981) apparently led to more-stable subsistence for, and hence growth of, the population (Bartelheim & Krauß, 2012). Moreover, hilltop settlements appear from the beginning of the 6th millennium cal BC (Todorova, 1982), and an enhanced specialisation of different trades, such as ceramics and flint, can be witnessed (Bartelheim & Krauß, 2012: 86-88; Manolakakis, 2005; Sirakov, 2002). The production of the so-called flint *superblades* (flint blades measuring up to 40cm in length), for instance, is based upon a geologically restricted source in Northeast Bulgaria around the town of Razgrad and upon a specialised mining and production process (Todorova, 1995: 55; Sirakov, 2002: 220-221; Krauß, 2010: 297). Similar evidence has been found concerning the exploitation and production of mineral salt, as has been revealed by archaeological evidence from Provadia-Solnitsata, where large-scale exploitation seems to have existed from the mid-6th millennium cal BC onwards (Nikolov, 2012: 14-18). According to Nikolov, the production 'reached industrial quantities' (Nikolov, 2012: 27) from ca. 4700 cal BC until ca. 4200 cal BC, thus coeval to the Varna I cemetery.

The *chaînes opératoires* of these different commodities may have continuously driven forward the development of more complex organisational structures from the Late Neolithic onwards. For instance, the metallurgical sequence might have included different groups of people who could have been in charge of (a) the prospection

and exploitation, (b) the distribution of the raw material, (c) the production, (d) the distribution of the finished products, (e) their use and (f) their repairs. These intertwined work processes and distribution networks most likely required a communicative superstructure that was subject to socially imposed rules (Ottaway, 2001, Ottaway & Roberts, 2008). In order to maintain this complex socio-economic construct, institutionalised control may be assumed, which again possibly involved a special group of persons (Biehl & Marciniak, 2000: 190). Generally, the increasing organisational effort of the different crafts, particularly of metallurgy, most probably promoted marked social changes, such as enhanced division of labour, which eventually increased social inequality, as is surmised for Varna (e.g. Renfrew, 1978; Biehl & Marciniak, 2000: 189; Windler, *et al.* 2013: 208).

Considering the outlined preceding socio-economic dynamics, the increasing differentiation within the Kodžadermen-Gumelniţa-Karanovo (KGK) VI communities apparently started long before the spread of metallurgy (Bartelheim & Krauß, 2012; Kienlin, 2014: 448). In this regard, Bartelheim and Krauß (2012) infer that '[f]or south-east Europe, the use of metals has to be seen as a logical consequence of the cultural development which has definitely not been initiated by the advent of metal technology' (Bartelheim & Krauß, 2012: 89). Instead, the exchange or trade of various commodities may be regarded as an important trigger for such a cultural development and the emergence of large cultural complexes such as the Late Chalcolithic KGK VI culture (Todorova & Vajsov, 2001: 9). However, within these dynamics, the metallurgical production significantly increases and is paralleled by marked social and demographic changes (Lichardus, 1991a; Bartelheim & Krauß, 2012; Hansen, 2013). For example, we can trace a densification of the settlement pattern, as well as the progressive fortification and development of the hilltop settlements, which accompany increasing social inequality (see Todorova, 1981: 7, fig. 2; Todorova, 1982; Todorova, 1999; Todorova & Vajsov, 2001; Krauß, 2008; Windler, *et al.* 2013). This apparently led to the assumption that the social development was causally linked essentially to metallurgy.

The multitude of the material culture that is traceable during the Late Chalcolithic, however, rather indicates that '[t]he trade of raw materials and finished products in metalworking need not […] be the result of specialised trade contacts or long-distance trade routes, but a more diffuse pattern of interlocking trade networks may have existed dealing in numerous exchange commodities' (Rowland, 1971: 211). Specifically, commodities made out of Spondylus, serpentinite, marble, carnelian, copper and gold, which are found as paraphernalia at Varna, may rather point to interwoven occupations and trades (Biehl & Marciniak, 2000; Todorova & Vajsov, 2001; Chapman, Higham, *et al.* 2006: 164-165; Krauß, 2010). Judging from the high accumulation and the large spectrum of finds, Varna may be viewed as a place that particularly benefited from ample participation in the existing exchange networks. Indeed, Varna's strategically favourable position within these economic networks is considered decisive for the exceptional development of that site (Todorova, 1995; Krauß, 2010; Ivanova, 2012).

Essentially, the rich burials reflect the great accessibility of different commodities. It is assumed that the social reputation of a person, a deity or a whole community finds its expression in the 'increasingly diverse set of cross-cutting relations'

(Chapman, Higham, *et al.* 2006: 161). Consequently, the achievement of wealth or social importance is ascribed by Chapman, Higham, *et al.* (2006) essentially to this aspect of personhood. Interestingly, in the region under investigation, this wealth was expressed merely within the funerals, whereas the settlements do not show clear evidences for a corresponding social stratification (discussed in detail in Chapman, Higham, *et al.*: 162-165). In contrast to this and similar interpretations, it was also argued that the rich burials do not necessarily display personal wealth or social rank, but rather should be regarded as an expression of 'collective social identity' (Biehl & Marciniak 2000: 202) and of 'social power in a ritualized and symbolic way' of the surviving community (Biehl & Marciniak, 2000: 203).

Considering the outlined developments, it may be assumed for the Late Chalcolithic that 'people […] were transformed by the impact of new social relations, new kinds of social groupings and new raw materials' (Chapman, Higham, *et al.* 2006: 162). Copper (Černych, 1988; Černych, 1992; Todorova, 1995: 61) and, consequently, gold may be regarded as such new raw materials with a highly transformative cultural effect, especially judging from the burial customs at Varna. Indeed, if we consider the abundant copper objects that occur during the second half of the 5th millennium cal BC, as well as the coeval retention of Late Neolithic or Early Copper Age commodities and crafts, we can deduce a supplementary metal craft, with the metallurgists, who presumably may have formed a new societal segment.

The reinvention of the social elite at Varna?

At this point, the following question arises: Who was able to achieve the supposed social privileges within these communities, or, more precisely, who were the richly buried people from Varna? It has frequently been assumed that they represent metalworkers, because tools formed part of their grave furniture. Hence, craftsmanship or metallurgy was regarded as essential to achieve a high social rank (see Marazov, 1988; Lichardus, 1991b). However, we must emphasise again that almost all of the rich burials at Varna belong to the group of symbolic graves without skeletal remains. It is hardly possible to infer a person's identity and social reputation from such contexts. In a more general sense, the abundant commodities, like metallurgical products, especially gold objects, and the use of tools within the funeral custom rather reflect the communal potential of the surviving community members. Thus, the paraphernalia within such depositions first and foremost reveal such a community's abundant wealth, its symbolism, and its active participation in wider cultural exchange and communication networks.

Such networks significantly determine the social and cultural behaviour of communities, as they represent an area of, on the one hand, social interaction between the poles of peaceful coexistence and exchange, and on the other, struggles for their preservation. Hence, the abundant finds of (also gold-decorated) hammer-axes and bows in the rich burials from Varna I may equally be viewed as supporting indications for evolving struggles as a result of corresponding issues. There is archaeological evidence that copper and antler shaft-hole axes played a role as personal weapons in assaults (Бояджиев, 2014). While it has been argued that these objects might as well represent tools (as has often been assumed for

the hammer axes) or hunting gear (the bows), there are further implements that may be related to warlike struggles, such as a composite 'sword' from Giurgiuleşti (Moldavia; 4340-4050 cal BC; Anthony 2007, 244; Hansen 2013, 143) made with small microlithic flint blades slotted along the edges of a bone point (Anthony 2007, 257; Hansen 2013, 143 and fig. 9, 144). It could be viewed as an offensive weapon. In addition, anthropological evidence for warlike conflicts was found: for instance, the hilltop settlement Yunacite in western Thrace was destroyed by an attack (Zäuner 2011). These examples demonstrate that it is often difficult to infer the functional background of grave goods from their form. Thus, considering the outlined social and economic dynamics as well as the archaeological context, we must ask two questions:

Can we define a specialisation of the different crafts by the evidence of implements or supposed tools within the archaeological record? And, hence, is it possible to recognise the social role of metallurgy and the metalworkers (see for example Marazov, 1988) in the light of the archaeological remains? In the following, we will scrutinise the supposed outstanding social role of the metallurgist on the basis of the expanded data from the Varna I cemetery. Furthermore, we will discuss traces of other potential artisanship, by trying to recognise them in the mirror of the archaeological sources. To approach this problem, we will require a clear functional definition of the implements and anthropological markers that would indicate specific occupations of the deceased.

The equipment of the Chalcolithic metalworker

Generally, the sets of tools used by the Chalcolithic metalworkers are difficult to identify directly from the archaeological record (Rowlands, 1971: 216; Roberts, 2009: 469). Usually, indirect evidence from analyses of finished products serves to reconstruct the metallurgist's equipment. In this regard, optical analyses of tool marks and surface topography of the objects aim at a better understanding of the manufacturing techniques and the reconstruction of the used tool set. Such analyses were only recently performed on the gold objects from Varna. In addition, the objects were analysed chemically, primarily to examine distribution patterns, but also to analyse production techniques and organisation (Leusch, Pernicka, *et al.* 2014).

The studies showed that the manufacturing processes included different casting techniques. The first casting was probably done to produce ingots as pre-products to facilitate better transport and trade, and for the sake of further transformation via remelting and plastic shaping techniques (Echt, *et al.*, 1991; Armbruster, 2001). Even lost-wax casting played a role as a gold-working technique. It was applied for casting of both solid and hollow objects.

Furthermore, different plastic shaping techniques were applied using hammers, punches and doming blocks. Hammers were most likely made out of stone, copper or antler, and stones or wood might have been used for anvils. Folding and bending also fall under plastic shaping techniques. For chasing and parting, chisels were used (Armbruster, 2010). Appliqués, which were most likely sewn-on textiles, were perforated with a conical point, possibly some kind of awl. Grinding stones, sand, ashes and siliceous plants could have been used as abrasives for finishing and polishing. Combined with fibres, these abrasives might also have been used for parting.

Moreover, the casting equipment typically comprises a hearth, bellows and tuyères, as well as casting moulds. Hardly any such tools have been found within the corresponding archaeological record, especially not within the contemporaneous settlements. Despite the lack of such tools, it is assumed that the production of all gold objects from the Varna cemetery took place at nearby settlements. The remains of submerged settlements were found at the shore of the Varna Lake (Ivanov, 1988: 49; Biehl & Marciniak, 2000: 184; Todorova & Vajsov, 2001: 10). The lack of evidence of such tools could be because the total equipment for gold-working, except the hearth, could be easily transported in a container or bag. Ethnographic examples show that especially fine metalworkers can work without a special workshop, in a sedentary, nomadic or semi-nomadic way, never leaving any equipment at the working place (Armbruster, 1995). Such equipment and such a way of working would leave few or no archaeological traces.

Implements or tools – The archaeological remains of Chalcolithic artisans

In the following section, we will briefly summarise different objects that might have served as tools, not only for metalworking (Table 1). Based on the available information, 122 out of 226 burials from the Varna I cemetery that have so

Object	Possible function	Burial contexts
Awls	Tool. Multifunctional use for perforating or chasing different materials as wood, bone, antler, shells, copper, gold, leather, etc.	1, 4, 6, 8, 11, 26, 40, 41, 43, 46, 51, 52, 54, 61, 65, 66, 92, 97, 109, 113, 134, 139, 143, 146, 155, 167, 180, 182, 206, 226, 231, 255, 261, 277, 283
Cushion stones	Most probably a tool. Neolithic/Early Copper Age tradition.	41, 72, 90, 93, 99, 134, 150, 209, 220, 222
Stone adzes	Mostly tools. Multifunctional use. Neolithic/ Early Copper Age tradition.	4, 13, 14, 21, 23, 43, 51, 52, 78, 79, 97, 111, 112, 115, 116, 127, 133, 135, 143, 144, 145, 151, 152, 153, 155, 159, 170, 171, 172, 180, 181, 182, 187, 192, 194, 195, 200, 201, 204, 206, 209, 217, 229, 240, 243, 244, 247, 249, 252, 253, 255, 256, 259, 261, 265, 282, 284, 286, 288, 290, 293
Flint scrapers	Tool. Multifunctional use. Applicable e.g. for wood, bone or mollusc working, evisceration and skinning of game and preparation for leather production.	6, 19, 23, 25, 40, 43, 52, 56, 65, 90, 92, 109, 113, 126, 143, 145, 152, 153, 227, 229, 242, 249, 283, 284, 286, 290
Chisles	Tool. Wood or metal working.	1, 4, 5, 21, 40, 41, 43, 55, 65, 97, 144, 151, 231, 253
Copper hammer-axes	Mostly weapons (see Бояджиев 2014).	1, 4, 5, 6, 21, 26, 32, 36, 39, 40, 43, 53, 54, 55, 57, 65, 92, 97, 113, 116, 143, 146, 151, 195, 209, 226, 227, 229, 231, 240, 244, 255, 263, 275, 282, 283, 293
Copper pick	Imitation of an antler pick (?)	4
Antler tools	(mostly unspecified/fragmented) picks. Mostly fragments of battle axes (recognized as axes during the excavations and described in the field diaries by Ivan Ivanov, but damaged because of the soil acidity and bad storing conditions)	4, 13, 14, 28, 79, 85, 88, 92, 105, 111, 112, 115, 117, 133, 143, 144, 152, 153, 168, 170, 180, 182, 192, 200, 204, 207, 215, 217, 277, 284, 286, 294
Tuyères	Tool. Heat control for burning or (s)melting. Necessary for metallurgy	Known from settlements like Kubrat, Goljamo Delčevo and Pietrele (Lichardus, 1988; Todorova, 1982; Hansen, 2009)

Table 1: Chalcolithic tools from the cemetery Varna I and contemporaneous sites. Their practical function remains arguable and also a multifunctional use has to be considered.

far been evaluated contain such tools. Small hammer or smoothing stones and stone adzes were frequently found that already occur in the Neolithic (Figure 2). Furthermore, beyond these 'traditional' tool assemblages, a growing variety of implements or tools has been found at Varna that stands out in comparison to the previous periods. These newly occurring tools comprise awls, chisels, picks, flint

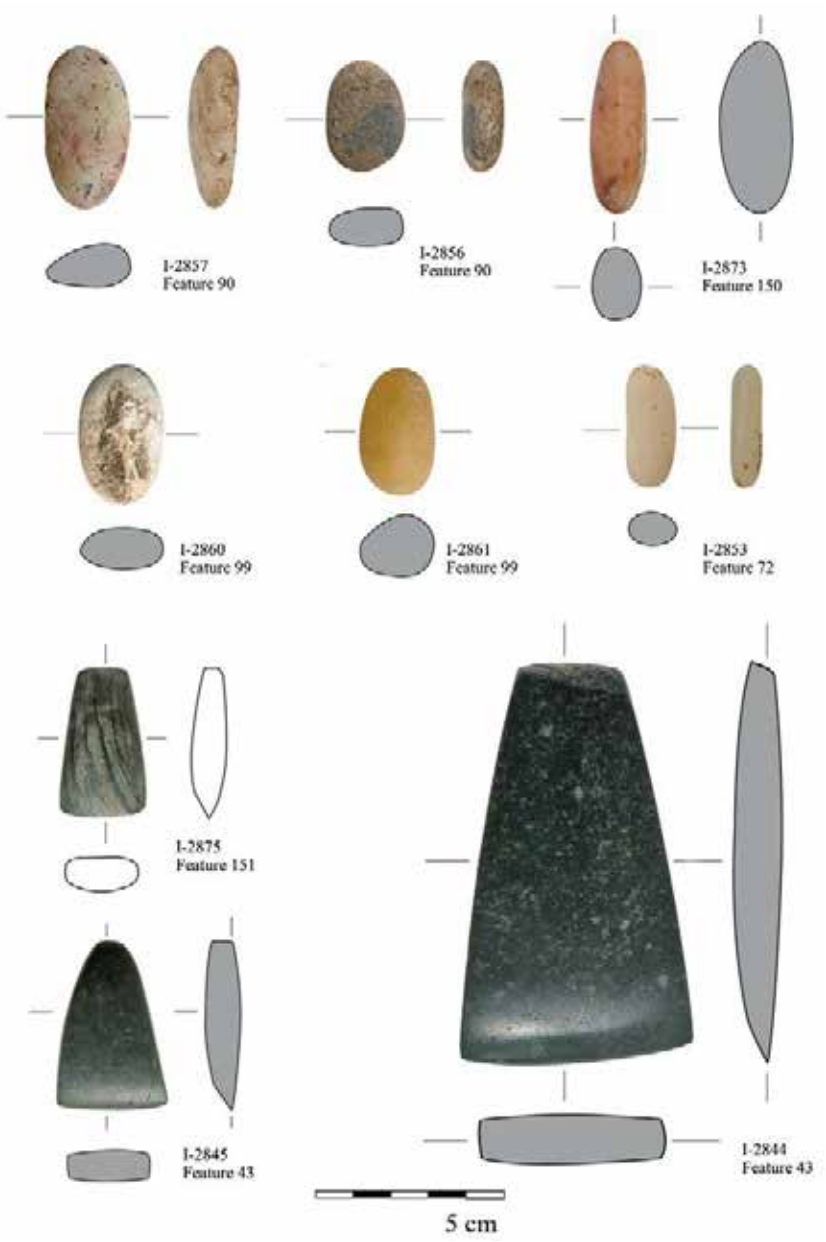

Figure 2: Traditional Neolithic tools like small hammer or smoothing stones and stone adzes from the Varna I cemetery. © R. Kostadinova, R. Docsan, V. Slavčev.

scrapers and the previously discussed hammer axes. Also tuyères could be found within contemporaneous settlements (Hansen, 2009: 27, fig. 20; Lichardus, 1988: 106, fig. 58; Nikolov, 1988: 218, fig. 147-148).

In particular, the presence of copper awls, chisels and different hammer axes in the rich burials is striking. It is noteworthy that hammer axes were often interpreted as mining tools and, thus, were considered the strongest evidence for the high social prestige of metallurgy and the metallurgists. However, so far they have hardly been found at prehistoric mining sites. Instead, typical prehistoric mining tools commonly 'included (grooved) hammer stones and antler picks' (Kienlin, 2014: 456). Recently, they have instead been classified as 'close combat weapons' (Бояджиев, 2014: 164).

Despite such ambiguities, the above-mentioned growing variety of implements or tools, together with the wide range of artefacts -that is, the products of skilled craftsmanship – indicate enhanced specialisation of artisanship. Beyond this, patterns of implements could be attested for the Varna burials that also might point to some degree of such specialisation. These arrangements may preliminarily be divided into four major groups, A – D (Table 2), based upon the specific find combinations of essentially five categories of implements: namely chisels, awls, cushion stones, flint scrapers and stone adzes.

Group A primarily contains chisels (Figure 3), awls (Figure 5), and copper hammer-axes, which are apparently typically part of rich male (supine) inhumations (grave no. 43) and, even more so, of symbolic graves, e.g. the cenotaph grave 4 (Figure 4). Other characteristic objects of this group are the aforementioned *superblades* made out of yellow flint, copper adzes and, importantly, the abundant gold items. Characteristically, this group is the only one where jewellery made out of dentalium shells occurs.

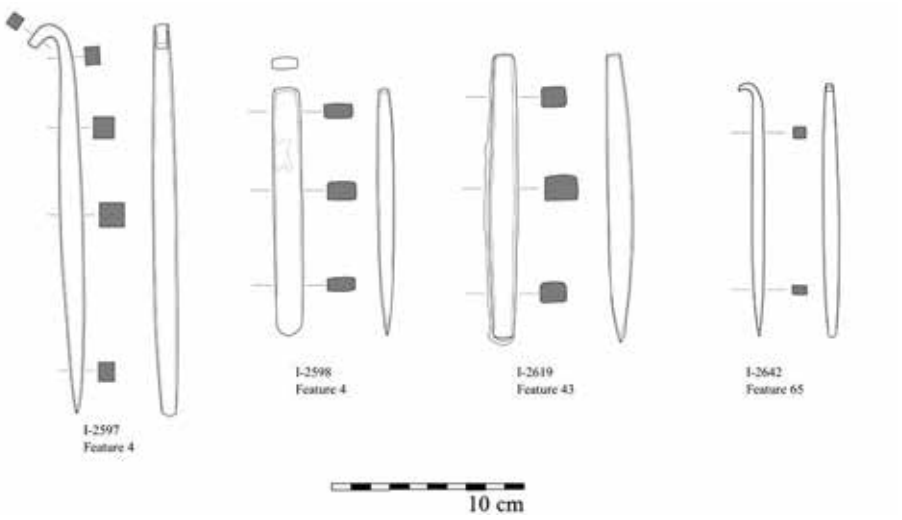

Figure 3: Chisels from different burials from the Varna I cemetery. © K. Dimitrov, R. Docsan, V. Slavčev.

Figure 4: Symbolic grave 4(A), grave 1 (B), burial 36 (C) and grave 43 (D). © Kalin Dimitrov (B and D) and Barbara Armbruster (A and C).

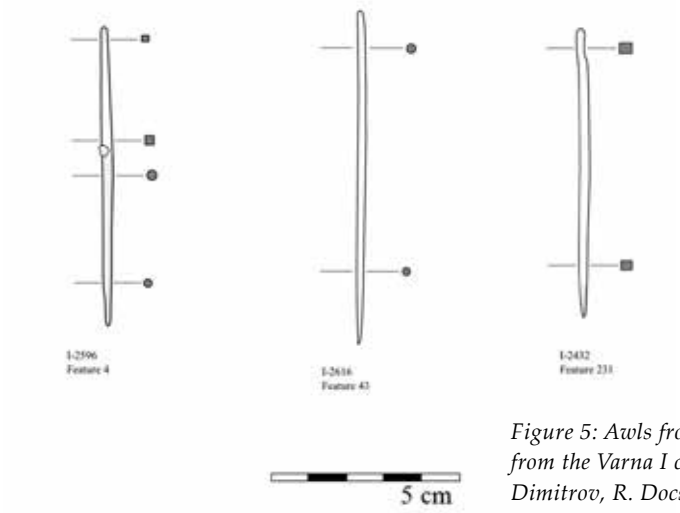

Figure 5: Awls from different burials from the Varna I cemetery. © K. Dimitrov, R. Docsan, V. Slavčev.

Group B comprises mostly male supine burials with copper awls and flint scrapers (Figure 6) or stone adzes. It might be regarded as reduced assemblages similar to group A, where copper chisels remain absent and where there are noticeably fewer gold objects. Still, hammer-axes and *superblades* repeatedly occur.

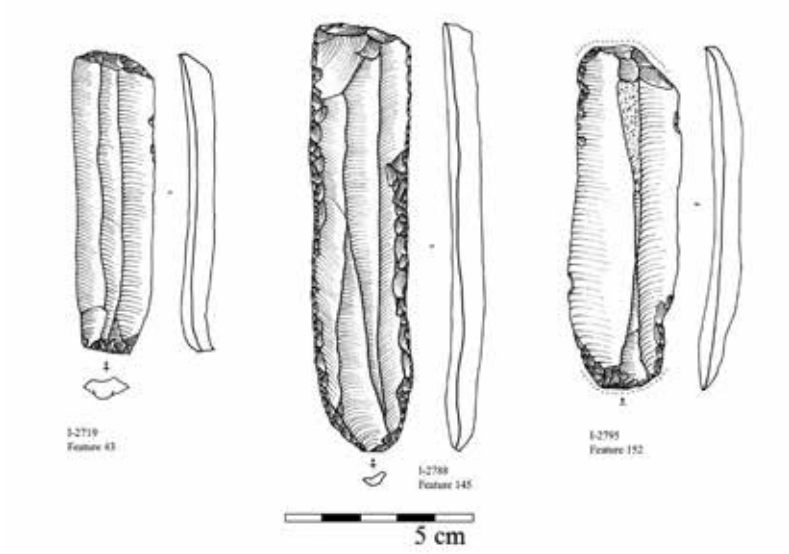

Figure 6: Flint scrapers from different burials from the Varna I cemetery. © L. Manolakakis.

Group C only includes male, supine burials that typically contain stone adzes (Figure 2) and flint tools (scrapers?). Tools or jewellery items made out of metal remain absent in this group. One might speculate that the copper adzes and copper chisels from group A represent a more sophisticated implementation of the stone adzes and flint tools from group C, but this is certainly highly notional. Similar assemblages could be found in the Durankulak cemeteries, where stone adzes, long flint blades, copper chisels and axes and antler picks frequently belong to male grave furniture (Todorova, 2002b).

Finally, group D seemingly suggests a completely different find spectrum. Mostly crouched inhumations belong to this group, where cushion stones are the distinctive feature (Figure 2). They were frequently combined with copper and Spondylus jewellery and flint objects. In Durankulak, such assemblages of cushion stones, flint implements and bone awls or pins are also traceable and seem to represent a female set of grave inventory (Todorova, 2002b).

Discussion: tools or symbols?

Generally, the habit of depositing such implements or tools in the graves may allude to the significance of crafting for the social community that was buried at Varna. At first glance, the distinctive tool kits seem to speak for different crafts that are represented in the respective burials of each group. Thus, one might think of a craft specialisation that is reflected by these findings. However, the specific differences in the grave furniture and the burial customs of each grave group that contains tools seem to represent different social or gender groups, rather than different social strata. Only group A comprises extraordinary rich burials with tools. However, considering that these burials are mostly depositions or so-called symbolic graves (Table 2), it is a stretch to interpret the presence of tools as indicative of a high social rank for metallurgists or artisans. Considering groups B to D, the social

ranking remains elusive and certainly needs to be further examined. In particular, the meaning of the supposed tools within these graves as 'social insignia' remains arguable. Following, for example, Chapman, Higham, *et al.* in this regard, '[t]he communal values of the […] products went hand in hand with the status of their creators' (Chapman, Higham, *et al.*, 2006: 162). Yet, according to the archaeological residues, this causality between highly valued products and the high status of the producing artisans is not clearly reflected by the archaeological record. Instead,

Burial	dentalium	copper adze	copper chisel	copper hammer axe	copper awl	flint 'superblade'	gold objects	stone adze	flint tool (scraper?)	spondylus	cushion/slick stone	copper jewellery	inhumation	cenotaph	sex	burial posture	Group
231		+	+	+	+									+			
1		+	+	+	+	+	+			+			+		?	?	
41	+		+	+	+	+	+			+	+			+			
4	+	+	+	+	+	+	+			+				+			
55		+	+	+	+	+	+							+			
21		+	+	+	+	+	+	+						+			A
151		+	+	+	+	+	+	+					+		m	s	
97			+	+	+	+	+	+		+				+			
65			+	+	+	+	+		+					+			
40	+		+	+	+	+	+		+					+			
43	+	+	+	+	+	+	+	+	+	+			+		m	s	
6				+	+	+	+		+				+		m	s	
283				+	+		+		+					+			
92				+	+	+			+				+		m	s	
113				+	+	+			+					+			
109					+	+			+				+		?	cr	
52					+				+				+		m	s	B
249					+	+		+	+			+	+		m	s	
182					+			+					+		f	s	
180					+			+					+		?	s	
261					+			+					+		m	s	
206					+	+	+	+					+		?	?	
145								+	+				+		?	s	
23								+	+				+		m	s	
284								+	+				+		m	s	C
290								+	+				+		?	s	
152								+	+	+			+		m	s	
286								+	+				+		?	s	
220									+	+	+	+	+		f(?)	cr	
93									+	+	+	+	+		m	s	
99										+	+		+		?	cr	D
222									+	+	+		+		f(?)	cr	
150									+	+	+	+	+		m	cr	

Table 2: Result of the Seriation of tools together with further characteristic object types. The analysis was done with program 'PAST' using the tools as comparative variables, which were arranged by an unconstrained seriation procedure. Different tool assemblages are distinguishable and divided into four groups, A to D. (Abbreviations sex and burial posture: M = male, F = female, S = supine position, CR = crouched position).

the tools' precise practical functions and use mostly remain unclear, which hinders the direct deduction of a specific craft by their form and the inference of potential social connotations. Again, to interpret the burials of group A as representations of metalworkers that held social privileges, as Marazov (1988) and others have suggested, must be regarded carefully, especially when we recall that these burials were mostly symbolic – that is, depositions and cenotaphs.

In this regard, '[e]thnography […] shows that no particular status can be automatically assigned to the smith (or any specialised craftsperson) simply on the basis of assumed prestige for his particular skills and knowledge' (Rowlands, 1971: 217). It might as well be possible that the tools were highly valued as symbols of power and as such were deposited in the graves of the social or religious elite or within the ritual deposits (Rowlands, 1971: 217; Nessel, 2012). The symbolic graves of group A seem to provide support for this thesis. Moreover, considering the multitude of prestige items within the rich burials of group A (Figure 4, below), tools represent only one part of the social insignia that also includes gilded hammer axes or sceptres and gold jewellery. Still, the exceptional grave no. 43 also belongs to this group, which represents an astonishingly rich inhumation of a male individual, who may indeed be viewed as a social leader. But in this case, it also seems plausible that the tools were included for a symbolic reason rather than for their practical use, especially if we consider that none of these implements show clear traces of usage. It might be assumed that 'their presence in more mundane situations and activities […] substantiated [their] suitability as markers of male habitus and [thus as] expression of a person's identity and social standing' (Kienlin, 2014: 452). As such, they presumably could have been regarded as attributes that, according to the surviving community, characterised the social reputation and not necessarily the prevalent occupation of the deceased.

The golden tools (?) from Varna

Beside the introduced tool assemblages, singular objects were also found in the prominent burials from Varna that might be addressed as stylised tools. However, owing to their singularity, it is difficult to contextualise these objects and to use them in corroboration of a supposed high social rank of the craftsperson or artisan. The first object that we mention here is the small golden hammer or sceptre from burial 36 (Figure 7), which is one of the richest burials from the site. This golden hammer seems to be an imitation of a typical gold smithing hammer for chasing,

Figure 7: Golden sceptre from complex 36. © Barbara Armbruster.

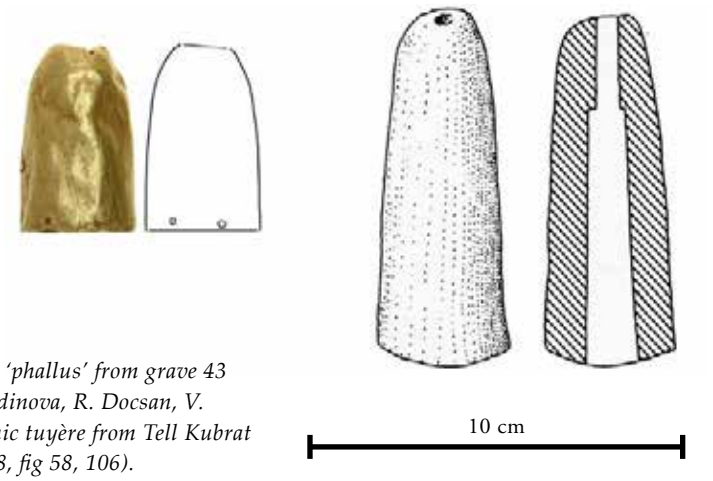

Figure 8: The golden 'phallus' from grave 43 (Varna I; © R. Kostadinova, R. Docsan, V. Slavčev) and a ceramic tuyère from Tell Kubrat (after Lichardus 1988, fig 58, 106).

but considering the lack of contemporaneous analogies, this interpretation must remain open (Leusch, Pernicka, *et al.* 2014). In addition, the gold-decorated hammer axes from burials nos. 1, 4 and 43 were connected to metallurgy or mining, as discussed above, but it could be shown that this functional interpretation lacks supporting evidence in the archaeological record as well. Moreover, the hammer axe from grave no. 43 is made out of soft and loose limestone, which makes it unsuitable for a functional application.

Another object is the golden sheath from grave 43, which is frequently referred to as a phallus (Figure 8, left hand side). The recent review of the excavation documentation clearly revealed that the original position of this object was beside the right thigh of the deceased (see also Ivanov, 1988: 55, fig. 25; Biehl & Marciniak, 2000: 186; Slavchev, [in print]) and not between his legs, which obviously led to the interpretation of it as a phallus. As an alternative interpretation, this may represent an imitation or gilding of a tuyère (Lichardus, 1991b: 174). Furthermore, the contemporaneous ceramic tuyères (one example from Kubrat [Bulgaria] shown in Figure 8, right-hand side) were often mis-interpreted as phalli (Lichardus, 1991b: 174). However, the interpretation of the artefact from grave no. 43 as a tuyère model is too far-fetched, as this model remains unparalleled and because of the big diameter of the output vent. The two perforations at the bottom of the artifact rather indicate that it was appliquéd (stitched) to a device, and most likely served as a decoration of such an ornament.

Thus, even though it is very tempting to interpret the tools (and especially the gold-decorated objects) as signifying the artisan's, and especially the metallurgist's, prestige, methodologically they can hardly be used as direct evidence for such an argument.

Metal production as a socially organised institution

To approach the question about the social role of Chalcolithic artisans or, more precisely, metalworkers, we need to distance ourselves again from the funeral depositions and try to picture their potential socioeconomic importance within the societal structures. As has been shown, increased metallurgical production

was paralleled by progressive inequality and social differentiation, as several Late Chalcolithic burial places and settlement finds indicate (Lichardus, 1988: 91-104; Windler, *et al.* 2013). For instance, some households at Pietrele reveal separate ceramic and textile production, as well as agricultural and hunting activities that apparently reflect a division of labour and indicate a differentiated social organisation and some degree of specialisation (Reingruber, 2010). However, none of these artisans' households point to an exceptional high social rank for the craftsmen themselves, which parallels the observations from the Varna graves (groups B to D). Recently, it has been possible to study the complex organisation of fine metalworking via a comprehensive investigation of the abundant gold objects from the Varna I cemetery. The results elucidate the complexity of the *chaîne opératoire* of gold and point to directed production and distribution (Leusch, Pernicka, *et al.* 2014), which is corroborated by the analytical work of the copper finds that revealed similar structures (Pernicka, Begemann, *et al.*, 1997; Gale, Stos-Gale, *et al.*, 2003).

Principally, the burials from the Varna I cemetery indicate different ideological backgrounds that are traceable by the specific arrangement of golden objects and other grave furniture, as we partially discuss above. For instance, we find (among others) male and symbolic graves with specific implements like bows, chisel, stone adzes and hammer axes. Furthermore, there seem to be female burials containing another set of grave furniture, like cushion stone and different jewellery items. Finally, these inhumations contrast with a group of symbolic depositions with iconographic or symbolically laden gold objects, such as ring idols. The two richest burials, nos. 43 and 36 (Figure 4), each represent such ideologically different funerary customs. As with the differences in their grave inventory patterns, there is evidence for a specific production of the different gold specimens found primarily in these two richest burials. By means of X-ray fluorescence analysis (XRF), it is possible to analyse almost every object from the Varna I cemetery and determine their specific chemical composition. The gold alloys that were used are primarily naturally occurring variations of placer gold with silver concentrations of between ca. 5 and ca. 45 per cent, and copper concentrations ranging between ca. 0,05 and ca. 2,5 per cent. When plotting the specific concentrations of each object in a scattergram, different clusters representing different types of material can be distinguished: the so-called gold groups (Figure 9). These gold groups can be treated like typological features that may be interpreted as indicators for associated or separate production processes (Leusch, Pernicka, *et al.* 2014). Regarding grave 43 and burial 36, distinct gold groups could be found; these are plotted in Figure 9. This may point to distinct production sequences for the specific consumers or funerals. Thus, the typological and chemical peculiarities emphasise the structural differences between burials 36 and 43 and point to a directed production probably related to the distinct funeral rites. Still, we cannot exclude the possibility that a single workshop worked for different purposes/needs of specific clients in different times or seasons, when different groups of gold-diggers returned back with gold from different alluvial deposits.

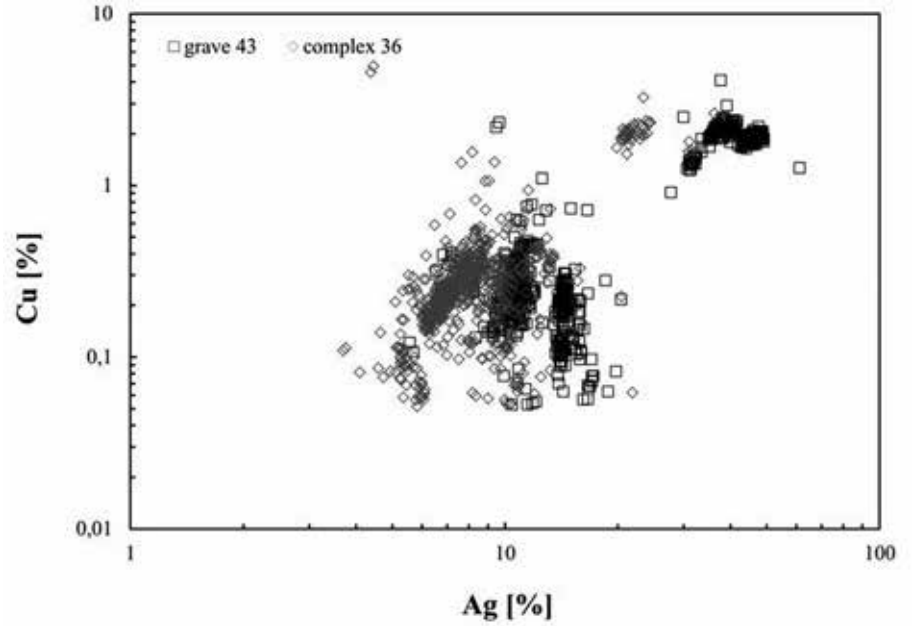

Figure 9: Scatterplot of the compositions of gold objects from burials 36 and 43. The distinguishable point clouds represent different chemical gold groups. © Verena Leusch.

By and large, the new investigations of the gold objects from Varna indicate a very directed production. In this sense, one may hypothesise that 'products of skilled artisans […] influence and assist in the implementation of [the social] authority' (Helms, 1993: 69) and the '[r]ecognition of persons of influence as skilled craftsmen [*as may be discussed specifically for grave no. 43*] […] suggests […] that the qualities and values associated with skilled crafting are fundamental also to the role of political leadership' (Helms, 1993: 70). Significantly, the observable 'patterns of consumption' (Roberts, 2009: 471) that could be elaborated by the typological, technological and chemical analyses of the gold objects suggest different social and/or religious rules. These additionally determine the general arrangement of the grave furniture on the basis of distinguishable ideological intentions, in which implements like tools or weapons played an important role (Ottaway, 2001, Ottaway and Roberts, 2008). These normative burial rites may be associated with groups of people or perhaps institutions that evidently controlled (a) these customs and (b) apparently the production and distribution of the gold objects and also other commodities.

'No pain, no gain'(?): anthropological evidence from grave no. 43

As the material culture and archaeological records provide only ambiguous evidence for the reconstruction of the social role of the artisan, skeletal remains from the Varna I cemetery were also investigated, with the goal of finding out about the physical stress of the debated individuals and providing an additional basis to approach this question.

Unfortunately, the very poor preservation of the bones from the Varna I cemetery considerably limited the information that could be obtained from the material. Anthropological analyses (based on isotope and osteological studies) aimed to investigate people's nutrition and migration and the physical condition of the deceased. Analyses carried out at the University of Tübingen have so far revealed no significant differences in dietary preferences from those already traced by Honch, Higham, *et al.* (2013).

The man buried in grave no. 43, however, deserves closer attention when discussing the role of the artisan within the Varna society. It is the best preserved and, moreover, the most outstanding individual from the site. According to the new investigations, he was between 50 and 65 years of age, some 10 years older than had previously been assumed (Zäuner, 2013). With an estimated height of ca. 1.70 m (Yordanov, 1978: 50), the robustness of the bones is above the average for the Bulgarian Copper Age. His nutrition was obviously based upon a protein-rich diet, as the presence of calculus on his teeth indicates. Generally, the man shows a continuously good diet throughout his life, which may be taken as a sign of the higher social status into which he was possibly born.

The muscle marks on the bones indicate great physical stress over the whole life span of the deceased. In particular, the bones of the lower arm display prominent muscle marks and stand in contrast to the weaker musculature of the upper arm. The leg muscles were also prominent. At the same time, arthrosis on the cervical spine, the hands and the feet could be attested. The left hip and especially the left knee were also affected, which may have caused severe pain. More surprisingly, a squatting facet can be seen on his left tibia. This may point towards a predominant sitting or squatting posture, perhaps in connection with the prevalent work of the deceased. Thus, the osteological evidence indicates that the man buried in grave no. 43 apparently had to work for the visible wealth and his social position. However, in contrast to the prevailing assumption, the pathological degeneration speaks against a position as an active warrior (Yordanov, 1978: 58).

But what was the occupation of this prominent man that led to these specific bone alterations? Metalworking is a possibility, as it involves a lot of sitting or even squatting and could also lead to strengthened lower arm muscles by the frequent use, for example, of smaller hammers, tongues, chisels and burins. This would support the hypothesis suggested by Marazov, Lichardus and others (Marazov, 1988; Lichardus, 1991b: 186) that craftspeople possessed social power. However, this apparently was not his only occupation. The prominent leg muscles may also indicate that this man could have covered remarkable distances afoot, perhaps in the course of trading activities. Furthermore, in the grave goods of this man, we can see an amazingly large number of weapons – a battle axe, a bow, a spear, a tomahawk (?) or a similar type of percussion hatchet. These finds could be contextualized with martial or hunting skills (Yordanov, 1978: 58). Thus, it cannot be ruled out that he was some kind of 'multitasker' and perhaps involved in different (seasonal?) activities of production, trade, hunting or even martial activities. In general, the bone alterations and degenerations of this man do not fit the idea of a parasite ruler or priest living at the expense of his people (*cf.* Nikolov, 1991: 163), but rather suggest an active participation in the socio-economic practices of his community.

Conclusion: the artisan within the Varna society

The role of the artisan, more specifically the metallurgist, within the Chalcolithic Varna society has recently been discussed against the outlined archaeological background and newly obtained analytical data. While older literature often suggested that metallurgical skills were essential for obtaining social power (Marazov, 1988; Lichardus, 1991b; Todorova, 1995), more recent considerations rather act on the assumption that social rank is connected to the control and the preservation of established exchange networks (Todorova, 2001, Ivanova, 2012; Bartelheim & Krauß, 2012).

Other than the prevalent opinion, the archaeological record does not give clear evidence that the craftspeople or smiths were 'privileged specialist[s] holding a high status position' (Rowlands, 1971: 215) within the Varna society. Nevertheless, craft obviously contributed to defining identity, and tools apparently were attributed with a transformed meaning as symbols of power. From ethnographic evidence, a similar *habitus* is known, where metallurgical tools were not part of the artisan's grave furniture, but instead were part of the grave furniture of the social or religious leaders (as summarized in Nessel, 2012). However, such metallurgical tools are hardly unequivocally recognisable within the burial contexts from the Varna I cemetery. This is the basic problem when we try to discuss the role of the metalworker as a specialised craftsperson within the given society. Furthermore, following Rowlands, metalworking in particular shall be understood 'as a separate cultural institution which can be seen to be composed of a number of socio-economic activities' (Rowlands, 1971: 210) that are merely fragmentarily tangible by the archaeological record; thus, interpretations in this direction must remain suggestive.

What can be traced is an increased and enhanced crafts production, especially of metallurgical products during the second half of the 5th millennium cal BC. This is frequently related to crafts specialisation. The different tool kits that were found in the burials from Varna as summarised in Table 2 seem to support this assumption. Additionally, different patterns of gold consumption could be recognised on the basis of comprehensive typological, technological and chemical analyses. These indicate a very directed production of the items that were used within the funeral customs.

In summary, judging from the abundant number of burials that contained implements or tools, crafting and artisanship may well be considered highly important for the Varna society and also for its social and religious elite. Particularly fine metalworkers, who were in charge of producing regalia and thus had to be acquainted with the specific secular and religious symbolism, may be regarded as indispensable for such leaders to demonstrate their power.

But did the artisans themselves form the social upper class, and were they thus responsible for the creation of their own insignia? Interestingly, anthropological evidence, albeit based on just one skeleton, reveals that the social elite seemingly were not parasitically consuming products manufactured by a suppressed underclass. The male individual from grave no. 43 – the most outstanding and best-preserved inhumation – shows indications of physical labour throughout his life that might be regarded as suggesting metalworking, but could also be indicative of trading, fighting and hunting. However, it is still the only burial that might be assumed to embody an artisan or metallurgist; besides, it remains a solitary finding, which

does not allow for generalisations about a leading social role for metalworkers. Perhaps it must generally be questioned whether artisanship can be considered a 'full-time' occupation that solely created a person's identity and defined his/her social rank. Considering the presented archaeological evidence of tools as grave goods, crafting might be regarded as a socially important aspect of personhood. But beyond that, trading and martial skills might equally be considered important aspects, when we think about the complexity of the socio-economic activities and dynamics of that time.

Hence, judging from the numerous graves known from the Varna cemetery that contained implements or tools and various elaborate products of skilled craftsmanship, artisans apparently contributed significantly to the outstanding manifestation of that burial place. However, archaeological sources so far do not clearly allude to their high social rank. Certainly, this should be further evaluated according to other sites (e.g. the cemeteries from Durankulak), where more inhumations and related settlements could be found that, moreover, cover a larger chronological framework.

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Who's in charge here?

The making of military communication vectors in the Late Iron Age in western Europe

Alexandre Bertaud

Introduction

To command on the battlefield, within the clash of arms, warlords need proper tools to carry their orders to the soldiers. In this particular context, musical instruments play an important role. This paper investigates which of the instruments found in excavations could have been used by the societies of the final centuries BC across much of continental western Europe. Having described the instruments, we can answer major questions: Who were the artisans capable of producing such objects? How did they make them, and for what purpose? It is only through considering these questions that we can better understand the connection between the makers and the users of these particular objects. In order to understand these issues, we must first observe and define which are these instruments and in which contexts we find them.

Types of musical Instruments

Carnyx

The most typical musical instrument of the western European Iron Age is probably the *Carnyx*. This word is attested only from the 12th century onwards, first in the eastern Roman Empire (from Eustathius of Thessalonica, see Homo-Lechner and Vendries 1993), that is to say, more than ten centuries after the last archaeological evidence for these instruments in western Europe. However, modern historians have used it in their studies about the instruments described by Greco-Latin authors, such as Polybius, who wrote about the Telamon battle (II, 29), or Diodorus Siculus (V, XXX, 4). This historical interest is restricted to the impressions that these instruments made on warriors of both sides: the Romans as well as their enemies. The morphology of the instrument called "Carnyx" in modern bibliography is better known through iconographical remains than through the first literary description of the musical instrument during the late Byzantine era (as mentioned above). Indeed, many *carnyx* representations have been discovered in Roman as well as in indigenous contexts (Hunter 2001). Coinage iconography tells us how the Gauls visualized this instrument. On the few known examples, we see individuals

holding a *carnyx* in one of their hands. These personages seem important: One has wings and probably personifies Victory (Figure 1, a). The other holds several attributes (*carnyx*, boar insignia, severed human head, long sword, helmet and armour) and his name is mentioned: *Dubnoreix*, a personage of the Gallic Wars (Dumnorix to Caesar, *BG*, I, 3, 9, 16, 18-20 and V, 5-7; Figure 1, b). Furthermore,

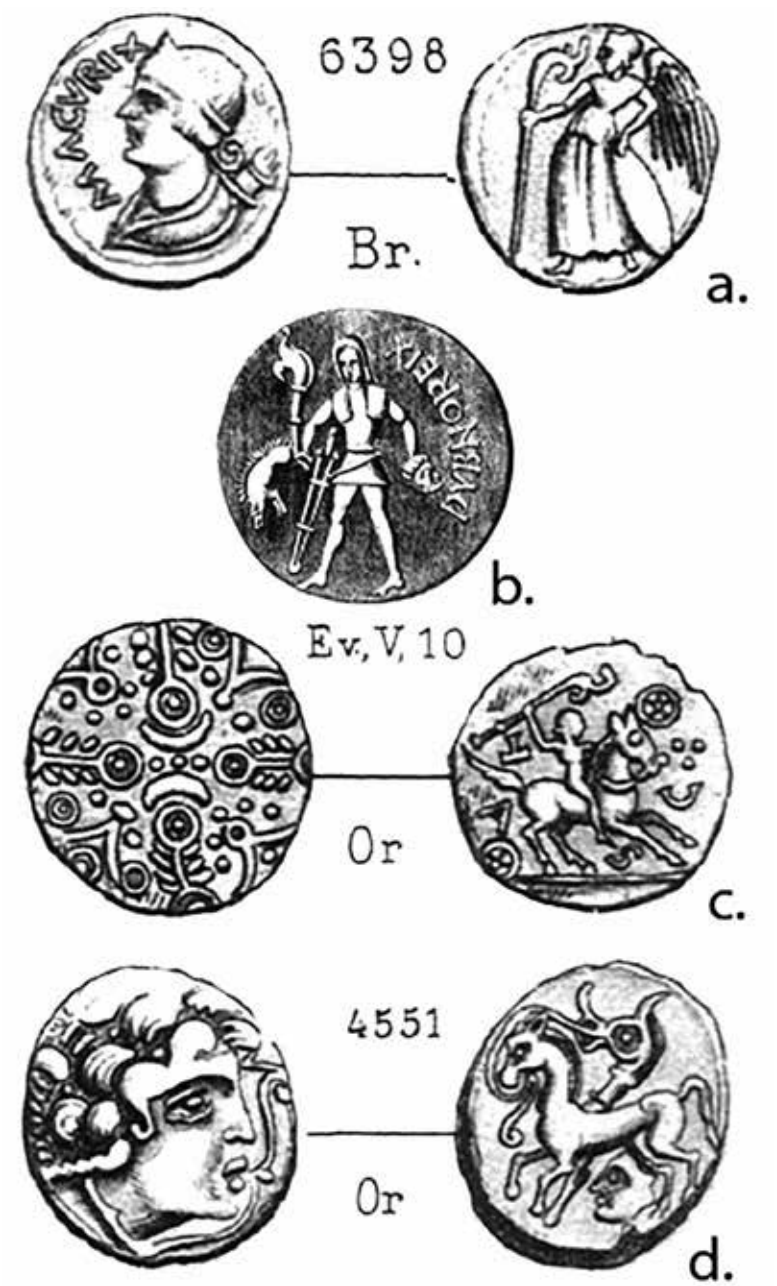

Figure 1: Coins with carnyx representation (a, c, d: after De La Tour 1965, respectively pl. XX, XLIII, XIII ; b: Goudineau 1990: 93).

some of the other *carnyx* representations on coins are associated with horses. On a coin from Britain, a cavalryman is shown holding a *carnyx* (Figure 1, c), and in a Lemovice issue, the same instrument is associated with a horse and a severed human head (Figure 1, d). Beyond these numismatic examples, the *carnyx* is better known through its depiction on one of the most emblematic masterpieces of Celtic art: the Gundestrup cauldron, found in a Jutland bog in Denmark (Figure 2). Several publications (for instance: Goudineau 2006: 53-77) have already analysed the iconographic program of the thirteen silver plates finely worked on the inside and on the outside. I focus on the warfare scene, where a band of seven warriors walks from the right-hand side to the left, towards a larger figure immersing a personage in a cauldron. Most of the infantry band is composed of warriors holding a spear and a big oval shield. The last warrior of this group, however, does not have the same equipment: he keeps a sword on his shoulder and wears a helmet surmounted by a boar representation. Behind this personage, three figures are shown playing a musical instrument held in a vertical position: the *carnyx*. This instrument is made of a long straight tube in which the column of air goes from a mouthpiece to a pavilion, which in this case is in the shape of a boar head. On the upper register, four cavalrymen are shown riding from the left to the right-hand side. All of them are wearing helmets surmounted by animal-shaped crests, and two of them hold spears. This representation gives some hints towards understanding the indigenous use of this musical instrument in a warfare context. The musical instrument is associated with footmen warriors, and musicians stay close to the warrior equipped in a specific fashion, presumably a warlord.

Association between the *carnyx* and warfare is also very important in Roman depictions of this musical instrument, especially those related to victory over Gallic warriors (Hunter 2001: 93). Indeed, some Roman coins show the musical instrument used to build trophies (Figure 3, a, b). The same kind of iconography can be found on monuments. On the Orange Arch, the *carnyx* is presented as a warlike trophy (Figure 3, c). Emphasizing the power of the Roman Princeps, the

Figure 2: Warfare scene from the Gundestrup caldron. (after Goudineau 2006: 60-61).

Figure 3: Roman representations of canyx. (a: after Clavel-Lévêque 1989: fig. 53 n°1; b: Clavel-Lévêque 1989: fig. 54 n°1; c: Nerzic 1989: 38; d: Galinsky 1996: 159).

statue of Augustus from the Prima Porta shows a woman with a *carnyx* on her knees, which is a representation of the obedient Gaul (Figure 3, d).

This musical instrument has been viewed as a symbol of the Gallic warrior since Antiquity, but, surprisingly, archaeological research in western Europe has permitted the discovery of only a few elements of it. If we discard the *carnyx* from Deskford (Scotland), which is attributed to the end of the 1st or the 2nd c. AD (Piggott 1959), *carnyces* or fragments of *carnyces* have been positively identified only in Mandeure (Doubs, France) and Tintignac (Corrèze, France). On the first settlement, fragments of bronze sheet forming a boar head, emphasizing the dentition and with an empty place for the boar's tusks, gave the first direct evidence

Figure 4: Carnyx element from Tintignac. (after Maniquet 2009).

for a *carnyx* pavilion form, found for the first time on French ground (Barral 2007). The earliest discoveries, from the middle of the 19th century to the beginning of the 20th century, have allowed this particular instrument and its particular pavilion to be studied. The recent discovery from Tintignac (in Naves 2009) has deeply changed the common vision of this instrument. In this sanctuary, Christophe Maniquet discovered several *carnyx* parts: at least two pavilions, one with a boar head, the other with a snake, as well as tubes and a mouthpiece (Maniquet 2009) (Figure 4). The mouthpiece, a part unknown until the Tintignac discovery, is a cup-end form piece of metal linked to the body by a straight tube. With these elements we can now better understand the position of the *carnyx* player.

The Tintignac remains were found in association with weapons (swords, scabbards, helmets, one shield boss), again demonstrating this musical instrument's strong connection with the military sphere. Four bronze animal ears were also found. These ears were made in hammered bronze sheet, with the larger part in laurel form and a central gutter. Comparable objects were discovered only on a few settlements: two in La Tène (Switzerland, found in 1913; Hunter 2009: 75), two in Abentheuer (Germany; Hunter 2009: 75), one in Sanzeno (Italy; Hunter 2009: 75), five in Mandeure (Barral 2007) and four in Tintignac (Maniquet 2009). These ears seem to be a part of the *carnyx*, because of their shape and because of their contextual association with this musical instrument in Mandeure and Tintignac.

Their central gutter can be short or long and ends in a tube, which seems to fit inside a hole that appears on the top of the pavilion. They would have increased the size of the instrument: With two big ears made from copper alloy on the *carnyx*, the instrument must have been visible over a long range. Furthermore, through their vibrations, these appendices could accentuate the sound produced by the *carnyx* (Hunter 2009: 80). But these ears could also be a part of military signals. The removal of an ear on one or the other side could have been a signal for soldiers, as a semaphore-style accompaniment to the noise of the instrument: visual signals to complement the acoustic ones.

The *carnyx* was a symbol of the Gallic warrior for the Romans, but also for Gauls themselves. Most of the discoveries were made in Gaul in association with weaponry, reinforcing the idea that this musical instrument was strongly linked to Late Iron Age Gallic warriors.

Blowing horns

The *carnyx* is not the only musical instrument associated with warfare in western European Iron Age societies: blowing horns are also important. The late prehistoric horns are less well known than Roman ones, or even than the Gallic *carnyx*. Indeed, there are only a few representations of this instrument in late prehistoric and classical art. Horn types can be distinguished according to the material used to make them.

Ceramic blowing horns are quite rare and relatively unknown: Indeed, no representation of them has been discovered, and we know them only through the discovery of artefacts in settlements in the Spanish Meseta region. In the Celtiberic town of Numancia (Garray, Soria, Spain), 28 ceramic instruments made of a long rolled-up tube, with a mouthpiece on one side and a pavilion that can be painted or decorated with a beast or boar head on the other side (Figure 5), were discovered in ancient excavations at the beginning of the 20th century (Wattenberg 1963). A few examples have been found outside Numancia. For example, a ceramic horn measuring 15cm x 25cm was found in Izana (Langa, Soria, Spain) (*Celtas y Vettones* 2001: 425); the most oriental known horn was found in Alloza (Teruel, Spain) (Homo-Lechner and Vendries 1993: 19); and a third was found in Tiermes (Soria, Spain; Pastor 1987: 9). Unfortunately, the excavations that discovered ceramic horn fragments took place a long time ago, so the discovery context is not well known. The mouthpiece part has a cup-end form and allows the air to be blown through the instrument. These horns are made of the same clay as that of fine Iberian wares, and are sometimes painted (for example Figure 5, b).

Musical blowing horns entirely in bronze have been discovered in Ireland; these date from the first half of the 1st millennium BC onwards (Coles 1963). In continental western Europe, this type of horn is unknown, with the possible exception of two fragments in the Musée d'Archéologie Nationale in Saint-Germain-en-Laye (France), but from an unknown settlement context.

Horns partly made with perishable materials may have existed, but none have so far been found complete. Only a few parts could perhaps be preserved, such as the metallic ornament, often in bronze. That is why we call them "composite blowing horns". They are better known than ceramic horns in the iconography:

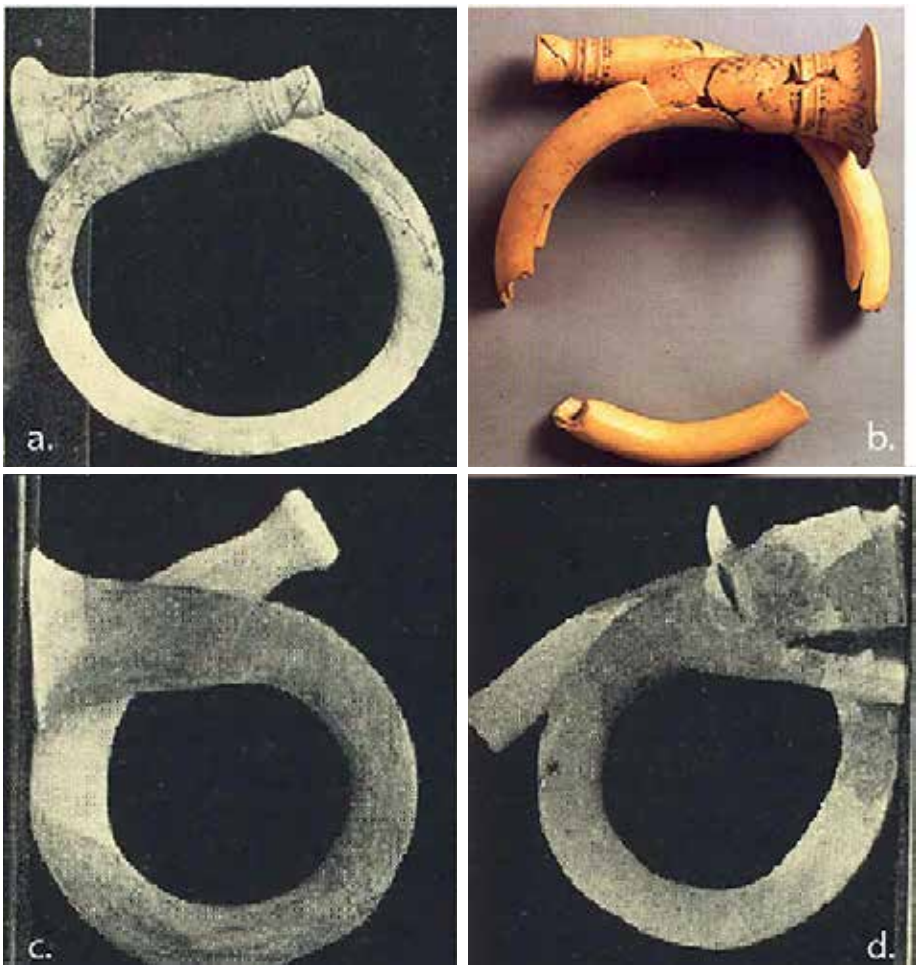

Figure 5: Ceramic horns from Numancia. (a, c, d: after Taracena Aguirre 1929: 16; b: Celtas y Vettones 2001: 4240).

Indeed, certain coins depict figures using musical instruments that look like horns, as does an Iberian *Aes* bearing the name "Loutiskos", on which a cavalryman is using what seems to be a horn (Figure 6, a). In Central Europe, a coin from Austria (Helm B 23) also represents a figure holding and blowing into a horn (Figure 6, b). This time, the figure is on foot and has a sword in his right hand. But the specific association of horns with warfare contexts is more obvious in the Iberian painted ware, and the most characteristic of them comes from Tossal de San Miquel de Lliria (Valencia, Spain) (Bonnet Rosado 1995). On one of the *dinoi* (Figure 6, c) there is a painted depiction of a battle between two warriors carrying shields, one using a spear, the other a curved sword (a falcata). There are also two musicians, one on each side of the scene. The one on the left-hand side seems to be a woman, because of her long dress and particular cap. She plays an *aulos.* On the right-hand side, the other figure is blowing a horn.

Figure 6: Blowing-Horn representations on coins and ware. (a: after Guadán 1979: 76; b: Prokisch 1993: 39; c: Bonet Rosado 1995: 442).

This composite blowing horn artefact is difficult to identify among remains recovered during excavation, mainly because of the disappearance of much of the material and the fragmentary aspect of the surviving artefacts (for an example of a medieval wood and copper alloy composite blowing horn found in a river, see Homo-Lechner 1996: 115). Mostly, these surviving parts could correspond to the two ends of the horn, covered in bronze. The ends of some horns dating to the late prehistory have been discovered, but their ambiguous morphology has resulted in different interpretations. Most of the time, they are interpreted as drinking-horn ornaments, on the basis of analogies to the famous examples of Hochdorf or Klein Aspergle in Germany, dated to the Early Iron Age (end of the 6th to the 5th c. BC) (Figure 7). These Early Iron Age drinking horn ornaments, made in metal, are not pierced (Les Trésors des Princes Celtes 1987: 177, 261), a characteristic that does not allow for any other use than that of the drinking vessel. Some other objects, however, have a central, straight hole. One end has a cup-end form, while the other is horn-shaped. Artefacts from Boé grave (Lot-et-Garonne, France, Figure 8, a ; Schonfelder 2002: 82-87), Goeblingen-Nospelt grave D (Luxembourg, Figure 8, b; Bockius and Luczkiewiez 2004: 104), Grossromstedt grave 1926 (Thüringen, Germany, Figure 8, c; Bockius and Luczkiewiez 2004: 109), Schkopau grave 5

Figure 7: Horn extremities, up iron horn from Hochdorf, down golden horn extremities from Klein Aspergle. (after Trésor des Princes Celtes 1988: up 177, down 261).

(Saxe-Anhalt, Germany, Figure 8, d; Bockius and Luczkiewiez 2004: 109), and Vijni Vrh (Lower Sava, Slovenia, Figure 8, e; Božič 1983) are good examples of this kind of object. Their shape is very close to the Tintignac *carnyx* mouthpiece; based on this, I conclude that far from being drinking horn ornaments, these objects were indeed musical instrument parts, namely composite blowing horn extremities. The nails discovered on the bronze element horns are short enough to maintain the bronze part with the horn part, without obstructing the stream of air.

Composite blowing horns appear in various regions in western Europe. One can infer their presence from the iconography, as well as from excavation finds. The oldest representations seem to be the Iberian painting on the Tossal de San Miquel de Lliria wares during the 3rd c. and the beginning of the 2nd c. BC (Bonnet Rosado 1995: 84-85, 87-89, 100-101, 175-176) and the "Louitiskos" coin minted in the 2nd century (Garciá-Bellido and Blázquez 2001: 272-273). Both of these representations make it clear that these instruments were used in a military context. The artefacts I interpret as composite blowing horn parts are more recent, and

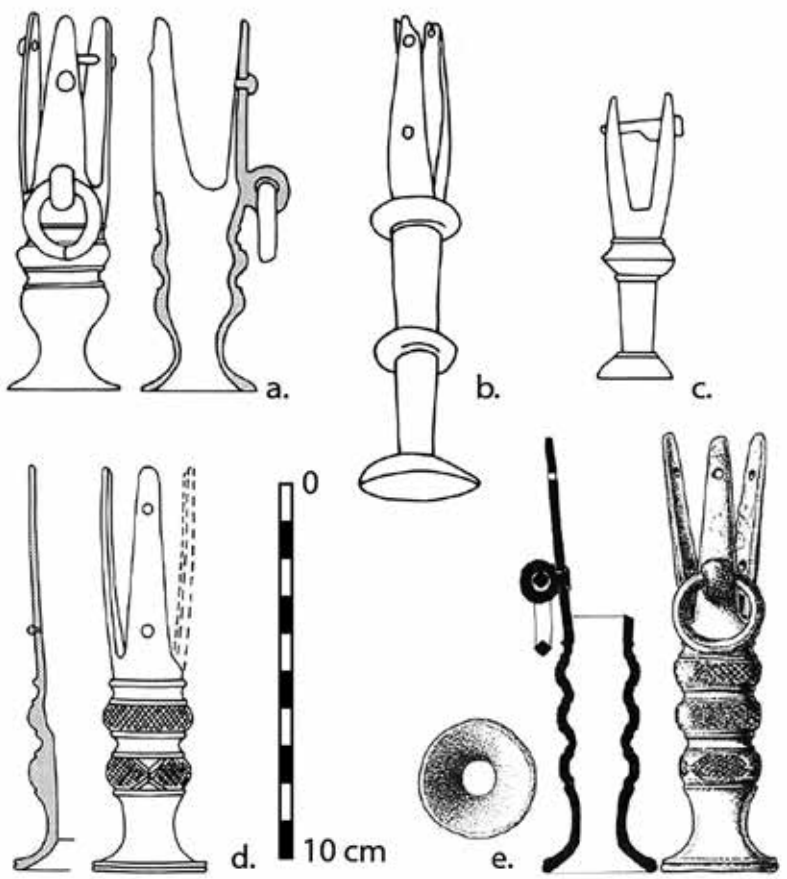

Figure 8: Music horn extremities from a: Boé, b: Goeblingen-Nospelt, c: Grossromstedt, d: Schkopau, e: Vijni Vrh. (a, b, c, d: after Bockius and Luczkiewiez 2004: 106; e: Božič 1983: 423).

could date from the 2nd half of the 1st c. B.C. (Schönfelder 2002 for the Boé grave; and Božič 1983: 424 for the other examples).

The use of blowing horns in warfare contexts may have appeared first in the Iberian Peninsula, later spreading over northern regions. *Auloi* and lyres are also represented on native iconography of Gallic coins or on Iberian wares, but archaeological research has not so far enabled us to discover any of them. The elements that were previously interpreted as the fragments of an *aulos* are now interpreted as fragments of a chest (Homo-Lechner and Vendries 1993).

Producing military communication

Throughout Iron Age Europe, many different materials and techniques, such as copper alloys and clay, were used to produce these musical instruments. Copper alloy was used to provide sheets, shaped by hammering especially for the production of a *carnyx*'s tubes, ears and pavilion, whereas some boar head fragments are not made of hammered sheets (Maniquet 2009: 45-48). The pavilion extremity of the horns, as in Boé, also consists of hammered bronze sheet (Schonfelder 2002: 82-87). But copper alloys could also be directly cast for particular pieces. Indeed,

carnyx rings that keep tubes together are in cast bronze, and the same production process appears with *carnyx* and horn mouthpieces. Molten bronze is the best way to obtain the complicated shape of the mouthpiece and especially the inner part, in cup-end form, that requires specific acoustic properties.

Ceramic horns have a particular *chaîne opératoire*. The nature of the clay paste, depurated clay with a colour between orange and beige, the production, and the firing techniques are the same as those used to make Iberian fine ware (*Celtas y Vettones* 2001: 424). The so-called "Iberian fine ware" is not restricted to the nuclear Iberian area on the Mediterranean coast; we also find this kind of ware in most of the Iberian Peninsula areas. People who were able to craft such musical instruments had a precise knowledge of the Iberian fine ware *chaîne opératoire* and used the same clay and production process.

Given the above, it would appear that these warfare musical instruments were produced by specialised workers. Potters capable of producing Iberian fine ware employed their skills to make tubular and zoomorphic objects that produced sounds: ceramic blowing horns. In relation to the copper alloy treatment, I note that craftspeople used different methods, hammering bronze sheets or melting down specific pieces, to produce the *carnyx*. The composite blowing horns were thus likely produced by different specialised artisans because of the different materials involved: bronze smiths who cast copper alloy to give a shape to the mouthpiece or hammered sheet, and then to make the pavilion; and horn workers. These particular objects were made by artisans who were very knowledgeable about how to work with a particular material. It seems that they were not musical instrument makers, but rather craftspeople who, on occasion, employed their knowledge and skills to make particular objects at someone's request.

The sound of war

Now that I have defined musical instruments associated to warfare in western Europe during the final centuries BC, the subsequent question concerns the people who used them.

These instruments, associated with warfare (as seen on iconographical remains), would have served on the battlefield to give instructions using different sounds and rhythms. Visual messages could have complemented the acoustic signal, as has been hypothesized for the *carnyx*. The combination of these elements was fundamental for the warlords leading soldiers during the battle, who needed them to operate coordinated tactical movements. Each soldier could hear the sound signals emitted by his warlord and see the associated semaphore, so in the clash of arms, he could proceed according to orders. With the use of these instruments, the soldiers attached to a warlord could receive his orders and identify and follow his tactics. Representations on the Gundestrup cauldron and on wares from San Miquel de Lliria show that the person who played the instrument was not necessarily the warlord himself. Pictures show that a related person stayed close to the captain in order to transmit orders and indications. Horn- or *carnyx*-bearers may well have been of high status, as appears to be the case in some Middle Age poems. For example, in the *Song of Roland*, Earl Roland possesses and plays a blowing horn to ask reinforcement from King Charles. However, this prestige may

well have been linked to the personal proximity to the warlord, as the horn player carried the warlord's 'voice' – that is, his orders.

The area of diffusion of each of these instruments is quite wide: the *carnyx* in France and the ceramic horns in the Spanish Meseta. Musical instruments played a socially and culturally distinct role, and also formed a social status marker. For example, in the Numantine area, in the Spanish Meseta, the use of a ceramic horn probably characterized the warrior elite.

These instruments enabled a leader's troops to recognise him. The use of a musical instrument in an area allowed recognition from other warrior aristocrats using the same kind of musical instrument as being one of them – that is, a warlord. These prestigious musical instruments create or confirm the status of the owner of this tool type as a warrior leader.

Conclusion

Musical instruments linked to warfare in western Europe during the final centuries BC can take various forms. These instruments answered to specific criteria and patterns: Cultural and social aspects converged in these artefacts, whose specific morphology was also linked with the owner's identity. Craftspeople used their particular knowledge to produce unique artefacts that were specific to only one owner, who was recognized by his community as one particular warlord. This study of musical instruments carrying the warlord's 'voice' helps us to understand the complexity of relationships between aristocrats and artisans, who were intimately linked in a way that emphasised social distinction: the elites in their capacity to lead and command warriors, the craftspersons in their capacity to make complex and prestigious artefacts for the warlords.

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Chipped stone tools from the Early Bronze Age settlement of Minferri (2100-1650 cal. BC) (Lleida, Spain)

Raw materials, technology and activities inferred

Dioscorides Marín Castro, Juan F. Gibaja Bao, Natalia Alonso Martínez, David Ortega Cobos, Antoni Palomo Pérez and Andreu Moya Garra

Introduction and background

The lithic productions of the Early Bronze Age in the Iberian Peninsula are still scarcely known. Until now, few efforts have been made to understand the role of chipped stone tools and their economic value. For this period, most of the studies deal with pottery and metal objects because of their importance as cultural markers. It has often been stated that metallurgy becomes a day-to-day technology for the development of the main economic activities in the prehistoric communities of the second millennium cal BC (Lull, 1983; Soriano, 2013). Thus, the consolidation of metallurgic productions during the Early Bronze Age would have been the main cause of the decrease of the chipped stone tool assemblages from the Middle East to western Europe (Rosen, 1997). However, we cannot obviate the coexistence of lithic assemblages during the early stages of the Bronze Age. In several archaeological sites of the northeast Iberia and other areas of the Iberian Peninsula, many chipped stone tools have been recovered (Bouso, *et al.,* 2004, Harrison, *et al.,* 1994, Clemente, *et al.,* 1999; Gibaja, 2003; Gibaja, *et al.,* 2010) (Figure 1). Nevertheless, until today, the lithic record remained unstudied, covering only a marginal role in the social and economic interpretations of the Early Bronze Age societies.

The lithic elements that initially attracted the scholars' attention are the so-called 'sickle blades' (Childe, 1930). These characteristic tools have been analysed with a variety of methodologies, mainly to prove their employment in agricultural works (Harrison and Meeks, 1987; Gibaja, 2003; Clemente, *et al.,* 1999, Gibaja, *et al.,* 2010). Moreover, a complete sickle handle was recovered from the site of *Mas de Menente* during the 1920s (Cabanilles, 1985). It consists of a wooden handle of curved shape with a central groove for the insertion of

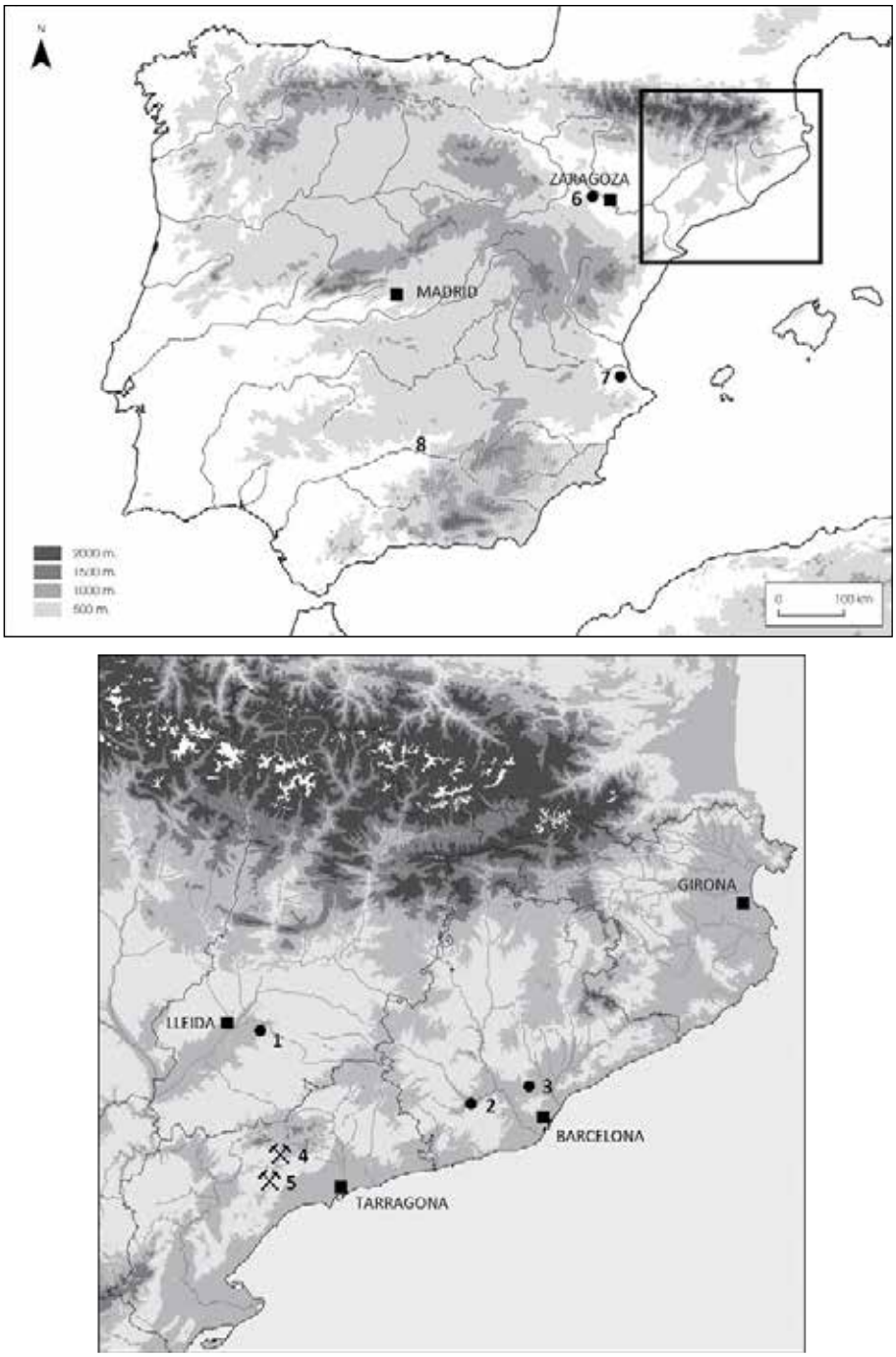

Figure 1: Geographical situations of the sites mentioned in the text. 1: Minferri (Juneda, Lleida). 2: Mas d'en Boixos (Pacs del Penedés, Barcelona). 3: Can Roqueta II (Sabadell, Barcelona). 4: Solana del Bepo (Ulldemolins, Tarragona). 5: Mina de la Turquesa (Cornudella, Tarragona). 6: Moncín (Borja, Zaragoza). 7: Mas de Menente (Alcoi, Alicante). 8: Area of influence of the Argaric culture.

the flint implements (Figure 2). More extensive studies were carried out for the so-called Argaric group in the south-east of the Iberian Peninsula (Gibaja, 2003; Clemente *et al.,* 1999). Here, samples of blades from several sites of the region were analysed, demonstrating their employment as sickle inserts. Such tools were produced outside of the settlements and later transported and used on site. Moreover, several caches of unused blade blanks were recovered in Argaric sites, confirming the existence of an intra-site circulation and trade exchange of lithic implements. Indeed, the metal sickles are absent during the Iberian Early Bronze Age (Gómez Ramos, 1999; Soriano 2013). Their production started during the Late Bronze Age (1200-900 cal BC), although they remained rare objects until the Iron Age (Fraile, 2008).

Sickle blades, however, are not the only type of flint tools that have been recovered in the Early Bronze Age settlements. In northeast Iberia, a considerable amount of chipped stone materials has been recovered, for example in Can Roqueta II (Bouso, *et al.,* 2004; Terrats, 2010), Mas d'en Boixos I (Bouso *et al.,* 2004; Farré *et al.*, 2002), Moncín (Harrison *et al.,* 1994) and Minferri (Alonso, 1999:186-190, Palomo *et al.*, n.d.-a-) (Figure 1). Lithic productions (both tools and refuse findings) have been only superficially analysed and, at the current state of the research, we do not know about the managing strategies of the raw materials, the debitage systems implicated in lithic tools production and the activities carried out with them. In this sense, the main objective of this work is to advance a first

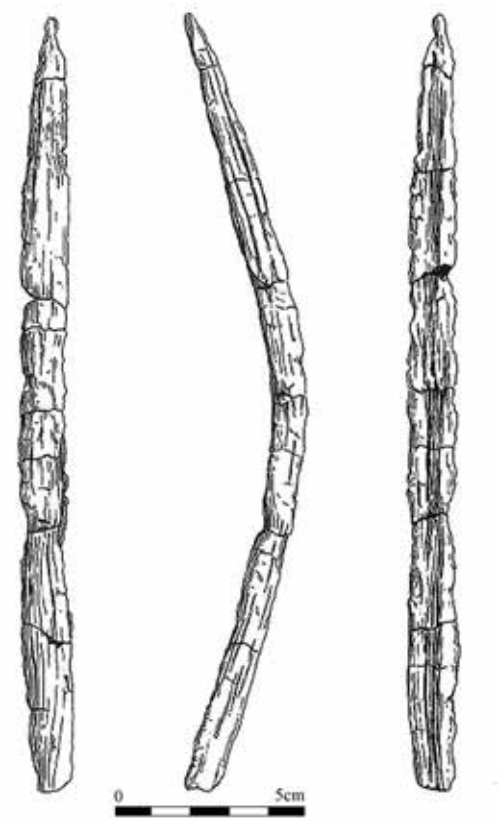

Figure 2: Wooden sickle handle from Mas de Menente (Alcoi, Alicante). (Source: Cabanilles, 1985: 38).

approximation of the economic processes in which the Early Bronze Age lithic tools were involved, as well as the relation between the flint technology and the emerging metallurgy production among these communities.

The pit settlements: the example of the Minferri site

All excavated sites in the northeast of the Iberian Peninsula show common features, with a recurrence of storage-negative structures associated with other evidence such as post holes and dwelling pits. From here derives the name of pit settlements or '*campos de hoyos*' (Martínez, 1989). These settlements represent hamlets where the houses and the different architectural features were dispersed in an extensive field without fortifications. Unfortunately, modern agricultural activities have eroded most of the Bronze Age soils. Only negative structures have been conserved, potentially illustrating a form of urbanism but with much of the site stratification now lost.

In this sense, one of the most representative sites is Minferri (Lleida) (Figure 1). The site is interpreted as a large hamlet with a dispersed settlement pattern (López, 2000). There, 425 archaeological structures were excavated during eight archaeological campaigns between 1993 and 2006, a total excavated surface of 1.5 ha (Equip Minferri, 1997; GIP, 2001; Prats, 2013). A diverse range of pit features was detected, often showing several reuses. Pits for cereal storage are the most common feature. However, refuse and dwelling pits, dispersed burials and pit-holes have also been detected (Figure 3). Sites such as Minferri are well known in northeast Iberia and in the entire Ebro river Basin. All of these sites are located on rich river basins suitable for extensive farming. The large amount of storage pits, among other evidence, reveals an economy largely based on cereal crops.

Minferri was dated through 13 radiocarbon dates (Table 1) from the pits and burials. However, five more radiocarbon dates currently aid in analysing the animal depositions associated with the Bronze Age burials (Nieto *et al.*, 2014). Two different occupation phases have been distinguished (Table 1). The first one is short and falls during the fourth millennium cal BC. This occupation is currently represented by four storage pits with Late Neolithic regional pottery styles such as the Veraza style and others (Prats, 2013). However, the largest occupation is represented by the Early Bronze Age structures (Figure 3). The dwelling pits conserved at the site seem to be related to this same phase. The radiocarbon sequence established for the Early Bronze Age covers a large interval between *ca.* 2100-1600 cal BC.

At Minferri, archaeobotanical analyses were carried out on a sample of 6000 charred seeds and plant remains recovered from 60 pits of different morphology (Alonso, 1999, Alonso *et al.,* 2006). The results show the predominance of durum and common wheat (*Triticum aestivum/durum*), followed by barley (*Hordeum vulgare*) and minor percentages of other species, like flax (*Linun usitatissimum*).

Domestic animals are represented by a variety of species: cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*), pig (*Sus domesticus*) and dog (*Canis lupus familiaris*). Moreover, it is common to find isolated depositions of whole articulated animal skeletons alone within the pits, or together with individual human burials. This ritual behaviour is also common on other archaeological sites of the region

such as Can Roqueta II and is considered one of the most distinctive traits of the regional Early Bronze Age funerary and cultural practices (Albizuri, 2011).

The burial distribution is concentrated in different sectors of the site, but all the burials share the same space with other archaeological features, such as the storage pits (Figures 3). It seems that the inhabitants of the Minferri site were reusing the pits where they previously stored grain as burial sites. The burial behaviour can be divided in two categories: On the one hand, we have documented seven single burials, and on the other hand, 11 multiple and collective burials between two and 11 individuals interred within reused storage-pits or in an arranged niche within the pit wall (Equip Minferri 1997, Nieto *et al.,* 2014) (Figure 3).

Pottery and animal remains are the most common finds on the site. The lithic assemblages represent the third most common group, and this includes grinding stones (Alonso, 1999: 246-248) and other macro-lithic tools categories, such as stone axes, which are not treated in this paper because we are only focusing on the chipped stone tools assemblage. Nevertheless, we paid special attention to the metallurgical remains, owing to our interest in the comparison of the metallurgy with the data obtained from the chipped stone tools analyses. The finds linked to the bronze tools production are mainly fragments of crucibles and casting moulds (plain axes, one chisel and one awl), a fireplace with copper slags and two fragments of bronze tools, one arrow and one awl fragment (Equip Minferri 1997, López and Moya, n.d.; Rodríguez 2005, Soriano 2013). In other words, the metallurgical process detected at Minferri is giving us information about the recasting of bronze tools inside the settlement (Figure 3), but the absence of mining tools and residues of the mineral reduction processes can be explained as a result of an activity focused on the recycling of bronze tools.

Structure type	Feature Code	^{14}C BP	cal BC ± 2σ	Lab code	Sample type	Phase
Storage pit	SJ-191	4630 ± 40	3620-3341	beta-164902	Charcoal	Late Neolithic
Storage pit	SJ-124	4540 ± 40	3368-3068	beta-164901	Charcoal	Late Neolithic
Faunal deposition	SJ-89	4560 ± 30	3487-3105	beta-318373	Faunal bone	Late Neolithic
Burial	SJ-296	3360 ± 50	2450-1710	beta-181657	Human bone	Early Bronze
Storage pit	SJ-331	3610 ± 40	2131-1881	beta-164903	Seed	Early Bronze
Storage pit	FS-33	3590 ± 110	2281-1645	ubar-548	Charcoal	Early Bronze
Storage pit	FS-38	3560 ± 70	2131-1695	ubar-547	Charcoal	Early Bronze
Storage pit	SJ-53	3510 ± 60	2014-1689	ubar-549	Charcoal	Early Bronze
Burial	SJ-54	3450 ± 50	2193-1428	ubar-550	Human bone	Early Bronze
Burial	SJ-88	3410 ± 90	1935-1501	beta-92280	Faunal bone	Early Bronze
Faunal deposition	SJ-386	3430 ± 30	1877-1639	beta-318367	Faunal bone	Early Bronze
Faunal deposition	SJ-402	3420 ± 280	1872-1631	beta-318370	Faunal bone	Early Bronze
Storage pit	FS-55	3660 ± 280	1766-1517	ubar-551	Charcoal	Early Bronze
Faunal deposition	SJ-405	3380 ± 30	1733-1632	beta-318371	Faunal bone	Early Bronze
Storage pit	SJ-69	3380 ± 70	1766-1517	beta-92279	Charcoal	Early Bronze
Burial	SJ-405	3370 ± 30	1744-1539	beta-318369	Human bone	Early Bronze
Burial	SJ-135	3330 ± 60	1750-1458	beta-164178	Human bone	Early Bronze
Burial	SJ-296	2960 ± 40	1367-1041	beta-181658	Human bone	Early Bronze

Table 1: Published Radiocarbon dates of Minferri. (Source: http://telearchaeology.com/c14/db.aspx, Nieto et al., 2014, 63).

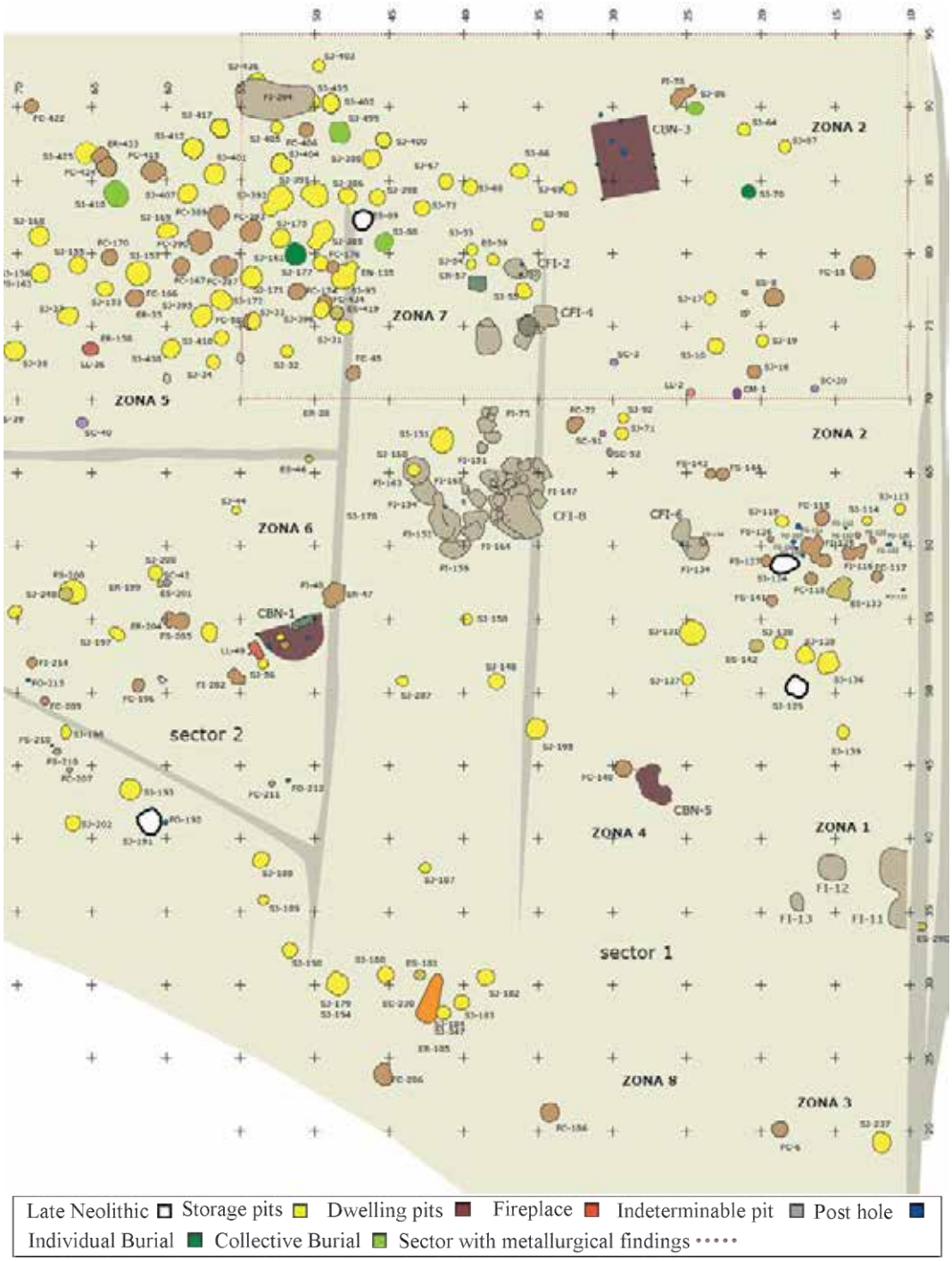

Figure 3: The so-called Minferri central area. (Source: Grup d'Investigació Prehistòrica (GIP), Universitat de Lleida).

Chipped stone tools sampling and methodology

The chipped stone assemblage discussed in this paper amounts to 528 flint artefacts from 134 Bronze Age features. The chronological determination of each structure has been made through the analysis of pottery fragments (carinated vessels, globular shape vessels, "S" shape vessels with clay decoration, -Maya and Petit, 1987-), and their correlation with the radiocarbon data (Equip Minferri, 1997; Prats, 2013). The chipped stone assemblage analysed in this paper represents more than 90% of the entire assemblage; fragments less than 10 mm in length were discarded from the use-wear study (Van Gijn, 2010; Gibaja, 2002), but were included in the technological characterisation. Our objective was to advance a general approximation of the lithic resource management and exploitation, from material procurement to core reduction and tools utilisation.

First, the raw material sources available in the neighbouring territories were identified and analysed; subsequently, archaeological materials were studied through standard petrographic methods to determine their main petrologic features and provenance. This stage of the analysis was carried out with the aid of the *LitoCAT* regional chert and flint reference collections held at IMF-CSIC (Terradas *et al.,* 2012). It allows us to relate the archaeological materials with well-known regional flint types.

The second stage of the research consisted of the determination and description of the technology and of the lithic reduction sequence employed to produce the toolkit. We based our observations on experimental flaking of flint varieties exploited at Minferri. Experimental practice allowed us to contrast the techno-morphological methods employed on the experimental collection with the archaeological assemblages (Palomo *et al.*, n.d). The reproduction of the same flaking marks observed in the archaeological record helped us to distinguish both the flaking method and the type of hammer employed in the lithic productions.

Finally, we determined the activities carried out with the archaeological tools through the analysis of the macro and micro use-wears conserved on the flint surfaces. We have combined stereo and metallographic microscopes (Leica MZ16 of 20X-40X, and a Leica DM2500M of 50X-400X, both with Helicon Focus software). We compared the results of the macro and microscopic analyses with the experimental lithic tools reference collection hosted at IMF-CSIC. For a better understanding of the macro and micro use-wear patterns on the types of flint exploited at Minferri, we have developed different experimental programs to solve specific questions. We have reproduced harvesting activities of wheat and barley in different states of drying: dry skin treatments, butchering, and woodworking activities on hard wood materials.

The lithic tool production strategies and methods

The area where Minferri is located is characterised by a notable scarcity of knappable lithologies. In the immediate vicinity of the site, flint pebbles are uncommon, but can be found in small quantities in the fluvial terraces close to Minferri. Such materials were occasionally exploited in Paleolithic periods, such as Acheulean and

Mousterian (Peña *et al.,* 2005). Two pieces from these periods were detected at Minferri: one Mousterian point and a little discoidal core. However, these clearly represent intrusive materials.

The flint formations for tool production are accessible only on a regional scale, between 20 and 40 kilometres from the site (Figure 4). We can distinguish two main geological areas or domains that may have attracted the inhabitants of Minferri. These geological formations belong to Ebro Tertiary basin: a) Lower Eocene sulphate evaporitic units related to the marginal lacustrine systems developed at the eastern edge of the basin and outcropping adjacent to the west side of the Catalan Coastal Range; b) Late Oligocene and Miocene carbonate lacustrine deposits from the central and eastern sector of the Ebro basin (Figure 4, A, B). Thus, we can easily identify the flints, owing to their different sedimentary environment.

The main group attested in the Minferri series is the Eocene flint that comes from the evaporitic units and resthe 72.5% (n=383; Table 2) of the material analysed. These materials are characterised by a strong macroscopic variability. Flint colours vary from white/grey to reddish hues. Microscopically, they are characterised by lenticular gypsum inclusions, anhydrite moulds, iron oxides and, occasionally, organic matter. This type has a massive texture and is azoic (Figure 4, A1- A4). The Oligocene-Miocene flint type comes from carbonate lacustrine environments and amounts to 8.1% (n=43). Macroscopically, this lithology is characterised by a

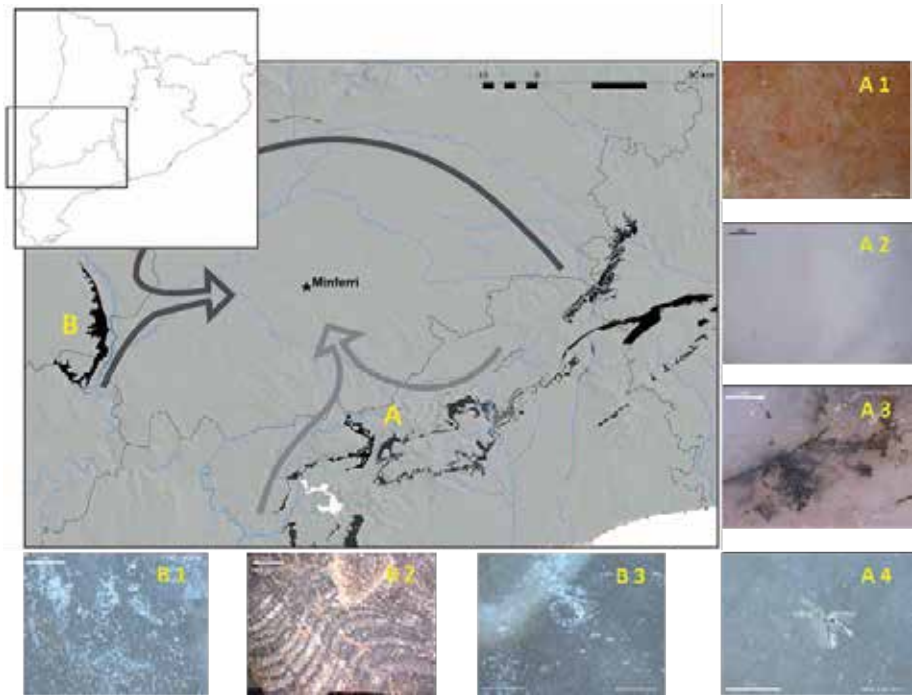

Figure 4: Minferri flint types and provenance area. A, Eocene evaporitic chert types; B, Oligocene-Miocene lacustrine types. A1, iron oxides; A2, epigenised gypsum in crystal pseudomorphs; A3, black inclusion (organic matter?); A4, anhydrite crystal moulds. B1, ostracode carapaces; B2, banded texture of the Liesegang rings; B3, charophye algae.

dark colouration, from black to clear brown. They often present concentric banded textures (Liesegang rings). The fossiliferous content is abundant, characterised by fossil associations such as transversal sections of charophyte algae, ostracods and, to a lesser extent, gastropods (Figure 4, B1- B3) as a signal of shallow and deep lacustrine formation environments. The rest of the studied materials (n=102), are represented by other types of rocks, such as quartzite and other metamorphic rocks like hornfels, but most of them are flint strongly burned or altered by different chemical and mechanical post-depositional effects (Plisson, 1985; Van Gijn 1990), where the raw materials have been impossible to determine (Table 2).

From a technological point of view, two different flaking methods can be distinguished: blade and flake production (Table 2). Blades appear to have been produced mainly outside of the settlement; these are both the evaporitic and the lacustrine flint types. The low percentage of cortical blades and the absence of blade cores and the typical core trimming elements support this hypothesis. Blades measure 19,7-26,2 mm in width; 5,7-8,15 mm in thickness; and 44-62 mm in length, if we compare the interquartile ranges of the mean among the entire blade blanks (n=25).

These observations must be related to the flaking method and to the hardness of the raw materials implicated. The thickness showed by the blade blanks can be explained by the use of soft stones as hammers; these cause thick bulbs and several points of impact on the butts, as showed by the experimental flaking (Palomo

	EVAPORITE	%	LACUSTRINE	%	INDET	%	TOTAL	%
FLAKE	146	*38,1%*	20	*46,5%*	40	*39,2%*	206	*39,0%*
RET. FLAKE	21	*5,5%*	6	*14,0%*	3	*2,9%*	30	*5,7%*
BLADE	78	*20,4%*	7	*16,3%*	15	*14,7%*	100	*18,9%*
RET. BLADE	45	*11,7%*	4	*9,3%*	4	*3,9%*	53	*10,0%*
CORE	25	*6,5%*	-	-	11	*10,8%*	36	*6,8%*
HAMMER	1	*0,3%*	-	-	1	*1,0%*	2	*0,4%*
CHIPS	67	*17,5%*	6	*14,0%*	28	*27,4%*	101	*19,1%*
TOTAL	383	*72,5%*	43	*8,1%*	102	*19,3%*	528	*100%*

Table 2: Minferri chipped stone industry count and frequency by raw materials type. (RET=Retouched; INDET=Indeterminate).

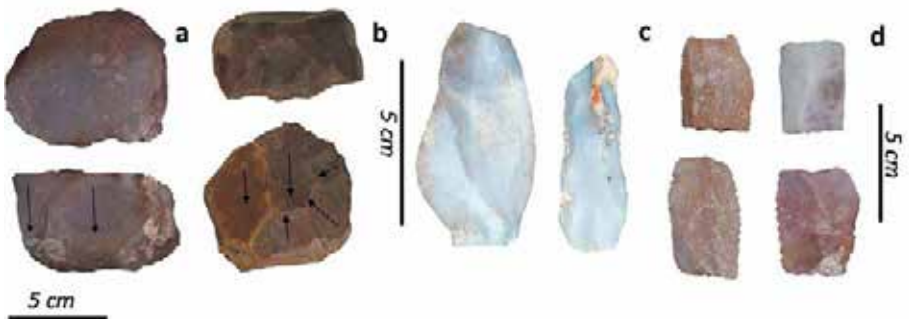

Figure 5: Lithic productions of Minferri. A: unipolar core of flake production; B: centripedal core of flake production; C: complete blade blanks; D: rectangular blanks regularised trough abrupt deep retouch.

et al., n.d). Another interesting point is the reconfiguration of the blade blanks. Before retouching, blades are always truncated to obtain rectangular blanks, and they are later regularised through abrupt deep retouching in order to facilitate the insertion of the catches into the wooden handles (Figure 5, C, D).

Flake production appears notably different. First, all the stages of core reduction are well represented in the site. The analysed cores (n=36) have been exploited with both unipolar and centripedal recurrent flaking systematics (Figure 5, a, b) being based on only one percussion platform. The resulting flakes are generally thicker than the blades with dimensions of 22,6-33,6 mm in width; 6-10 mm in thickness; and 23,3-40 mm in length for the entire flake blanks (n=112). In general, their production does not seem to follow a regular scheme, and only a small fraction are retouched (5.7%), mainly to make end-scraper shapes.

Lithic use-wear analysis

Resulting from the use-wear analysis on the assemblage analysed (n=528), we have determined 137 active edges that correspond to 160 determined uses. In seven cases, however, it has been impossible to determine the activity carried out, and thus the edge function remained indeterminable. In 18 cases, we have been able to infer only the hardness of the worked matters and the movement of the action performed on the basis of macro-wear traces. Those cases are mainly related to the work of soft animal matters like meat or fresh hide. This determination has been made through the association of the micro chipping patterns and the rounding degree of the edges (Vaughan, 1985; Ibáñez and González Urquijo, 1994). The rest of the assemblage shows a wide range of worked matters such as meat cutting, animal-skin treatment, woodworking, cereal harvesting and a mineral matter working (Table 3).

The work of animal substances is represented by different production processes related, on the one hand, to the meat cutting and butchering processes, and on the other hand, to the hide cutting (longitudinal motions on fresh or dry hide) and hide scraping activity (transversal motions on hide). Butchering tools have been recognised on the basis of the presence of diagnostic micro-polishing traces. Bright spots of rough polishes are visible between 200X and 400X, associated with continuous patterns of edge-scarring (Figure 6, A). Blade blanks are preferred in respect to flakes, as acute edges – between 25º and 30º- are the most effective for cutting soft animal substances (Ibáñez and González Urquijo, 1994).

	FLAKE	%	BLADE	%	RET. BLADE	%	TOTAL	%
BUTCHERING/MEAT	4	*12,2%*	13	*25,0%*	3	*7,7%*	20	*16,4%*
HIDE	22	*53,7%*	15	*13,3%*	6	*15,4%*	43	*30.7%*
BONE	1	*2,4%*	1	*1,7%*	-	-	2	*1,4%*
MINERAL	3	*7,3%*	4	*6,7%*	-	*5,1%*	9	*6,4%*
WOOD/PLANT	5	*12,2%*	10	*16,7%*	5	*12,8%*	20	*14,3%*
VEGETAL /CEREAL	1	*2,4%*	12	*20,0%*	25	*59,0%*	36	*25,7%*
INDETERMINABLE	4	*9,8%*	3	*5,0%*	-	-	7	*5,0%*
TOTAL	40	*29,3%*	58	*42,9%*	39	*27,9%*	137	*100%*

Table 3: Minferri chipped stone industry count and frequency by worked matters.

Tools related to animal-skin treatment can be separated in two groups: fresh-hide working, probably related to the butchering and skinning of the animal carcasses (n=8) (Figure 6, B), and dry-hide working (n=28), associated with processes of hide cleaning, hide tanning and leather cutting (Figure 7, C). Preferred blanks are flakes,

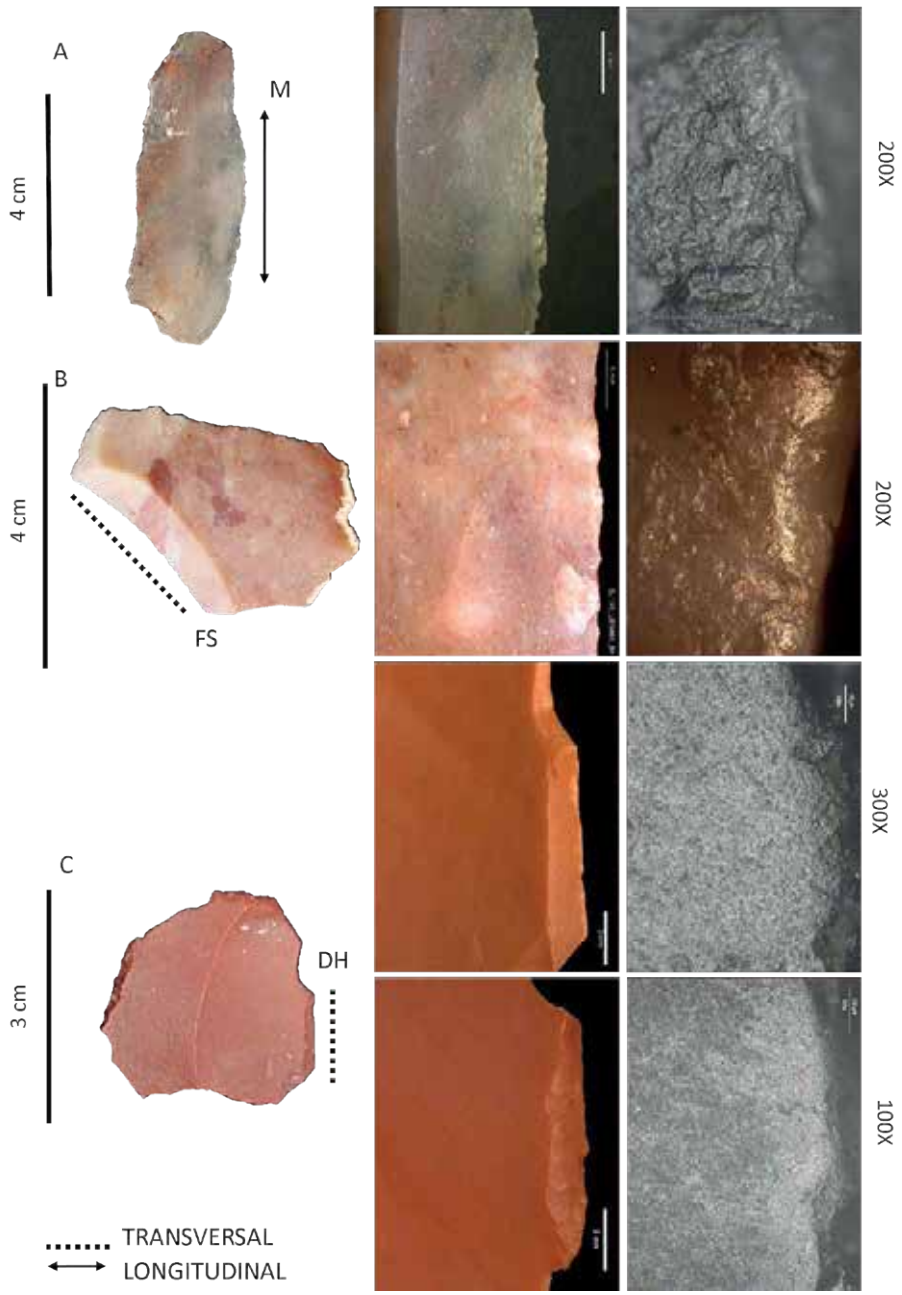

Figure 6: Tools related to the working of animal substances. A: Blade for the meat cutting; B: Flake for the fresh-skin treatment; C: Retouched flake for the dry-hide treatment.

more resistant and thicker, for scraping activities, while longitudinal motions are realised with both blades and flakes, generally selecting acute angles (Table 3). The working of vegetal substances is strongly associated to blade production, and more precisely to retouched blades (Tab. 3). We can summarise two different processes associated with the harvesting and threshing activities:

Firstly, on the basis of the micro-wear patterns, we have distinguished the type of harvesting movement made. When the cereal/straw cutting is carried out far from the ground the micro-polished area is flat and smooth (n=26) (Figure 7, a); on the contrary when the entire straw is harvested, cutting the plant close to the ground, the polish is characterised by abrasions, striations and micro-pits (n=8) (Clemente and Gibaja, 1998) (Figure 7, b).

Secondly, we have been able to distinguish the use of some threshing sledges (n=2) (Figure 7, c). These types of tools are distinguishable because of the presence of a diagnostic wear pattern (Anderson *et al.,* 2006; Gibaja *et al.,* 2012). The lithic tools are characterised by heavy abrasions over the entire surface, as a result of the constant contact with the soil. This situation produces extensive polishes made of chaotic abrasions, pronounced edge-roundings and invasive edge-fractures.

Cereal harvesting is the most represented activity among the retouched blades. This association suggests that blades are voluntarily truncated to adapt the blank size to the sickle insertion. Moreover, many of these blades are also characterised by a denticulation of the active edge. These fractures probably correspond to successive phases of edge resharpening, to prolong the effectiveness of the edge when it becomes dull and useless due to its prolonged utilisation. Microscopically, this behaviour is easily recognisable, as resharpening scars show a lower degree of polish development in respect to the original edge (Figure 7, D).

Woodworking activities mainly correspond to scraping processes. For these tasks, obtuse angles between 45º and 90º, or even larger, are preferred. The edge is often thickened and stabilised through retouching (Table 3). On the contrary, when the angle is inferior to 45º, the edge is unretouched and used almost perpendicularly to the wood/plant (Figure 8, A). In general, it seems that woodworking activities correspond to finishing and sharpening processes of small implements such as wooden sticks, wooden handles or, eventually, as part of basketry workings.

Other worked materials are mineral substances, such as pottery, and bone/antler, but these working processes are represented by low percentages of used edges. Mineral working activities are mainly represented by transversal actions related to the scraping/polishing of soft stones or pottery. There is no clear selection of blanks, as both flakes and blades are employed. Moreover, in some cases, mineral polishes appear to overlap with hide polishes, possibly suggesting that hide scraping has been carried out with mineral additives (Figure 8, D). Other use-wear traces related to the mineral working show contact with soft stones, shells or ceramic (Figure 8, C). This could indicate, on the one hand, the production of small implements with soft stone or shell such as beads (three shell beads and one shell necklace have been recorded at Minferri), or on the other hand, the implication of the lithic tools in the processes of pottery decorations or repairs (Torchy and Gassin, 2010).

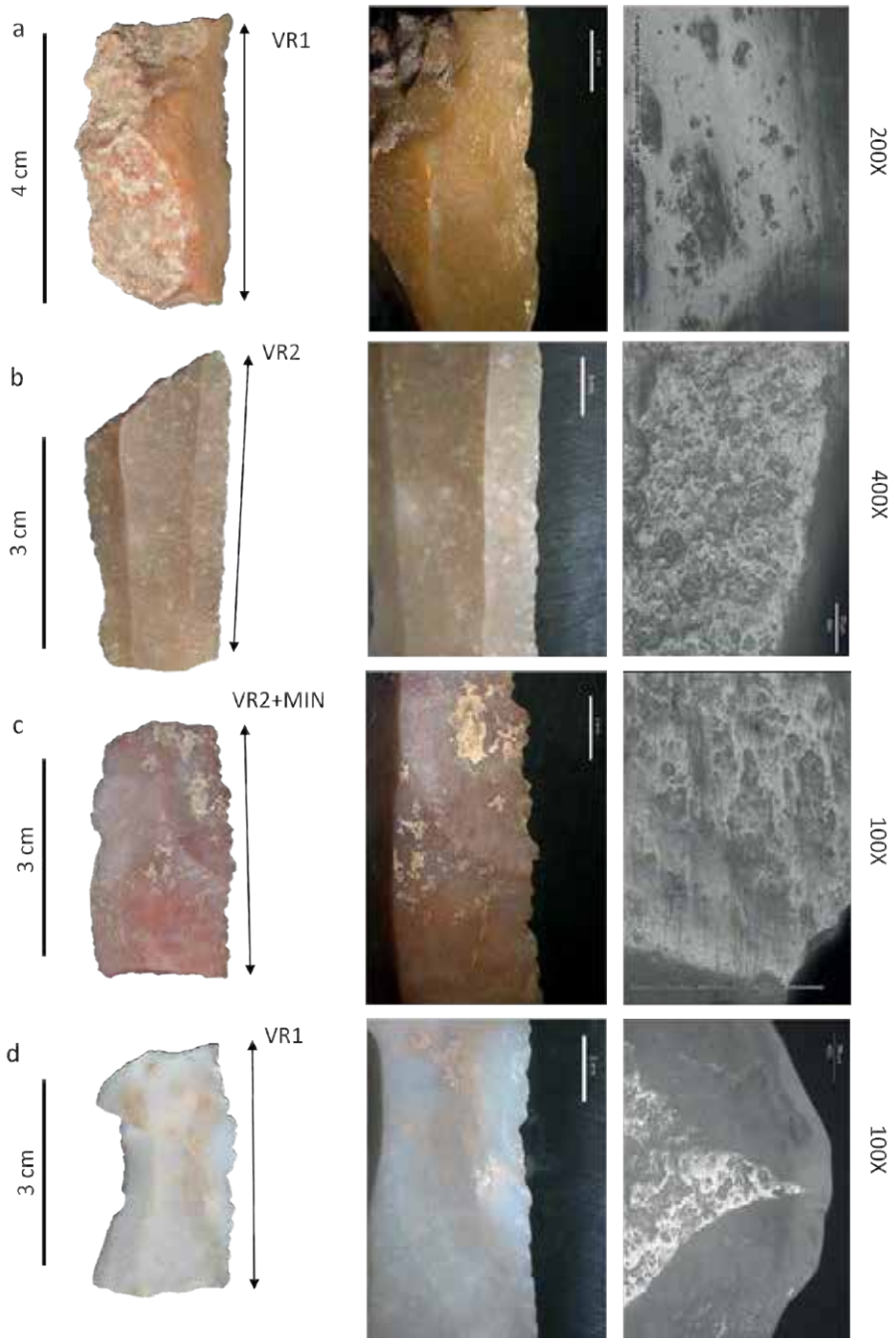

Figure 7: Sickle blades. A: Retouched blade to cut vegetal resources far from the floor (VR1); B: Retouched blade to cut vegetal resources close to the floor (VR2); C: Retouched blade to cut vegetal resources close to the floor or as a threshing sledge; D: Retouched blade to cut vegetal resources far from the floor (VR1) with resharpening scars on the edge.

Finally, we have recognised bone-working activities on two pieces, one flake and one blade, both showing transversal motions (Figure 8, B). The minor presence of bone-working activities could be explained by the scarce presence of bone industry evidence in Minferri. Only a few fragments of bone needles and two antlers interpreted as digging tools have been recovered during the excavation

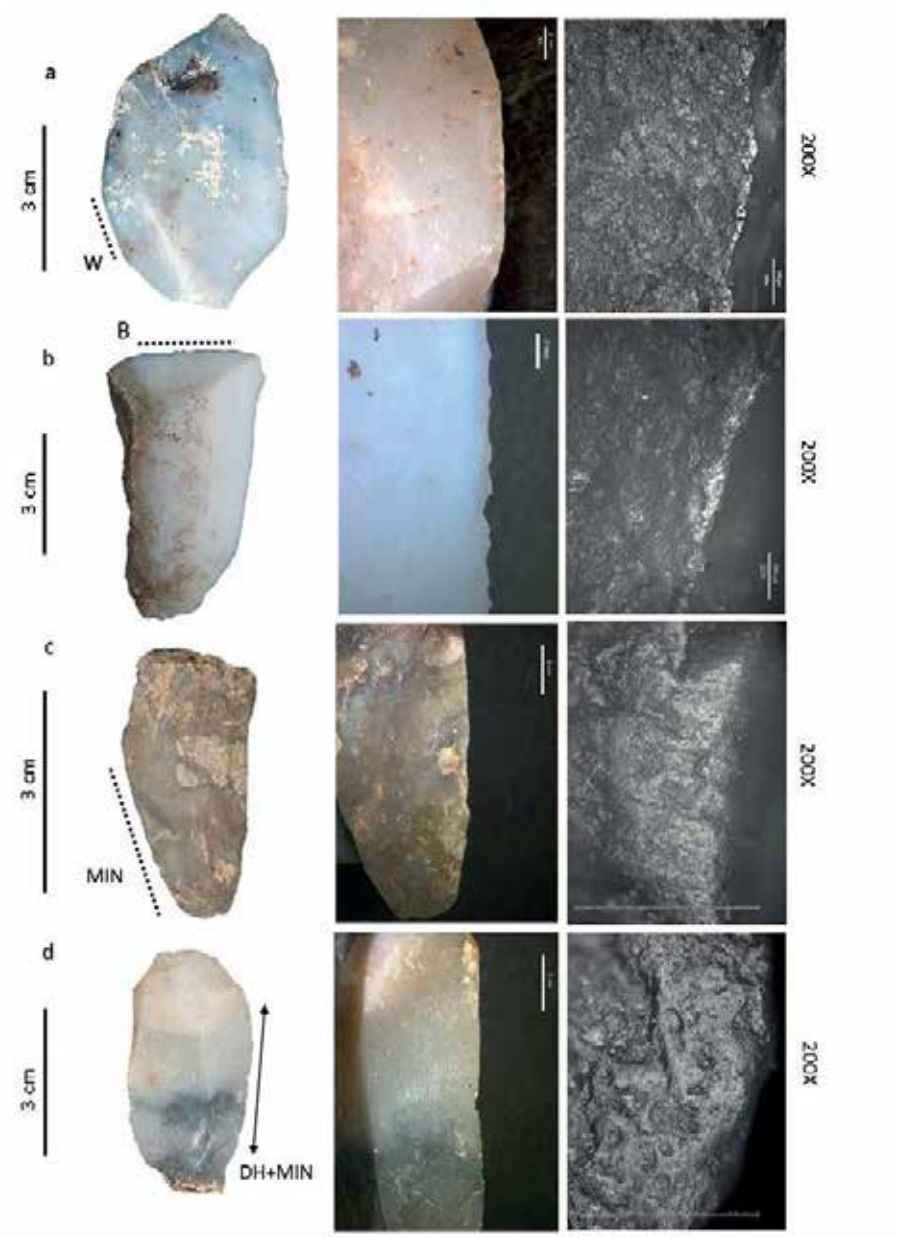

Figure 8: Lithic tools for working wood, bone and mineral matters. A: Flake to finish or sharpen a wooden object with a transversal motion; B: Flake to work the bone with a transversal motion; C: Flake to scrape a mineral or shell object. D: Blade to cut dry hide with mineral additives.

campaigns (Equip Minferri, 1997). Alternatively, other tools, such as pebbles or grinding stones, could have been used to manufacture these types of artefacts.

The economic role of chipped stone tools

The analysis of the lithic assemblage of Minferri shows that lithic tools were employed in a huge variety of activities and working tasks, suggesting multiple economic processes. Our data strongly support a thesis that the substitution of the chipped stone tools, in favour of a wide employment of metal artefacts, did not take place at Minferri. Indeed, lithic materials were still extensively exploited for tool production, following, as we expected, specific strategies for raw materials procurement, flaking methods and tool configuration.

Regional flint types are collected over a territory of *ca.* 20.000 km^2 in the form of cores, preforms, and finished tools. The strategies of core reduction seem to be oriented toward the production of large and thick blades irrespective of raw material type. To corroborate this hypothesis, we have performed a chi-square test between the raw material and technical structure of each group. The result of the test confirms the null hypothesis (χ^2:7.555; df: 5; *P*: 0.183). The flaking strategies applied on both lacustrine and evaporitic flints are fundamentally the same.

Lithic artefacts produced in Minferri followed a flaking method that did not require complex strategies in flintknapping. Indeed, only a few steps were necessary to acquire the desired products. However, given the distance of the site from the chert outcrops (*ca.* 20-40 km), it is likely that most of the production stages were

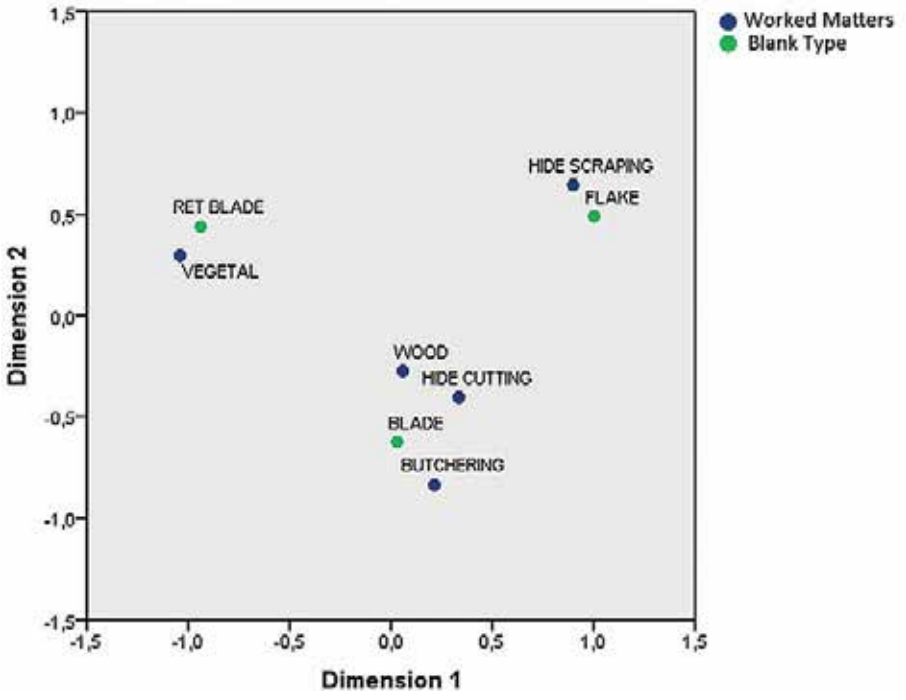

Figure 9: Scatterplot of correspondence analysis (CA) representing the relationship between the tool type and the worked materials determined in the use-wear analysis.

performed outside of the settlement. Indeed, the core reduction strategies carried out in Minferri were very expensive due to the rapid exhaustion of the raw material and the large quantity of resources needed during the production, suggesting that the local sources were not sufficient to carry out such productions.

The results of the use-wear analyses confirm that lithic production plays an important role in the economic processes that took place in Minferri. A huge variety of tasks were carried out, from food procurement to artefact manufacturing and maintenance. Agricultural activities certainly had a central role in the site's economy. Most of the blades were designed for this type of activity and moreover, their production appears highly standardised. However, an association between the technological and functional patterns seems also to apply to other categories of tools. In order to corroborate this association we performed a simple correspondence statistical analysis (CA) between the variables blank type and use-wear. Prior to this, we ran a chi-square test to investigate the statistical significance between these two factors. Obtained results did not confirm the null hypothesis (χ^2: 45.772; df: 8; *P*: 0.000), suggesting that the relation between the tools and the activities performed with them has a high statistical significance (Figure 9).

On the basis of these results, we hypothesise that the flake production was a local activity complementary to the production of blades. Indeed, the correspondence of the blade blanks with the use-wear analysis shows that these tools were made to carry out multiple processes of subsistence and crafting. Retouched blades are effectively related to the harvesting activities, while flakes were mainly used in crafting processes such as hide scraping (Figure 9).

Conclusions

New data acquired from the integrated study of the chipped stone tools from the Minferri settlement is a novelty for that time and region, and very useful to calibrate the impact of metallurgy during the second millennium cal BC in northeast Iberia. Minferri is one of the few settlements in the northeast of the Iberian Peninsula where metallurgical remains have been found. The metallurgical assemblage recovered at the site is composed of some fragments of crucibles, plain axe moulds and one chisel mould (Equip Minferri, 1997; López and Moya, n.d.; Rovira, 2006; Rodríguez, 2005; Soriano, 2013). Metal artefacts, however, are almost absent.

The copper ores near the settlement are located 20-40 km away in a straight line from Minferri to the south. This is the same area where the procurement of the evaporitic flints is carried out (Priorat, Tarragona) (Figure 1). In this sense, it is remarkable that in the Priorat area prehistoric copper mining sites have been identified (Montero *et al.*, 2012). Recent studies suggest that those mines were possibly active during the Bronze Age, while more research is necessary to prove such attribution (Rafel *et al.,* 2016). These mining sites are La Mina de la Turquesa and La Solana del Bepo (Figure 1), where it is possible that the procurement strategies of both lithic and metallurgy raw materials were linked. In other words, it seems that what was important for the community was relative proximity to the outcrops of both flint resources and copper ones. While, in the meantime, the lithic resources were exploited *in situ* (the blade production), surely due to the weight of the cores, the metal resources could have been transported to the

main settlement. However, the complex infrastructure needed to complete the final products prevented this from taking place.

The relation between lithic and metallurgical production is thus still poorly understood for this period. However, our data suggest that, in Minferri, chipped stone tools retained an important economic role that was not carried out with metal tools. The main types of metal tools documented on the site are plain axes, which may represent the employment of massive metal objects for activities in which a great deal of force was necessary, although some macro-lithic axes and adzes were also documented during the field work. Other metal objects represented on site are one awl and one arrowhead fragment. These may indicate the use of metal tools in activities such as hunting or drilling, which, in contrast, are not very well represented by the lithic assemblage.

It seems thus that the metallurgical production in Minferri was an occasional craft activity, perhaps carried out only by a specialist craftsperson who knew the process of production. This hypothesis can be attested due to the concentration of the metal findings only in a small and specific area of the entire site (Figure 3) which could indicate a workshop area, as it is, indeed, the only metallurgical area for this region and period. This could indicate productions for a supra-local exchange (López and Moya, n.d.). However, the tools created from bronze represent recurrent types of tools, especially plain axes that would not have covered the entire instrumental equipment needs of this prehistoric community. On the contrary, the production of chipped stone tools seems to be simpler from a technical point of view, but the methods were probably known by the majority of the community members because of the tools' crucial role in developing and maintaining the main economic processes.

The duality and complementarity between both crafts seems to be clear. On one hand, we could link the strategies employed for the procurement of both raw materials in the same region, but on the other hand, the production of both crafts were carried out in different conditions. The lithic assemblages, as we observed, were produced to carry out subsistence activities such as butchering, harvesting, clothing and wood working. In contrast to these lithic production lines, bronze alloy objects seem to have been used for activities such as hunting or felling trees, but probably also for warfare.

The absence of metal and lithic artefacts as gifts in the settlement burials does not allow us to ascribe specific social differences between individuals, nor does it allow us to infer the value of these crafts beyond their significance for the economy in these prehistoric communities. Only ritual acts, such as the sacrifice of animals with some pottery offerings inside the burials (Nieto *et al.*, 2014), are represented in Minferri and the other archaeological sites of the region, such as Can Roqueta II (Albizuri, 2011). It is important to note that there are some differences between the individuals buried at Minferri in terms of animal depositions (GIP, 2001; Nieto *et al.,* 2014), but there is not enough information to propose clear hierarchical and differential social relationships, as has been noted for the contemporaneous Argaric culture at the southeast of the Iberian Peninsula (Lull, 1983; Risch, 2002; Chapman, 2003). On the contrary, it seems that the metallurgical process in the settlements of the northeast of the Iberian Peninsula during the Early Bronze Age

(2300-1650 cal BC) was not enough to accentuate the inequalities and bring about political structures more complex than chiefdoms.

Finally, we can suggest that the communities from the northeast did not have the complex structures of specialisation and trade that have been noted for the Argaric society (Risch, 2002) (Figure 2). Nevertheless, the production of grain for the communities of the northeast was exponential, and the population grew if we compare it with the settlements of the previous periods in the same region (Albizuri *et al.,* 2011; Prats, 2013). In comparison with the Argaric society, the communities of northeast Iberia during the Early Bronze Age lived in open settlements in the lower part of rich valleys, where they could practice extensive farming near the resources people needed to manage their own means of production. In conclusion, it is likely that this scenario was possible because of, on the one hand, the absence of specialist intermediaries and, on the other hand, the absence of a strong social elite, both linked to a developed metallurgy and fortified settlements, as has been observed in the contemporary Argaric culture (Lull *et al.*, 2010; Lull *et al.*, 2014).

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The artisans of metal and the elite in the western Hallstatt zone (630-450 BC)

Emilie Dubreucq

Introduction

This paper will focus on the central-western Hallstatt Culture, located between southwestern Germany, western Switzerland and eastern and central France (Figure 1) during the end of the First Iron Age (between Ha D1 and the beginning of LTA1 – around 630-450/425 BC).

During this period, important developments in political structure, indicated by centralised and highly stratified social organisation, provide fecund ground for studying "metal craftspeople" and the elite and have prompted several interpretative models (Kimmig 1969; Brun 1992; Milcent 2003). This phenomenon of centralisation and social stratification is especially apparent through funerary practices, with some tombs gathering exceptional wealth–for example, the Royal tomb in Vix (Burgundy: Rolley 2003) and the tomb of Hochdorf (Baden-Wurttemberg: Biel 1985). At

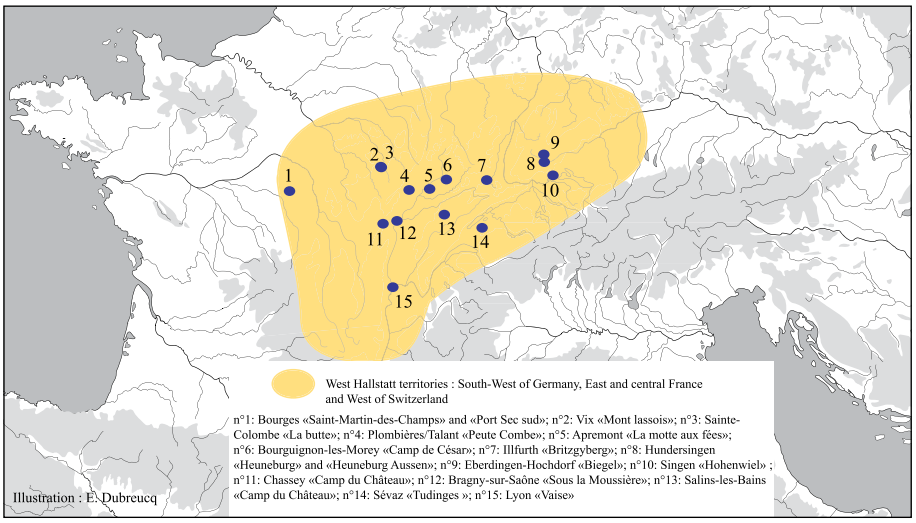

Figure 1: Location of the central western zone of the Hallstatt culture and different settlements of this paper (E. Dubreucq).

the same time, hilltop sites were reoccupied, and some have been considered elite residences and regarded as craft production centres, exemplified by the site of Heuneburg in Germany (Kimmig 1968; Gersbach 1989; Kurz 2010).

The development of these central sites north of the Alps, some now described as the result of a real process of proto-urbanisation, is contemporary to the development of city-states in the Mediterranean territories, with which the Hallstatt groups maintained diverse relationships through trade (Rolley 1992), diplomatic relations (Fischer 1973; Verger 2003; Milcent 2004), and, probably, religion (Verger 2006).

From a technical point of view, this phenomenon appears together with the development of metalwork within the settlements themselves (Dubreucq 2013). Because of its physical properties, iron revealed itself to be much more efficient than bronze in many utilisations–for example, weaponry, tools and equipment for wagons. This led to noticeable improvements, especially in terms of artisanal production. The spread of iron use to all areas of daily life also indicates a highly structured society capable of organising the entire production chain, from obtaining the raw materials to distributing the finished products.

Within this society, characterised by a growing level of complexity, we will try to define the roles of the upper class and/or the artisans during a time when they became the makers as well as the central pillars of economic and technological development. By investigating how the archaeological features and sites were organised, this article aims to discuss the relationship between the artisans and the aristocrats within the Hallstatt society.

Characterising the elite members of the society

Since the end of the 19th century, archaeological sites characteristic of the Hallstatt Culture have revealed a number of extremely rich tombs, some of which have been described as "princely". Indeed, it is within the funerary world that the elite portray themselves in the most visible fashion.

The aristocratic tombs

From the end of the Bronze Age, the northern Alps developed into a region of complex and dynamic entities, both technologically and economically (Brun, Ruby 2008). Territories became more stable as the society transitioned into increased complexity, characterised by a more defined hierarchy and the development of specialised craftsmanship.

The beginning of the Early Iron Age witnessed an evolution of funerary practices with the redevelopment of barrows. These monuments were erected by the whole community but benefited only one person. This beneficiary was generally male, and judging from the funerary offerings often accompanying the deceased (horse tack, sword), the monuments were probably mostly dedicated to horsemen or warriors of some kind (Vuaillat 1977; Olivier, Reinhardt 1993; Chaume, Feugère 1990).

At the end of the 7th century BC, under the impetus of the eastern Hallstatt regions (Bavaria, Austria, Slovenia), a concentration of power began to grow, first in southwestern Germany, eastern Switzerland and parts of eastern France (Alsace and Lorraine) (Pare 1989). The *tumuli* became very large monuments containing

lavishly equipped tombs. They were characterised by a wooden framed funerary chamber containing high-status goods such as wagons; imported metal wares conjuring an image of luxurious banquets; and particularly rich personal objects, such as ornaments and clothing accessories made out of precious materials: for example, gold, amber, glass and coral. During the 6th century BC (Ha D2-D3), this concentration of power spread to several regions in eastern and central France (Burgundy, Franche-Comté, Lorraine, Centre), where it reached its zenith between the end of the 6th century and the beginning of the 5th century BC (Piningre *et al.* 1996; Olivier 2000; Milcent 2004). The famous royal tomb of Vix in Burgundy demonstrates this clearly (Rolley 2003).

Although the most luxurious tombs stand out, we can also distinguish different hierarchical levels by looking at the richness and the quality of the objects placed within the tombs, as well as the size of the monument reserved for the elite class in the Hallstatt society (Milcent 2003).

Aristocrats and the settlements

Understanding the elite through the study of Iron Age settlements is more difficult, as the archaeological record is often incomplete or missing altogether (Malrain 2007). Moreover, the excavation of those sites has covered limited areas too small to distinguish the elite from the rest of the population. However, the development of rescue archaeology and the excavations of numerous structures have added new perspectives for research on this topic (Daubigney 1993; Malrain 2007; Guichard, Perrin 2002). Among the main criteria used to shed light on the aristocrats are the goods they used, together with a study of the architecture of their homes (Malrain 2007).

The status of the objects is defined by their qualities–whether aesthetic, symbolic or exotic–as well as by the quality of the craftsmanship (*cf.* Craftspeople community, 1). It is also interesting to compare these objects with those discovered within a funerary context, where they are considered status symbols (Brun 1997).

Different types of finds are of interest on settlement sites. First, metal objects, such as fragments of wagons, kitchenware or weapons, are the ultimate prestigious goods found in the tombs. However, such finds are also often found on the settlement sites (Dubreucq 2013), demonstrating their use in their owners' everyday life (Figure 2).

Pottery can also be a good indicator of socio-economic prominence (Bardel 2012). For example, wheel-thrown pottery was a product that was still quite rare during the Early Iron Age. It was produced on only a few high-status sites and was viewed as a specialised and high-standard craft (Augier *et al.* 2013) (Figure 3). Imported ceramics from the Mediterranean or from southern Gaul are also used to distinguish a hierarchical structure. Some of these vessels contained exotic products such as wine or oil (in *amphorae*) whilst others were used to complete the dinner and drinking set (such as Attic bowls) and were wheel-thrown and painted (Bardel 2012).

However, using the presence of imported pottery as a criterion for detecting the upper class has been much criticised and debated, particularly on sites dating to the LTA1 (Milcent 2007), where such pottery has been found in workshop rubbish

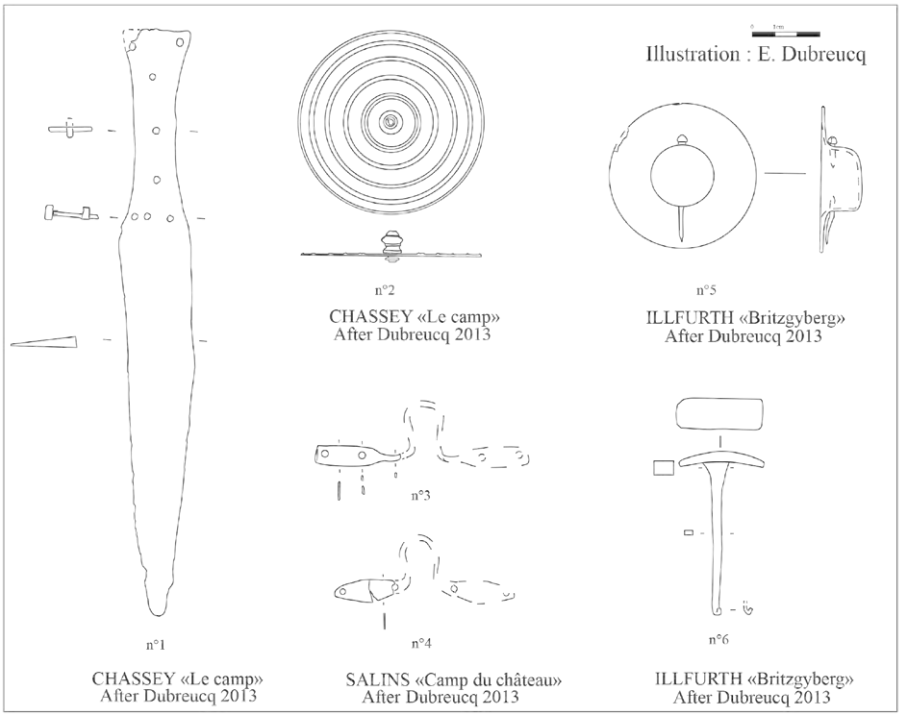

Figure 2: "Prestigious" objects from settlement (n°1: iron dagger; n°2: bronze lid of quiver; n°3: bronze handles of vessels; n°4-5: iron elements of wagon).

pits (*Cf.* 2). Therefore, these finds cannot always be associated with higher-status features, as is the case for earlier sites dating from Ha D1 to Ha D3.

Over the past 10 years, the development of archaeozoological and archeobotanical studies has made it possible to obtain new information on the quality of people's diet, which also gives some indications about the hierarchical structure of the society. Some recent studies on a number of Hallstatt sites have shown that the meat consumed was of high quality and that the animals dedicated to human consumption were carefully selected (especially young animals; for example Euler, Krause 2012). The same observations have been made through the study of cereals showing that the varieties discovered on hillfort sites contrasted with those associated with agricultural and open-air occupations (Euler, Krause 2012).

Alongside the study of the material culture, the architecture can also help to distinguish the elite from the other members of the society. The size, complexity and organisation of the equipment and features are also acknowledged as criteria for social distinction in archaeological studies (Gersbach 1996; Malrain 2007). They have been used during this research as well.

Unfortunately, only a few known Hallstatt settlements provide such information. The Heuneburg site in Germany is the best example, as it has been excavated on a large scale since the 1950s. Through systematic explorations, S. Kurz and his team exposed a truly "proto-urbanised" site, which extended for over 20 hectares on the main plateau, referred to as a fortified citadel. The site

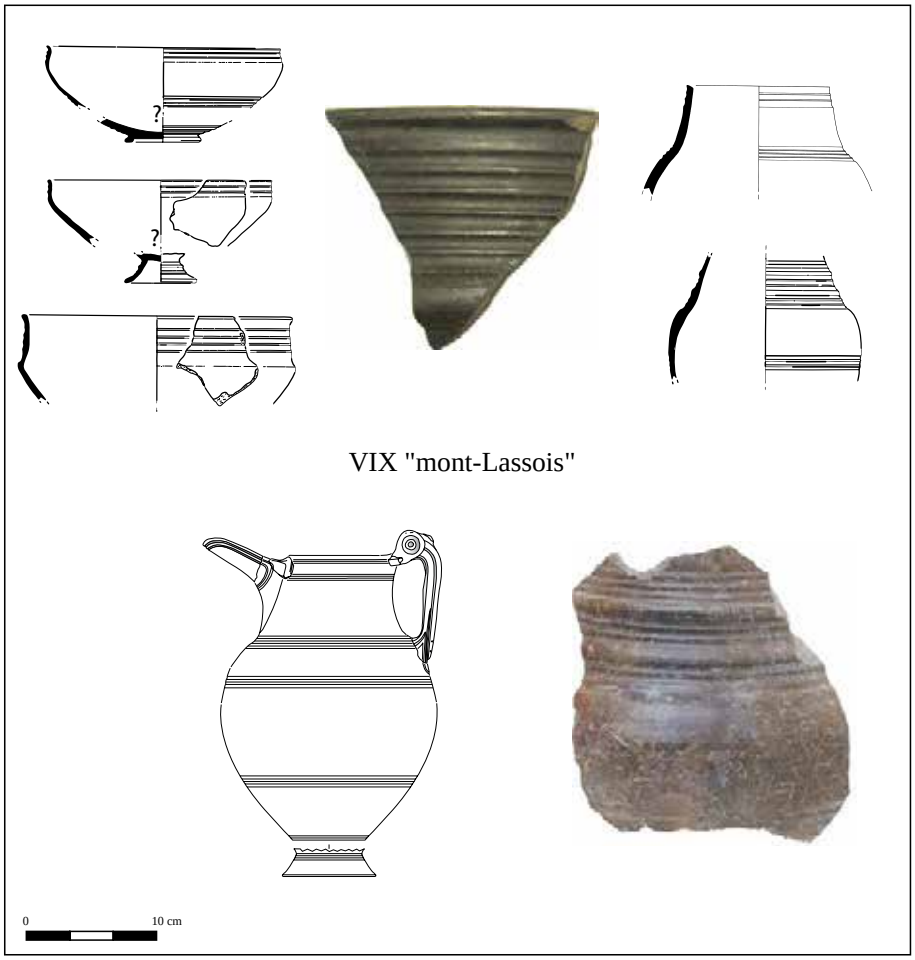

Figure 3: Wheel pottery finds from Mont lassois-Vix (Burgundy-France). Illustration / photography D. Bardel and I Balzer.

is divided in different areas: a fortified plateau and an "exterior" site, which was also protected by fortifications (Kurz 2010). Originally, the fortification had been built according to local traditions, but after the first phase of occupation, a mud-brick wall was constructed around the three hectares surrounding the plateau. This particular type of construction was unique north of the Alps and clearly inspired by Mediterranean examples. Many structures have also been discovered on the plateau itself as well as outside the citadel, and these were organised into different districts or areas, each separated by a ditch system that was to evolve over time (Gersbach 1995; Gersbach 1996; Kurz 2010).

Through a detailed look at the structures and their remains, such as postholes, beam slots, hearths and chimneys, E. Gersbach was able to propose a building typology based on the size of the units and the complexity of the associated structures (Gersbach 1995; Gersbach 1996). He was able to show the density of the first occupation through his analysis of small, aligned buildings, including workshops (Kurz 2010). Although most of these buildings measured around

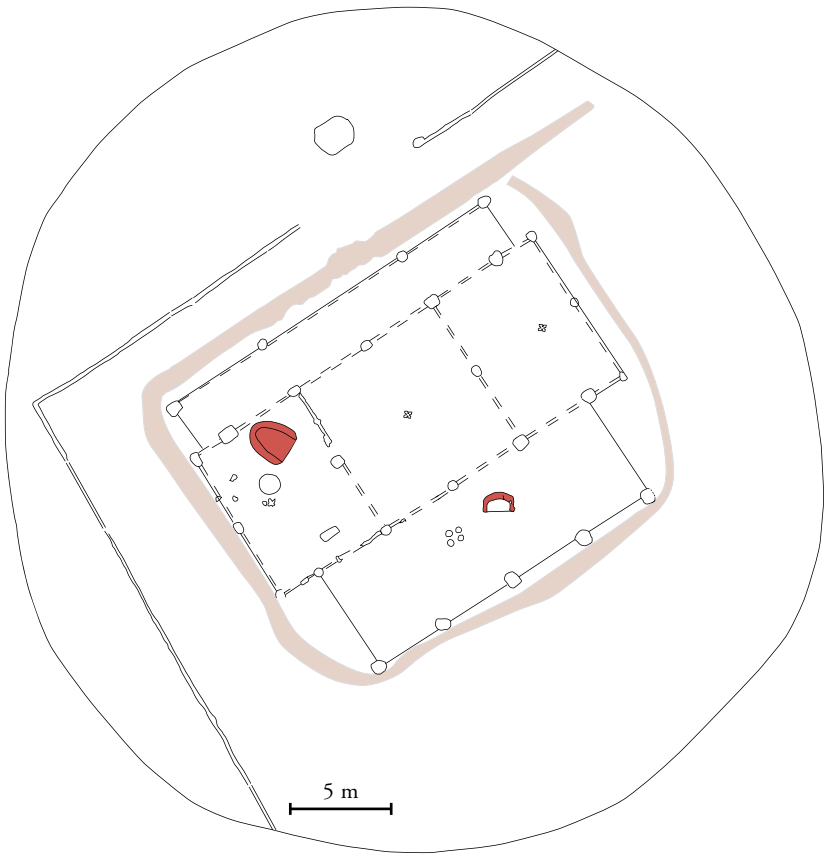

Figure 4: Building plan of "Outside settlement" in Heuneburg for period IV-Ha D1 (approx. 600 BC) (Baden-Württemberg-Germany). After Kurz 2000. Illustration: E. Dubreucq.

30 m², some were distinguished by their larger size, notably on the external part of the site (Gersbach 1996; Kurz 2010). They have been interpreted as buildings reserved for a small group within the community – the elite.

During the fourth period (dated to Ha D1), an enormous building housing many different rooms was erected outside the citadel, while the mud-brick wall was in use. It measured nearly 320 m² and has been compared to the Etruscan palatial architecture in Murlo or Acquarossa (Kimmig 1983) (Figure 4). Its design is exceptionally uniform and has three main elements: one central, square-shaped room, with two rectangular rooms built onto two of the sides.

To the north, these three rooms were expanded with a continuous and narrow extension, while to the south another rectangular room was built. In the centre of the square room, a very large hearth was discovered and interpreted as being used for domestic purposes linked with a reception activity (Kurz 2000; Verger 2008). At the rear of the building another hearth was discovered, this time with a chimney-stack system suggesting an artisanal structure. This was confirmed by the large quantity of metal waste associated with it. A fire destroyed this building and the site itself at the end of the IV period (around 530 BC) (Kimmig 1983).

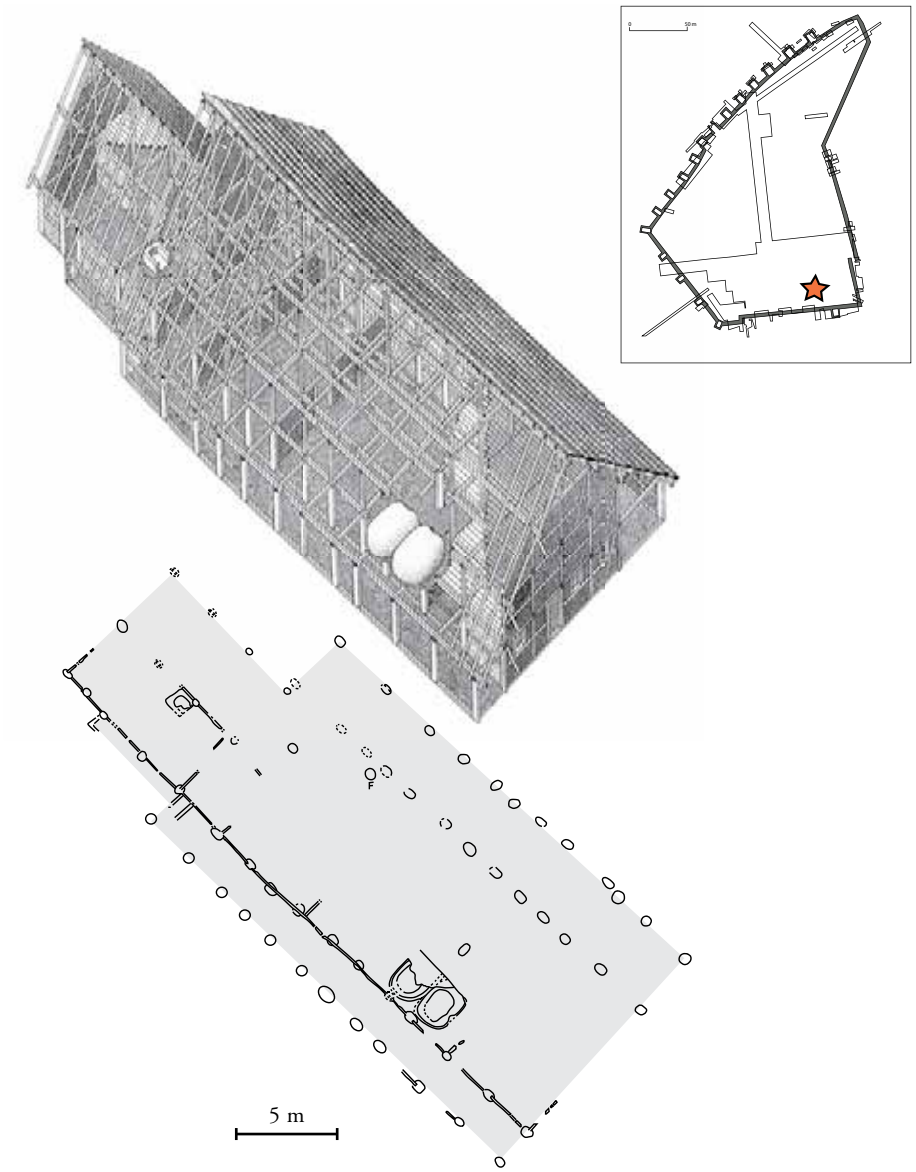

Figure 5: A new building plan and architectural reconstruction in the Citadel of Heuneburg for period III-Ha D2 (580-530 BC) (Baden-Württemberg-Germany). After Gersbach 1996. Illustration: E. Dubreucq.

During the next period of occupation (III-Ha D2), this palace was not rebuilt but instead was replaced by a burial mound (Kurz 2000). A new aristocratic building appeared on the south-east corner of the plateau (Figure 5). This evolution has been interpreted as the result of a possible political change (Sievers 1984; Kurz 2000). This 335 m² building was composed of one main rectangular-shaped room divided into several areas, with another rectangular section added to the west and a narrower extension to the south. The main room contained two

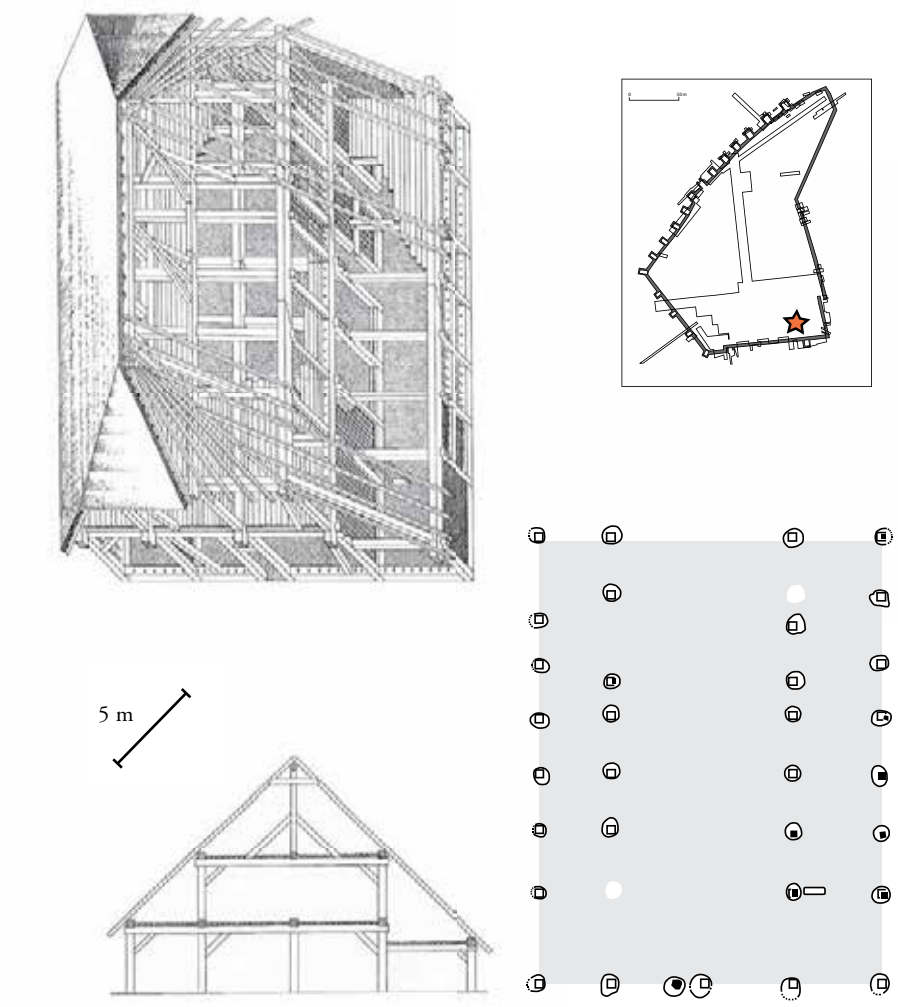

Figure 6: Building plan and architectural reconstruction in the Citadel of Heuneburg for period II-Ha D3 (530-480 BC) (Baden-Württemberg-Germany). After Gersbag 1996. Illustration: E. Dubreucq.

immense hearths. The space itself has been interpreted as a probable reception room (Gersbach 1996).

During the next phase (II-Ha D3) and in the same area, another construction was built (Figure 6). Although its design shows modifications compared to the previous building, its size is nonetheless impressive, thus leading us to conclude that it was again linked to the elites (Gersbach 1996).

As such, the Heuneburg settlement is an exceptional site for the end of the Early Iron Age, especially if we consider the richness of the material and architectural remains it produced. It enables us to gain a fairly good understanding of the elite members of this community.

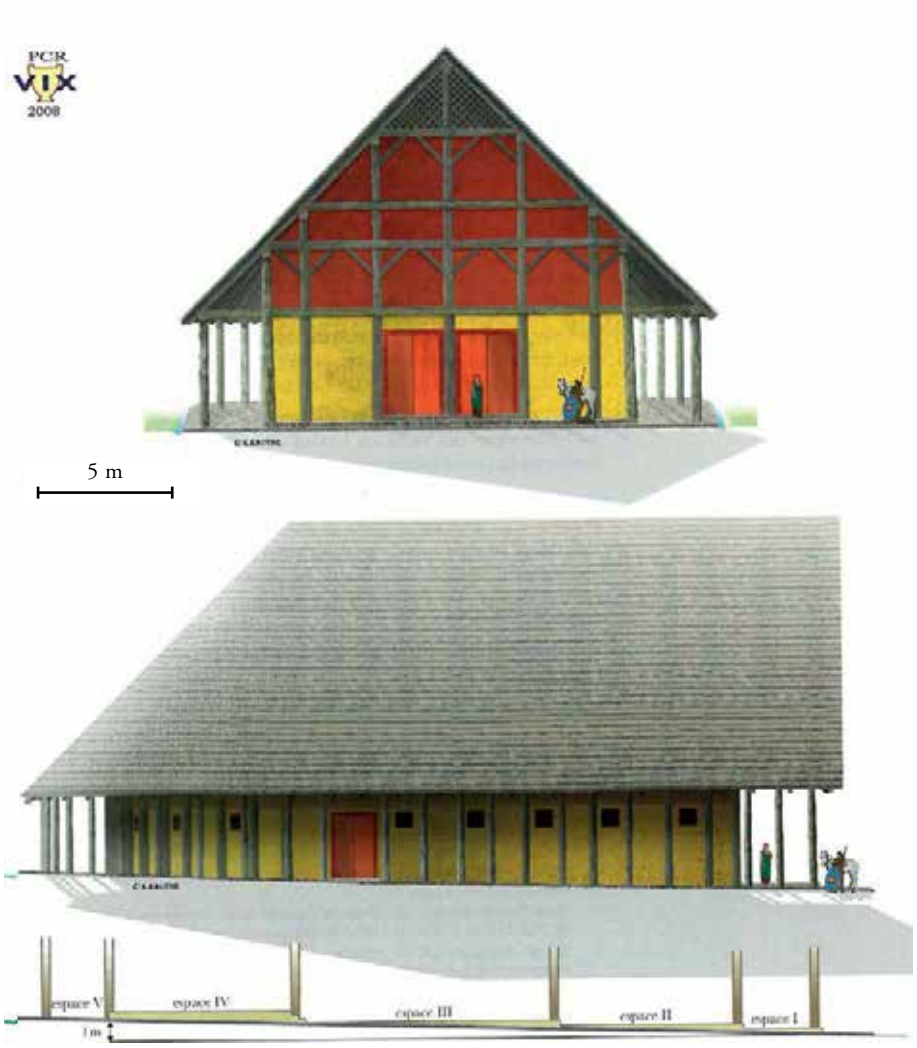

Figure 7: Reconstruction of elites building of Mont Lassois-Vix (Burgundy-France) (Illustration: M. N. Filgis and K. Rothe – in Chaume, Mordant 2011).

Another site, Mont Lassois in Vix (Burgundy), also factors into the debate over aristocratic architecture, albeit this settlement was occupied over a shorter time. This fortified site was mainly used between Ha D2 and the beginning of LTA1 (530 to 450 BC). On the upper plateau were discovered the remains of a rectangular building measuring nearly 265 m² (Chaume, Mordant 2011) (Figure 7). This rectangular structure, made of load-bearing posts, presented a semi-circular apse at one end. Next to its rounded end, the building was divided in two rectangular rooms, both with an "*in antis*" entrance. In addition to the large size of the building, the presence of various types of coloured wall plaster confirms the quality of the construction, which was also surrounded by a complex ditch system that encompassed the whole site. Similar to the Heuneburg site, the material finds were of exceptionally high quality, in particular the ceramics (Bardel

2012), confirming that an elite occupied this building (possibly the lady of Vix?) Clearly, the variety of archaeological remains discovered on this site indicates an ostentatious function. The lack of craft remains there seems to exclude the possibility of artisanal activities.

Craftspeople community in Hallstatt period: status

No so-called "craftspeople" burials or burials "with tools" have been discovered in this geographical area. At the end of the First Iron Age, this type of discovery is more common in the eastern Hallstatt area (Austria and Slovenia), during the Ha C periods (8th C. BC).

Apart from a few rare examples, craftspeople were not necessarily represented in the funerary world. During the Later Prehistory, metal craftspeople can essentially be understood through the study of their production.

The variety of productions and craftspeople at the end of Ha D -and the beginning of LTA1

The study of metal collections from settlements shows us the variety of the metal production within a given society (Dubreucq 2013), whereas objects deposited in graves are more specific, in that they would have been selected for funerary purposes only. So, by looking at all the different types of archaeological context (funerary sites and settlements), we can determine the diversity of the preserved metal finds, which can be separated into two large categories: objects used by the masses and more exceptional objects reserved for a more privileged social class.

Among the metal finds most often discovered on archaeological sites, jewellery pieces are the most common and display the most variety (Figure 8). Such finds include: fibulae intended for keeping clothes in place, ring-shaped jewellery (bracelets, torques, leg rings), pendants (with varied shapes), pins (intended mainly for styling hair), belts, bodkins and some rarer finds, such as shoe rivets. Depending on the regions and periods, these objects quickly evolved, demonstrating the craftspeople's capacity for innovation and creativity in this domain. Without a doubt, the best example of this innovation is the fibula because of the variety of the materials used to make it (copper alloys, iron, coral or amber) and the diversity of the craftsmanship.

Cosmetic items used by the whole population and intended for body care also appear from this period onwards. They come in the form of "wash kits" comprising of tweezers, a scalptorium and occasionally an ear swab. Razor blades and other similar implements were also used for trimming beards or cutting hair.

Knives are also important finds illustrating daily life. By the Ha D period, they already came in forms that differed in accordance with their intended function (chopping knives, boning knives).

In addition, there are several less common finds that were intended for use by the masses. These items required much more complex craftsmanship, highlighting the need for specific expertise and know-how. Other finds linked to kitchenware are metal vessels. The large bowls in particular can be distinguished from other types of kitchenware in that they required the mastery of bronze sheet working (Figure 9).

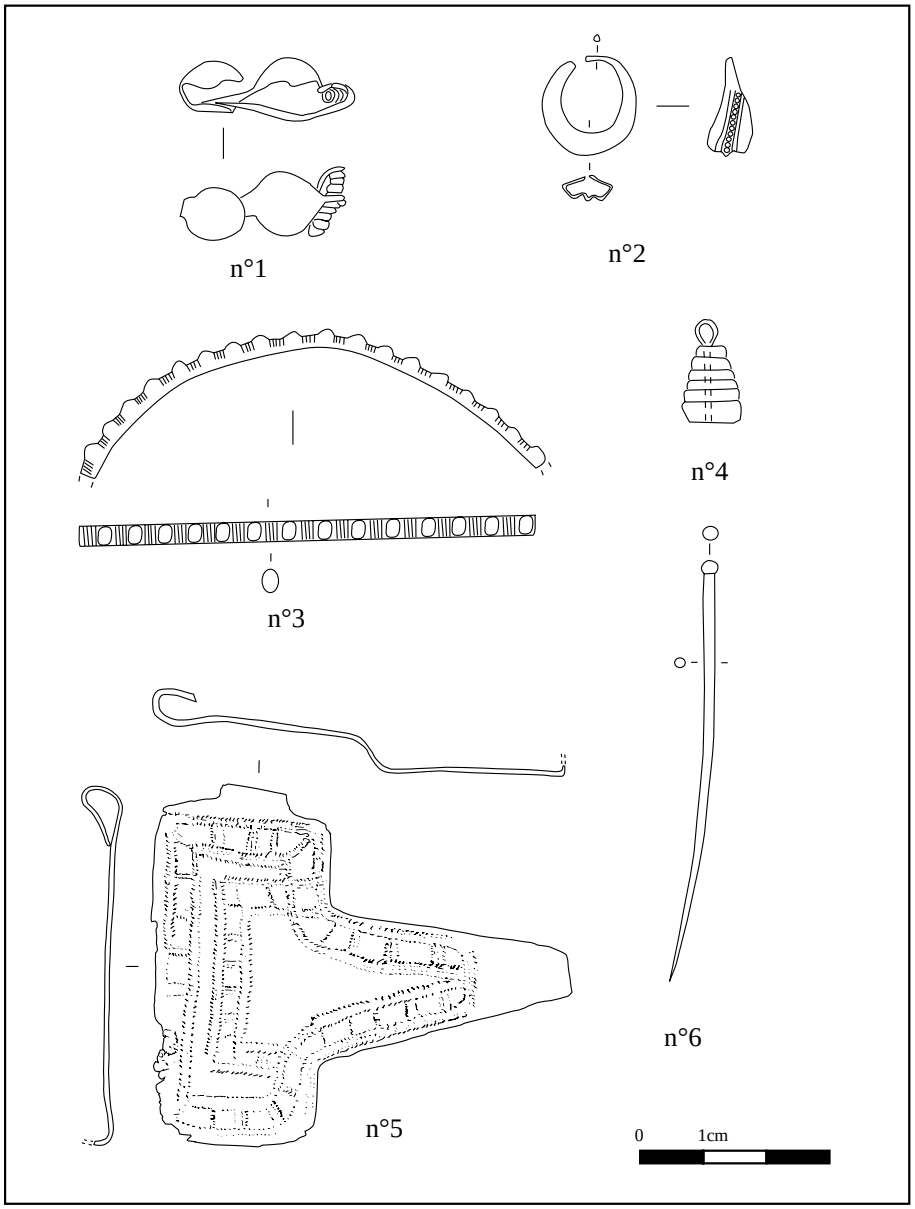

Figure 8: Different jewellery pieces from settlement (n°1: fibula; n°2: earring; n° 3: ring leg; n°4: pendant (metal with amber or bone); n° 5: belt; n°6: pin). Illustrations: E. Dubreucq.

However, let us not forget the locksmith trade (Figure 10), as it is still uncommon during this period since only a few keys have been discovered (their very small number could indicate the status of these finds) (Dubreucq 2013). It is the same story for measuring implements (Figure 10), which are equally rare finds for the Hallstatt territories. Some weights are known, found in Bourguignon-les-Morey (Franche-Comté – France) (Dubreucq 2013), in Singen (Baden-Württemberg-Germany) (Hopert 2003) and in Bourges (Centre-France) (Pescher 2012), as well

Figure 9: Reconstitution of bronze vessels pieces from Hallstatt (Austria) (Photo: E. Dubreucq).

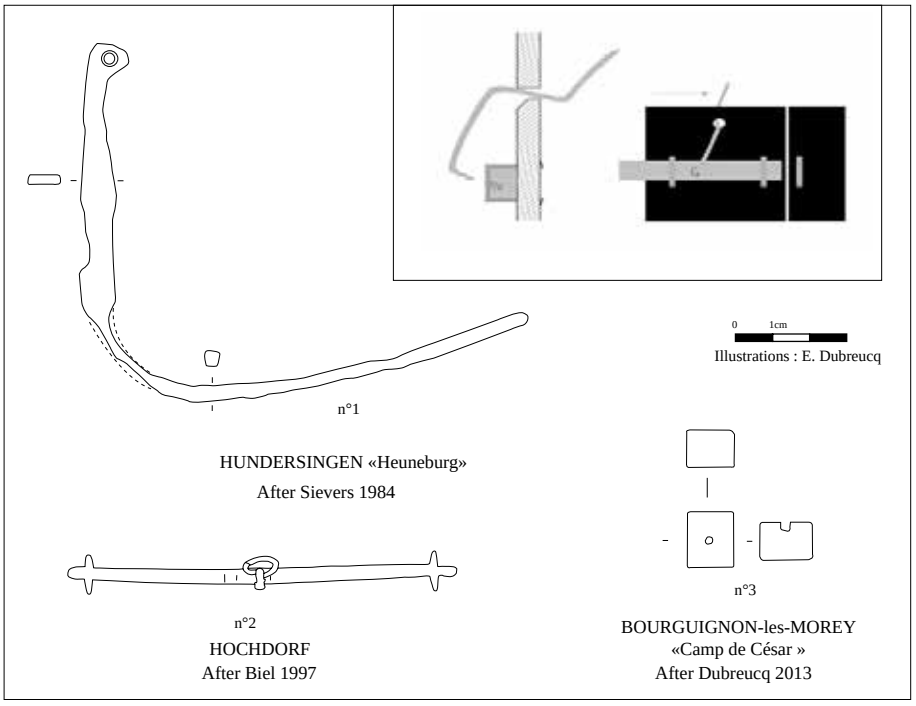

Figure 10: A key and different measuring implements from the settlements of Bourguignon-les-Morey and Hochdorf (n°1: an iron key with schema of functioning of a lock; n°2: a bronze beam balance; n°3: an iron weight).

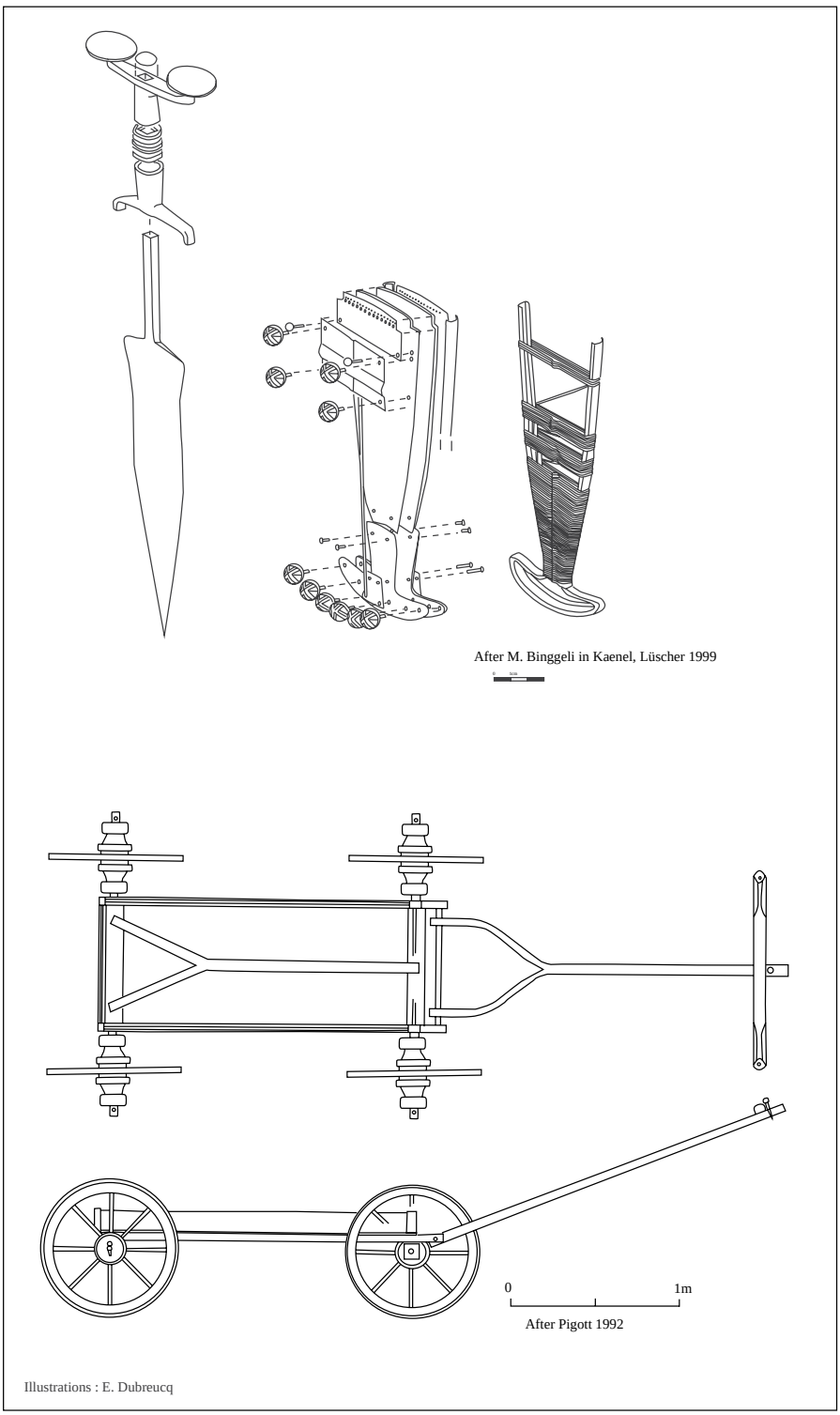

Figure 11: Examples of a dagger and its scabbard (Estavayer-le-Lac, Switzerland) (After Kaenel, Lüscher 1999) and a wagon (After Piggot, made during Ha D-LTA1).

as the discovery of a beam balance in Hochdorf (Baden-Württemberg-Germany) (Biel 1997). Such items were used during exchanges, for weighing rare things such as gold, perfumes and medicinal plants (Peake, Séguier 2000). They were also used by the metal craftspeople for producing alloys, as in Singen, where the weights discovered are linked to the waste material of bronze metalworking (Hopert 2003).

Three other functional categories also reveal the complex know-how of the metal smiths: the weapons, in particular daggers and swords; items linked to transport (wagons and harnesses); and precious metals used for jewellery.

As far as the first two categories are concerned, (weapons and transport) (Figure 11), the workshops were composed of metal and wood workers. In his work about weapons, L. Dhennequin clearly showed how the craft progressed between the Ha C and the end of Ha D periods (Dhennequin 2005). He demonstrated how the craftspeople's skills developed with the production of more-complex weapons, consisting of numerous welded decorative pieces, employing the damascening technique. The technique consists of inlaying several materials together such as copper alloys, iron, wood, and sometimes gold. Dhennequin also looked at the production of dagger scabbards, which were made of very fine sheet metal, foreshadowing the Celtic sword. Stretching a fine metal sheet over the length of these scabbards requires a purified metal of very good quality.

Wagons were also difficult to make during the First Iron Age (Egg 1983; Pare 1992) (Figure 11). The craftspeople would weld together metal with different wooden pieces (sometimes up to five different types on one vehicle). The wood required particular characteristics: solidity, elasticity, manageability, and several aesthetic criteria.

Contrary to the production of everyday metal objects, the rarity and relative similarity of objects linked to transport indicate the existence of several workshops that were highly specialised and produced most of these finds. L. Dhennequin, C. Pare and S. Sievers (Sievers 1982; Pare 1992; Dhennequin 2005) showed the large number of wagons and weapons present in few areas of southwest Germany (Baden-Württemberg), especially around the high-status settlements Heuneburg and Hohenasperg, leading us to believe that they were probably the craft production centres of these prestigious objects. As far as these authors are concerned, craftspeople can be viewed as "masters of art", and their skills were probably highly valued. According to C. Pare, craftspeople were able to travel in order to make objects that had been ordered. It is however difficult to prove whether craftspeople made part of an object in their workshops and then moved on to complete it at the site where it had been ordered, or if the object was made entirely in the workshop where it was ordered.

These are questions that also concern gold objects, in particularly torques and bracelets, which have been discovered in some high-status graves (Figure 12).

These objects have been found in 20 graves scattered between southwestern Germany and eastern France. They have a relatively similar morphology, indicating similarity of taste and symbols employed among the elites, but also indicate the probable existence of few workshops that could produce these objects (Eluère 1987). As was the case for weapons and wagon production, gold objects were

Figure 12: Example of gold objects: bracelets and earrings from the grave of Sainte-Colombe (Burgundy-France) and torques from graves of Apremont (Franche-Comté-France) (Photo: B. Armbruster, ANR West Hallstatt Gold).

complicated to produce, and this complexity was heightened by the fact that they were made of rare and precious material.

The distinction between everyday and high-status objects is intended to highlight the fact that within the craftspeople's community, there were many different types of skills, which illustrates how many different types of craftspeople there were. Having considered M Berranger's work (Berranger 2009), I raise the question of the hierarchical order of the technical skills, which V. Roux also investigated (Roux 2000) in her work about carnelians. M. Berranger suggested three main levels, which I view as consistent with the end of the First Iron Age.

She distinguished:

- Non-specialised craftspeople: who had a short training period, who did not put their skills into practice and whose skills were not highly valued (illustrated by the production of some jewellery made of copper alloys).

- Specialist Craftspeople: who were specifically trained and who regularly practised their skills and would sometimes specialise in a particular type of craft (illustrated by the production of objects such as fibulae).

- Expert craftspeople: who had a long training period and subsequently had to practice regularly so as not to lose the skills acquired; they had an exceptional level of expertise (illustrated by the production of high-status objects).

Furthermore, in order to understand in more detail the level of the metal smiths' skills and their roles within society, it seems appropriate to complete this study by looking at craft production features–in other words, by looking at the workshop as a workplace, by studying the waste material produced and by looking at the array of tools, all of which allow us to identify these activities.

The production structures: archaeological features and known material remains

For several reasons, the metalworking workshops during the First Iron Age have been little known for some time. First, the size of the excavation sites tended to be too small compared with the size of the settlements, and thus archaeologists were unable to study this kind of feature. Furthermore, the remains of these features are not always preserved well enough to determine their function. Indeed, the recognition of these workshop structures is also relatively recent and linked to the metallurgy specialists' progress in the field and to the lab study of the waste materials.

For a long time, only the high-status settlement of Heuneburg (Baden-Württemberg, Germany) allowed us to broach the question of production structures, as it had been excavated over a larger area (Kimmig 1968; Gersbach 1989; Drescher 1995). However, the preservation of workshop structures was not ideal and the remains were found mainly in a secondary context on the plateau, or were extremely eroded. This was the case especially on the outside settlement, which was overlain by a necropolis (Kurz 2000).

Heuneburg aside, remains associated with metalworking have been found in a few other sites, such as Vix-Mont Lassois in Burgundy, France (Joffroy 1960), but the features have never been found in context. It was not until the middle of the 1980s with the Bragny-sur-Saône (Burgundy, France) excavation that investigations could begin once again (Feugère, Guillot, 1986; Flouest 1993). Despite this, 30 years after the excavation, we still have little information on the organisation of the craftsperson's workspace on this site. In Germany, the discovery of several features on the Hochdorf site (Baden-Württemberg, Germany) was important (Biel 1990; Modaressi-Tehrani 2004). As with Bragny-sur-Saône, it was shown that the metallurgic activities did not exclusively take place on hillfort sites, but that they also occurred in open-air settlements where the craftsperson's work was an important part of the settlement's activities (and not only metal, but also textile crafts, for example). Adding to the study of these settlements dated to the beginning of LTA1 (475-425 BC) was the discovery in 1990 of the Sévaz-Tudinges site in the Canton of Fribourg, Switzerland (Mauvilly *et al.* 1998; Benkert *et al.* 2010). This site updated the information on the craft production structures thanks to the good preservation of the remains as well the development of preventive archaeology, which enabled the discovery of new sites. This was certainly the case in France in the 2000s, when a number of workshops were excavated on different sites, for example in Lyon-Vaise (Rhône-Alpes, France: Cararra 2009), in Bourges (Centre, France: Milcent 2007; Augier *et al.* 2009; Augier *et al.* 2012), and Plombières-les-Dijon / Talant (Burgundy, France: Labaune *et al.* 2013). Thus, it seems interesting to examine how the location of the workshops on these settlements changed over time between Ha D and the beginning of LTA1.

During the earlier periods (Ha D1-Ha D3), most examples of workshops were located on hillfort sites within the ramparts, whereas at the beginning of LTA1, workshops began to appear in the suburbs of the fortified sites, such as on open-air settlements where artisanal crafts, particularly metal working, were important. These changes have been linked to the development of new types of occupation and new ways of managing space, which was characteristic of the beginning of LTA1 (Milcent 2007).

From Ha D1 to Ha D3

Despite some limitations in its recording, the Heuneburg site remains the most emblematic when studying metallurgical workshops for the considered period. The best example of a workshop dates to the IV period (Ha D1-600 BC) and was discovered on the southeastern corner of the plateau. It was a rectangular building with one extra square room smaller than the rest of the structure (Gersbach 1995) (Figure 13). The main room had three D-shaped hearths arranged in a uniform manner, although each

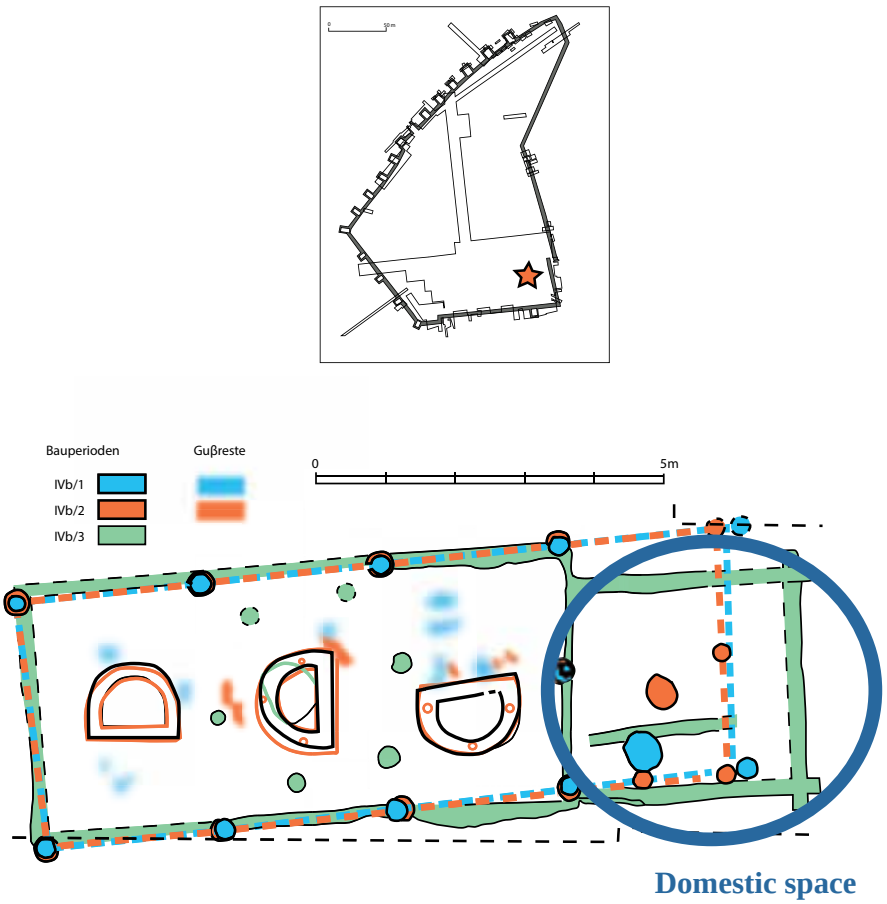

Figure 13: Examples of metal workshop features in Heuneburg citadel (Baden-Württemberg-Germany). After Kurz 2010. Illustration: E.Dubreucq.

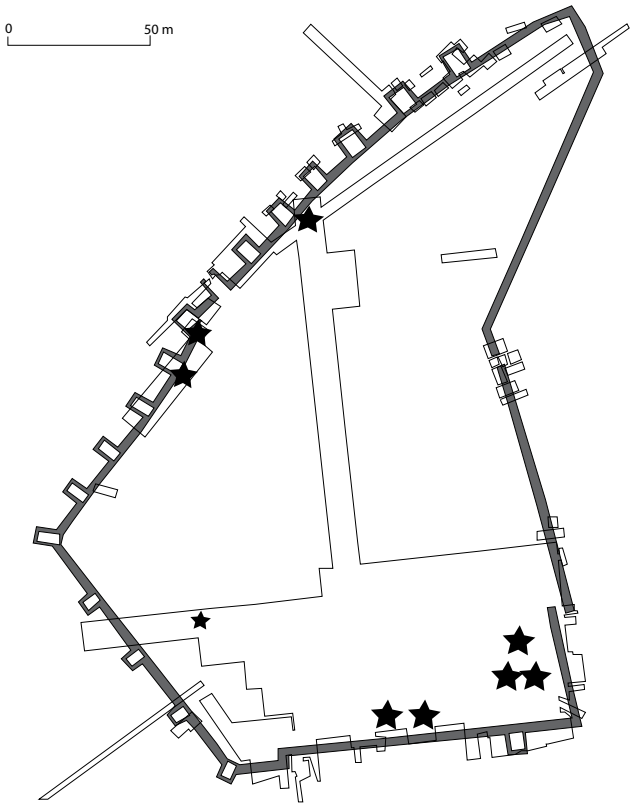

Figure 14: Probable locations of metal workshops in Heuneburg citadel (Baden-Württemberg, Germany). Illustrations: E. Dubreucq.

had a different orientation. There were a number of used moulds or casting waste, indicating the building's function in metalworking of copper alloy. The adjacent room was interpreted as being domestic in nature (Kurz 2010).

Apart from this well-conserved example, other metalworking structures were not clearly identified on the plateau. However, their distribution was assumed from the concentration of archaeological finds: elements related to hearths, metal or pottery waste (moulds, melting pots, etc.) (Drescher 1995). The hearth features have different forms. H. Drescher has used some of these features to reconstruct complex structures with "closed bell" shapes (Drescher 1995). Other hearths have been reconstructed in the shape of a semicircle and consist of a construction made of clay. However, it is difficult to understand the internal organisation of the workshops, as the location of the working area (workbench, anvil) has not been determined. The iron and copper alloys were worked on the site, but it is not possible to precisely place these activities: Were they polymetallic workshops

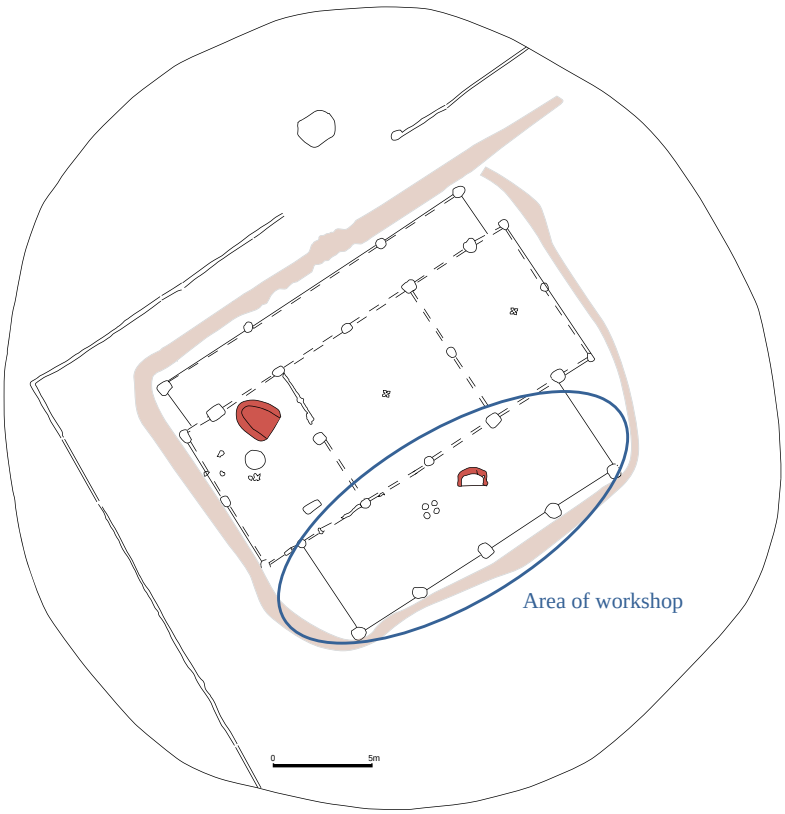

Figure 15: Area of metal workshops in "Outside settlement" of Heuneburg (Baden-Württemberg, Germany). After Kurz 2000. Illustration: E. Dubreucq.

where both metals were worked, or were there two different workshops next to each other? There is still a lack of information on the precise organisation of craft activities on this site.

As far as the location of settlements is concerned, three zones can be distinguished in the citadel (Figure 14). The first was at the southeast corner of the plateau, along the rampart and near the entrance of the site. The second was to the south of the site, also along the edge of the fortification. The last was situated to the northwest of the plateau, also along the ramparts.

Outside the hillfort, another particularly well-conserved workshop was discovered. The building was located behind the large building associated with a palatial function and previously described. This workshop contained a very large hearth and had a chimneystack system for evacuating the smoke (Figure 15). The analyses of the large quantity of metallurgical waste products showed that the workshop would have produced bronze ware and some luxurious objects, such as metal vessels (Kurz 2010). The large palatial building destroyed by fire was reconstructed in order to house a very large workshop. In each main room there were several hearths and, according to the large quantity of finds discovered, different materials were being worked: metal, lignite, bone and possibly even amber (Kurz 2000).

Except for the Heuneburg structures, metalsmithing features have not generally been preserved on other settlements dating from Ha D1 to Ha D3 (Dubreucq 2013). Only the remains of a few waste products from bronze or iron working have been observed during some excavations, but such finds could not be placed into context.

During LTA1 period

The site at Sévaz-Tudinges (Canton of Fribourg, Switzerland) has been closely studied and is particularly interesting in terms of the features discovered, dating to the LTA1 period (Mauvilly *et al.* 1998; Benkert *et al.* 2010). The excavated area was divided into three zones representing different activities: the western zone, which was associated with metallurgical activities; a central zone, rich in waste material (domestic and craftwork-related); and an eastern zone, associated with habitation. It is, in fact, the organisation of the western zone, which is most interesting (Figure 16). It covers an area of about 40 m^2 where there were a number of cut features grouped together and a number of structural elements. Features 1 and 2 are two large pits situated next to each other, subcircular in shape, with diameters of 1.8 m and 1.9 m and depth of around 0.9 m – 1 m.

The edges of these features are vertical except at the break of the slope towards the bottom, where the edges are concave. It seems certain that feature 2 was a working pit where the blacksmith would have stood, using the edge of the pit as a bench for his work. From the waste material discovered, it seems that iron was the metal being worked here (Mauvilly *et al.* 1998). Among the other features associated with metallurgy is feature 13, a fire pit, with remains of clay only present on the eastern side, suggesting the existence of some sort of standing structure (low protection wall or a dome perhaps) probably built to protect the fire pit. The presence of a melting pot and the absence of iron waste would suggest that it was used to produce copper alloys. Several stone blocks were discovered–some were in situ, for example on the edge of feature 3, and some were sealing the pits. They could be viewed as working and striking benches used as a type of anvil. In the Sévaz workshop, several working areas were constructed for bronze and iron craft working, and they were grouped together in the same building.

The Lyon-Vaise area in the Rhône-Alpes region of France also contains interesting examples of workshop features. Thanks to a number of preventive archaeology excavations, remains associated with metal crafts are now better understood (Cararra 2009). Among the types of features often found within many workshops are large circular pits with a diameter of between 2 m and 2.4 m and a depth of between 0.3 m and 0.5 m (Cararra 2009). They are generally filled with metallurgic waste and are similar to the pits discovered in Sévaz, Bragny-sur-Saône (Feugère, Guillot 1986), Bourges (Milcent 2007; Augier *et al.* 2012) and Plombières-les-Dijon / Talant (Labaune *et al.* 2013) (Figure 17). They were probably constructed to create workspaces, which are not greatly understood because of the lack of preservation of the workshop floor surfaces.

In summary, our current understanding of workshop structures remains relatively incomplete for the periods between Ha D1 and Ha D3. The organisation of the metalsmith's workplace cannot yet be understood in detail.

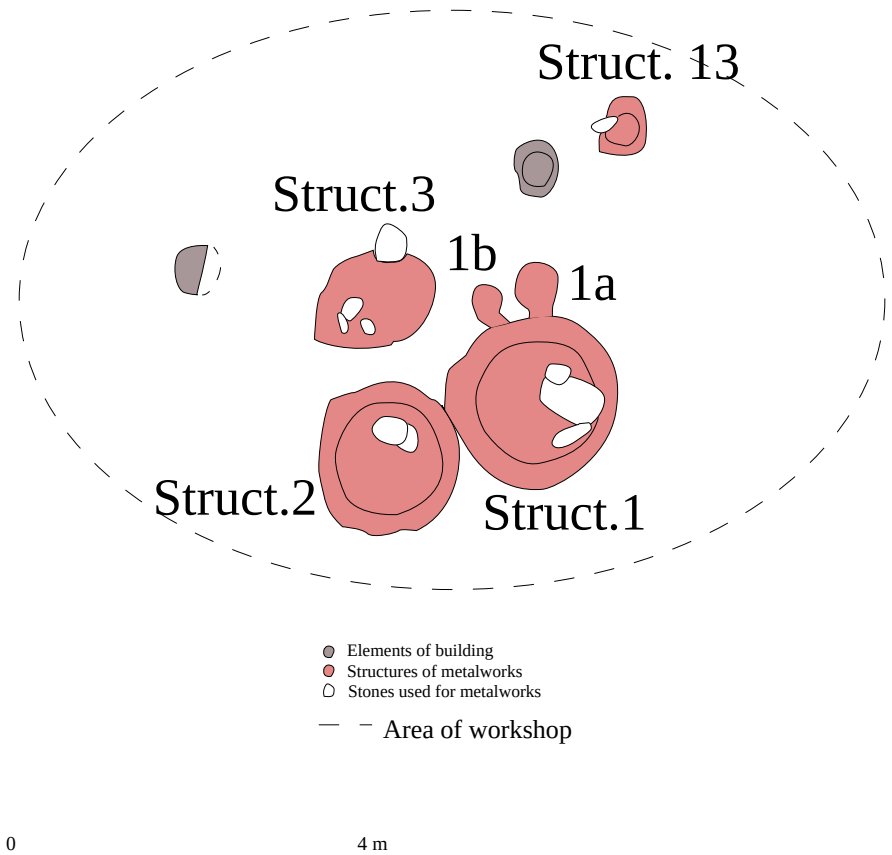

Figure 16: Workshop features of Sévaz-Tudinges (Canton of Fribourg- Switzerland). After Mauvilly et alii 1994. Illustrations: E. Dubreucq.

At the beginning of LTA1, workshops are generally constructed around a fairly deep pit, which would have allowed room for a stool or an installation adapted to the various types of work a craftsperson needed to carry out. Depending on what s/he was making, a craftsperson might have been able to work standing up (especially when forging larger pieces) seating or kneeling. Nevertheless, many questions remain about the various aspects of how the workshop was organised–for example, what kind of surface was used to hammer and work the metal? These elements have rarely been found. There are also further questions about the devices used to circulate the air such as "tuyères" bellows, as well as questions concerning fuel storage pits (for coal). Compared with the Celtic or Roman workshops, work still needs to be done on improving the documentation and understanding of the subject.

Putting these workplaces aside, the study of waste material and the tools used nevertheless enables us to complete our understanding of craft production structures. The waste generated by craftspeople in the metallurgy trade provides us with a wealth of information. Some waste was recycled in part (e.g., copper alloys that can be re-melted), allowing us to study the technical process and to

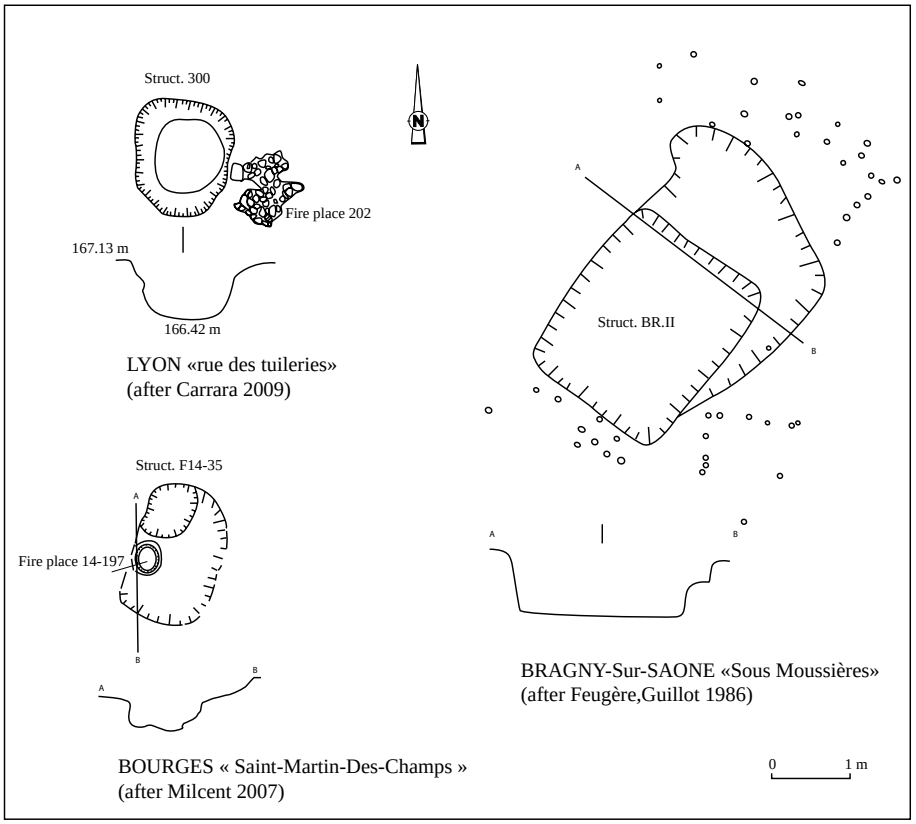

Figure 17: Other examples of workshop feature finds in LTA1 in France. Illustrations: E. Dubreucq.

understand the craftspeople's skills (Armbruster 2000). Furthermore, the waste material is essential for the identification of the types of crafts made in the workshops. The study of waste with a metallographic point of view also brings a wealth of information on techniques used by craftspeople and degrees of skills (Drescher 1995; Madaressi-Tehrani 2004; Berranger 2009; Filipini 2012). About iron objects, M. Berranger and A. Filipini have shown the very good quality of metal, well-purified by the technique of currying by successive folds. They have also shown that craftspeople deliberately combined the steel and the "soft" iron to obtain various qualities of metal, and especially to obtain the flexibility and resistance necessary for the functioning of objects.

Studying the range of tools used also helps us to understand the metalsmiths and their skills via another avenue of enquiry. With the appearance of iron, the tools, which were already advanced and specialised by the end of the Bronze Age, were henceforth also made of iron (Dubreucq 2013) (Figure 18) because of its technical qualities. As iron is stronger, it can be recycled by plastic shaping.

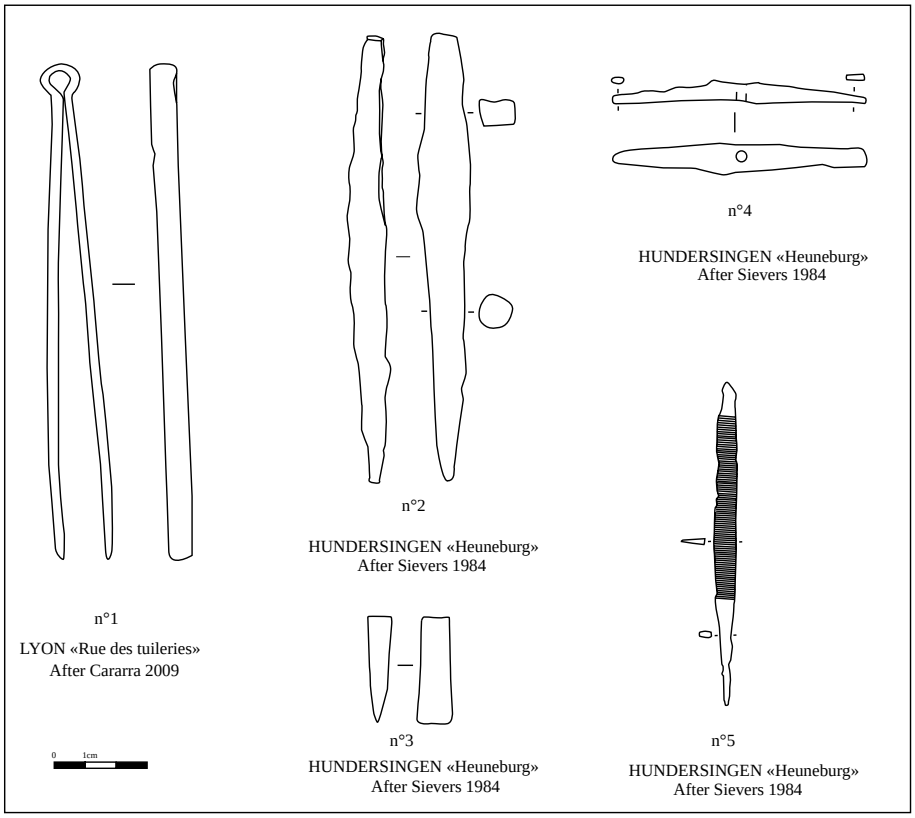

Figure 18: Different types of iron tools from metal workshops (n°1: plier, n°2: anvil; n°3: chisel, n°4: hammer, n°5: file). Illustrations: E.Dubreucq.

If we have increased our understanding of craft production structures at the end of the First Iron Age, it is especially the study of the crafts and the material finds associated with them (such as waste material and tools) that enables us to better understand the role of the metalsmiths in society.

As far as the craftspeople's social status is concerned, it is clearly a difficult subject to broach as they were rarely represented in the funerary world. Nevertheless, by studying the features on settlement sites, particularly refuse pits associated with the workshops, it is possible to imagine what their quality of life might have been like. Refuse pits have been found most commonly on sites dating to the LTA1 period, and it seems that metal craftspeople did have a good quality of life, which is highlighted by the presence of imported wine vessels (Marseille's amphorae, Attic ceramic) (Collet, Flouest 1997; Mauvilly *et al.* 1998; Milcent 2007; Cararra 2009; Augier *et al.* 2012) and other precious objects (perfumes, glass) (Collet, Flouest 1997). On some sites evidence for the consumption of quality meats has also been found (Flouest 1993; Augier *et al.* 2012).

The Hallstatt aristocrats and craftspeople

Based on the diversity of the available archaeological records, it appears for the most part that the Hallstatt craftspeople had workplaces that could double as homes, which were different from the buildings reserved for the elite. The clear spatial division, especially at the Heuneburg site, suggests that the elite were not the people working in the workshops.

However, the site that lies outside this hillfort does not answer our questions quite so clearly, as the workshop is located within a building that has been interpreted as an aristocratic residence (Verger 2008). Bearing this in mind, we can assert that the elite became wealthier and took control of the production of bronze wares; these would have been produced in large quantities in the palace workshop, where prestigious goods, such as metal dishes, would have been crafted. However, it is more difficult to establish whether it was the elite who worked in those places themselves, or if they had the specific skills needed for the crafting of these luxurious goods.

Although we have some good evidence of workshops during the LTA1 period, remains linked to the upper class are less well documented on settlement sites. What conclusions can we draw from the discovery of luxurious goods in the rubbish pits next to the workshops? According to P.-Y. Milcent, it could suggest that the elite and the craftspeople lived in the same districts (Milcent 2007). On the other hand, these clues could also suggest that the artisans played an increasingly important role in the economy at the time, particularly on open-air sites where craft production was the main activity. It seems reasonable to wonder whether the craftspeople themselves did not also become wealthier due to the success of their work. Furthermore, access to luxurious goods would have been made easier in open settlements, because those were probably the centres of trade, where many lavish commodities arrived before anywhere else. As certain objects such as fibulae suggest, it appears that the artisans were totally integrated into the exchanges and contacts network (Cararra *et al.* 2013). They may well have taken advantage of these products, which initially had only been meant for the aristocrats.

Although the craftspeople had a decent quality of life around LTA1, it seems, according to S. Kurz, that some of the workshops depended upon a chieftain who would probably have overseen the type of work carried out (Kurz 2010). In that case, it is all the more true that the elite were the main commissioners of luxury goods, suggesting a strong technological and symbolical implication. Metal was of strategic importance, and it seems certain that the elite controlled access to the raw materials and their trade.

Conclusion

During the Hallstatt period, the link between the elite and the artisans is still not an easy subject to analyse, as research into artisans and their workshops is only recent and not yet well documented. Despite the restricted level of recording, it seems that near the end of the First Iron Age the elite and the artisans were not one and the same but two sections of the community, with both contributing to the society that had started to become more complex from the end of the Bronze Age onwards.

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For blacksmiths, are advanced technical skills the way to achieve elite status?

The case of the western Hallstatt area during the transition between First and Second Iron Ages

Anne Filippini

Introduction

During the Iron Age, the societies of the Western Hallstatt area definitely appear hierarchical (Brun 1997; Kimmig 1969). This phenomenon is clearly noticeable in this entire zone, which is situated between eastern and central France, western Switzerland and southwestern Germany.

One or more elite figures may have controlled many, or all, spheres within these societies; the main spheres comprise political, economic, technological and "religious" practices. This is especially apparent at the end of the First Iron Age. During the sixth century BC and until the beginning of the fifth century BC, the Western Hallstatt area was characterized by the development of a particular type of hilltop settlement, with or without ramparts; these settlements indicated that their inhabitants enjoyed a life of wealth (Milcent 2004). These settlements engaged in trade networks (medium or long distance), consumed imported luxury goods and integrated fully into the cultural milieu of the *Westhallstattkreis*[1].

These important settlements were thus foci for aristocratic power that controlled both territories and trade networks, mainly relations with the Mediterranean territories (Brun 1992). These locations were always near an important communication route and tended to harbour nearby luxurious burials attributable to these aristocracies. Some of these burials contained waggons, and all contained imported goods, mainly from the Mediterranean. The site of Mont Lassois/Vix, in eastern France, centred on a hilltop settlement that dominates the Seine Valley, is a very good illustration of this. Nearby, an incredibly rich female burial was excavated. She was buried on the box of a ceremonial waggon, accompanied, in particular, by an exceptional drinking assemblage comprising silver phials, bronze

1 The *Westhallstattkreis* is a term used by Kimmig to describe the geographical area where the model of princely settlements and graves (*Fürstensitze* and *Fürstengräber*) (Kimmig 1969) typical of the Western Hallstatt area takes place.

vases and Attic ceramics and, of course, the famous Vix krater. Jewellery, most notably a gold torque, was also recovered from the grave (Rolley 2003).

Archaeologists have long argued that craft production at and around such sites seems to have been controlled by these aristocracies (or elites). It is important to define the term "craft production" in this specific context as a system involving both mass production and a range of distribution greater than that characteristic of domestic production. This type of production is thus an economic activity that involves trade or commerce for the site where the craft activities take place.

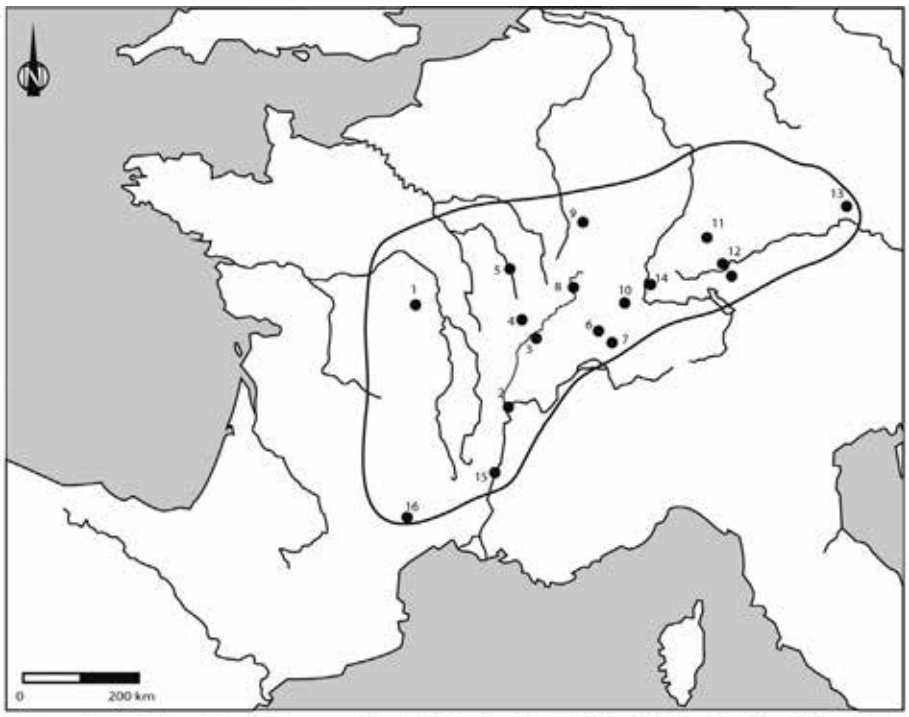
There are remains of artisanal activities, principally related to metalworking, on most of these aristocratic sites: Mont Lassois (France) and Heuneburg (Germany) are primary examples (Dubreucq 2013 and in this volume). However, the quantities of evidence recovered indicate only small- to medium-scale production within the elite settlements (Filippini 2015). We thus have to seek elsewhere to find the evidence for the scale of production that underpinned the wealth of these social elites. That specific production may have taken place off-site, at some distance from these aristocratic settlements. In these cases, it is not possible to say whether craftspeople in these habitats dedicated to production were independent or under the control of the elites located in the aristocratic settlements. This reflection is in part an answer to the question of the status of craftspeople, and blacksmiths specifically.

Nevertheless, craft activity during this period implies two key issues. On the one hand, the work implied in obtaining rare raw materials or for the enhancement of raw materials required initial preparation and, in turn, necessitated both time and manpower. These requirements were costly, both for the people who ordered pieces to be made of these materials and for the artisan before he could recover his 'investment' in the sale of the artefacts produced. On the other hand, there is abundant evidence for the development of advanced techniques for working the raw material, which required both specialised knowledge and skills. Such knowledge was likely held by few people. Craftspeople operating in this milieu must have had an exceptional status, as they had access to this specialised knowledge and could, in due course, teach it to others (Roux 2000). Using smiths as an example, we will investigate the social status of craftspeople.

This paper develops a number of reflections contained in my PhD thesis, which is now published (Filippini 2015). My study provided a general overview of the evidence from the settlements of which excavations demonstrate that craft activities were an important economic component. My work focused on the evidence of ironworking at these sites. From this study, an assessment of the social status of the artisans who carried out the smithing emerged, and this turned out to be an important aspect for the study of the iron economy. It is this aspect of the research that I develop further here.

The fifth century BC context

As a general rule, archaeological discoveries attributable to this period demonstrate that this was a metal-using civilization. The transition between the two Iron Ages is, furthermore, very important in the history of ironworking and iron usage, as the modes of iron consumption began to change and became more common from the fifth



1 : Bourges (FR) ; 2 : Lyon (FR) ; 3 : Bragny-sur-Saône (FR) ; 4 : Plombières-lès-Dijon (FR) ; 5 : Vix (FR) ; 6 : Sévaz-Tudinges (CH) ; 7 : Posieux-Chatillon-sur-Glânes (FR) ; 8 : Bourguinon-les-Morey (FR) ; 9 : Messein (FR) ; 10 : Illfurth (FR) ; 11 : Hochdorf (GER) ; 12 : Heuneburg (GER) ; 13 : Bopfingen (GER) ; 14 : Breisach (GER) ;15 : Crest- Bourbousson (FR) ; 16 : Sainte Eulalie de Cernon - Le Puech de Mus (FR).

Figure 1: Map of the main settlement sites of the western Hallstatt area.

century BC onwards. During this period, iron artefacts both diversified and multiplied, and traces of metallurgical activity seem to be more common on sites occupied in this century than during the previous ones (Augier *et al* 2012; Dubreucq 2013).

At the end of the sixth century BC, but mainly during the succeeding fifth century BC, other settlement types emerged (Figure 1). These present clear signs of wealth and, equally, they seem to be integrated into middle- and long-distance trade systems. Although these sites are often not as wealthy as those previously mentioned, they are as significant as the richest ones for our understanding of the social and economic practices in the Hallstatt area across the sixth and fifth centuries BC. These sites can be either small settlements or bigger agglomerations, but fewer new hilltop settlements were constructed at this time. The hillforts used in the preceding century also appear less intensively occupied. Their discovery during the past thirty years marked a change in the interpretation of Hallstatt society. Striking examples of this site type known from recent archaeological fieldwork include Bragny-sur-Saône (Saône-et-Loire, France) (Flouest 1993), Sévaz (Canton de Fribourg, Switzerland) (Mauvilly *et al* 1998), Plombières-les-Dijon (Côtes-d'Or, France) (Labeaune 2013) and Sainte-Eulalie-de-Cernon (Aveyron, France) (Gruat *et al* 2007). In the Hallstatt province within France, two sites distinguish themselves in scale from the other sites that have been discovered:

Lyon (Bellon, Perrin 1992, 1997; Cararra 2009) and Bourges. Their location near major routes and rivers (the Loire for Bourges, and the Rhône for Lyon), show their importance in exchange networks. They both provide many traces of craft activities, but also contain the remains of rich lifestyles, demonstrated by the consumption of numerous imported goods, mainly from the Mediterranean, along with the presence of metallic artefacts in substantial quantities.

This iron economy was growing significantly on such sites and became visible by several means, such as the emergence of supply and exchange channels for raw materials and by the artefacts recovered, as well as through the evidence they furnish for production and modes of consumption. Among the principal actors in this economy were, of course, the smiths. They had particular, specific knowledge, which my study reveals, and which I present below. These craftspeople seem to have had a particular place and an elevated status in some settlements, especially during the fifth century BC.

We had to adopt new ways of approaching the material under study in order to progress our understanding of the social situation of these particular craftspeople and their ironworking activities and processes. In cases where direct evidence for artisanal activities was only part of the remains, our interest also focused on social indicators, such as the evidence for imported goods (quantity and quality) and the presence of metallic artefacts on the settlements themselves.

To achieve this, I deployed various types of sources of information. First, I studied the evidence for workshops via traditional archaeological methods, an approach that begins during the excavation. The identification of structures and of associated artefacts is significant. Some types of artefacts can be assigned directly to ironworking (such as slags, hammerscale, handle-tang, and rods or plates with cutting edges) whereas others can provide information on the social status of the settlement, and thus of the smiths who lived there (such as knives, brooches, arm-rings, and other items used in everyday life). After the excavation, more detailed studies of all this material allow us to distinguish tools and other aspects of production. This approach also allowed us to characterize smithing wastes (e.g., slags), which are the most common finds. Hammerscale, waste material and unfinished items were also recorded. All of this evidence allows us to characterise the type and scale of iron production, and to determine the operational sequence of object production with some certainty.

Second, I employed archaeometric approaches for studying the evidence. For metal objects and residues, these methods are applied to the waste and by-products of metalworking, because destructive analyses are needed. In rare and special cases, some objects can be analysed directly using these methods.

I used mineralogical and chemical analysis to study slag and hammerscale and to extract information on smithing operations. The first stage is to choose defining samples from each type of slag, and then to make polish sheets of them in the most representative zone to facilitate study by optical microscope, in reflected light as in transmitted light, and mainly in polarised and non-analysed light. This allowed me to identify each element constituting the production phases observed on the section of the slag. Then, we completed these observations by chemical analysis to identify the chemical composition of the different phases, to check if our microscopic

observations were correct, and if so, to confirm their attribution to post-reduction activities. For this, we used the electron microprobe to obtain detailed analysis of each phase represented in the sample. The results aid in the interpretative processes needed to determine the organisation of the workshop, and, beyond that, the organisation of production (Coustures *et al* 2004, Beauvais 2007, Filippini 2015). The study of hammerscale used the same methods as those used for slags. This combined approach is also used to determine the geographical origins of the iron ore used, and then to identify the exchange networks that developed to satisfy the need for iron among the smiths working on different settlements.

Moreover, metallographic analysis can be carried out on offcuts from metal objects or on objects themselves. The key requirement is that the iron itself is in a good state of preservation; it has to be as little oxidised as possible. This kind of analysis allows to refine the *chaîne opératoire* represented in the production of particular items, but it is also very important for the identification of both the nature of the metal (iron, steel, or an admixture, and the proportion of carbon in the steel) and the smithing techniques used (Beauvais 2007, Berrenger 2014, Filippini 2015). Combining archaeological approaches with archaeometry, including its different sub-disciplines, allows us to answer wider and more varied research questions than studying only the artefacts themselves. The largest issue we can tackle concerns the iron economy that is represented by the evidence from a specific archaeological and historical context.

Forging during the fifth century BC

Among the various sites that have yielded ironworking remains, several types of settlements are represented and can be distinguished using several criteria, such as the areas they covered, the quantity and the variability in the materials discovered, the presence of other craft activities, and the presence or absence of metallic objects, Mediterranean imports, and wheel-finished pottery. All these points allow for a better understanding of the circumstances within which ironworking took place. There is no archetypal iron workshop for this period, although the examples at Sévaz-Tudinges (canton of Fribourg, Switzerland) (Mauvilly *et al.* 2007) come close. Here, both the structures and the material residues of ironworking were recovered.

This paper examines the material from two major French sites: Lyon (Rhône) and Bourges (Cher). These sites were chosen because it was possible to study in detail one workshop area from each of them: Port Sec Sud in Bourges (Augier *et al* 2012) and Les Tuileries in Lyon (Carrara 2009), both of which yielded important traces of ironworking.

Several shared characteristics between the sites invite comparison of these iron workshops. For example, they both have an extensive estimated area of occupation (200 hectares for Bourges and 150 hectares for Lyon), although excavations have not covered their entirety. In addition, at present they are the only known unenclosed settlements with such a significant area of occupation in France at this period. Moreover, they can be described as agglomerations, implying that these settlements have a special status; this is apparent because of the various groups present within the population, including the possible admixture between several social strata (Milcent 2012). Both sites produced large quantities of Mediterranean

imports, such as Massliote amphorae, Attic ceramics and imports from the South of France. Another characteristic that these sites share is the widespread presence of the remains of craft industries: the working of animal bones, and of lignite, as well as the manufacture of textiles and pottery and, of course, metalworking in both copper alloys and iron. With regard to the evidence for ironworking, however, there are differences between Port Sec Sud and Les Tuileries.

The two sites studied in detail share all characteristics mentioned above, but a very important difference lies in the extent of the area excavated: 120.000 m² for Port-Sec Sud and 6000 m² for Les Tuileries. In this case, however, the area concerned by the Iron Age craft activities occupied only 1500 m². Equally, the quantities of ironworking evidence recovered are also very different. In the case of associated waste products, we recovered 90 kg of slags, 1,6 kg of hammerscale and 21 kg of fragments of kiln-/hearth-lining at Les Tuileries, versus only 12 kg of slags, 0,05 kg of hammerscale and 2 kg of fireplace lining in Port Sec Sud. The actual quantities of waste metal occurred in very different proportions at the two sites. Talking all kinds of offcuts together, Les Tuileries produced 86 offcuts, whereas at Port Sec Sud, we counted 342 occurrences of such fragments. Thus, the more extensive site, Port-Sec Sud, yielded the smaller amount of non-metallic elements associated with iron production, but more iron offcuts. The reverse was the case for Les Tuileries.

Despite similarities in material culture and their implications on status and daily life, ironworking evidence from the sites suggests that they operated differently. Several explanations for this contrast can be advanced. It might reflect on their geographical position and the proximity of both iron ore deposits and iron smelting sites, such that the material recovered on each site reflected the supply of raw materials. An additional explanation for the differences lies in the organization of the on-site activities: for example, whether they were shared among several workshops or were much more concentrated. Finally, the distinction noted above could result from the characteristics of the production itself, the types of objects made, and the nature of the metal worked.

The combination of archaeological and archaeometric approaches is particularly useful in this context, when analysing a material as intractable to interpret as the slags and some of the offcuts from these sites. In what follows, I will present some of the key results from my study of the iron wastes from Lyon – Les Tuileries and Bourges – Port-Sec Sud. These are a selection of the best examples, in my opinion, to demonstrate the organization of craft activities on these sites, as well as the particular know-how possessed by the smiths. Consideration of these two aspects will help us to approach the status of the smiths on these sites and, more generally, the status of specialised craftspeople.

Les Tuileries in Lyon (Figure 2)

The initial observations of all the slags and subsequent mineralogical and chemical studies on a significant selection of them, demonstrated that all this material recovered from the workshop on the Les Tuileries site are attributable to the post-reduction stage of ironworking. No smelting is evident on-site.

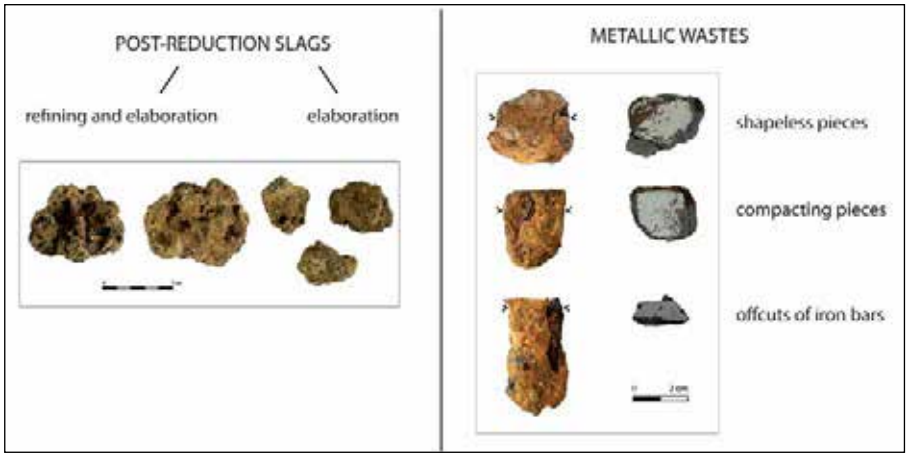


Figure 2: Examples of iron working wastes from the site of Lyon Les Tuileries: post-reduction slags (from refining and elaboration activities) and examples of metallic wastes presented in the order of elaboration (shapeless pieces, compacting pieces and offcuts of iron bars).

The evidence aligns with the working of raw iron, from the point just after it has been taken out of the furnace where it had been reduced. As a first approximation, all the identifiable stages are grouped together under the general term of "post-reduction". Further subdivision is only possible following the interpretation of the archaeometric analysis, which enables us to distinguish a clear difference between the two stages that form the post-reduction processes: the refining of the iron and the making of the artefacts. More generally, it is helpful and important to know to which stage the slag belongs, as this provides information on the organisation of the workshop and allows us to identify the form in which the iron arrived on the site. There are further questions that should also be addressed: Were there several smiths present, or different workshops, that were specialised in one or more stages of the metallurgical process, or in the stages of production for a particular object? What was the quantity of metal worked, and what was the importance of the workshop in the economy of the site and in the iron economy more generally?

From the site of Les Tuileries, two types of iron slag have been identified: one type was attributable to both the refining and tool-making stages; the other was related to the making of artefacts. Their undifferentiated distribution across the site does not help us to determine whether these activities took place in the same locus, or if they were separated spatially. However, this assertion allows us to consider that this workshop received the iron in a raw form, but already only slightly refined, because we do not have any indication of the entire smelting process occurring here.

Regarding the iron wastes, among the 86 pieces considered to be offcuts, we identified shapeless pieces still containing slag, compacted pieces with edges, and also offcuts, which consist of iron ready to be forged. However, there were fewer than 20 small pieces corresponding to the making of objects. These last pieces were both rare and badly preserved. Through the macroscopic and microscopic observations of these metallic iron wastes, the evidence uphold my conclusions,

that, after studying slags, the smelting process is absent, and that the refining process and the production of artefacts do not occur in their entirety here. All these observations led to the interpretation of this site as a workshop, receiving raw (or rather almost raw) iron. Its main activity was to refine this material and to supply other workshops with metal ready to be transformed into artefacts. It is thus possible to propose that the forge at Les Tuileries in Lyon represents the first step in a *chaîne opératoire* consisting of the transformation of iron, as it initially arrived on site, into objects. The other stages in this transformation took place at another location (or possibly at multiple others).

Port Sec Sud in Bourges (Figure 3)

Analysis here proceeds in exactly the same way at the site of Port Sec Sud in Bourges as for the site of Les Tuileries. Archaeological observation indicated that all the slags belonged to post-reduction activities. Mineralogical and chemical analyses confirmed this and clarified the stages in the working of iron at this settlement. While the excavation area extended to 12 ha, it is possible, particularly since all the remains have been discovered in secondary positions, that several workshops may have existed here.

Two steps in the process are represented in Port Sec Sud assemblage. In order of processes within the *chaîne opératoire*, a few slags (apparently linked to the stage of refining raw iron just after its removal from the furnace) were recovered, along with gromps, which are part of raw iron (Nosek 1994). While present and isolated as fragments, this type of slag seems to be a minor proportion of the debris, compared with the quantities of waste corresponding to the next stage of

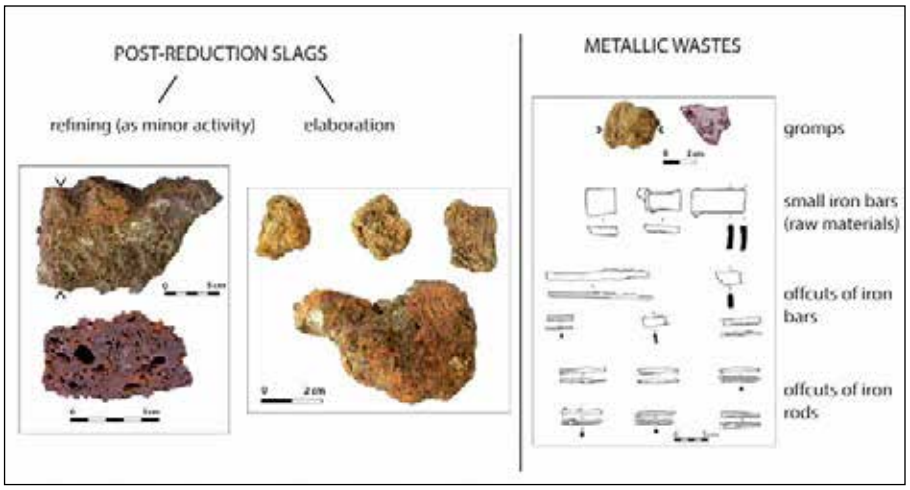


Figure 3: Examples of iron working wastes from the site of Bourges Port Sec Sud: post-reduction slags (from refining (as a minor activity on the site) and elaboration activities) and examples of metallic wastes presented in the order of elaboration (gromps as the first state of metal worked, and then small iron bars as usual raw material, offfcuts of iron bars and iron rods). (Pictures and drawings: A. Filippini).

the work. This next stage, the elaboration, is much more frequently recognised in the material from this site.

Observation of the many offcuts recovered confirms this initial conclusion. Semi-finished products, here in the form of iron bars, were also discovered. Among the several kinds of offcuts represented on this site are small bars and rods that were made from the bigger iron bars and were used for manufacturing artefacts.

For this or these workshop(s) – the number is uncertain – the blacksmiths worked principally with imported raw material, which arrived on site in the form of small bars, corresponding to an iron material ready to be forged. For the most part, the processing of raw iron into these semi-finished products must have taken place at another location, outside the area excavated or most likely elsewhere in the surroundings of the agglomeration.

The few slag remains corresponding to refining raw iron did not allow us to identify more precisely what the iron was destined to be made into: Was it intended to be bars such as the ones we have already described, or perhaps smaller bars or rods that could be transformed directly into artefacts? Either way, we think there was such restricted quantity of remains of this type that this was a marginal practice, designed to supply the workshops when the principal method of provisioning them (the iron bars) was not effective. Two options for iron supply have been pointed out with these observations: mainly iron bars, and occasionally

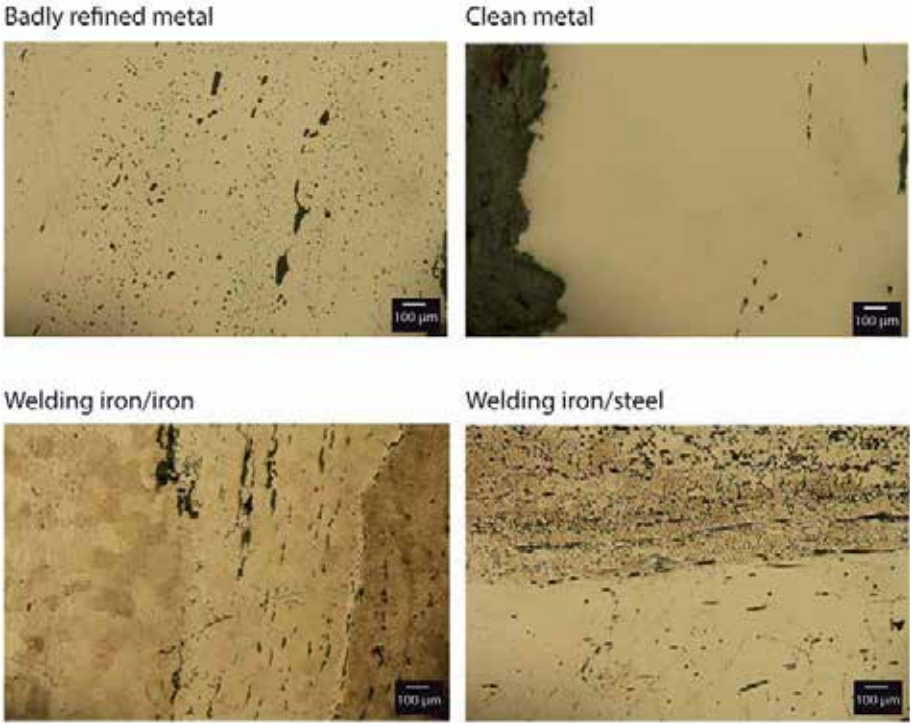


Figure 4: Examples of different sorts of iron found on the crafts sites: badly refined metal and clean metal up in the figure; examples of different sorts of welding down in the figure: iron on iron and iron on steel. (Pictures: A. Filippini).

raw iron. However, the geographical origin of these two sources of iron has not been determined because there has been insufficient chemical study of iron ore and slags coming from this area, and we do not have any comparison data. In sum, the significant number of offcuts, along with their small size and the nature and relative scarcity of the slag, are signs of the presence of workshops that specialised in the making of small objects.

During my study, offcuts have been a very good way to reveal the practice and the mastery of techniques. This aspect has been approached thanks to metallographic analysis. The observations of the metal of the offcuts indicate the use of a very

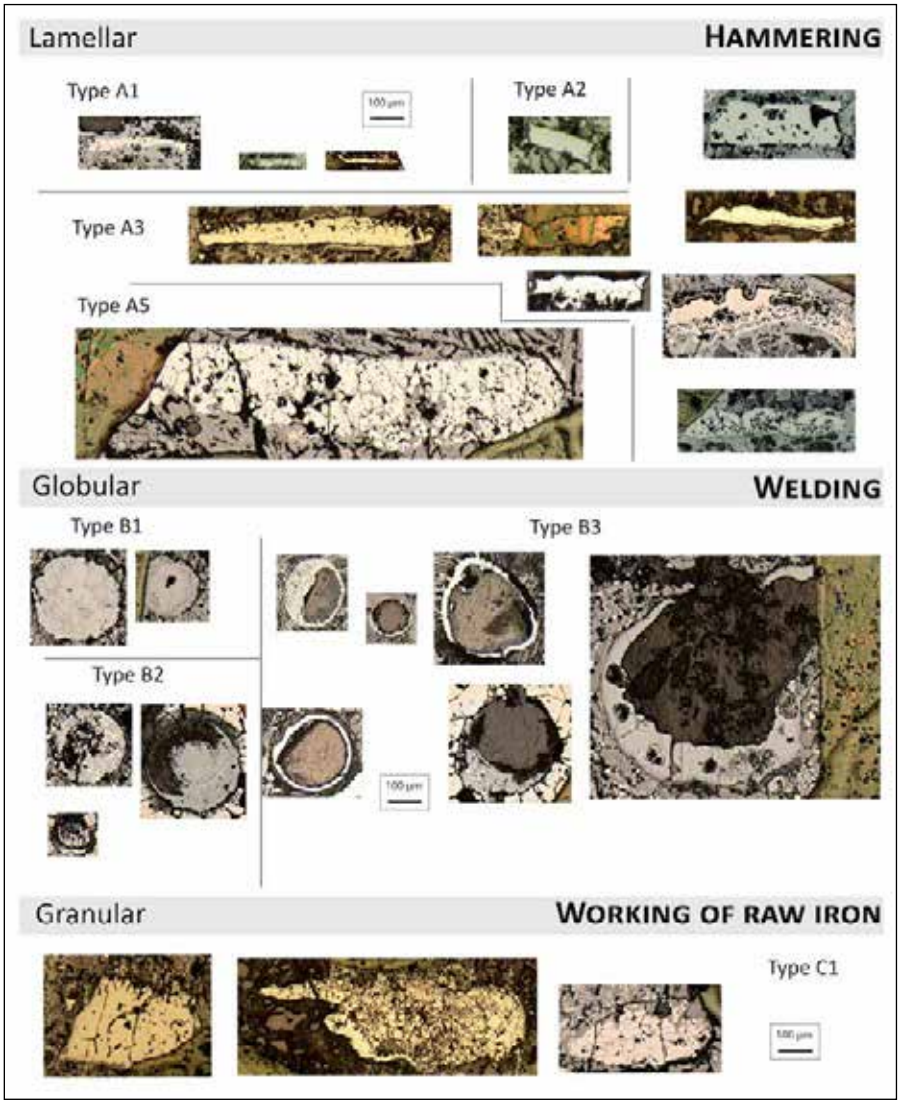


Figure 5: Examples of hammerscales from different types (lamellar, globular and granular) defining different skills: (hammering, welding and the work of raw iron). (Pictures: A. Filippini).

clean metal. I have also showed that the technique of welding between two pieces of iron or between one piece of iron and one of steel was very well mastered. This technique is known as one of the most difficult for the smiths because of the fragility of the metal during the heating process which must be extremely precise (Figure 4).

On both the sites of Les Tuileries and Port Sec Sud, the excavations also yielded hammerscale. Each type of hammerscale characterises a technical skill: lamellar ones indicate the practice of hammering; the globular ones indicate welding, as I saw during the observations of the metal of the offcuts; and granular hammerscale indicates the work of raw iron (Figure 5). Combined with the examination of the other waste, the hammerscale traces are indicative of the different activities practiced in the workshops.

A common know-how?

The production of drum-footed fibulae is the only recognised *chaîne opératoire* that is common to the two settlements. This has already been described in a number of papers (Filippini, Pescher 2009; Cararra, Dubreucq, Pescher 2013), because these brooches are representative of metal production in the fifth century BC; examples

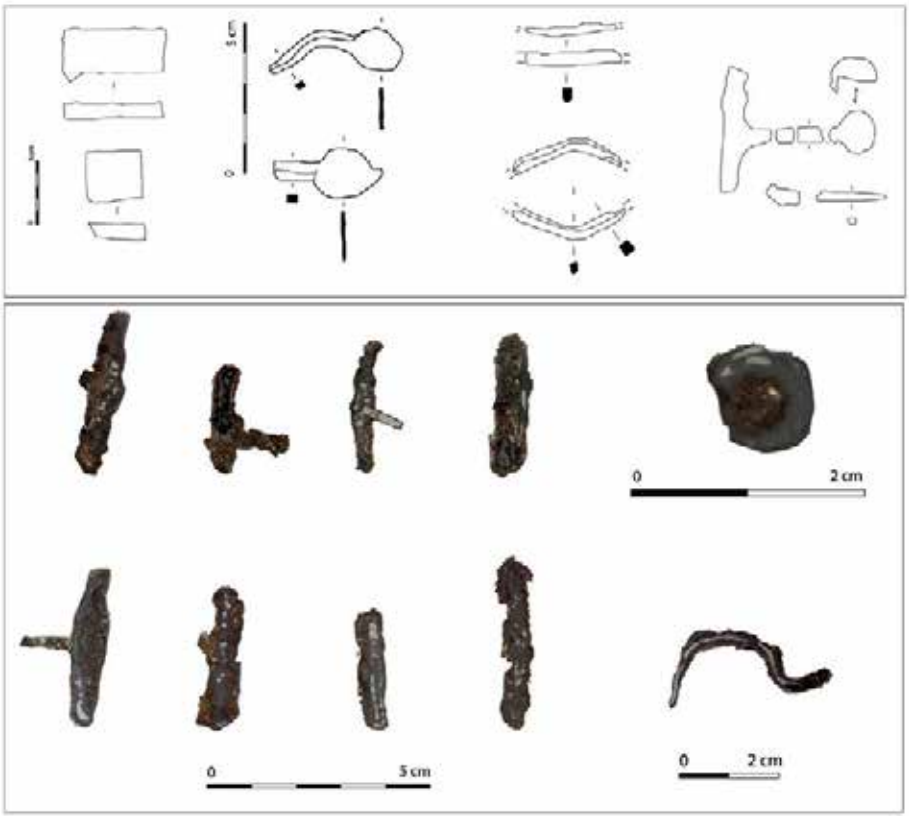


Figure 6: Some of archaeological elements of the « chaîne opératoire » of the drum-footed brooches, and the pieces studied. (Pictures and drawings: A. Filippini).

Figure 7: Photomicrographs of different parts of the brooches studied, showing the quality of the metal used up in the figure, and the nature of the metal and the work of the smith for each part down in the figure. (Pictures and drawings: A. Filippini).

are made of iron but also of bronze, and to date, production using the latter metal has been better studied. Below, the technical dimension of the making of the iron brooches studied identified is outlined using an archaeometric approach.

The site of Port Sec Sud yielded several items corresponding to different stages in the manufacture of these iron fibulae. The first is the small iron bars that form the raw material. Then come the small metal rods with a disc-shaped end that could be transformed into the drum-foot, and then the offcuts of rods. The order of the two latter stages could be reversed, as the discovered rods show cutting edges (indicating that they are real offcuts), but this shape of metal object is also the initial form used to create the drafts. Finally, there is the completed object. Figure 6 shows all these different archaeological evidences. It also shows the pieces studied with metallographic analysis: bow, springs, and example of the drum-foot.

The first microscopic observations of all these elements show that there is very little waste from the operation of reduction for any of the parts of the brooches studied. This demonstrates that metal of very high quality was employed. The metallographic analysis of the rods and of the different parts of the brooches showed variations between the metal of the rods that presented irregular layers of iron and steel, and the metal constituting elements of the fibulae themselves, in which traces of hammering and twisting were apparent (Figure 7). The nature and quality of

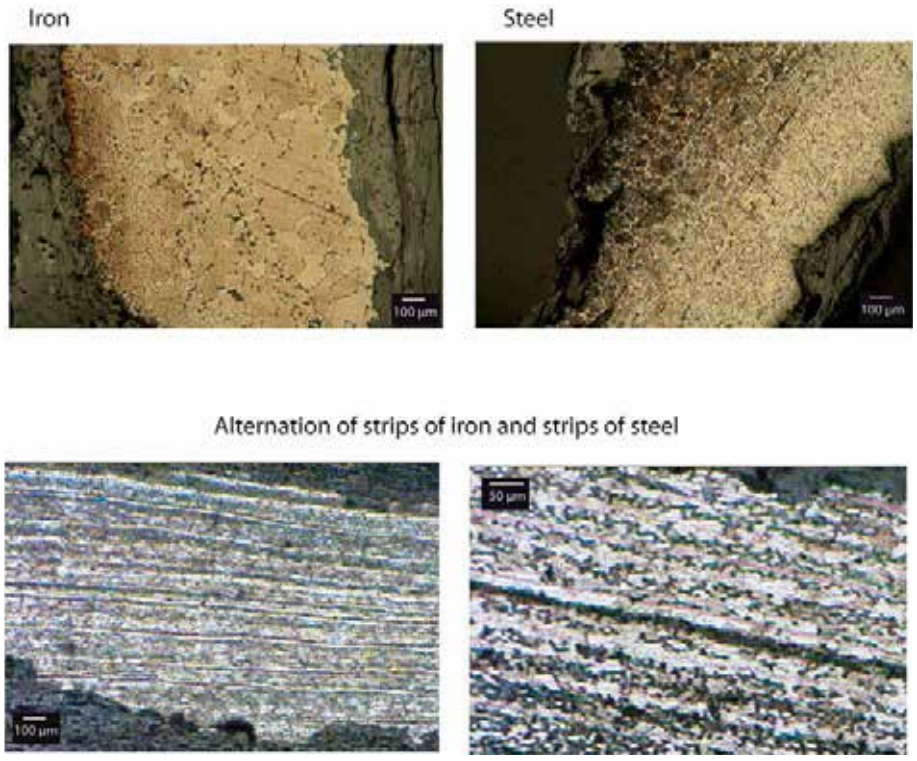


Figure 8: Photomicrographs from knives, showing different natures of metal used: iron, steel, or alternation of iron and steel strips. (Pictures: A. Filippini).

the worked metal and fabrication techniques used in these fibulae revealed much particular know-how that the blacksmiths who made them had perfectly mastered. Fibulae offer a very good example of the available techniques, but another type of artefact can also be used to help to understand the specialisation of craftspeople: knives. This category of object is important because of the variety of its potential uses. Depending on its size, shape, and decoration, it can be used to prepare food, to hunt, to fight and to kill, but it can also be an instrument of "power" or prestige; as such, it can also have a social dimension.

We applied the same methodology to study the knives as that used for the fibulae. Metallographic analysis carried out on a selection of knives revealed the great variety of techniques that were known from the fifth century BC, and demonstrated that they were made of high-quality metal. We observed the deployment of different qualities of metal that seemed to relate to the morphology of particular knives: iron, steel, and alternating iron and steel strips are all identifiable (Figure 8). The use of this last material demonstrates a particular technological intention: the association of alternate iron and steel strips gives the object both resistance and flexibility. Particular technical procedures are also very important because they give the cutting edge of knives specific physical properties that are essential to their function, and also related to the nature of the metal deployed. Peculiar treatments recognized include cementation, hammering at low

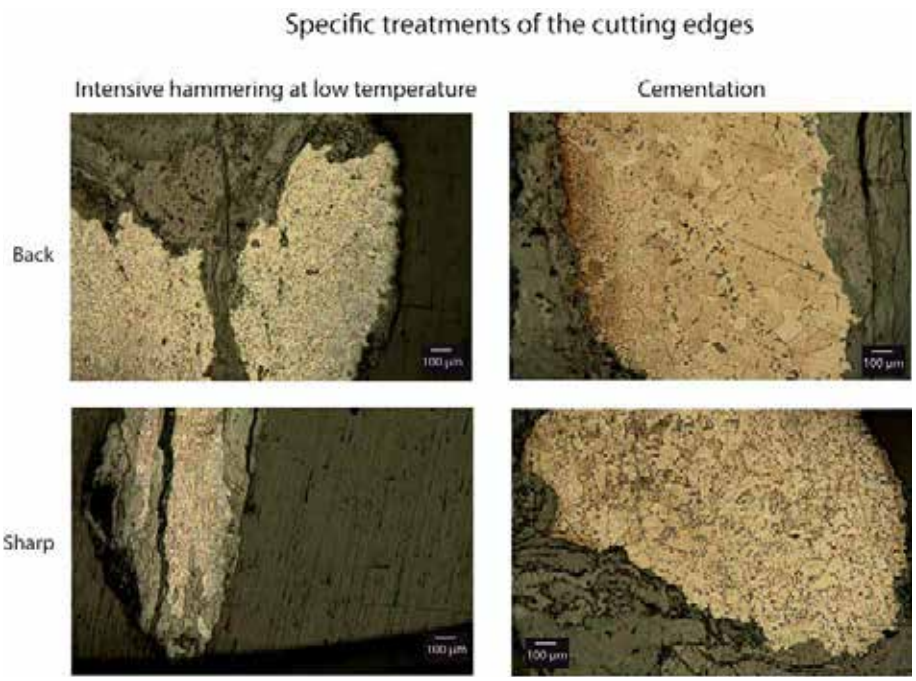


Figure 9: Photomicrographs of the backs and sharps of two knives, showing the different and specific treatments applied on the cutting edges. (Pictures: A. Filippini).

temperature, or quenching (Figure 9). All of these give blades better resistance. The identification of all these practices shows that the smiths had a very good knowledge of the materials (especially iron) at their disposal, but also demonstrates knowledge of many specialised production techniques.

Conclusion: who were the blacksmiths?

The results of archaeometric studies show a high level of technological understanding and mastery and a great deal of know-how that could only be acquired in the framework of specialised craftspeople. We can even envisage craftspeople specialised in the making of only a single type of object. As has been noted, drum-foot brooches were made in iron as well as in bronze. With the exception of certain specific procedures (the forging of iron, as opposed to the pouring of molten bronze into moulds), the work required to finish the object is similar, irrespective of the metal used. It is thus clear that production was specialised, and this is especially characteristic for the drum-footed brooches because of the standardization of the component elements and of the finished objects.

This example shows the beginning of optimization of productivity in protohistoric societies: As the drum-footed brooch is an emblematic object during the end of the First Iron Age, the production had to be very important, and in this context, the high quantity of artefacts manufactured needed blacksmiths who were specialised in the manufacturing of this kind of brooch. The partition of work is one of the results of the generalisation of metal using. Generally, there is evidence for organisation of production; activities were separated based on the successive

stages of the *chaîne opératoire* for the making of artefacts, and this system is proof of a specialisation of the activities undertaken, and by extension, specialisation amongst the craftspeople who made them (Berranger 2014). Each gesture, and thus each skill, had to be learned by the smiths, and the combined evidence suggests that we are probably here witnessing an intensification of the production process, aiming at increasing productivity.

The appropriate skills and know-how are restricted to blacksmiths; owing to this, they were respected by their entourage, making their consumers dependent on the products they created. In consequence, we can surmise that they enjoyed special status. Comparison with other settlements of the same period that include evidence of ironworking among their craft activities shows that the majority of these settlements also demonstrate exceptional status. Indeed, such sites produce significant Mediterranean imports, in terms of numbers, quality, and range. Their presence suggests an elevated social status for the inhabitants of these settlements (Flouest 1993, Augier *et al* 2012, Filippini 2015).

These observations contribute to the hypothesis that craftspeople were able to trade with populations from nearby settlements, opening access to supplies of food and other substantial needs. This situation is made possible because of the specialisation of craftspeople, who manufactured objects needed by other populations.

Might these craftspeople have been members of the aristocracy who were specialised in production and, at the same time, in controlling trade? Or could they belong to another social class that was more or less independent because of the special mastery that smithing required? We cannot be certain in our interpretations of social standing, but all of the evidence presented shows that craftspeople, and especially blacksmiths, held an exceptional place in these protohistoric societies at the transition of the two Iron Ages at Lyon and Bourges and in some other sites with similar characteristics.

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General Index

Artisans *versus* nobility?

In prehistoric Europe hierarchic societies arose and developed technological systems and processes in the production of objects related to everyday use, on the one hand, and items of religious and symbolic character emulating prestige and luxury, on the other, while both types of objects may not always be clearly distinguishable.

This volume deals with questions of how artisans and other social groups, involved in these productive processes and social practices, reacted to and interacted with the demands connected with elites identities formation, affirmation reconfirmation practices. Innovations and the development of new technologies designed to satisfy the needs of ostentatious behaviour and achieving prestige are key issues of this volume. For example, how can we identify the consequences of such processes, how can we define the role(s) that the craftspeople played in such contexts, and are these always as clear-cut as usually portrayed? The book's common aim is to investigate the economic, socio-political, as well as the technological contexts and backgrounds of the make-up of material culture and technologies in these periods. We examine which role(s) artisans may have played in status and identity formation processes, in rituals and in symbolic performances, in other words, in each aspect of life and death of selected Chalcolithic, Bronze and Iron Age populations in Europe. Many aspects of the social interaction patterns between the different groups of people in those periods have not been adequately discussed and investigated, especially the artisans' important role(s). This volume aims to redress these imbalances by investigating how social groups interacted with each other, and how we may recognize such interactions in the material remains.

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