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Nicolas Clément

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*Le prestige des guerriers : équipements d'archers campaniformes en Europe centrale*

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# The prestige of warriors: Bell Beaker archers' equipment in Central Europe

*Le prestige des guerriers : équipements d'archers campaniformes en Europe centrale*

Nicolas Clément

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## EDITOR'S NOTE

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## Introduction

- 1 European Bell Beakers and their related material culture (archery equipment, daggers, ornaments, etc.) were first discovered in graves from the nineteenth century onwards. These finds raised questions about the origin and spread of this culture, as well as its nature, between ideology and culture, or both at the same time or successively (Benz *et al.* 1998). No real consensus has yet been reached regarding the origin(s) and nature

of the Bell Beaker culture, in spite of the scope of the topic and the number of specialists who have studied it (Lemerrier 2018). In addition, studies of Bell Beaker culture are still largely dependent on typological and, to a lesser extent, technological approaches to pottery. However, although Bell Beakers are emblematic, they are probably not the most important element of this culture in terms of funerary practices (Salanova 1998). It therefore seems essential to study the objects associated with the pottery, and first and foremost, the archery equipment.

- 2 Early twentieth century diffusionist theories gave precedence to invasions and thus to warriors. They indirectly refer to coherent historical models (Celtic or barbaric invasions), in order to explain the rapid spread of the Bell Beaker culture throughout Europe (Harrison 1974). The demonstration of these alleged Bell Beaker invasions is far from conclusive and the last decades of research have largely abandoned such hypotheses. Monolithic and diffusionist explanations of Bell Beaker culture do not stand up to scrutiny of the facts (Lemerrier 2018). Indeed, material culture contradicts the idea of a single origin and has identified filiations outside the generally accepted cradles of the Bell Beaker culture, such as the perforated V-perforated buttons pre-existing in various Mediterranean and Baltic regions (Guilaine 2004), or the arrowheads with squared barbs and tang that originate in north-western France (Nicolas 2016). Moreover, the partition between Central and Northern Europe, where individual burials and a strong sexual division are the rule, and Western and Southern Europe, where the reuse of collective graves is predominant, only reinforces the strong impression of a polymorphic Bell Beaker culture and contradicts triumphant diffusionism.
- 3 Despite the protean nature of the Bell Beaker culture and the abandonment of diffusionist theories, anthropology, isotopic or DNA analyses have nevertheless demonstrated movements of individuals or populations (Price *et al.* 2004, Desideri 2011, Fitzpatrick 2011, Olalde *et al.* 2018). These movements undeniably supported the spread of the Bell Beaker culture in Europe over a fairly short period of time, one to two generations at most, which cannot be quantified by radiocarbon. Strontium isotopes and distribution maps show direct movement between remote centres receptive to the Bell Beaker culture and not down-the-line diffusion. These movements are all factors of homogenisation on a European scale. Depending on the region, the contribution of local communities appears to vary greatly: some regions experience massive population change, whereas others undergo partial renewal. The same phenomenon is perceptible in material culture or settlements (Price *et al.* 2004, Desideri 2011, Olalde *et al.* 2018, Gibson 2019). While some regions seem to adopt the Bell Beaker culture in its entirety, in others, at least initially, it cohabits with local cultures. Others only receive certain elements while some regions are particularly resistant (e.g. Lemerrier 2018, Nicolas *et al.* 2019). Despite these strong disparities, the arguments of the diffusionist equation are still present:
  - the European distribution of the Bell Beaker culture is constantly being completed, the gaps are gradually being filled in and existing concentrations are strengthened;
  - the Bell Beaker culture appeared almost simultaneously in a large part of Europe around the twenty-fifth century BCE;
  - graves with weapons constitute up to a quarter of Bell Beaker graves.
- 4 For this last reason, the somewhat overlooked question of the warrior and a warrior social class has recently been raised again (Bailly 2002, Vandkilde 2006, Heyd 2007,

Lemercier 2011). Burials with weapons are mainly adult males, although a few cases of juvenile or female graves attest to hereditary status and possible gender transgression (Turek & Černý 2001). In addition to grave contents, the Bell Beaker warrior takes shape with the anthropomorphic armed *stelae* of the necropolises of Saint-Martin-de-Corléans (Valle d'Aosta, Italy; De Marinis 1995) and Le Petit-Chasseur (Sion, Valais, Switzerland; Corboud 2009). They probably represent the warrior elite rather than gods or tutelary deities (Gallay 1995). However, the question of the status of these warriors and their panoply in the graves remains unresolved.

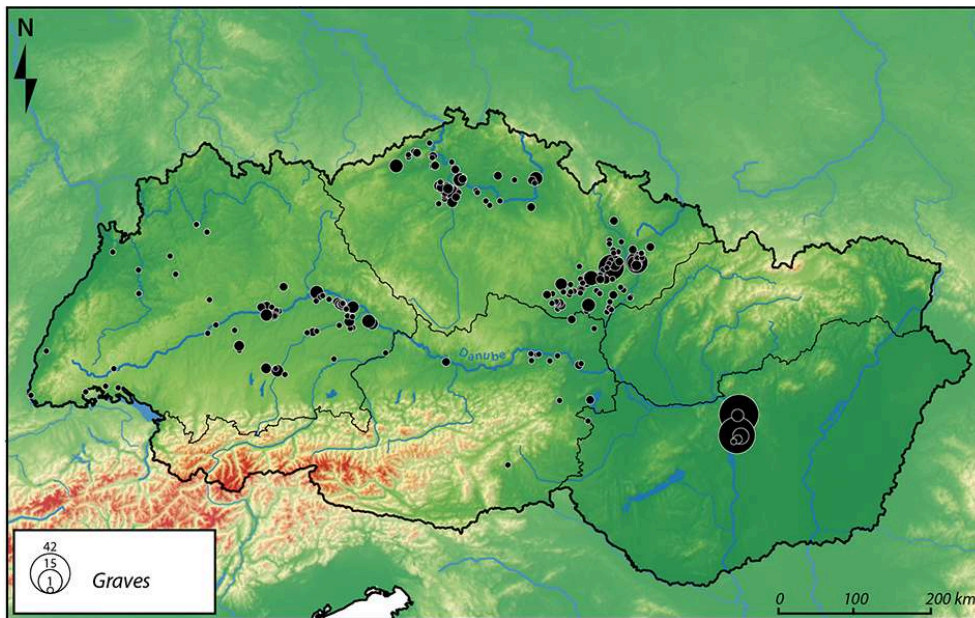
- 5 In order to clarify the status of the warrior, it seems crucial to analyse warrior object-signs by reconstructing their biographies in relation to the social hierarchies at work in Bell Beaker societies. For this purpose, Central Europe appears to be a particularly favourable region, since individual burial rites are the rule. Each person is assigned his own grave goods, which interlinks the biographies of the objects with those of individuals. In addition, significant numbers of these individual graves, generally grouped in large cemeteries, are known.
- 6 In this way, 480 Bell Beaker graves containing a set of archery items (bracers, arrowheads, grooved abraders, bow-shaped pendants, daggers) have been identified in Southern Germany, Austria, the Czech Republic and Hungary (tab. 1; fig. 1-2). This corpus is the most abundant in Europe for this type of burial. It provides the basis for the study of archery sets, in the Czech Republic and Hungary, and for the analysis of the anthropological and social data of the buried people. How was archery equipment made? What was it used for? Beyond the objects, what is the social identity of the deceased buried with an archery set? How do these objects reflect Bell Beaker social organisations and the diffusion of these societies?

**Tab. 1 – Inventory of Bell Beaker with archery-related items in Central Europe according to their contents. M: dagger mould**

Arrowhead	Bracer	Arrowshaft smoother	Dagger	Bow-shaped pendant	Number of graves
X	X	X	X		4
X	X	X		X	1
X	X	X			2
X	X		X	X	4
X	X		X		27
X	X			X	7
X	X				38
X			X	X	3
X			X		11
X				X	15

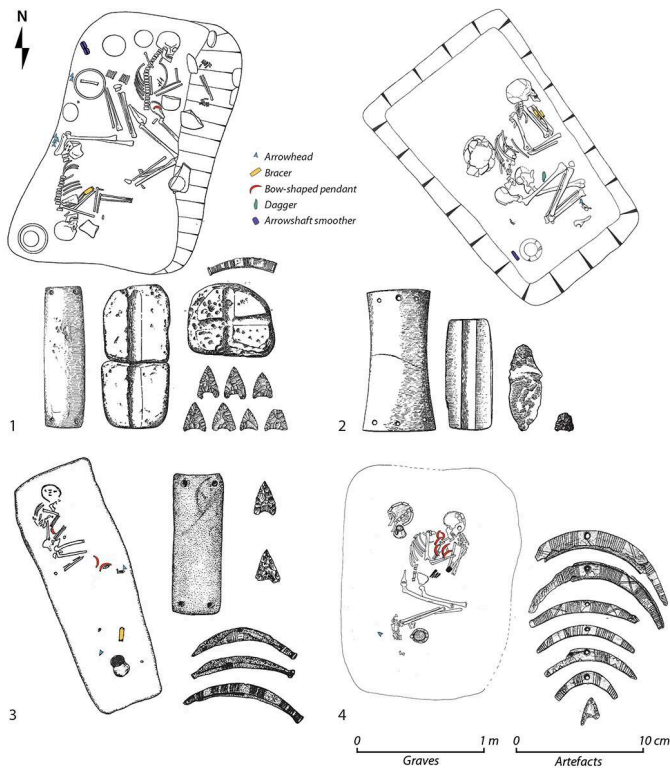
X					89
	X	X	X		1
	X	X			3
	X		X	X	6
	X		X		36
	X			X	12
	X				134
		X			4
			X	X	6
			X		45
			M		1
				X	31
				<b>Total</b>	480

1. Distribution map of Bell Beaker graves with archery-related items in Central Europe



LIST OF SITES, SEE ANNEX 2

## 2. Examples of Bell Beaker 'warrior' graves in Central Europe



Only archery-related items are figured

1- Double male burial at Rousínov-Rousínovec II 18/1985, Moravia, after **GEISLER 1990**;

2- Male burial at Hoštice I (grave 915/02), Moravia, after **MATĚJÍČKOVÁ & DVOŘÁK 2012**;

3- A 5-years old child burial at Landau-SüdOst (grave 1), Bavaria, after **HUSTY 2004**;

4- Male grave at Irlbach 'Am Auwald', Bavaria, after **KOCH 2005**.

## 1. Bell Beaker graves in Central Europe

- 7 On a European scale, Bell Beaker funeral practices are far from uniform. In Central Europe, individual burial is clearly preferred, but double or multiple burials, containing up to five individuals are not uncommon (fig. 2, 1). Crouched inhumation is predominant (fig. 2) and can coexist with cremation (Endrůdi 2013). The most striking element of these burials is that they are clearly gendered: men are generally lying on their left side with their heads facing north to east, while women are right-sided with their heads facing south, as well as east (Turek & Černý 2001; fig. 2). These burials are inserted in rectangular or oval pits, which can reach a depth of one metre when they are well preserved. On several occasions, traces of wooden structures were discovered (Matějčíková & Dvořák 2012). Recent excavations have identified pits in contexts where bones are preserved, with all the characteristics of a grave in terms of shape and content. However, no skeletons were found in these pits, suggesting the existence of cenotaphs (Peška 2013, Fojtík 2015). Some graves may be surrounded by ring-ditches with a diameter of 2 to 13 m, which may have delimited small mounds. Moreover, at the beginning of the twentieth century, excavations by I.L. Červinka (1910), in the Moravian woodlands, showed the existence of barrows, which can reach a diameter of about fifteen metres. Ancient discoveries mention isolated burials or small groups of graves. After extensive stripping, the Bell Beaker graves now appear to be grouped

together in cemeteries, ranging from about ten to more than a thousand graves. Nevertheless, such stripping can also reveal isolated graves, as in Tišice in Bohemia (Turek 2015, M. Kuna, pers. com.).

- 8 Burial patterns show east-west variation: to the west, inhumation dominates and cemeteries rarely exceed 30 graves (fig. 3), whereas to the east, cremation is more frequent or even dominant, and cemeteries are larger (Endrődi 2013). In Moravia, Hoštice I cemetery yielded 157 graves (Matějčíková & Dvořák 2012; fig. 3). In the Budapest region, the necropolises of Szigetszentmiklós 'Felső Úrge-hegyi dűlő' and Budakalász 'Luppa-csárda' reach 219 and 1,070 graves respectively (Czene 2008, Patay 2013). Clear gender groupings are rarely observed. The same applies to graves yielding archery equipment. Moreover, these warrior graves rarely constitute more than 10 to 15% of the total number of graves in the cemeteries. The only exception is the Hulín 'Pravčice' 2 cemetery in Moravia, where almost a third of the graves contained archery equipment (13 out of 45; 28.9%). The cemetery is divided into three groups, in one of which eight or nine warrior graves are set out in line (Peška 2013; fig. 3). In this case, such organisation probably underlines the privileged place of burials with archery equipment.

**3. Examples of Bell Beaker cemeteries in Central Europe. Most of them do not show specific patterns according to gender or archery-related items, with the exception of the Hulín 2 'Pravčice' cemetery in Moravia**



- 9 From a chronological point of view, several regional classifications have been established, with their own subdivisions (Dvořák 1989, Heyd 2000, Heyd 2001, Endrődi 2013, Turek 2013). However, for Bell Beaker burials, three main stages can be identified based on the typology of the beakers, with first of all an international style, then regional styles and the presence of common ware (Besse 2003):

- stage 1: graves with maritime and epimarine Bell Beakers, common ware is rare;



- stage 2: graves with decorated Bell Beakers of various regionalised styles and common ware;
  - stage 3: graves with only common ware.
- 10 The identification of the first stage is also confirmed by other types of associated objects (Heyd 2001) and this 'maritime' horizon is well recognised elsewhere in Europe (Needham 2012, Salanova 2011). However, the distinction between stages 2 and 3 is more problematic as it is not based on a typological evolution of Bell Beakers but on their occurrence. Radiocarbon dates indicate a relatively short duration for the Bell Beaker culture, spanning three centuries, between 2500 and 2200 cal BCE. The imprecision of radiocarbon dates neither refutes or confirms this relative chronology (Peška 2012).

## 2. Biographies of the Bell Beaker archery equipment

- 11 The 480 registered Bell Beaker graves yielded 1,233 archery items (arrowheads, bracers, grooved abraders, bow-shaped pendants, daggers), of which 570 (46.2%) were examined. The studied collections come from the Czech Republic and from the Szigetszentmiklós 'Felső Úrge-hegyi dűlő' site in Hungary (dir. R. Patay). However, we integrated all the available data from Central Europe into our study. In a techno-functional approach, we specified the raw materials used for each object, the manufacturing methods and use-wear in order to trace the biographies of these objects (Nicolas 2016).

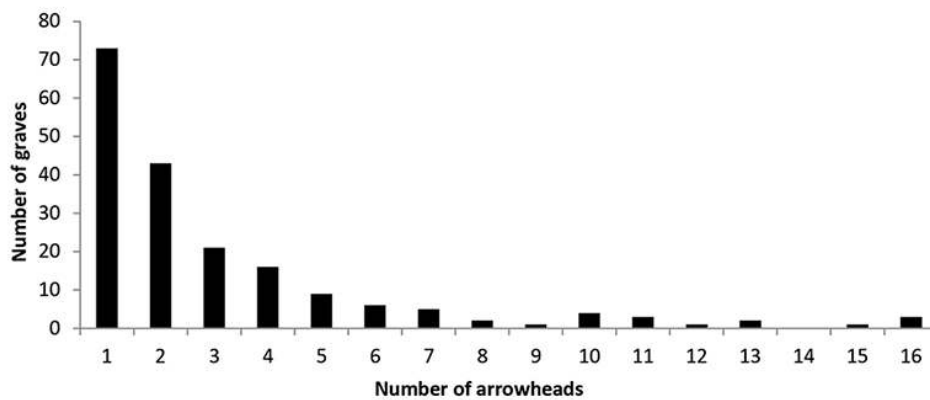
### 2.1. Arrowheads

- 12 Among the archery equipment, arrowhead sets are the most numerous objects in graves (tab. 2; fig. 4). They are generally found in groups, deposited with ceramic offerings. They can also be found in a bundle behind the pelvis, suggesting that they were contained in a quiver carried on the shoulder (fig. 2, 1).

Tab. 2 – Inventory of Bell Beaker arrowheads in Central Europe

Country	Number of graves	Number of arrowheads	Number of roughouts	Studied items
Germany	52	155	6	0
Austria	0	0	0	0
Hungary	24	66	3	35 (50.7%)
Czech Republic	125	395	22	296 (71%)
Total	201	616	31	331 (51.1%)

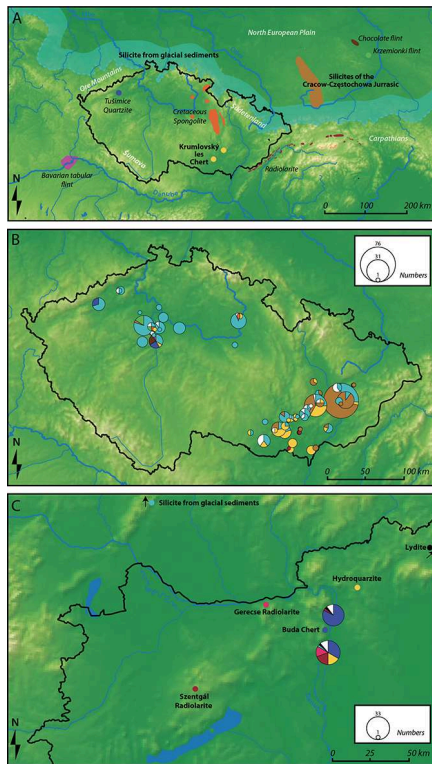
#### 4. Number of arrowheads deposited in graves



#### Raw materials

- 13 The supply of raw materials shows differences depending on the geological context (fig. 5). Where good-quality siliceous rocks are present, the supply is local (Nicolas 2016). In Southern Moravia, at Krumlovský, chert was widely used but with limited distribution (up to 50 km; Kopacz *et al.* 2009; fig. 5, B). Elsewhere, supply networks were set up to compensate for the poor quality of local rocks (small nodules, poor knappability). In the Czech Republic, two main sources of exogenous flint (50 to 200 km) were used: silicite from glacial sediments of Scandinavian origin which was transported to the barrier formed by the Ore Mountains and Sudetenland and flint from the Cracow-Częstochowa Jurassic in Little Poland (Kopacz *et al.* 2009, Přichystal 2013; fig. 5, A). The former is mainly found in Bohemia, while the latter is mainly spread over Northern Moravia. In addition to these main sources, some local siliceous rocks were used occasionally (Tušimice quartzite, Cretaceous spongolite in Bohemia). Other rocks, discovered sporadically in Bohemia, are distinguished by their distant origin exceeding 200 km for Bavarian tabular Jurassic flint and 400 to 500 km for Jurassic flint from Little Poland (fig. 5, A). All these exogenous rocks are characterized by good knappability (fine grain, homogeneous matrix, relative translucency). Although there are no primary flint deposits in Bohemia and Moravia, regional raw material circulation networks were set up in these regions for all types of lithic tools (Kopacz *et al.* 2009). Local second choice rocks exist but were seldom exploited. The use, albeit marginal, of extra-regional flint from Little Poland or Bavaria is probably due to the presence of Bell Beaker groups in these regions (Heyd 2000, Budziszewski *et al.* 2010). These arrowheads made of exotic flint seem to result from indirect exchanges or regular contacts between these different communities.

## 5. Origins of raw materials used for arrowheads in Czech Republic and Hungary



A- Origins of siliceous rocks used in Czech Republic (according to Přichystal, 2013);  
 B- Distribution of siliceous rocks used in Czech Republic (personal observations and according to Kopacz *et al.* 2009);  
 C- Origins and distribution of siliceous rocks used in Hungary (according to Zandler 2009 and Horváth 2017).

- 14 The Budapest region in Hungary, which was the easternmost Bell Beaker community (Csepel group), represents a particular case. This community was located on and around the island of Csepel, and was surrounded by different contemporaneous cultures (Endrődi 2013). Here, the supply networks seemed much more limited (< 85 km) and the local medium-quality flint from Buda was mainly used (fig. 5, C). Good quality radiolarites (Gerecse, Szentgál) are present in the region (40 to 85 km away), but were only marginally used for making arrowheads (Horváth 2017). This rather limited supply could be linked to the relative isolation of the Csepel group in Bell Beaker networks (Reményi *et al.* 2019).

### Typology

- 15 Central European Bell Beaker arrowheads are piercing and mainly hollow-based. Barbs can present a curved or trapezoidal base. Some arrowheads have a squared or pointed tang (fig. 6). Others have a straight base and can be considered as roughouts. Nevertheless, some specimens bear traces of use (blunt barbs, possible impact breaks), attesting that some straight-based examples may have been used as such. The rather diversified shapes are generally inscribed in a triangle with slightly convex edges. This morphology can sometimes be more clearly triangular or ogival. The barbs are generally squared and, to a lesser extent, rounded, pointed or mixed. The dimensions

of these arrowheads range from 1.5 to 4 cm long, 1 to 2.5 cm wide, with an average thickness of 0.4 cm.

#### 6. Types of Bell Beaker arrowheads in Central Europe



- 1- Arrowheads with squared barbs and tang, Borkovany I, grave 1/59, Moravia (RMM, no. 80/1-3/59);
- 2- Arrowhead with squared barbs and pointed tang, Předmostí, grave? 1, Moravia (MKP, no. 1600/63/4);
- 3- Arrowhead with pointed barbs and tang, Prosiměřice, grave A, Moravia (JMZ, no. A30789/23);
- 4- Arrowhead with trapezoidal hollow base and squared barbs Stehelčevce III, grave 2, Bohemia (VMS, no. 5846);
- 5- Arrowhead with trapezoidal hollow base and rounded barbs, Předmostí, grave? 1, Moravia (MKP, no. 1600/63/5);
- 6- Arrowhead with trapezoidal hollow base and pointed barbs, Hulín 2 "Pravčice", grave H45, Moravia (ACO, no. 04/2007-847-9b);
- 7- Arrowhead with curved hollow base and squared barbs, Hoštice I, grave 873/02, Moravia (MV, no. A84724);
- 8- Arrowhead with curved hollow base and rounded barbs, Hulín 2 "Pravčice", grave H45, Moravia (ACO, no. 04/2007-847-9c);
- 9- Arrowhead with curved hollow base and pointed barbs, Praha "Kobylis" XV, grave 12, Bohemia (MHMP, no. A518447);
- 10- Arrowhead with straight base, Szigetszentmiklós "Felső Ürge-hegyi dűlő", grave 423, Hungary (FM, no. 2009.11.423.1).

Photographs C. Nicolas.

- 16 From a chronological point of view, the three barbed-and-tanged arrowheads identified in the corpus belong to stage 1 and come from Moravia (Heyd 2001). The triangular barbed-and-tanged arrowhead from grave 1/59 at Borkovany I (fig. 6, 1) is the easternmost example of a model widely distributed in Western Europe (Bailly 2014). This model is probably borrowed from Artenac prototypes in Central-Western France (Nicolas 2016). This item is associated with a maritime Bell Beaker. This kind of beaker is considered to be old, and attests to the presence of these barbed-and-tanged arrowheads in the diffusion of the Bell Beaker culture in a clearly east-west movement (Bailly 2014). Two further barbed-and-tanged arrowheads are associated with epimarine Bell Beakers (Pernička 1961, Medunová-Benešová 1962; fig. 6, 2-3).
- 17 These sporadic western influences seem to have stimulated an original production of Bell Beaker arrowheads. From stage 1 onwards, hollow-based arrowheads are predominant in quivers (fig. 6, 4-9). These arrowheads originate from the local Corded Ware culture (Popelka 1992, Budziszewski & Tunia 2000, Kolář 2006). The few specimens deposited in Corded Ware graves are rather small in size (rarely more than 3 cm long), with a curved hollow base and pointed barbs. On the other hand, hollow-based arrowheads in Central European Bell Beaker production generally present squared barbs, differentiating them from this Corded Ware tradition. The trapezoidal base, linked to barb squaring, is also a novelty. There is little doubt that these mutations are linked to the circulation of western models with squared barbs and tang. This acculturation only affects the visible part of the arrowhead - the barbs - without

changing the local way of hafting - a hollow base inserted in the shaft. It not only reflects the adaptation of Central European arrowheads to contemporaneous trends but also the adoption of enhanced archery equipment as a result of the spread of the Bell Beaker culture.

### Technology

- 18 Bell Beaker arrowheads are made from flakes. More than twenty roughouts were detected, enabling us to identify several stages of production: slightly roughed-out blanks with short to covering, sometimes scaled retouch, regularised specimens shaped by invasive to covering subparallel retouch (fig. 7, 1-4), preforms broken during the shaping of barbs (fig. 7, 5-7). The presence of these roughouts in graves suggests a segmentation of the *chaîne opératoire*: arrowheads were not made at once but were probably knapped in accordance with supply possibilities and demand. The presence of arrowheads broken during knapping suggests that some breaks were not too restrictive and that such pieces were kept to be retouched from time to time. Some graves also yielded sets of flakes containing elements that can be used as blanks for arrowheads. The discovery of a heap of blanks in a grave at Barbing (Bavaria) with, among others, a possible antler pressure-flaker and two grooved abraders seems to confirm this hypothesis (Engelhardt 2010). This deposit was probably placed in a perishable container and may have been a kit with all the necessary elements for making flint arrowheads and shafts.

### 7. Arrowhead roughouts at different stages of production and probable evidence of copper pressure flaking



- 1-4- Roughouts with short to invasive retouch;  
 5-6- Roughouts with covering retouch broken by a plunging removal while knapping barbs;  
 7- Roughout with short retouch and bending fracture while knapping barbs;  
 8-9- Arrowheads with serrated edges showing tiny points of pressure (< 1 mm wide), suggesting the use of a copper pressure-flaker;  
 10-11- Roughouts probably knapped by a copper pressure-flaker from ledges of hinged removals.  
 1-4- Stehelčeves III, grave 2, Bohemia (VMS, no. 5862, 5859, 5857, 5861);  
 5- Hulín 2 'Pravčice', grave H58, Moravia (ACO, no. 04/2007-860-15);  
 6- Holešov, grave X, Moravia (MK, no. 276-31/70);  
 7- Radovesice-Bílina II, grave 116/78, Bohemia (RMT, no. 36752);  
 8-9- Hulín 2 'Pravčice', grave H54, Moravia (ACO, no. 04/2007-856-14a & 04/2007-856-14e);  
 10- Stehelčeves III, grave 1, Bohemia (VMS, no. 5831);  
 11- Svobodné Dvory, Bohemia (MVCHK, no. 21).

Photographs C. Nicolas.

- 19 Arrowheads were knapped by pressure flaking, as evidenced by the protruding negative bulbs and the regularity of retouch. Some antler sticks or points, related to arrowheads, may have been used for pressure flaking (Turek 2004, Nicolas 2016). In addition, arrowheads with serrated edges show very narrow pressure points, less than 1 mm, which strongly suggest the use of copper pressure-flakers (fig. 7, 8-9). Retouching thin ledges also point to the use of copper pressure-flakers (fig. 7, 10-11). Bell Beaker graves yielded more or less long copper awls with a squared section but they are not necessarily associated with arrowheads or roughouts (Kuna & Matoušek 1978, Turek 2004).
- 20 Shaping can be short, invasive or covering. The thinnest arrowheads are shaped by short or quite invasive retouch on thin flakes (< 3 mm). Barbs are systematically shaped by acute-angled to semi-abrupt retouch. They are short, and measure from 0.5 to 7.5 mm. Finishing is generally sketchy, consisting of some micro-retouch (< 2 mm) regularising the edges. Nearly a quarter of the arrowheads present more or less regular

serrated edges, obtained by leaving the micro-overhangs on either side of the pressure point.

### Production modes

- 21 Arrowheads are rather elaborate objects in Bell Beaker lithic industries, and have often been interpreted as an indication of lithic specialization. The presence of roughouts or tools (antler or copper pressure flakers; tab. 3) in a limited number of graves with arrowheads may have been interpreted as the kits of craftsmen (Bátora 2002, Turek 2004). The production of Bell Beaker arrowheads is of course meticulous, but it is not out of reach to anybody in a society where flint knapping was a common practice. Indeed, the small size of the Central European Bell Beaker arrowheads, the rarely covering shaping and short barbs do not represent a complex goal for a knapper with at least some experience. Moreover, the present author, rather inexperienced in this field, has successfully tried to reproduce the simplest Bell Beaker arrowheads with short or invasive retouch. Thus, the presence of roughouts or tools in graves does not necessarily indicate a high level of know-how or clearly identifiable craft specialisation. On the contrary, the more specialized the production, the more roughouts and finished products seem to be separated in the burials, as suggested by Early Bronze Age grave goods (Nicolas 2016, 2019). In Bell Beaker graves with arrowheads, a small proportion of the tools (12%) are linked to arrowhead production (roughouts, antler or copper pressure-flakers, grooved abraders), but are rarely associated with each other (tab. 3), suggesting selection in the arrowmaker's kit. This selection probably reflects the fact that this skill was attributed to the deceased, but there is no evidence that he knapped regularly or supplied the other archers.

Tab. 3 – Inventory of graves yielding arrowheads and artefacts related to arrow making

Site	Roughout	Antler pressure-flaker	Copperawl	Grooved abraders	Reference
Barbing II, Bavaria		X		X	Engelhardt 2010
Irlbach 'Am Auwald', grave 1, Bavaria		X			Koch 2005
Künzing 'Bruck' III, grave 9, Bavaria	X		X	X	Schmoltz 1992
Markt, grave 3, Bavaria	X		X		Kociumaka 2002
Szigetszentmiklós 'Felső Űrge-hegyi dűlő', grave 418, Hungary	X				Patay 2013
Szigetszentmiklós 'Felső Űrge-hegyi dűlő', grave 433, Hungary	X				Patay 2013

Szigetszentmiklós 'Felső Űrge-hegyi dűlő', grave 439, Hungary			X		Patay 2013
Szigetszentmiklós 'Felső Űrge-hegyi dűlő', grave 634, Hungary	X				Patay 2013
Szigetszentmiklós 'Űdűlűsor', Hungary			X		Endrűdi <i>et al.</i> 2011
Brandűsek, grave 71, Bohemia	X				Kytilcová 1960
Holubice, Bohemia			X		Šulová <i>et al.</i> 2008
Lodűnice u Berouna, grave 56, Bohemia	X				Benková & Čtverák 1997
Praha 'Kobylis' XV, grave 11, Bohemia		X			Turek 2006b
Radovesice-Bűlina II, grave 116/78, Bohemia	X	X			Turek 2004
Stehelűeves III, grave 1, Bohemia	X		X		Knor 1966
Stehelűeves III, grave 2, Bohemia	X				Knor 1966
Sulejovice, grave 3, Bohemia	X				Hájek 1962
Svobodnű Dvory, Bohemia				X	Moucha 2003
Holešov, grave X, Moravia	X				Ondrűček & Šebela 1985
Hoštice I, grave 915/02, Moravia			X	X	Matűjűcková & Dvořák 2012
Hulűn 'Pravűice' 2, H58, Moravia	X				Peška 2013
Ostopovice I, grave 14/70, Moravia	X				Dvořák <i>et al.</i> 1992a
Rousűnov-Rousűnovec II, grave 18/1985, Moravia				X	Geisler 1990



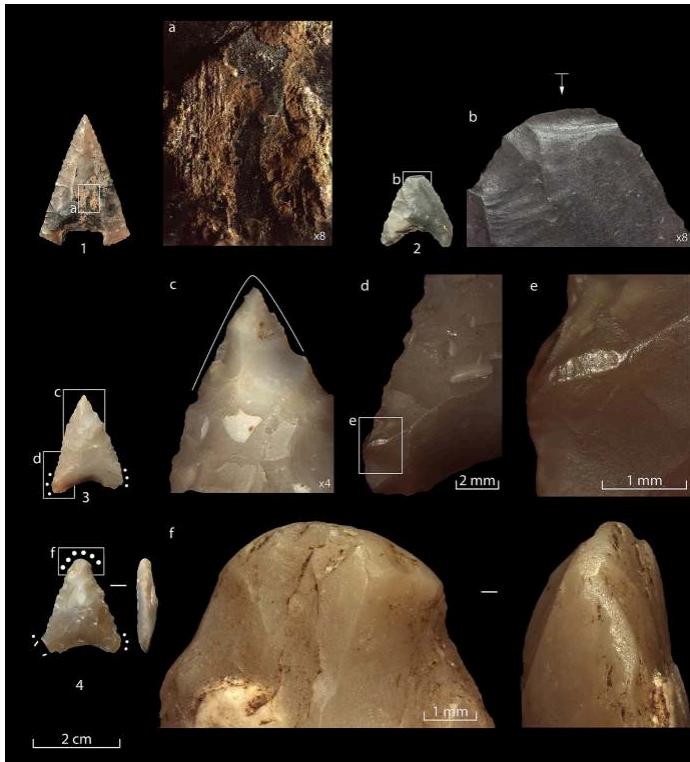
Smolín I, grave 13/51, Moravia			X	X	Novotný 1958
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- 22 The absence of a high level of know-how does not support the existence of real skilled craftsmen for the production of Bell Beaker arrowheads. The shared ability to produce even low-quality arrowheads suggests that each archer was able to maintain his own quiver. This does not exclude the possibility that some individuals acquired greater competence than others, justifying the depositing of arrowmakers' kits; for which we could speak of 'experts', as defined by Jacques Pelegrin (2007). They were able to attain a certain prestige with this skill and, at the same time, to exchange their production, without however obtaining a real counterpart (Nicolas 2016). For example, San hunters in the Kalahari Desert (Southern Africa) offer each other arrows through an exchange system called *hxaro*. They produce their own arrows (nowadays equipped with metal arrowheads), but only a small proportion of them (16%) are recognised as experts. In addition, the arrowmaker obtains a larger share of hunted resources, and is responsible for the distribution of meat (Wiessner 1983). On a similar basis, we have already proposed this archer-knapper model for the northwest of the continent and it seems to function on a European scale (Nicolas 2016, 2019).

### Biographies of arrowheads

- 23 The function of Bell Beaker arrowheads as projectiles is well documented. They show multiple traces of hafting and use. Arrowheads are generally fresh in appearance and do not appear to have undergone significant taphonomic alterations, except in some contexts where they can be covered by concretions. Only a minority (10%) of the 310 studied arrowheads bear residues, which may correspond to adhesive remains. The central part of two arrowheads from grave A at Prosiměřice (Moravia) is covered in black residues with a matt and dry appearance, suggesting an organic adhesive. In addition, these residues bear the woody imprint of the shaft, attesting to their adhesive role (fig. 8, 1-2). At the time of publication, one of them still had a glue fragment with the imprint of the binding thread wound on the shaft, which allowed the excavator to reconstruct the hafting method for this arrowhead (Pernička 1961). The binding glue covers the arrowhead, except a few millimetres along the edges. These examples suggest that the arrowhead was inserted into the split end of the shaft, tightened by a binding thread, and then covered with adhesive, except on the cutting edges.

## 8. Hafting wear on Bell Beaker arrowheads



1- Arrowhead showing the extent of the glue, with imprints of the shaft and binding threads, Prosiměřice, grave A, Moravia (JMZ, no. A30789/19);  
 2- Arrowhead with impact fracture, Svobodné Dvory, Bohemia (MVCHK, no. 17);  
 3- Fixed arrowheads with blunt barbs, Praha 'Kobylis' XV, grave 11, Bohemia (MHMP, no. A518452);  
 4- Arrowhead with a heavily rounded tip, Neratovice I, grave 16, Bohemia (NM, no. 43332); a. Glue remains and woody imprints of the shaft. b. detail of the bending fracture (> 2 mm), diagnostic of an impact. c. detail of arrowhead fixing, highlighted by a fresher retouch. d & e. details of a grained, bright and invasive blunt on ridges of barbs removal. f. detail of an intense, grained and bright blunt rounding the tip of the arrowhead.

Photographs C. Nicolas.

- 24 Frequent traces of blunting were observed on barbs. These blunted zones are rather grainy and are located on the ridges of removals (fig. 8, d-e). They are rarely visible with the naked eye but can be felt with the fingertip. When they are well developed, they can be more invasive and brighter (Nicolas 2016). However, their origin remains problematic (Gassin 1996: 117-118). Are they the result of deliberate abrasion to prevent the edge from cutting through the binding threads or are they the result of wear from transport in the quiver? An answer may be provided by other blunt zones located on the tips of many arrowheads (fig. 8, f). At low magnification, these blunted zones on the tips appear similar to those of barbs. Nevertheless, they can be much more intense until they round off the arrowhead, thus affecting its piercing properties. Studies carried out on arrowheads from the Moravian Early Bronze Age (Nitra culture) revealed similar traces. A high-magnification examination identified abrasion produced by friction with dry skin (Kaňáková *et al.* 2016). Such traces have also been obtained in a rather tenuous way by transporting hafted arrowheads in quivers (Wolski & Kalita 2015). If such an interpretation is correct, the most intense blunted zones observed on the Bell Beaker arrowheads might result from transport over a fairly long period of time (several years?).

- 25 A limited number (4.8%) of these arrowheads show diagnostic impact fractures (Fischer *et al.* 1984, Gassin 1996, Coppe & Rots 2017; fig. 8, 2). A minority of these arrowheads (5.8%) were also repaired after impact, as indicated by abrupt or fresher retouch (fig. 8, 3). In cases where the skeleton is preserved, these shot arrowheads do not appear in the bones or in the soft parts of the body. On the contrary, they are generally found together with all the arrowheads. There are only three known cases of deadly arrows at the scale of the Bell Beaker culture in Europe, out of several thousand graves (Schröter 1997, Nicolas 2017).
- 26 Although Bell Beaker arrowheads appear to be rather easy to make, they do not appear to be ordinary projectiles. The flint they are made of is often acquired outside the local territory and the exotic nature of some materials could enhance the value of these objects. The levels of know-how induced by their various qualities seem to suggest that they were made by more or less skilled knappers, presumably by the archers themselves. The glue remains, impact fractures and blunted zones show that these arrowheads were most often hafted; as underlined by certain positions in graves, suggesting quivers carried on the shoulder. The recurrent deposition of these objects in graves and their use-wears show that the arrows were regularly maintained and they had a high symbolic value.

## 2.2. Bracers

- 27 After arrowheads, bracers are the most common archery items deposited in graves (tab. 4). These are stone plates perforated at the ends and are assumed to have been used as wrist-guards after the first considerations of A.W.H. Ingram (1878).

**Tab. 4 – Inventory of Bell Beaker bracers in Central Europe**

Country	Number of graves	Number of bracers	Number of roughouts	Studied items
Germany	46	46	0	0
Austria	8	9	0	0
Hungary	73	77	0	32 (41.5%)
Czech Republic	147	165	4	114 (67.4%)
<b>Total</b>	<b>274</b>	<b>297</b>	<b>4</b>	<b>146 (48.5%)</b>

- 28 In graves, bracers are most often found on the individual's forearm (60.9%; tab. 5). The bracer is usually worn on the left forearm (fig. 2, 2), which points to a large proportion of right-handed individuals (87.2%). However, this observation applies to the practice of archery, because in shooting, the laterality of the guiding eye is of the utmost importance (Azémar 2003). Movement related to body decay often renders the position of the bracer on the forearm ambiguous (fig. 2, 1). Nevertheless, bracers are generally worn outside the forearm (fig. 2, 2), which is contradictory to their presumed use as wrist-guards. Indeed, for use as wrist-guards, one would expect to find them inside the forearm (Smith 2006, Fokkens *et al.* 2008). In the case of cremations, bracers are mixed

with burnt bones or placed near the ashes. A small proportion of bracers do not appear to have been worn by the deceased but deposited separately with the rest of the offerings (fig. 2, 3).

**Tab. 5 – Positions of the bracers on the body in Bell Beaker graves in Central Europe**

	Number	Outside the forearm	Inside the forearm
<b>Inhumation</b>			
<i>on left forearm</i>	34	11	1
<i>on right forearm</i>	5	1	1
<i>undefined forearm</i>	11		
<i>towards left elbow</i>	3		
<i>towards chest</i>	4		
<b>Cremation</b>			
<i>with burnt bones</i>	8		
<i>close to burnt bones</i>	5		
<b>Offerings</b>	12		
<b>Total</b>	82		

## Typology

- 29 In Central Europe, Bell Beaker bracers show diversity in terms of their cross-section (flat or concavo-convex), the number of holes (two to six), shape (rectangular, trapezoidal, oval), edge morphology (concave, rectilinear, convex), presence of decoration or flanges at the ends. They are quite variable in size, measuring 4 to 16 cm long, 1 to 6 cm wide and up to 1 cm thick. This diversity yields very variable shapes, ranging from the simple, natural-shaped two-holed pebble, to the more complex, trapezoidal and curved bracer to adapt to the shape of the forearm, decorated with flanges and engravings. E. Sangmeister (1964, 1974) defined six types based on the cross-section, number of holes (two or four), delineation of longitudinal edges and presence of flanges at the ends. This typology has the advantage of including most bracers but also creates unclassifiable items (six-holed bracers, two-holed curved bracers, etc.) and will eventually require revision.
- 30 A minority of bracers are decorated with engravings at the ends (10.2%) consisting of cup-marks, parallel or chevron-shaped grooved lines (fig. 9, 10, 12-13). One or more aligned cup-marks are usually located between the perforations or between the holes and the ends. They can be very small and difficult to perceive with the naked eye or as large as the perforations. The grooved lines are almost always grouped together and

parallel. They most often highlight the ends, between the edges and the perforations. At the corners, they may cross other parallel lines engraved at the ends of the longitudinal edges (fig. 9, 12). Sometimes the parallel lines are located between the perforations and can then evoke the threads that passed between them (fig. 9, 10). Furthermore, these ornamentations might be highlighted by white, black or greenish inlay or could be in the form of ochred lines (Nicolas *et al.* 2019).

9. Examples of raw materials used in Czech Republic for making bracers. Above, most commonly used grey, beige and brown stones; below, additional stones with well-defined colours (white, black, purple, green)



- 1- Light grey pelite, Hulín 2 'Pravčice', grave H74, Moravia (ACO, no. 04/2007-876-1);
- 2- Silicified beige aleuropelite, Tišice, grave 77/99, Bohemia (ARUP, no. 77-13);
- 3- Banded calcareous, fine-grained, beige sandstone with muscovite, Hoštice I, grave 862/02, Moravia (MV, no. A84644);
- 4- Beige-red pelite, Hulín 2 'Pravčice', grave H74, Moravia (ACO, no. 04/2007-876-4);
- 5- Fine-grained, grey-brown sandstone, Hulín 1 "U Isidorka", H95, Moravia (ACO, no. 30/2004-1804-8);
- 6- Grey-brown pelite, Hodějice, Moravia (MZMB, no. 66433);
- 7- Calcareous sandstone, Praha 'Ruzyně', Bohemia (NM, no. 46282);
- 8- Calcareous sandstone, Lochenice, grave 13, Bohemia (MVCHK, no. 24/81-57);
- 9- Bedded, fine-grained, black-green pelite, Praha 'Lysolaje' III, grave 10, Bohemia (NM, no. 70208);
- 10- Black pelite, Luleč, Moravia (MV, no. A12706);
- 11- Dark Culmian silty shale with schliers of siltstone, Hoštice I, grave 939/02, Moravia (MV, no. A84876);
- 12- Red silicified psammite of Perm Age? Souš, Bohemia (RMT, no. 2446);
- 13- Red pelite, Předmostí, grave? 2, Moravia (MKP, no. 1601-63-10);
- 14- Grey-green pelite, Němčice nad Hanou, grave 33, Moravia (MZMB, no. 66574). Determinations by the author and according to Přichystal & Všianský 2012 and Turek 2015.

Photographs C. Nicolas.

- 31 Two main traditions can be identified: two-holed, flat and long bracers and four-holed and curved bracers. The former is the dominant type in Western Europe and appears as early as stage 1 in Central Europe (Sangmeister 1974, type G; Heyd 2001). However, in stage 1, bracers are mainly four-holed (Sangmeister 1974, types D & E). The latter type

with a curved section is the main type in stages 2 and 3 and is prevalent in Central Europe and Great Britain (Sangmeister 1974, types A, B & C). Like arrowheads, bracer models seem to stem from the west of the continent but they were subsequently rapidly reinterpreted locally.

### Raw materials

- 32 The rocks used to make bracers are mainly of sedimentary origin, which makes it difficult to determine their origin. These sedimentary rocks are classified according to their granulometry, from sandstone to pelite, which is itself divisible according to Anglo-Saxon terminology (siltstone, mudstone, claystone), along with rarer specimens in slate. Pelites and sandstones are very often bedded and can have a calcareous, micaceous or muscovite component. All this gives an impression of great diversity, suggesting a multiplicity of supplies or quite varied secondary deposits, such as river beds. These rock formations are of Primary (Devonian, Carboniferous, Permian) and Tertiary age. They appear to have been supplied from local deposits rather than of extra-regional origin (Přichystal 1992, 2000, 2013, Přichystal & Všíanský 2012, Turek 2015; A. Přichystal, pers. com.). In all cases, the bearers of the Bell Beaker culture turned to rather soft and easy to shape rocks. Different blanks were used, such as small blocks, slabs and pebbles (fig. 10). Pelites and sandstones mainly range in colour from light-grey to brown, beige, yellow and ochre (fig. 9, 1-6). Some rocks seem to have been sought after for their bright colours (black, red, purple, green; fig. 9, 7-14).

### 10. Examples of bracer blanks



- 1- Sandstone pebble, Praha 'Kobylis' XV, grave 11, Bohemia (MHMP, no. A518450);  
 2- Fine-grained sandstone pebble, getszentmiklós "Felső Úrge-hegyi dűlő", grave 383, Hungary (FM, no. 2009.11.383.3);  
 3- Culmian siltstone pebble, Hoštice IV, grave 841/02, Moravia (MV, no. A34469);  
 4- Small slab of purple shale, Vyčkan, Bohemia (MČB, no. 27633).

Photographs C. Nicolas.

### Technology

- 33 The first stages in shaping bracers are currently unknown. However, some unpolished preforms ready to be holed or in the process of drilling, have been identified in settlements and graves (Turek 2015; fig. 11, 1-2). Quite deep oblique or longitudinal

striations were regularly observed on the faceted edges of bracers. They probably correspond less to coarse abrasion than to sawing (fig. 11, 4). We can thus deduce that the first step could be to saw a blank with an appropriate volume (block, slab). Then the blank would be shaped by abrasion (fig. 11, 3). For the most complex specimens with a highly curved section, this step was probably the longest, using long and convex abrading tools. Finer generally longitudinal abrasion then regularized the faces. Flat bracers can be polished longitudinally, transversely or obliquely. More attention is paid to polishing the outer surface of the bracer, while the inner surface is usually left with a coarser or even rougher degree of abrasion (fig. 10, 4, fig. 11, 3). The holes are generally hourglass-shaped and are sometimes preferentially drilled from the inside. In some cases, perforations are funnel-shaped, forming micro-scars on the opposite side. Frequently, hourglass-shaped perforations are not perfectly opposite each other and one or more aborted holes can be observed (fig. 11, 5). The drilling striations in and around the holes are very regular and circular and suggest the use of a bow drill (fig. 11, 6). Some parts are decorated with cup-marks, drilled in the same way as the holes. Other bracers are decorated with grooved lines (fig. 11, 7-8).

## 11. Bracer roughouts and traces of manufacture



- 1- Non-perforated roughout;
  - 2- Roughout in the process of being drilled;
  - 3- Rear face with coarse longitudinal abrasion;
  - 4- Longitudinal and oblique striations due to sawing on the edges of a bracer;
  - 5- Perforation surrounded by two aborted holes;
  - 6- Circular and regular striations around the hole, suggesting the use of a bow drill;
  - 7-8- Details of regular grooved lines with white inlays.
- 1- Brno 'Holásky' II, grave 35/38, Moravia (MZMB, no. 16409);  
 2- Bylany I, grave 2, Bohemia (NM, no. 60258);  
 3- Štětí nad Labem, Bohemia (RMT, no. 2874);  
 4- Szigetszentmiklós 'Felső Űrge-hegyi dűlő', grave 49, Hungary (FM, no. 2009.11.49.3);  
 5- Radovesice-Bílina III, grave 53/80-I, Bohemia (RMT, no. 44524);  
 6- Třebovle, Bohemia (RMK, no. 9127);  
 7-8- Souš, Bohemia (RMT, no. 2446).

Photographs C. Nicolas.

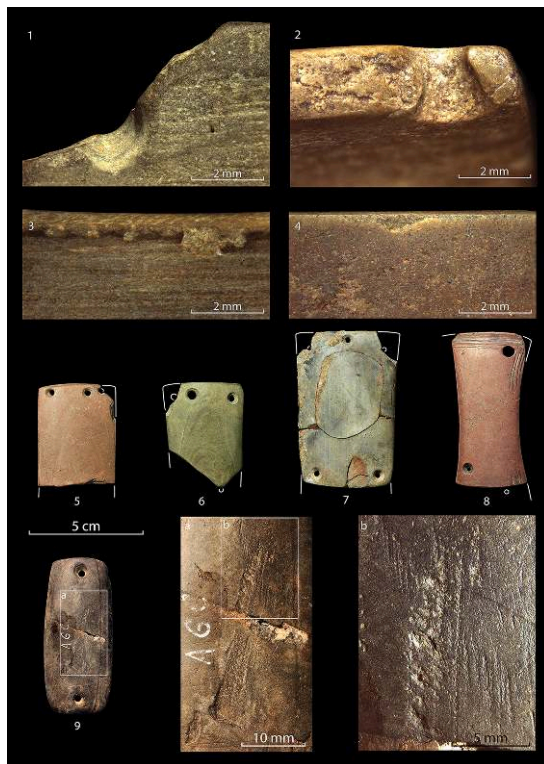
### Production modes

- 34 Most bracers did not require any particular manufacture know-how. Sawing, abrading, polishing can take time but are accessible to any handy individual. The crucial stage is undoubtedly perforation, as shown by the many aborted holes (fig. 11, 5), or bracers broken while drilling. However, such breaks are not considered to be restrictive and many pieces were reworked to be drilled again (fig. 12, 5-8). Experiments reproducing the simplest flat bracers suggest that such items could be made in two to four hours of work (Smith 2006, Van der Vaart 2009). Some simple bracers, such as pebbles perforated at the ends would not take much longer to make (fig. 10, 1-3). Nevertheless, the most complex bracers with a curved section required higher investment to hollow out the inner surface. Like arrowheads, everyone had to be able to produce their own bracer. However, this does not mean that everyone had the same talent and it is likely that differences in know-how were expressed by the quality of manufacture, symmetry



of shapes and perforations. In this respect, the frequent aborted holes highlight the lack of experience of some bracer makers. Nevertheless, trapezoidal bracers with curved sections, flanges at the ends and engravings are more complex to produce. Such items required the control of roughout volumes to optimise working time. Above all, the symmetry of the forms and the quality of the decorations of some specimens (fig. 9, 12) show certain know-how, which can only be acquired through experience. These sophisticated bracers were probably produced by a few experts or even craftsmen.

## 12. Bracers with wear marks indicating a long life cycle



1-4- Blunted bracer ridges;

5-8- Repeatedly broken, shaped and perforated bracers;

9- Bracer with an impact probably due to bowstring release.

1. Broken and heavily blunted hole, Stehelčevy III, grave 1, Bohemia (VMS, no. 57.1-62);

2- Broken and heavily blunted hole, Radovesice-Bílina I, grave 53-80-I, Bohemia (RMT, no. 44524);

3- Blunt edge with fresh chips, Most VI, grave 1, Bohemia (MM, 336/27);

4- Blunt edge with blunt chips, Hodějice, Moravia (MZMB, no. 66433);

5- Bracer end with a new hole, Ondratice I, grave 1/1900, Moravia (MZMB, no. 66967);

6- Bracer end, repeatedly broken, and perforated again twice, Stehelčevy III, grave 1, Bohemia (VMS, no. 57.1-62);

7- Half of a bracer, shaped anew, with two broken corners, perforated again and finally burnt, Bohutice II, grave 1/50, Bohemia (NM, no. 83043);

8- Repeatedly broken, shaped and perforated bracer, Velké Žernoseky, Bohemia (RMT, no. 13287);

9 a & b- Bracer front face with a flake extended by linear and parallel striations (results of the bowstring impact?), Souš, Bohemia (RMT, no. 2448).

Photographs C. Nicolas.

## Bracer ornaments

- 35 The biographies of bracers suggest that these perforated stones were used as ornaments and were not proper archers' wrist-guards (Nicolas, forthcoming). In Central Europe, most of them are profiled to be adjusted on the forearm (c. 10 cm long,

c. 0.5 cm thick, curved section, or even a trapezoidal shape). However, different specimens appear to be incompatible with use as a wrist-guard. As previously argued by Fokkens *et al.* (2008), small bracers (< 5 cm) are not sufficiently long to protect the forearm during bowstring release (fig. 10, 1-3). Equally, flange-ended bracers could be 1 cm thick, increasing the risk of the bowstring catching on the bracer. Nonetheless, experiments recently demonstrated that small removals could occur when the bowstring impacts the wrist-guard (Muñoz Moro 2017). Such use-wear is ambivalent, as similar removals can be caused by the erosion of polished surfaces (Nicolas *et al.* 2019). On the majority of bracers in Central Europe, these removals are found on both the front and rear sides, indicating that they are probably due to desquamation. However, a few bracers show traces that are probably related to their use as wrist-guards (*ibid.*). For one of them, it is a removal related to longitudinal striations, probably created by the friction of a violently detached chip against the bracer (fig. 12, 9). These counter-examples in turn suggest that most bracers were not used as wrist-guards. Furthermore, these perforated plates present varying degrees of bluntness, both in the area under consideration and elsewhere in Europe (Nicolas 2016, Van der Vaart 2009, Woodward & Hunter 2011; fig. 10, 1-4). For the bluntest bracers, they had to be worn for a fairly long time (during the life of individuals, over several generations?). Repeatedly, some bracers are broken, reshaped, holed again to such an extent that at the end of their lifecycles they were not suitable to be used as wrist-guards (fig. 12, 5-8). Furthermore, Fokkens *et al.* (2008) have pointed out that most of the bracers were worn outside the forearm, suggesting that they were more than likely ornamental rather than a proper wrist-guard. If some of them were used as wrist-guards, they could be the exception rather than the rule.

### 2.3. Grooved abraders

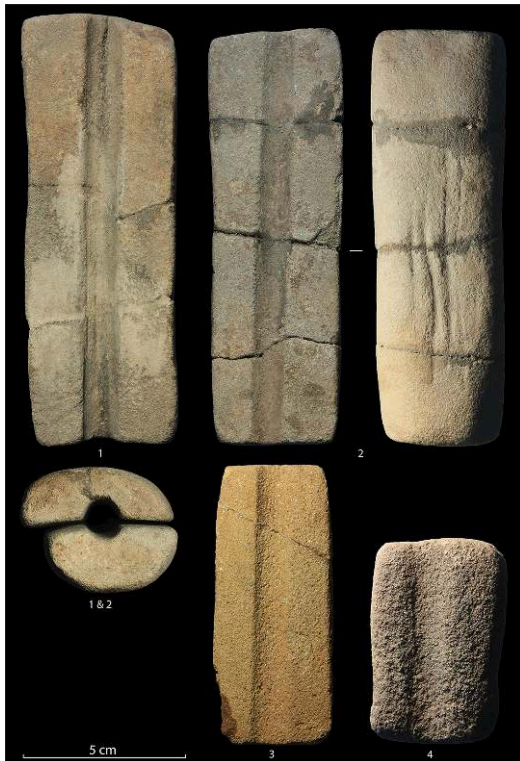
- 36 Grooved abraders appeared during the Late Paleolithic and some of them were interpreted as arrow shaft smoothers (Bolos 2012). Ethnographic surveys of Plains Indians are abundant for this type of tool. These grooved abraders were often used in pairs to produce a cylindrical, polished and uniform shaft with a back and forth motion (Flennikenn & Ozburn 1988). For the Early Neolithic, the fully-shaped specimens bearing a single wide groove with a U-shaped, axial and longitudinal cross-section seem to correspond to arrow shaft smoothers (Hamon 2016). Bell Beaker grooved abraders fall into this category (Bailly 2002). In Central Europe, they are found mainly in pairs, and sometimes as one or three items (tab. 6; fig. 13). They are frequently associated with archery equipment – arrowheads, bracers (11 cases out of 15) - which seems to confirm their link with making arrows. In graves, they are placed with ceramics (fig. 2, 1-2) or in clusters suggesting that they were deposited in a container in perishable material (Schmoltz 1992, Engelhardt 2010).

Tab. 6 – Inventory of grooved abraders in Central Europe

Country	Number of graves	Number of grooved abraders	Studied items
Germany	4	7	0
Austria	0	0	0

Hungary	4	5	0
Czech Republic	7	12	4
Total	15	24	4 (16.7%)

### 13. Examples of sandstone grooved abraders



1-2- Svobodné Dvory, Bohemia (MVCHK);  
 3- Hoštice I, grave 915/02, Moravia (MV, no. A84801);  
 4- Stehelčevy I, Bohemia (NM, no. 60233).

Photographs C. Nicolas.

- 37 In Central Europe, Bell Beaker grooved abraders are between 5 and 13 cm long and are oval or rectangular in shape and D-shaped in cross-section (fig. 13). In the case of pairs, it is not uncommon to see a more rounded, thick and narrower abradar and another flatter and wider specimen; the first adapting to the hollow of the hand, while the second is held firmly by the fingers (fig. 13, 1-2). These abraders are made of coarse, poorly cemented sandstones selected for their low grain cohesion. These constant characteristics give them a strong abrasive property, which is naturally maintained by the progressive detachment of quartz grains (Hamon 2016). As a result, it is difficult to determine the intensity of use-wear. It is likely that the active surface was previously slightly pitted to initiate the groove. The abradar grooves are 2 to 6 mm deep; the specimens found in pairs were used on arrow shafts with a minimum diameter of 6 to 12 mm. These tools may be multi-functional, as illustrated by an item from the grave of Svobodné Dvory (Bohemia): on the back, fine striations are visible at the base of a group of four irregular and shallow grooves (< 2 mm; fig. 13, 2).

## 2.4. Bow-shaped pendants

38 Bow-shaped pendants were first identified in the 1930s (Schirmeisen 1936, Willvonseder 1936), and were interpreted as bow models by Stuart Piggott (1971). They are widely associated with the Bell Beaker culture in Central Europe (tab. 7; fig. 14). However, curve-shaped ornaments also occur in the Corded Ware culture with boar tusks perforated at the ends and are perpetuated during the Early Bronze Age in the form of bronze sheets (Glason 1969, Piggott 1971). Czech and Austrian Bell Beaker specimens have been the subject of two recent studies focusing on typology and raw materials (Růžičková 2009, Kern 2016). They are made of hard animal materials, with the exception of an amber specimen found in grave 1 at Rožd'alovice I (Bohemia; Hájek 1968). The presence of enamel, the *cavum* and the cracking morphology indicate the use of *suidae* canines. The length of the finished products, from 5 to 14.5 cm, indicates the use of wild boar lower canines (Růžičková 2009; Y. Maigrot, pers. com.).

Tab. 7 – Inventory of bow-shaped pendants in Central Europe

Country	Number of graves	Number of bow-shaped pendants	Studied items
Germany	46	91	0
Austria	7	13	0
Hungary	25	35	23 (65.7%)
Czech Republic	6	7	4
<b>Total</b>	<b>84</b>	<b>146</b>	<b>27 (18.5%)</b>

## 14. Examples of bow-shaped pendants made of wild boar tusks



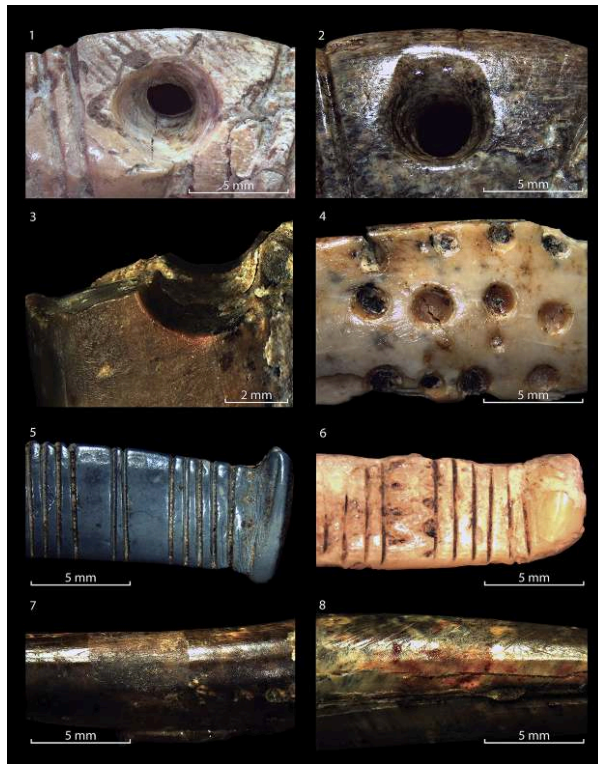
- 1- Radovesice-Bílina III, grave 53/80-II, Bohemia (RMT, no. 44538);
- 2- Hulín 1 'U Isidorka', grave H95, Moravia (ACO, no. 30/2004-1804-23);
- 3- Hulín 1 'U Isidorka', grave H95, Moravia (ACO, no. 30/2004-1804-4);
- 4- Jezeřany-Maršovice, grave 67, Moravia (MKSMK);
- 5- Ledce II, grave 1/52, Moravia (MB, no. 5/52-7);
- 6- Lochenice I, grave 14, Bohemia (MVCHK);
- 7- Hoštice I, grave 864/02, Moravia (MV, no. A84689);
- 8- Praha 'Lysolajé' III, grave 18, Bohemia (NM, no. 586499/41-55);
- 9- Praha 'Kobylis' XII, Bohemia (MHMP, no. 146009);
- 10- Hoštice I, grave 821/02, Moravia (MV, no. A84533).

Photographs C. Nicolas.

- 39 The pendant can present a flat, triangular or even circular section when fully shaped, depending on which part of the canine is used (Růžičková 2009). After cutting the tusk, the preform is regularised by abrasion (fig. 15, 1). The curved shape of these pendants can be ended in a simple way (rounded, pointed or squared), or button-like ended or by a point evoking the nock end of a bow (fig. 14). The middle part is pierced by a transverse or vertical hourglass-shaped perforation, or both successively, attesting to different attachment modes. Most of these pendants are decorated with engravings, which are generally bifacial. The most common pattern is made up of parallel and grouped incised lines. These linear ornaments can be enhanced with lines of triangles or cup-marks at their ends or connected by a single or multiple cross pattern. Two specimens are exclusively decorated with cup-marks (fig. 14, 4-5). This pattern appears to be the oldest as these two pendants are the only ones attributed to stage 1. Like some bracers, these engravings might be inlaid with dark matter to enhance the decorations (Růžičková 2009; fig. 15, 4 & 6). A last type of decoration has been highlighted on pendants with a circular cross-section. These are regularly-spaced matt strips, which have been preserved from the shiny use-wear (Růžičková 2009; fig. 15, 7). In this case, the decoration had to correspond to organic material elements applied to the pendant

(Růžičková & Králík 2007). One of these pendants bears ochre residues on both matt and bright strips (fig. 15, 8).

#### 15. Details of bow-shaped pendants



- 1- Detail of a slightly used perforation, surrounded by abrasion striations, grooved ornamentation, Praha 'Lysolaje' III, grave 18, Bohemia (NM, no. 586499/41-55);  
 2- Wear-deformed hole, Hoštice I, grave 864/02, Moravia (MV, no. A84689);  
 3- Blunt fracture at a hole, Hulín 1 'U Isidorka', grave H95, Moravia (ACO, no. 30/2004-1804-3);  
 4- Detail of cup-mark ornamentation with black inlay, Jezeřany-Maršovice, grave 67, Moravia (MKSMK);  
 5- Blunt button-like end, Ločenice I, grave 14, Bohemia (MVCHK);  
 6- Ornamentation of parallel grooved lines and triangles with black inlay, Radovesice-Bílina III, grave 53/80-II, Bohemia (RMT, no. 44538);  
 7- Shiny and matt strips, suggesting an ornament applied in organic matter, Hulín 1 'U Isidorka', grave H95, Moravia (ACO, no. 30/2004-1804-23);  
 8- Ochre remains on the surface of a bow-shaped pendant, Hulín 1 'U Isidorka', grave H95, Moravia (ACO, no. 30/2004-1804-22).

Photographs C. Nicolas.

- 40 These pendants were usually found on the chest (fig. 2, 4), more rarely around the pelvis (fig. 2, 1). At times, several of these ornaments were worn together, up to eight on the chest in a rather tight position (Engelhardt 2005, Koch 2005; fig. 2, 4). These positions and the large dimensions of some items suggest that these ornaments were worn more as pendants than buttons (Kern 2016). These pendants in hard animal materials are often altered by prolonged burial in the ground and broken at the perforation, the most fragile part. Thus, few pendants show their original surface and degree of wear. When specimens are well preserved, their surface is generally shiny, due to use-wear. The raw dentin is clearly visible on specimens from grave H95 at Hulín 1 'U Isidorka' (fig. 15, 7). Under low magnification, the edges are more or less blunt (fig. 15, 5-6). The perforations show poorly developed blunt zones indicating that these ornaments were suspended. Only one item shows intense wear: the extended

suspension widened the contour of the perforation (fig. 15, 2) and one broken end is largely smoothed (fig. 14, 7). In one case, the hole is broken and blunt, indicating that this pendant fragment was kept as it was (fig. 15, 3).

- 41 These pendants are all arc-shaped, except for one double-curved example (fig. 14, 5). In the hypothesis of a bow model, these pendants would correspond to simple bows, which were used from the Mesolithic to the Bronze Age (Junkmanns 2013). No Bell Beaker bows have been recovered, due to the absence of known lake dwellings for this culture, while most Neolithic bows were found in such contexts (Junkmanns 2013, Clark 1963). In addition, simple bows are represented on some Bell Beaker anthropomorphic *stelae* in the necropolises of Le Petit-Chasseur (Sion, Switzerland; Corboud 2009) and Saint-Martin-de-Corléans (Valle d'Aosta, Italy; De Marinis 1995). Although the pendants are decorated with ceramic-type patterns (Kern 2016), the arrangement of the incised parallel lines may evoke bow ligatures. In this case, only one Neolithic bow, from Meare Heath (England), dating from the fourth millennium BCE, offers a convincing parallel. This was reinforced by webbing and binding, which was only preserved by impression in the limb, and maintained by leather bands, which recall the decorations on some pendants (Clark 1963, Bosch 2008). The matt strips of the pendants in grave H95 at Hulín 1 'U Isidorka' may correspond to the application of such leather bands (fig. 14, 2, fig. 15, 7). According to S. Prior (2013) who made a replica of the Meare Heath bow, webbing and binding provide better absorption for bowstring release and would prevent breakage, as well as making the bow quieter.
- 42 S. Piggott (1971) argued for the introduction of the Bell Beaker composite bow on the basis of an engraving. Indeed, one of the anthropomorphic *stelae* from the Petit-Chasseur portrays a bow with a slight double curvature. However, the wavy profile does not necessarily correspond to the representation of a composite bow and can be obtained by thermal warping (Clark 1963: 52). Above all, the hypothesis of a composite bow seems unlikely in view of the archaeological remains: in Europe, bows are simple from the Neolithic to the Bronze Age (Junkmanns 2013). It would then be hard to imagine that such technological innovation would not have had any future among the successors of the Bell Beaker culture.
- 43 The fabrication of bow-shaped pendants from the most prominent part (the tusk) of hunted animals (wild boar) conveys strong symbolic meaning on these objects. The use of wild boar tusks as blanks is far from insignificant since it refers to the field of hunting and wildness. In some respects, these pendants could be interpreted as trophies, embellished by shaping and mounted as pendants to be worn on the chest (fig. 2, 4). According to this hypothesis, the size and number of the pendants would highlight the ability and capacity to hunt proportionally large and old wild boars. In addition, it is not uncommon for non-modified wild boar tusks to be placed in graves as well: are they tools, trophies or blanks for bow-shaped pendants?

## 2.5. Daggers

- 44 Copper or flint daggers appeared during the fourth millennium BCE (Heyd & Walker 2014). Although they are not a specific Bell Beaker feature, they constitute a fundamental element of this culture (tab. 8; fig. 16). They are mostly made of metal but also of flint (10 items; 5.7%). Elemental analyses show that daggers are made of various types of copper from different origins, more rarely of bronze (Merkl 2011). Stone

daggers are made from Bavarian tabular flint in Southern Germany, flint from glacial sediments or chert in the Czech Republic (Kopacz *et al.* 2009, Přichystal & Všíanský 2012).

**Tab. 8 – Inventory of daggers in Central Europe**

Country	Number of graves	Number of daggers	Studied items
Germany	28	29	0
Austria	6	6	0
Hungary	28	29	12 (41.4%)
Czech Republic	81	85	50 (58.8%)
<b>Total</b>	<b>143</b>	<b>149</b>	<b>62 (41.6%)</b>



## 16. Different types of Bell Beaker daggers



1-2, 4 & 8- Copper-alloy dagger with hammered butt;  
 3- Copper-alloy dagger with serrated butt; 5- Chert dagger;  
 6,7- Riveted copper-alloy dagger.  
 1 & 3- Szigetszentmiklós 'Felső Úrge-hegyi dűlő', grave 76-77, Hungary (FM, no. 2009.11.76.5 & 2009.11.77.15);  
 2- Předmostí, grave 1, Moravia (MKP, no. 1601-63-15);  
 4- Praha 'Prosek' 1, grave I, Bohemia (NM, no. 27987);  
 5- Hoštice I, grave 910/02, Moravia (MV, no. A84789);  
 6- Šlapanice II, grave 21/35 (MZMB, no. 169/35-58);  
 7- Letonice, grave 1, Moravia (MZMB, no. 66308);  
 8- Stehelčevy III, grave 1 (VMS, no. 5825).

Photographs C. Nicolas.

- 45 In graves, daggers are most often found on the chest or pelvis (fig. 2, 2), suggesting that they were worn on a belt, perhaps attached to a purse, as shown by one Bell Beaker *stela* from Sion (Corboud 2009), or a baldric, as suggested by the Late Neolithic anthropomorphic *stelae* from the Rouergue area in Southern France (Maillé 2011). They are also found at arm level, and in two cases (Ivanovice na Hané, grave 812/02 & Těšetice-Kyjovice, grave 27 in Moravia), they are superimposed with a bracer (Matějčková & Dvořák 2012, Kazdová *et al.* 2011). The daggers can also be placed as offerings with pottery.
- 46 A unique discovery of a sandstone mould from Luděřov grave (Moravia) shows that at least some of the copper alloy daggers were cast in open moulds (Hájek 1966). The blades are generally flat but can be reinforced by a slight central ridge. They are triangular, ogival or with a rounded tip. Several types of daggers can be differentiated according to hafting. Copper daggers usually have a flanged butt made by hammering (fig. 16, 1-2, 4, 8). More exceptionally, the butt can be serrated following a tradition mainly known in the Iberian Peninsula (Labaune 2016; fig. 16, 3). These butt daggers can be subdivided into several subtypes according to the morphology of the butt and

blade (Kuna & Matoušek 1978). Six daggers are riveted, with two, three or four holes drilled into the blades (fig. 16, 6-7). The handles of butt daggers generally outline a curved guard, while riveted daggers have a  $\Omega$ -shaped guard. Some rare traces show that the handles were made of wood (Dvořák *et al.* 1992b) and that the daggers were inserted into leather scabbards (fig. 17, 1).

#### 17. Copper-alloy daggers at different stages of use and use-wear



- 1- Praha 'Lysolaje' III, grave 9, Bohemia (NM, no. 70204);
- 2- Praha 'Kobylis' XI, Bohemia (MHMP, no. A236.102);
- 3- Slavkov u Brna III, grave 8/04, Moravia (MZMB, no. 66902);
- 4- Tišice, grave 77/99, Bohemia (ARUP, no. 77/2);
- 5- Brno 'Líšeň' II, grave 8 (MMB, no. 145/01-8/1);
- 6- Details of scabbard hairs, included in blade corrosion, Hulín 1 "U Isidorka", grave H95, Moravia (ACO, no. 30/2004-1804-5);
- 7- Chipped and cut cutting edge, Praha 'Lysolaje' III, grave 3, Bohemia (NM, no. 40733);
- 8- Chipped and blunted cutting edge, Praha "Kobylis" XI, Bohemia (MHMP, no. A236.102);
- 9- Chipped and blunted cutting edge, Brno 'Líšeň' II, grave 8 (MMB, no. 145/01-8/1).

Photographs C. Nicolas.

- 47 Flint daggers are made from marginally retouched tabular flint or large flakes. They generally also have a butt, which is sometimes notched, or a straight base (fig. 16, 5). Two original examples from Marefy cemetery (Moravia) are made up of six or seven bifacial retouched inserts which formed composite daggers (Šebela & Škrdla 2003).
- 48 From a chronological point of view, daggers with a short and wide butt appear to be the oldest, whatever their length (Heyd 2001). Riveted copper alloy daggers and flint daggers appear to develop later in stages 2 and 3. The marginal development of flint dagger production points to competition between stone and metal, attested elsewhere in Europe during the fourth and third millennia BCE (Vaquer *et al.* 2006, Steiniger 2015).

49 Dagger blades vary in length from 1.5 to 13.2 cm. It is likely that this disparity is due to use-wear and successive sharpening (fig. 17). When daggers are well preserved and have not been sharpened, blunt edges, chipping or notches can be observed, demonstrating the use of these weapons (fig. 17, 2-4). Three stages of wear can be defined. Most daggers look new (fig. 16, 1-4, 6 & 8) or worn, slightly modified by sharpening (fig. 17, 1-3). Almost a quarter of the blades is very worn, small in size and appears to have been significantly altered by re-sharpening (fig. 16, 7, fig. 17, 4-5). Use-wear and re-sharpening confirm that these weapons were well used, in spite of the fact that copper is sometimes considered to be too soft to be used effectively.

## 2.6. Synthesis

50 The techno-functional analysis of warrior object-signs demonstrates the complex biographies of these weapons, ornaments and tools. Arrowheads and daggers clearly show signs of use and maintenance. Nevertheless, some flint arrowheads appear to be little used and bear the traces of extended transport. These specimens blunted to various degrees must have been kept for their symbolic value. Similarly, most daggers are functional but do not show any high sharpening. A few extremely refined blades could have been recycled, but they were probably kept for the symbol they represented. Bracers show similar patterns: they were regularly repaired, and efforts were made to preserve fragments diverted from their original function, which remains uncertain. In addition, some bracers may have been sacrificed in foundation deposits in possible ceremonial buildings, such as Brodek u Prostějova in Moravia (Fojtík 2015), or at Hostivice in Bohemia (Daněček *et al.* 2014), highlighting the strong idealist values attached to this object (Nicolas *et al.* 2019). Bow-shaped pendants exalt the values of hunting and shooting skills in every respect by shaping bow models in wild boar tusks. Their biography is less obvious but it shows again that fragments could be kept rather than discarded. For all these objects, a recurrent feature is the deposition in the graves of roughouts and tools to make them: wild boar tusks that can be used as blanks for bow-shaped pendants, bracer preforms, roughouts, pressure-flakers and grooved abraders to make an arrow, sandstone mould – as well as metalworking tools (Peška 2016) – symbolizing the casting and shaping of metal objects. Thus, the whole biography of these object-signs, from manufacture to fragmentation, is represented in the graves.

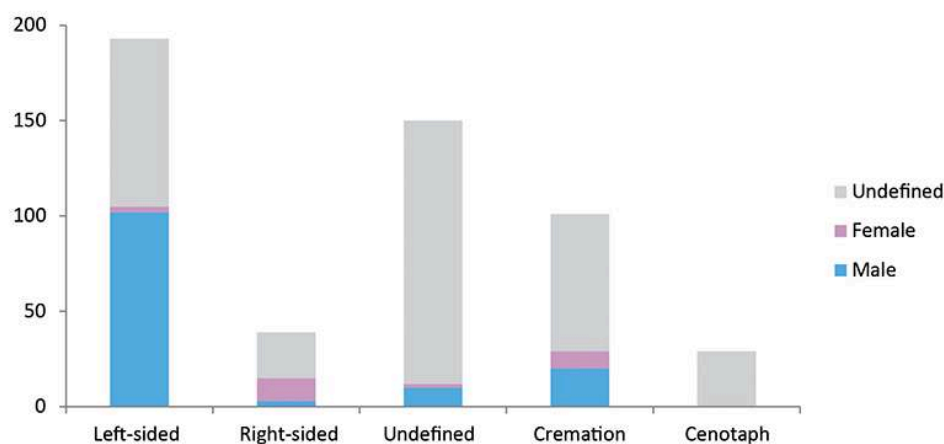
## 3. Warrior biographies

51 The techno-functional analysis of the archery equipment showed that it was deposited in the form of new or used items. Above all, use-wear analysis underlines the symbolic or functional values of weapons and ornaments. But what social values do these object-signs carry? To answer this question, we compared the biographies of the objects with those of the buried individuals, based on gender, age and wealth.

52 Apart from a few old examples, anthropological studies of skeletons mainly developed from the 1980s onwards. Two biases limit the determination of biological sex: immature individuals are indistinguishable and the practice of cremation damages bones, particularly the pelvis, which is the most reliable bone (Ferembach *et al.* 1979). Occasionally, the sex of immature individuals has been determined through DNA

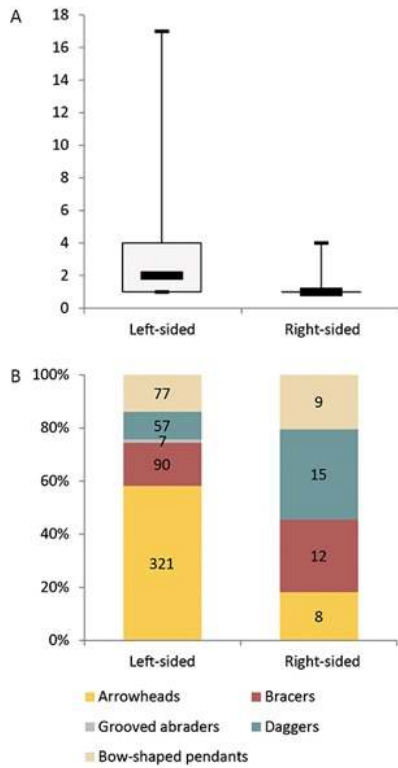
analyses (Vaňharová & Drozdová 2008). As a result, only 161 of the 480 graves are sexually determined. Nevertheless, gender, or cultural sex, makes it possible to fill these gaps (Trémeaud 2015). Indeed, in Central European Bell Beaker graves, the opposite positions of the deceased – left-sided or right-sided – express gender differences (Turek & Černý 2001). This rule is also confirmed for graves yielding archery equipment. Except for a few cases of gender transgressions, differentiation between males and females is confirmed by biological sex determinations (fig. 18). In this way, gender can be analysed on 232 graves without biological sex determination, including children's graves. In terms of age, 195 determinations were made, but most of these (110) only distinguish between adult and immature individuals. Here again, the alteration of bones by cremation partly accounts for this imprecision.

#### 18. Gendered body positions confirmed by sex determinations



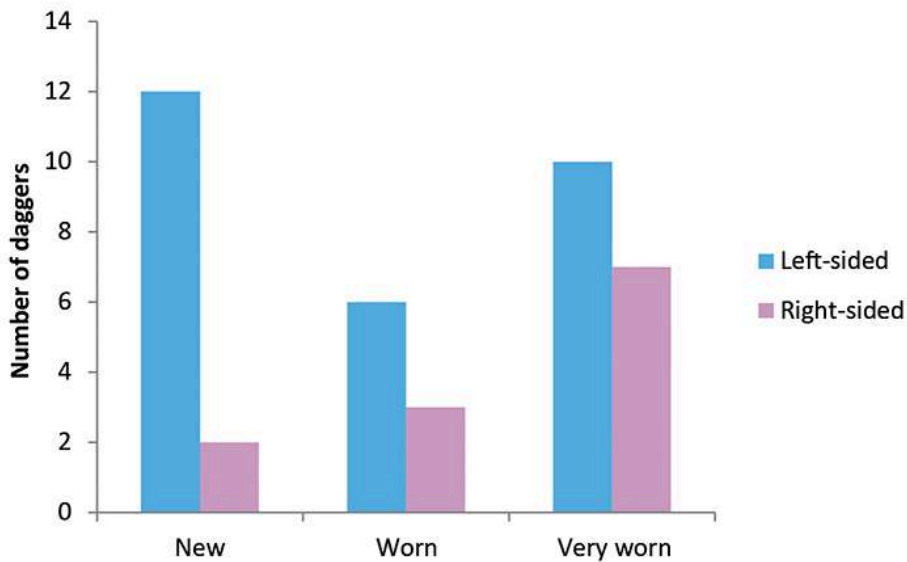
- 53 Unsurprisingly, graves with archery equipment are overwhelmingly male (fig. 18). This observation was already made for Central Europe (Turek & Černý 2001) and also applies to Western Europe (Salanova 2007, Woodward & Hunter 2015, Nicolas 2016). However, right-sided burials, which are female gendered, also occur. They represent 39 individuals out of 232 (16.8%), including 12 female individuals (5.2%). Women's access to archery equipment is not prohibited but remains marginal, probably due to the ideology of blood and the taboos related to blood flow, as theorised by A. Testart (1986). Apart from rare grooved abraders, all the archery objects were placed in female graves, but generally in small quantities. Thus, these female graves - but also three left-sided women buried like the male gender - usually only yield one archery item, or four at most. This distribution contrasts highly with male burials, which generally contain two to four archery objects and up to 17 for the wealthiest (fig. 19, A). Women's access to archery equipment is therefore severely restricted in terms of numbers of individuals and objects. In addition, the composition of archery sets differs according to gender. Right-sided burials (female) yield more frequent daggers and fewer arrowheads than male burials (fig. 19, B). If we look more closely at daggers, which are the most numerous items in these female graves, they appear to be more frequently worn than in male burials (fig. 20). These observations raise questions about the status of these armed women. Did they have warrior status (Turek 2016)? Or are we dealing with 'women of' or 'daughters of', whose kinship was emphasized by the offering of object-signs (Trémeaud 2015)?

19. Distribution of archery-related items according to gender



A- Box diagram of number of objects by grave;  
 B- Bar graph of the different archery-related items.

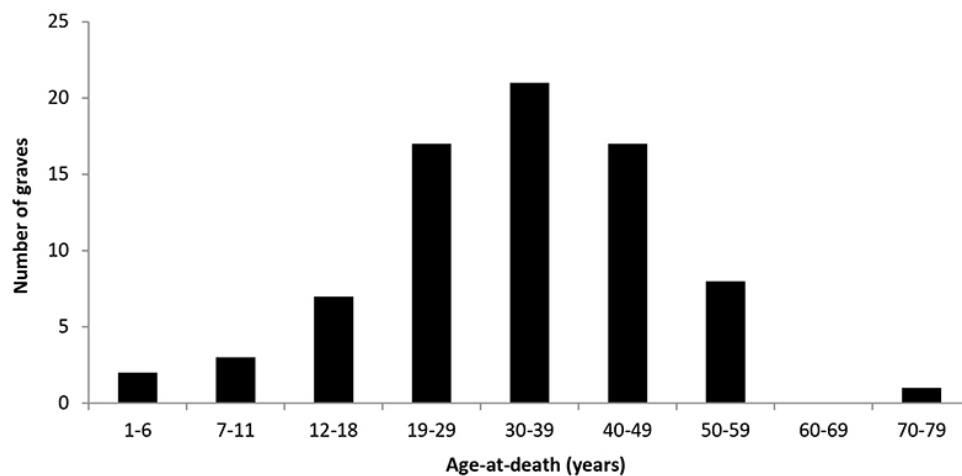
20. State of dagger wears according to gender



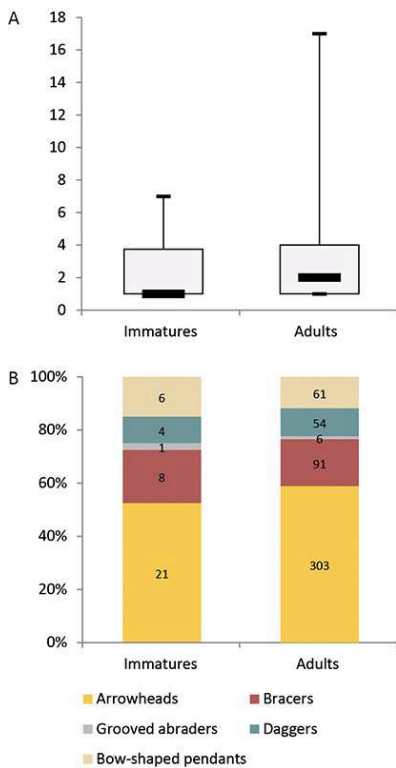
54 The graves of children and adults appear to be equally equipped, with no difference in the composition of assemblages (fig. 21-22). However, it should be noted that the most furnished graves are those of adults (fig. 22, A). Only a small minority of children's graves contained archery equipment. According to the two main anthropologically studied cemeteries (Hoštice I in Moravia & Szigetszentmiklós 'Felső Úrge-hegyi dűlő' in

Hungary), only 2 to 3% of children's graves contain archery objects but this rate is 11 to 21% for adults, mainly men (Köhler 2011, Matějčková & Dvořák 2012). Out of three immature graves, two of the bracers correspond to easy to make and small-sized holed pebbles (fig. 10, 2-3). These rudimentary objects seem to have been made specifically for children. However, this practice is not exclusive, as a third holed pebble was discovered in an adult burial (fig. 10, 1). It can be hypothesised that bracers, usually found as single items, are objects generally received or made in adulthood, marking inherited or acquired social status and accompanying the individual until his death. This hypothesis would explain why some broken and repaired bracers were kept in fragmented form.

#### 21. Bar graph of age-at-death of armed individuals



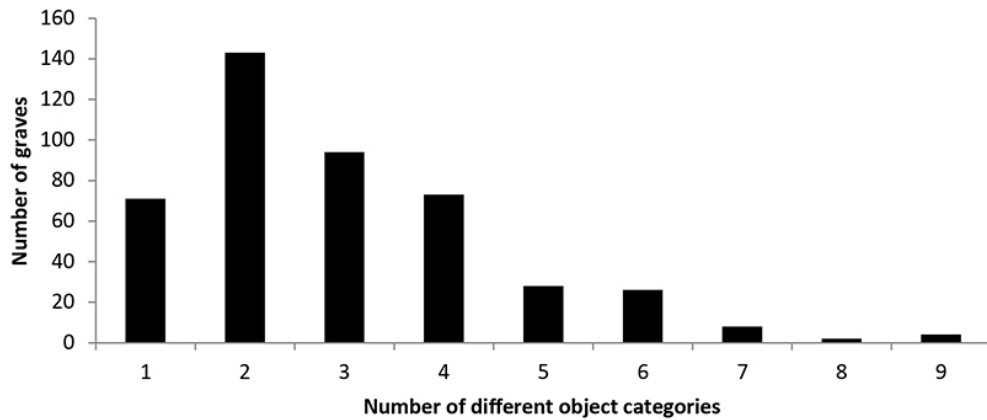
## 22. Distribution of archery-related items according to age



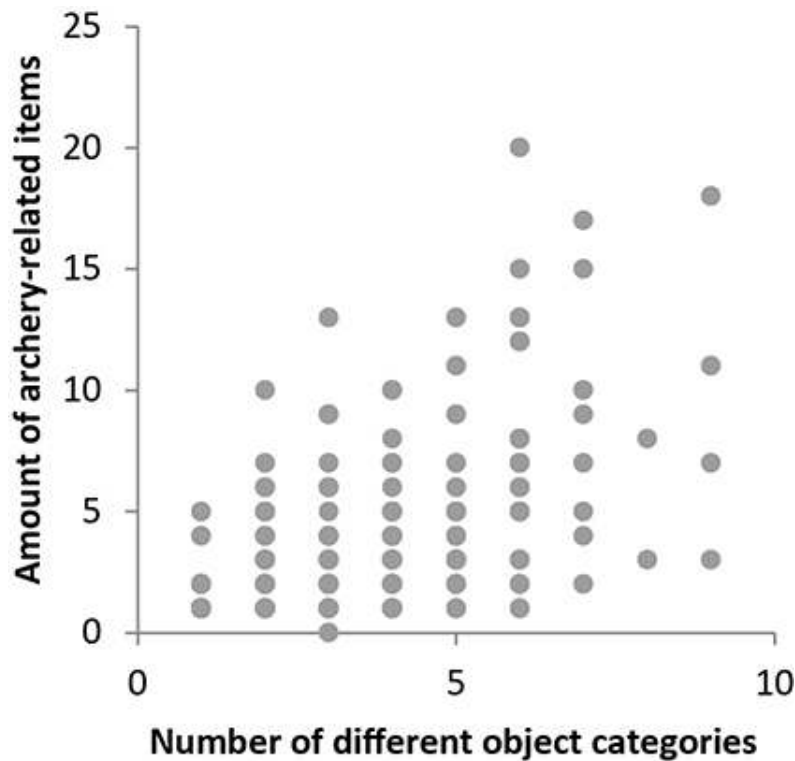
A- Box diagram of number of objects by grave;  
B- Bar graph of the different archery-related items.

- 55 Finally, the display of wealth in graves is a determining criterion in the composition of archery sets. Wealth was not assessed in terms of the quantity of grave goods but in terms of the ability to bring together different categories of objects, taking into account their nature and material (Manolakakis 2005). On one hand, whether a burial yields one or ten pots, only one category will be counted. On the other hand, if a grave contains gold, silver or amber ornaments, one category will be counted for each raw material. In this way, burials yield up to nine different categories of objects (fig. 23). The more diversified the grave goods, the more archery objects there are (fig. 24). This is probably the main sign to look for in archery equipment. It expresses the personal wealth of the deceased or at least the prestige he was granted through offerings. This wealth factor would explain why infants (0-5 years old) can be accompanied by substantial goods and arrowheads that they probably owe to heredity or promising skills rather than to a real ability to practice archery (fig. 2, 3).

23. Number of object categories placed in warrior graves



24. Distribution of archery-related items according to the hoarding of different object categories

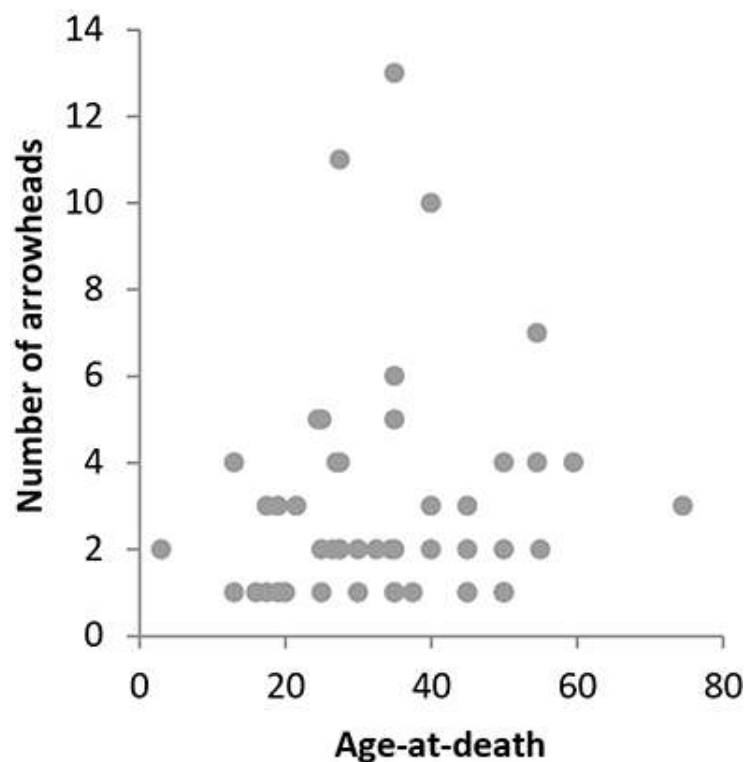


56 This pattern makes it possible to define a society that is far from egalitarian but not very hierarchical. The greatest inequality is expressed between men and women. In burials, the arrows sets are eminently symbolic, and most of the time, only one or two specimens were deposited in graves. Age is a decisive criterion since most of the burials with arrows are those of adults. In addition, the largest quivers are found with individuals who died between the age of 20 and 50 years old (fig. 25), an age group in which the cultural marking of arrowheads and social competition is highest according to ethnographic studies among the Dani of New Guinea (Pétrequin & Pétrequin 1990). Nevertheless, wealth is the most important factor in the deposition of grave goods. It expresses the deceased's ability to hoard and renew goods. This prestige may be hereditary, as evidenced by well-equipped burials of children, but their small number suggests that this social prestige was also acquired. Although some graves are wealthier



than others, there are no clear cuts between 'poor' and 'rich' burials (fig. 23). As a result, the Bell Beaker society in Central Europe seems to be subject to strong social competition, through the accumulation of socially valued goods. Although a few graves of young equipped children suggest an inherited warrior status, this seems to have been acquired most of the time during adolescence or adult life. Thus, in this Bell Beaker society, social status does not seem to have been immutable. Access to the Bell Beaker 'warrior institution' (Vandkilde 2006) seems to have been regulated through sex and age (mainly male adults), personal qualities or rank (less than half of male adults are buried with archer's equipment), that could be hereditary. The weak social layout of cemeteries (fig. 3) and the absence of grave goods exclusively intended for the elite seem to reflect the low hierarchy of this society. Similarly, this lack of supra-local authority is reflected in settlement patterns by networks of scattered farms and the non-existence of central places (Heyd 2007).

#### 25. Number of arrowheads in quiver according to the age of individuals



## Discussion

- 57 During the Bell Beaker period, evidence of war activities is very rare and can be summed up by a few cases of arrows stuck into skeletons. This violence is always intra-cultural since both these deadly arrows and grave contents are linked to the Bell Beaker culture (Nicolas 2016). Based on ethnographic data, conflicts were probably only episodic during the Bell Beaker period; they can be roughly classified as formal battles, rapines and large-scale raids or massacres (Keeley 2009: 135). In Central and Northern Europe, the Bell Beaker custom of individual burial could hardly correspond to endemic collective violence. Out of several thousand individual Bell Beaker burials, no mass graves with evidence of conquests by force of weapons are known for this period,

although they seem to have occurred elsewhere during the Neolithic (Guilaine & Zammit 2001) and the Bronze Age (Louwe-Kooijmanns 1993, Fyllingen 2006). In Central Europe, the Bell Beaker culture did not replace the Corded Ware culture - another large-scale network - but coexisted with it for several centuries. This cohabitation resulted in a division of territories but also in mixed cemeteries (Heyd 2007, Turek 2013). This coexistence does not seem to have been particularly conflictual since no fortified sites are known and Bell Beaker settlements are systematically open (see Gibson 2019). In this respect, only Southern Iberia and Mediterranean France are exceptions: the Bell Beaker culture fits into pre-existing fortified or naturally defended sites (*ibid.*). To sum up, the second half of the third millennium BC is not particularly warlike and there seems to be no evidence of any conquest of the European continent. On the contrary, the Bell Beaker culture is integrated into the pre-existing cultural fabric. If people with archery equipment could be named warriors, it is not because they regularly went to war but rather a question of status through which social prestige was expressed.

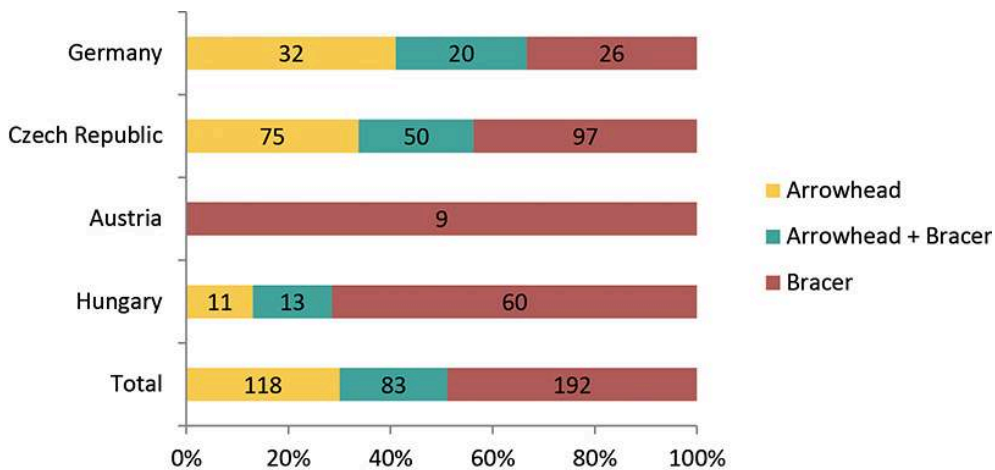
- 58 If we consider hunting, the ratio of wild species appears to be marginal in the Bell Beaker economy (< 5%) and particularly in funerary offerings of pieces of meat. Nevertheless, this singular activity should not be underestimated, given the hunted game (e.g., Bell Beaker sites in Czech Republic have yielded remains of aurochs, deer, roe deer, wild boar, brown bear, hare and beaver; Kysely 2012). The existence of hunting trophies demonstrates the social value associated with this activity. In an agropastoral society, such as the Bell Beaker one, the predation of small or large mammals may have represented both an occasional resource (flesh, hard materials, fur) and a source of social prestige gained by hunting skills or legitimized by its practice. Ethnographic or medieval data point to both possibilities (Godelier 1982, Beck *et al.* 2006). In many ways, hunting left more evidence than war. In addition to game remains, the shaping of bow-shaped pendants made of wild boar tusks attests to the symbolic link between the bow and hunting. The dagger may also be part of the hunter's equipment and may be used to give the final blow, as proposed by H. Case (2004).
- 59 Hunting and war cannot be opposed, as their practice is so ambivalent (Godelier 1982). Recent study on skeletal remains from Bohemia has pointed out that the people buried with stone bracers practiced regularly archery until to develop enthesal changes (on the joint between bones and ligaments; Ryan *et al.* 2018). This means that grave goods reflect well the activity of the deceased and do not result only of ideal or social construction of the afterlives by the mourners. However, Bell Beaker armed men do not appear to be hunters living by predation, as shown by the faunal remains, nor warriors in perpetual conflict. Based on the use-wears of some arrowheads, part of the archery equipment seems to have been used rarely and kept as items of display. Thus, archery equipment and the way it is deposited in graves indicate strategies of social prestige rather than the economic activity of the deceased. These statuses of warriors/hunters appear to be multiple, depending on the wealth of individuals but also the nature of the grave goods. Although all the objects studied here are related to archery, individual selection has been observed. All the archery objects can be associated with each other but there are preferential sets. Daggers are more commonly found with bracers, while bow-shaped pendants are more frequently associated with arrowheads (tab. 9). Bracers and arrowheads - the two most symbolic archery objects and the most frequent in

burials - are not linked in graves: only one fifth of the bracers and arrowheads are placed together (fig. 26). These patterns suggest several statuses and perhaps as many grades. For example, they might correspond to the distinction between hunters and warriors (Ryan *et al.* 2018). This diversity is also a cultural sign, which varies depending on the region. In Germany and the Czech Republic, arrowheads and bracers are equally distributed, while in Hungary and Austria, arrowheads are less common or even non-existent.

**Tab. 9 – Inventory of associations of archery-related items. Shaded cells, most frequent associations (> 50%). Daggers and grooved abraders are most frequently associated with bracers, while most of the bow-shaped pendants are found with arrowheads**

	Arrowhead (%)	Bracer (%)	Grooved abrader (%)	Dagger (%)	Bow-shaped pendant (%)
<b>Total</b>	201 (100%)	275 (100%)	15 (100%)	153 (100%)	85 (100%)
<b>Arrowhead</b>	-	83 (30%)	7 (47%)	49 (32%)	67 (79%)
<b>Bracer</b>	83 (41%)	-	11 (73%)	81 (53%)	30 (35%)
<b>Grooved abrader</b>	7 (3%)	11 (4%)	-	5 (3%)	1 (1%)
<b>Dagger</b>	49 (24%)	81 (29%)	5 (33%)	-	19 (22%)
<b>Bow-shaped pendant</b>	67 (33%)	30 (11%)	1 (7%)	19 (12%)	-

26. Associations of arrowheads and bracers in Central European countries



60 This widely accepted but locally interpreted value system undoubtedly facilitated the spread of the Bell Beaker culture in Europe (Benz *et al.* 1998). Thus, adherence to Bell Beaker warrior ideology could be motivated by the opportunity it gave individuals to express strategies of social prestige. At the same time, this common value system facilitated networking in a large part of Europe and stimulated the circulation of innovations (metallurgy), goods (flint, amber, shells, etc.; Heyd 2007), individuals (Price

et al. 2004, Desideri 2011, Olalde et al. 2018), and even marriage partners (Brodie 1997, Vander Linden 2007a). The spread of the Bell Beaker culture did not occur out of nowhere but was gradually implanted in pre-existing networks based on shared common values, such as the Corded Ware cultural complex in Central and Eastern Europe, which conveyed a similar ideology, exalting individuals equipped with 'battle-axes' (Vander Linden 2007b), or in France the circulation of Grand-Pressigny daggers, which conveyed similar symbolic values (Beugnier & Plisson 2004). Rather than the alleged conquests, for which evidence is sorely lacking, the figure of the warrior and his object-signs appear above all as vectors of the Bell Beaker ideology.

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## APPENDIXES

## Annex 1: List of abbreviations of museums

ACO: Archeologické centrum Olomouc  
ARUP: Archeologický ústav Praha  
FM: Ferenczy Museum Center in Cegléd  
JMZ: Jihomoravské muzeum ve Znojmě  
MMH: Masarykovo muzeum Hodonín  
MKSMK: Městské kulturní středisko Moravský Krumlov  
MZMB: Moravské zemské muzeum Brno  
MGP: Muzeum a galerie v Prostějově  
MB: Muzeum Brněnska  
MČB: Muzeum Český Brod  
MHMP: Muzeum hlavního města Prahy  
MKP: Muzeum Komenského v Přerově  
MK: Muzeum Kroměřížska  
MMB: Muzeum města Brna  
MVCHK: Muzeum východních Čech v Hradci Králové  
MV: Muzeum Vyškovska  
NM: Národní muzeum  
OMC: Oblastní muzeum v Chomutově  
RMK: Regionální muzeum v Kolíně  
RMM: Regionální muzeum v Mikulově  
RMT: Regionální muzeum v Teplicích  
SMRP: Středočeské muzeum v Roztokách u Prahy  
ÚAPPB: Ústav archeologické památkové péče, Brno  
VMS: Vlastivědné muzeum ve Slaném

## Annex 2: List of Bell Beaker cemeteries containing warrior graves

*Bibliographic references refer to the main inventories, listing the complete bibliography, or to the main publication. The number of graves corresponds to warrior burials.*

### Germany

Aiterhofen II, Straubing-Bogen, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Altdorf II, Landshut, Lower Bavaria: 2 graves (Heyd 2000, Bosch 2008)

Atting "Aufeld", Straubing-Bogen, Lower Bavaria: 2 graves (Bosch 2008)

Aufhausen, Dingolfing-Landau, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Augsburg "Haunstetten" I, Augsburg, Swabia: 1 grave (Heyd 2000, Bosch 2008)

Augsburg, Augsburg, Swabia: 3 graves (Heyd 2000)

Barbing I, Regensburg, Upper Palatinate: 1 grave (Heyd 2000, Bosch 2008)

Barbing II, Regensburg, Upper Palatinate: 1 grave (Engelhardt 2010)

Bopfingen "Flochberg", Ostalb, Stuttgart: 1 grave (Heyd 2000)

Burgweinting, Regensburg, Upper Palatinate: 5 graves (Bosch 2008)

Buxheim, Eichstätt, Upper Bavaria: 3 graves (Heyd 2000, Bosch 2008)

Dietfurt an der Altmühl, Neumarkt in der Oberpfalz, Upper Palatinate: 2 graves (Heyd 2000, Bosch 2008)

Dillingen an der Donau "Reitweg", Dillingen a. d. Donau, Swabia: 1 grave (Heyd 2000, Bosch 2008)

Efringen-Kirchen, Lörrach, Bade-Wurtemberg: 1 grave (Heyd 2000)

Eitensheim, Eichstätt, Upper Bavaria: 2 graves (Bosch 2008)

Engen "Welschingen", Konstanz, Fribourg-en-Brisgau: 1 grave (Heyd 2000)

Ergolding, Landshut, Lower Bavaria: 1 grave (Heyd 2000)

Etting, Ingolstadt, Upper Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Germering "Obere Bahnhofstr.", Fürstenfeldbruck, Upper Bavaria: 3 graves (Bosch 2008)

Gottfrieding, Dingolfing-Landau, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Großmehring I, Eichstätt, Upper Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Hauersdorf, Deggenhofen, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Heilbronn "Klingenberg", Heilbronn, Bade-Wurtemberg: 1 grave (Heyd 2000)

Ingelfingen "Criesbach", Hohenlohekreis, Bade-Wurtemberg: 1 grave (Heyd 2000)

Irlbach "Am Auwald", Straubing-Bogen, Lower Bavaria: 1 grave (Bosch 2008)

Irlbach, Straubing-Bogen, Lower Bavaria: 4 graves (Heyd, 2000, Bosch 2008)

Köfering, Regensburg, Upper Palatinate: 2 graves (Heyd 2000, Bosch 2008)

Kornwestheim, Ludwigsburg, Bade-Wurtemberg: 1 grave (Heyd 2000)

Künzing "Bruck" III, Deggenhofen, Lower Bavaria: 4 graves (Heyd 2000, Bosch 2008)

Landau I, Dingolfing-Landau, Lower Bavaria: 1 grave (Heyd 2000)

Landau III, Dingolfing-Landau, Lower Bavaria: 3 graves (Heyd 2000, Bosch 2008)

Luckenpaint, Regensburg, Upper Palatinate: 1 grave (Heyd 2000, Bosch 2008)

Mailing I, Ingolstadt, Upper Bavaria: 1 grave (Bosch 2008)

Mailing II, Ingolstadt, Upper Bavaria: 1 grave (Bosch 2008)



- Markt, Augsburg, Swabia: 1 grave (Bosch 2008)
- Mettenheim, Mühldorf am Inn, Upper Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Mintraching "Aukofen", Regensburg, Upper Palatinate: 1 grave (Heyd 2000, Bosch 2008)
- Mitterharthausen, Straubing-Bogen, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- München "Sendling", München, Upper Bavaria: 4 graves (Heyd 2000, Bosch 2008)
- München West, München, Upper Bavaria: 1 grave (Guckenbiehl & Schreiber 2008)
- Nassenfels, Eichstätt, Upper Bavaria: 2 graves (O'Neill 2010)
- Neubiberg "Unterbiberg", München, Upper Bavaria: 1 grave (Bosch 2008)
- Oberstimm I, Pfaffenhofen an der Ilm, Upper Bavaria: 2 graves (Heyd 2000, Bosch 2008)
- Oberstimm II, Pfaffenhofen an der Ilm, Upper Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Ochsenfurt, Würzburg, Bavière: 1 grave (Heyd 2000)
- Ochsenfurt "Tückelhausen", Würzburg, Bavaria: 1 grave (Heyd 2000)
- Offingen, Günzburg, Swabia: 1 grave (Heyd 2000)
- Osterhofen "Altenmarkt" III, Deggendorf, Lower Bavaria: 5 graves (Heyd 2000, Bosch 2008)
- Reusch, Neustadt an der Aisch-Bad Windsheim, Bavaria: 1 grave (Heyd 2000)
- Riegel, Emmendingen, Emmendingen: 1 grave (Heyd 2000)
- Riekofen, Regensburg, Upper Palatinate: 1 grave (Heyd 2000, Bosch 2008)
- Safferstetten, Passau, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Schwäbisch-Hall "Hessental", Schwäbisch-Hall, Bade-Wurtemberg: 1 grave (Heyd 2000)
- Stetten an der Donau, Mühlheim an der Donau, Freiburg im Breisgau: 1 grave (Heyd 2000)
- Stockach "Wahlwies", Konstanz, Freiburg im Breisgau: 1 grave (Heyd 2000)
- Straubing-Alburg, "Hochfeldweg", Straubing, Lower Bavaria: 3 graves (Bosch 2008)
- Straubing-Alburg I "Lerchenaid", Straubing, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Straubing-Alburg II "Lerchenaid", Straubing, Lower Bavaria: 1 grave (Heyd 2000)
- Straubing-Alburg IV "Stadtäcker", Straubing, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Straubing-Alburg V "Lerchenaid", Straubing, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)
- Straubing-Gabelsbergerstraße, Straubing, Lower Bavaria: 2 graves (Heyd 2000, Bosch 2008)
- Straubing-Kasernstraße, Straubing, Lower Bavaria: 1 grave (Heyd 2000)
- Stühlingen, Waldshut, Freiburg im Breisgau: 1 grave (Heyd 2000)
- Trieching, Dingolfing-Landau, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Wallersdorf III, Dingolfing-Landau, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

Weichering, Neuburg-Schrobenhausen, Upper Bavaria: 4 graves (Heyd 2000, Bosch 2008)

Widdersdorf-Pörndorf, Bruckberg, Lower Bavaria: 1 grave (Heyd 2000)

Wiesloch, Rhein-Neckar, Bade-Wurtemberg: 1 grave (Wagner 2011)

Wolferkofen, Straubing-Bogen, Lower Bavaria: 1 grave (Heyd 2000, Bosch 2008)

## Austria

Bad Fischau "Zwergloch", Wiener Neustadt, Lower Austria: 1 grave (Bosch 2008)

Deutschkreutz, Oberpullendorf, Burgenland: 1 grave (Bosch 2008)

Gemeinlebarn, Sankt Pölten, Lower Austria: 1 grave (Metzinger-Schmitz 2004, Bosch 2008)

Henzing, Tulln, Lower Austria: 1 grave (Heyd 2000, Bosch 2008)

Laa an der Thaya I, Mistelbach, Lower Austria: 1 grave (Heyd 2000, Metzinger-Schmitz 2004)

Laa an der Thaya II, Mistelbach, Lower Austria: 1 grave (Heyd 2000, Metzinger-Schmitz 2004, Bosch 2008)

Nußdorf ob der Traisen "Franzhausen", Sankt Pölten, Lower Austria: 1 grave (Metzinger-Schmitz 2004)

Oberbierbaum 1, Tulln, Lower Austria: 1 grave (Heyd 2000, Metzinger-Schmitz 2004, Bosch 2008)

Oggau, Eisenstadt, Burgenland: 2 graves (Heyd 2000, Bosch 2008)

Ossarn, Sankt Pölten, Lower Austria: 1 grave (Heyd 2000, Bosch 2008)

Scharlinz, Linz, Upper Austria: 2 graves (Heyd 2000, Bosch 2008)

Wien-Aspern, Vienne, Vienna: 2 graves (Heyd 2000, Metzinger-Schmitz 2004)

Wien-Essling, Vienne, Vienna: 1 grave (Heyd 2000, Metzinger-Schmitz 2004)

Wipfing, Tulln, Lower Austria: 1 grave (Růžičková 2009)

## Hungary

Budakalász "Luppa-csárda", Szentendre, Pest: 42 graves (Horváth 2017)

Budakalász "Tangazdaság", Szentendre, Pest: 1 grave (Kalicz 1955)

Budapest-Békásmegyér, Budapest, Budapest: 4 graves (Kalicz-Schreiber & Kalicz 2000)

Budapest-Csepel "Rákóczi Ferenc street", Budapest, Budapest: 1 grave (Endrődi 2013)

Budapest-Csepel "Water Works", Szigetszentmiklós, Pest: 1 grave (Endrődi 2013)

Budapest-Csepel, Waste Water Treatment Plant, Budapest, Budapest: 1 grave (Horváth *et al.* 2007)

Szigetszentmiklós “Felső Ūrge-hegyi dűlű”, Szigetszentmiklűs, Pest: 36 graves (Patay 2013)

Szigetszentmiklűs “űdűlűsor”, Szigetszentmiklűs, Pest: 7 graves (Endrűdi 2012, Endrűdi 2014)

Szigetszentmiklűs “Water Works”, Szigetszentmiklűs, Pest: 2 graves (Endrűdi 2013)

Tűkűl, Szigetszentmiklűs, Pest: 1 grave (Kalicz-Schreiber 1975)

## Czech Republic

Bűhařovice I, Znojmo, South Moravian Region: 1 grave (Olivűk 2009)

Bűlina IV, Teplice, Ūstű nad Labem: 1 grave (Hájek 1968)

Bűlina VI, Teplice, Ūstű nad Labem: 1 grave (Hájek 1968)

Blařovice II, Brno-venkov, South Moravian Region: 5 graves (Dvořák *et al.* 1992<sup>a</sup>, Metzinger-Schmitz 2004, Olivűk 2009)

Bohutice II, Znojmo, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivűk 2009)

Borkovany I, Břeclov, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivűk 2009)

Brandűsek, Kladno, Central Bohemian Region: 3 graves (Bosch 2008, Hájek 1968)

Brankovice, Vyřkov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivűk 2009)

Březno “Čachovice”, Chomutov, Ūstű nad Labem: 5 graves (Neustupnű & Smrř 1989)

Brno “Holásky” II, Brno-műsto, South Moravian Region: 5 graves (Bosch 2008; Dvořák *et al.* 1992a; Metzinger-Schmitz 2004; Olivűk 2009)

Brno “Lűšeň” II, Brno-műsto, South Moravian Region: 1 grave (Olivűk 2009)

Brno “Slatina”, Brno-műsto, South Moravian Region: 1 grave (Tűmová 2008)

Brno “řidenice”, Brno-műsto, South Moravian Region: 1 grave (Dvořák *et al.* 1992a, Metzinger-Schmitz 2004, Olivűk 2009)

Brodek u Prořejeva, Prostűjov, Olomouc: 3 graves (Grűmer *et al.* 2017)

Bylany I, Chrudim, Pardubice: 2 graves (Bosch 2008, Hájek 1968)

Chrářřany I, Rakovnűk, Central Bohemian Region: 1 grave (Hájek 1968)

Dolnű Dubnűany, Znojmo, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivűk 2009)

Dolnű Sukolom, Uničov, Olomouc: 2 graves (Olivűk 2009)

Dolnű Vűstonice II, Břeclov, South Moravian Region: 1 grave (Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivűk 2009)

Dolnű Vűstonice III, Břeclov, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivűk 2009)

- Dřevohostice “Bezuchov”, Přerov, Olomouc: 1 grave (Olivík 2009)
- Hodějnice, Vyškov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Hodonice I, Znojmo, South Moravian Region: 1 grave (Petrík *et al.* 2012)
- Hodonice-Tasovice, Znojmo, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Holešov, Kroměříž, Zlín: 4 graves (Metzinger-Schmitz 2004, Olivík 2009)
- Holubice, Praha-západ, Central Bohemian Region: 1 grave (Šulová *et al.* 2008)
- Holubice, Vyškov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004)
- Hoštice I, Vyškov, South Moravian Region: 18 graves (Matějčíková & Dvořák 2012, Olivík 2009, Růžičková 2009)
- Hoštice IV, Vyškov, South Moravian Region: 1 grave (Matějčíková & Dvořák 2012)
- Hostivice, Praha-západ, Central Bohemian Region: 1 grave (Růžičková 2009)
- Hrubčice, Prostějov, Olomouc: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Hrušky I, Břeclav, South Moravian Region: 1 grave (Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivík 2009)
- Hulín 2 “Pravčice”, Kroměříž, Zlín: 13 graves (Peška 2013)
- Hulín 1 “U Isidorka”, Kroměříž, Zlín: 6 graves (Peška 2013, Růžičková 2009)
- Ivančice, Brno-venkov, South Moravian Region: 1 grave (Dvořák *et al.* 1992a, Metzinger-Schmitz 2004, Olivík 2009)
- Ivanovice na Hané, Vyškov, South Moravian Region: 4 graves (Matějčíková & Dvořák 2012; Olivík 2009)
- Jenišův Újezd, Teplice, Ústí nad Labem: 1 grave (Beneš 1987)
- Jezeřany-Maršovice, Znojmo, South Moravian Region: 1 grave (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009, Růžičková 2009)
- Jiříkovice, Brno-venkov, South Moravian Region: 1 grave (Olivík 2009, Matějčíková 2001)
- Josefov I, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Josefov III, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Klobouky III, Břeclav, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivík 2009)
- Klobouky IV, Břeclav, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivík 2009)
- Kněževs I, Praha-západ, Central Bohemian Region: 2 graves (Hájek 1968)
- Kobylnice I, Brno-venkov, South Moravian Region: 2 graves (Bosch 2008, Dvořák *et al.* 1992a, Metzinger-Schmitz 2004)
- Kolín VI, Kolín, Central Bohemian Region: 1 grave (Hájek 1968)

- Kostelec u Holešova II, Kroměříž, Zlín: 2 graves (Olivík 2009)
- Kostelec u Holešova III, Kroměříž, Zlín: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Kuřim I, Brno-venkov, South Moravian Region: 1 grave (Dvořák *et al.* 1992a, Metzinger-Schmitz 2004)
- Lechovice, Znojmo, South Moravian Region: 2 graves (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Ledce I, Brno-venkov, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1992a, Metzinger-Schmitz 2004)
- Ledce II, Brno-venkov, South Moravian Region: 2 graves (Bosch 2008, Dvořák *et al.* 1992a, Metzinger-Schmitz 2004, Olivík 2009, Růžičková 2009)
- Ledce III, Brno-venkov, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1992a, Metzinger-Schmitz 2004)
- Letonice, Vyškov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Lhánice, Třebíč, Vysočina: 4 graves (Metzinger-Schmitz 2004, Olivík 2009)
- Libochovice II, Litoměřice, Ústí nad Labem: 1 grave (Hájek 1968)
- Lochenice I, Hradec Králové, Hradec Králové: 5 graves (Bosch 2008, Hájek 1968, Růžičková 2009)
- Loděnice u Berouna, Beroun, Central Bohemian Region: 1 grave (Benková & Čtverák 1997)
- Lovosice I, Litoměřice, Ústí nad Labem: 2 graves (Hájek 1968)
- Luděřov, Olomouc, Olomouc: 1 grave (Bosch 2008, Metzinger-Schmitz 2004)
- Luleč, Vyškov, South Moravian Region: 1 grave (Olivík 2009)
- Marefy, Vyškov, South Moravian Region: 2 graves (Metzinger-Schmitz 2004)
- Mikulčice I, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Mikulčice II, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Mikulčice III, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Mlékovice, Kolín, Central Bohemian Region: 1 grave (Bosch 2008, Hájek 1968, Růžičková 2009)
- Mochov, Praha-západ, Central Bohemian Region: 1 grave (Hájek 1968)
- Modřice, Brno-venkov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Most, Most, Ústí nad Labem: 1 grave (Hájek 1968)
- Most VI, Most, Ústí nad Labem: 1 grave (Hájek 1968)
- Mutěnice II, Hodonín, South Moravian Region: 1 grave (Olivík 2009)
- Němčice nad Hanou, Přerov, Olomouc: 2 graves (Olivík 2009)
- Nemilany I, Olomouc, Olomouc: 1 grave (Olivík 2009)

- Neratovice, Mělník, Central Bohemian Region: 1 grave (Hájek 1968)
- Neratovice I, Mělník, Central Bohemian Region: 5 graves (Bosch 2008, Hájek 1968)
- Nesovice, Vyškov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Ondratice I, Prostějov, Olomouc: 1 grave (Olivík 2009)
- Opatovice, Přerov, South Moravian Region: 2 graves (Peška 2011)
- Ostopovice I, Brno-venkov, South Moravian Region: 1 grave (Dvořák *et al.* 1992a, Metzinger-Schmitz 2004, Olivík 2009)
- Pavlov I, Břeclav, South Moravian Region: 5 graves (Dvořák *et al.* 1996, Metzinger-Schmitz 2004)
- Praha "Bubeneč" II, Praha, Praha: 1 grave (Bosch 2008)
- Praha "Dolní Chabry", Praha, Praha: 1 grave (Hájek 1968)
- Praha "Dolní Liboc", Praha, Praha: 1 grave (Hájek 1968)
- Praha "Jinonice", Praha, Praha: 1 grave (Horák *et al.* 2008)
- Praha "Kobylis" VI, Praha, Praha: 1 grave (Kandyba 1935)
- Praha "Kobylis" XI, Praha, Praha: 1 grave (Turek 2005)
- Praha "Kobylis" XII, Praha, Praha: 1 grave (Růžičková 2009, Turek 2005)
- Praha "Kobylis" XV, Praha, Praha: 2 graves (Turek 2005)
- Praha "Letná", Praha, Praha: 1 grave (Turek 2008)
- Praha "Lysolaje" III, Praha, Praha: 5 graves (Bosch 2008, Hájek 1968, Růžičková 2009)
- Praha "Prosek", Praha, Praha: 1 grave (Turek 2006a)
- Praha "Ruzyně", Praha, Praha: 1 grave (Hájek 1968)
- Praha "Velká Chuchle", Praha, Praha: 3 graves (Zemanová & Turek 2009)
- Praha "Vršovice" IV, Praha, Praha: 2 graves (Hájek 1968)
- Předlice, Ústí nad Labem, Ústí nad Labem: 1 grave (Hájek 1968)
- Předmostí, Přerov, Olomouc: 2 graves (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Přívory, Mělník, Central Bohemian Region: 1 grave (Hájek 1968)
- Prosiměřice, Znojmo, South Moravian Region: 2 graves (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Prostějov IV, Prostějov, Olomouc: 1 grave (Olivík 2009)
- Prusinovice I, Kroměříž, Zlín: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Pustiměř III, Vyškov, South Moravian Region: 1 grave (Olivík 2009)
- Radovesice-Bílina II, Teplice, Ústí nad Labem: 2 graves (Bosch 2008)
- Radovesice-Bílina III, Teplice, Ústí nad Labem: 2 graves (Bosch 2008, Růžičková 2009, Turek 2006a)

- Řež, Praha-východ, Central Bohemian Region: 1 grave (Hájek 1968)
- Rosnice, Hradec Králové, Hradec Králové: 2 graves (Bosch 2008, Hájek 1968, Růžičková 2009)
- Roudnice nad Labem, Litoměřice, Ústí nad Labem: 1 grave (Hájek 1968)
- Rousínov I, Vyškov, South Moravian Region: 1 grave (Růžičková 2009)
- Rousínov-Rousínovec II, Vyškov, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009, Růžičková 2009)
- Rousínov-Rousínovec, Vyškov, South Moravian Region: 1 grave (Kuna & Matoušek 1978)
- Rožd'alovice I, Nymburk, Central Bohemian Region: 2 graves (Hájek 1968, Růžičková 2009)
- Šlapanice II, Brno-venkov, South Moravian Region: 6 graves (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009, Růžičková 2009)
- Slavkov u Brna III, Vyškov, South Moravian Region: 2 graves (Olivík 2009)
- Služín, Prostějov, Olomouc: 1 grave (Olivík 2009)
- Smolín I, Brno-venkov, South Moravian Region: 1 grave (Bosch 2008, Dvořák *et al.* 1996, Metzinger-Schmitz 2004, Olivík 2009)
- Souš, Most, Ústí nad Labem: 1 grave (Hájek 1968)
- Starý Bydžov, Hradec Králové, Hradec Králové: 1 grave (Hájek 1968)
- Stehelčevy I, Kladno, Central Bohemian Region: 1 grave (Bosch 2008, Hájek 1968)
- Stehelčevy III, Kladno, Central Bohemian Region: 2 graves (Bosch 2008, Hájek 1968)
- Štětí nad Labem, Litoměřice, Ústí nad Labem: 1 grave (Hájek 1968)
- Střelice, Znojmo, South Moravian Region: 2 graves (Metzinger-Schmitz 2004, Olivík 2009)
- Sulejovice, Litoměřice, Ústí nad Labem: 1 grave (Hájek 1968)
- Svatobořice, Hodonín, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Svatoborice-Mistřín, Hodonín, South Moravian Region: 2 graves (Metzinger-Schmitz 2004, Olivík 2009)
- Svobodné Dvory, Hradec Králové, Hradec Králové: 1 grave (Hájek 1968)
- Syrovín, Hodonín, South Moravian Region: 1 grave (F. Kosrouch, com. pers.)
- Tešetice, Znojmo, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Těšetice-Kyjovice "Sutny", Znojmo, South Moravian Region: 1 grave (Petrík *et al.* 2012)
- Tišice, Mělník, Central Bohemian Region: 1 grave (Bosch 2008, Turek 2006a)
- Tišice-Chrást I, Mělník, Central Bohemian Region: 1 grave (Hájek 1968)
- Tišice-Chrást II, Mělník, Central Bohemian Region: 2 graves (Hájek 1968)
- Třebovle, Kolín, Central Bohemian Region: 1 grave (Hájek 1968)

- Turovice “Kopice”, Přerov, Olomouc: 1 grave (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Tvořihráz, Znojmo, South Moravian Region: 1 grave (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Únanov II, Znojmo, South Moravian Region: 1 grave (Olivík 2009)
- Vedrovice, Znojmo, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Velké Přílepy “Kamýk”, Praha-západ, Central Bohemian Region: 3 graves (Skružný *et al.* 2000)
- Vémyslice I, Znojmo, South Moravian Region: 1 grave (Olivík 2009)
- Veselí nad Moravou, Hodonín, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Vlíněves, Mělník, Central Bohemian Region: 2 graves (Limburský 2012)
- Vřesovice, Prostějov, Olomouc: 1 grave (Metzinger-Schmitz 2004)
- Vykán, Nymburk, Central Bohemian Region: 1 grave (Bosch 2008, Hájek 1968, Růžičková 2009)
- Vyškov, Vyškov, South Moravian Region: 1 grave (Olivík 2009)
- Žabovřesky, Litoměřice, Ústí nad Labem: 2 graves (Hájek 1968)
- Záhlinice, Kroměříž, Zlín: 3 graves (Bosch 2008, Metzinger-Schmitz 2004, Olivík 2009)
- Zarazice, Hodonín, South Moravian Region: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Želešice I, Brno-venkov, South Moravian Region: 1 grave (Dvořák *et al.* 1992a, Růžičková 2009)
- Zešov, Prostějov, Olomouc: 1 grave (Metzinger-Schmitz 2004, Olivík 2009)
- Zvoleněves II, Kladno, Central Bohemian Region: 1 grave (Hájek 1968)

## ABSTRACTS

The Bell Beaker culture is illustrated above all by the figure of the warrior, which is omnipresent in grave goods and has long supported invasionist theories. In order to better understand the social significance of the Bell Beaker warrior, this study aims to analyse the related object-signs (arrowheads, bracers, grooved abraders, bow-shaped pendants, daggers) in Central Europe, where individual graves are predominant. Based on a techno-functional approach, the whole biography of these objects is analysed here in order to clarify their modes of production and consumption. Alongside the biographies of individuals based on their sex, age and wealth, the history of these objects makes it possible to outline a model of Bell Beaker society. Far from the alleged conquests, it transpires that adherence to warrior ideology may have been driven by the opportunity it gave individuals to express strategies of social prestige.

Le Campaniforme s'illustre notamment par la figure du guerrier, prégnante dans les viatiques et qui a longtemps supporté des théories invasionnistes. Afin de mieux percevoir la portée sociale



du guerrier campaniforme, cette étude se propose d'analyser ses objets-signes (pointes de flèches, brassards, abraseurs à rainure, pendentifs arciformes, poignards) en Europe centrale, région dense en tombes individuelles. Grâce à une démarche techno-fonctionnelle, c'est l'ensemble de la biographie de ces objets qui est analysée ici afin d'en préciser les modes de production et de consommation. Confrontée aux biographies des individus selon leur sexe, leur âge et leur richesse, l'histoire de ces objets permet d'esquisser un modèle de société campaniforme. Loin des supposées conquêtes, l'adhésion à l'idéologie du guerrier a pu être motivée par l'opportunité qu'elle donnait aux individus d'exprimer des stratégies de prestige social.

## INDEX

**Mots-clés:** Europe centrale, Campaniforme, guerrier, technologie, tracéologie

**Keywords:** Central Europe, Bell Beaker, warrior, technology, use-wear analysis

## AUTHOR

**NICOLAS CLÉMENT**

Post PhD student Marie Skłodowska-Curie, Bournemouth University, UMR 8215 Trajectoires,  
Maison Archéologie et Ethnologie René Ginouvès, 21 Allée de l'Université, 92023 Nanterre, France  
[clement.nicolas@wanadoo.fr](mailto:clement.nicolas@wanadoo.fr)