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Reviewed Article:

CRAFTER: Potting Techniques of the Bronze Age

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Throughout its history, experimental archaeology has fulfilled a valuable role in archaeological research, allowing craftspeople and scholars alike to deepen an understanding of people and their societies in the past. EXARC's recent involvement in the CRAFTER project, and the author's participation in its International Meeting in Mula (Spain), has demonstrated that significant knowledge gaps remain in our understanding of potting practices in Europe during the Bronze Age. The following discussion provides an overview of some of the benefits of focusing research on defining those practices more clearly and consistently, while raising a few issues which have historically complicated matters. A very brief summary is then

provided of some recent contributions which explicitly describe pottery forming practices at sites across Europe, presented following the very broad tripartite system of Early, Middle, and Late Bronze Age. Finally, some lingering questions are posed, in order to examine how we as experimental archaeologists and craftspeople may work more collaboratively in order to create a fuller and richer picture of the European Bronze Age potter's life.

> Unlike metallurgy, ceramic production was already known and practiced across Europe during the Bronze Age. So, unlike in the case of metallurgy which rapidly spread across the continent once the technology was developed, this period did not witness a major technological breakthrough in pottery production technology. Potters existed and were practicing their craft, well integrated into the material world of Bronze Age societies.

Introduction

The Bronze Age has been examined from many perspectives through the history of archaeological inquiry, and one can track the theoretical and methodological frameworks of the field through time simply by evaluating the way that ceramics have been discussed. At present, there are a plethora of high-quality contributions every year which further refine our understanding of ceramics and – by extension – the social lives and cultural practices from this period of human history. The present contribution serves as a very brief overview of the state of our knowledge of pottery forming techniques in use during the Bronze Age across Europe in order to highlight gaps which experimental archaeology is well-suited to tackle.

In discussing the European Bronze Age, an expansive perspective is taken here, encompassing those regions which border the European Atlantic coast, the North Sea, Baltic Sea, Black Sea, the northern Mediterranean, northern/western Anatolia, and central Europe as well (See Figure 1). The groups which developed, dominated, and declined over the Bronze Age illustrate the networks of trade and interaction across the continent. This amply justifies a broad perspective in considering potential scope of knowledge transmission between potters and communities, irrespective of whether production was domestic or workshop-based, specialised or not. Phenomena such as itinerancy, artisan exchange, intermarriage, warfare, enslavement, and resettlement are all potential mechanisms of technological transfer at the micro-regional level. These small-scale interactions, when considered over the whole of the Bronze Age, can tell a powerful story of population interaction. Indeed, the spread of bronze metallurgy has been interpreted in this very manner, highlighting networks of interaction which most likely predated the innovation itself (Kristiansen and Larsson, 2005). The rapid spread of metallurgical technology across the continent after its discovery illustrates the existence and location of established connections between communities within culture groups, and across them.

The story of ceramic production technology, however, can tell a differently nuanced story of the nature of cultural contact. Unlike metallurgy, ceramic production was already known and practiced across Europe during the Bronze Age. So, unlike in the case of metallurgy which rapidly spread across the continent once the technology was developed, this period did not witness a major technological breakthrough in pottery production technology. Potters existed and were practicing their craft, well integrated into the material world of Bronze Age societies. As such, it is more difficult to suggest that potters had strong incentives to alter their existing practices from one forming technique to another; there was no significant 'advantage' driving a spread of changed pottery production techniques across the continent. Technique changes through time are therefore much more likely to reflect the close relationships between potters or their communities, a supposition which has strong support in existing anthropological and ethnoarchaeological research (Gosselain, 2000; Knappett and Van Der Leeuw, 2014; Roux, 2003; see also Jeffra, 2011, pp.17–41 for discussion of innovation uptake processes). Furthermore, the focus on production techniques (rather than vessel shape and decoration) addresses potting practice change at a deeper level; imitation of vessel shape and decoration is possible through observation of a finished object, while altering potting practices requires direct contact between potters–communication and trust, grounded in personal interaction.

Theoretical Orientation and Analytical Benefits

A point worth raising in introducing this topic is the established benefit of the *chaîne opératoire* approach in ceramic studies. Indeed, a review of the literature which explores production technologies shows frequent reference to this approach (Edmonds, 1990; Pierret, 1995; Giligny and Méry, 2010; Roux, 2017). Also well covered is an extensive anthropological discourse surrounding issues of transmission of craft knowledge, organisation and intensity of production, and the mechanics of skills acquisition (for example Costin, 1991; Lave, 1991; Lave and Wenger, 1991; Costin and Hagstrum, 1995; Lave, 1996; Stark, 1998; Gosselain, 2000; Eerkens and Lipo, 2007). The dominant instance in which the *chaîne opératoire* concept is applied, however, is in the array of studies which focus on raw material composition and preparation. Confusingly, there is a certain amount of terminological overlap in discussions of potting technology. Scholars who focus on ceramic petrography and compositional analyses use the term to indicate raw material processing, while others take 'potting technology' to indicate processes of deforming clay in order to create the final geometric volume of a vessel. The resolution of that terminological overlap is not the focus of this paper, and instead it should be noted that 'technology' will be used henceforth to describe the process of transforming a prepared clay mass into a vessel (See Figure 2 for an illustration of the types of potting technology discussed below).

A second and equally important issue is the fact that many excavation reports and pottery catalogues present minimal information about the production techniques for their individual

catalogue entries. Although early descriptions of the range of variability seen in prehistoric European potting do exist (such as Stevenson, 1953), there remains much progress to be made. It is something of a shame that Stevenson's work was not followed with the detailed studies he proposed in discussing the whole of European prehistory; we are instead left with a gap in interest following his hypothesis that "there were two large separate potting traditions in Central Europe": coil built and percussion shaped (1953, p.65). We might then have made greater inroads into understanding "the original areas and extent of the various pot-making methods, their spread and interlock, and their modern survival" (*ibid*, p.68).

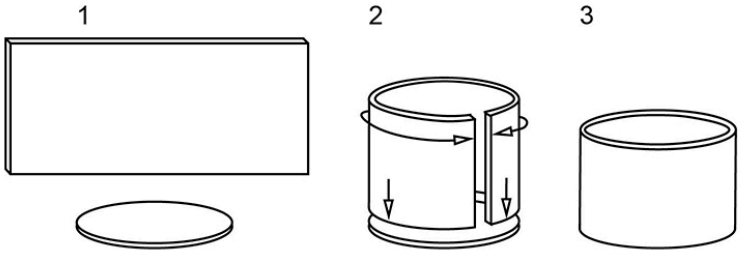
By and large, the specific details of these techniques, their distribution, and their persistence through time remain under-explored. Wide-ranging macro-regional discussions of observed potting techniques are not especially common in the literature, not surprising given the uneven coverage the issue has received. The exceptions to this pattern are found in contexts where multiple production techniques overlapped, coexisted, or supplanted one another over time. A consistently-observed example of this exception is the focus of much of the author's research: the earliest use of the pottery wheel in previously hand-building traditions (Jeffra, 2011; Jeffra, 2013; Roux and Jeffra, 2015). It is important to note the intentionally vague terminology in the previous sentence; hand-building is not a single technique, but a category of techniques including coiling, slab construction, pinching, and percussion, among others. In practice, this category is defined by the absence of a freely-rotating potting tool; when scholars identify catalogued ceramics as wheel made or handmade, they are in fact identifying the material as wheel or not-wheel.

How then might we better describe pottery manufacture, to avoid this wheel or not-wheel distinction? As a starting point, Roux (2016) has addressed this by creating a thoughtful and consistent terminology for describing the various aspects of the ceramic *chaîne opératoire*. Incorporating this approach of making measured observations of production traces before identifying vessels as coil built, or paddled, or slab built will go a long way toward fleshing out our knowledge of potting across Bronze Age Europe. As a result, we stand to gain far better insight into previously unseen networks of communication and collaboration from these pre-literate societies.

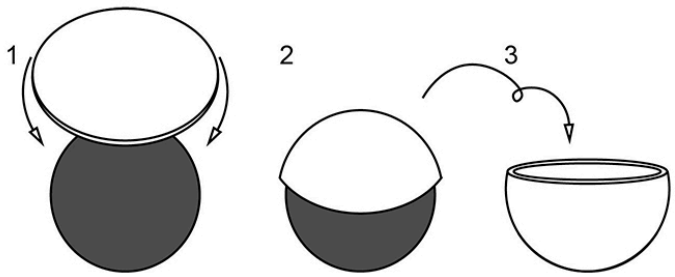
Published Examples of Bronze Age Forming Techniques

Despite the fact that potting techniques are not discussed consistently in publications, some very sketchy summarisation of potting practices through time is possible. What follows is a very brief overview of findings in the literature.

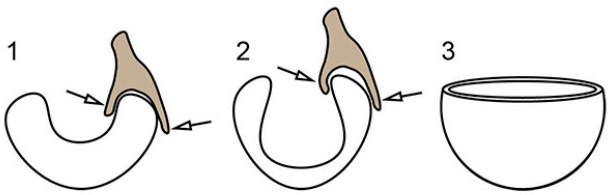
A. Slab



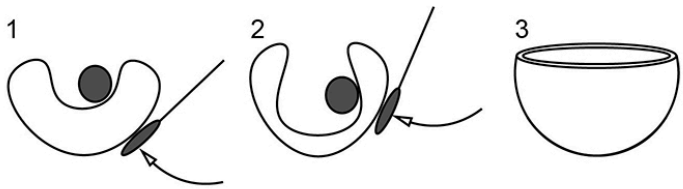
B. Moulding



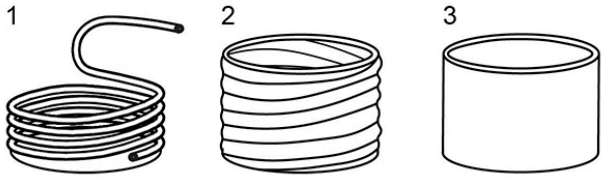
C. Pinch



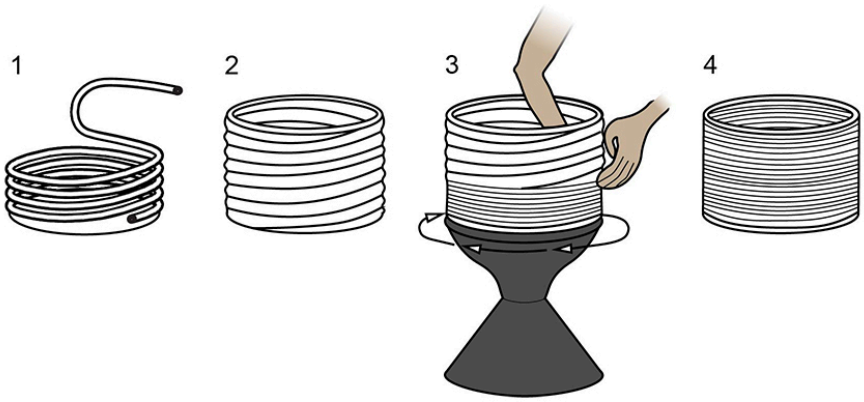
D. Percussion



E. Coil



F. Wheel Coiling



G. Wheel Throwing

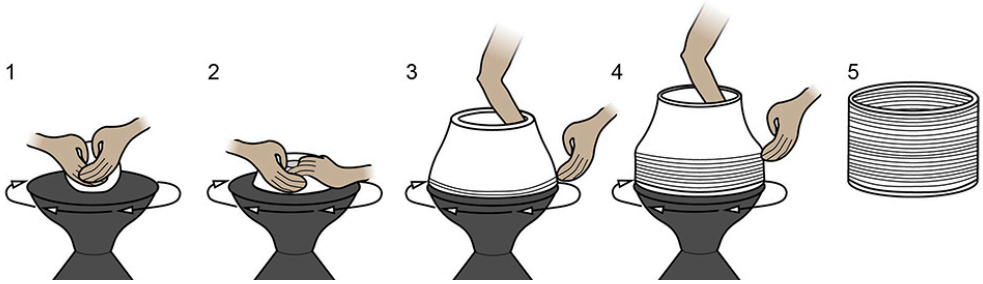


FIG 2. FORMING TECHNIQUES DISCUSSED IN TEXT: A. SLAB, WHERE CLAY IS FLATTENED INTO A SHEET (1), CURVED INTO THE SHAPE OF VESSEL COMPONENTS (2) AND SEAMS ARE SMOOTHED AFTER JOINING (3); B. MOULDING, WHERE A MASS OF CLAY IS DEFORMED OVER A LARGE, STATIONARY SHAPE (1), GIVEN A UNIFORM THICKNESS (2), AND THEN REMOVED FROM THE MOULD AND SMOOTHED (3); C. PINCH, WHERE A MASS OF CLAY IS PINCHED REPEATEDLY BETWEEN FINGERS AND THUMBS OF BOTH HANDS TO CREATE A VOID (1), THEN BASE AND UPPER WALL AND RIM THICKNESSES ARE FINISHED (2), AND THEN SMOOTHED TO GIVE FINAL SHAPE (3); D. PERCUSSION, WHICH IS SIMILAR TO PINCHING IN ACTIONS, THOUGH THE MASS OF CLAY IS SHAPED USING A PERCUSSIVE ACTION. A STATIONARY OBJECT IS HELD INSIDE THE MASS OF CLAY AND A TOOL LIKE A PADDLE IS USED TO STRIKE THE OUTSIDE TO OPEN THE MASS OF CLAY (1), THIN AND SHAPE THE WALLS (2), BEFORE THE VESSEL IS FINISHED (3); E COIL, WHERE CLAY IS ROLLED INTO LONG THIN CORDS OF CLAY AND STACKED IN RINGS OR SPIRALS (1) AND THEN ATTACHED TO ONE ANOTHER (2) AND FINALLY SMOOTHED TOGETHER (3); F. WHEEL-COILING, WHERE COILS OF CLAY ARE STACKED (1) AND JOINED (2), BEFORE BEING SMOOTHED AND SHAPED USING ROTATION FROM A POTTERY WHEEL (3) TO CREATE A FINISHED VOLUME (4); G. WHEEL THROWING, WHERE A MASS OF CLAY IS CENTRED ON A ROTATING POTTERY WHEEL (1), AND GIVEN A CENTRAL VOID (2), BEFORE THE WALLS ARE DRAWN UPWARD (3) AND OUTWARD (4) TO CREATE A FINISHED VOLUME (5). IMAGE BY DÉSIRÉE CAMPOLO AND CAROLINE JEFFRA.

Late Chalcolithic and Early Bronze Age Europe is dominated by hand building techniques in potting (See Figure 3). In general, prehistoric potting of northwest Europe has been identified as exclusively coil built (See Figure 2.E) (Gibson, 2002, p.41), including the widespread Beaker culture of the period. Bucking this trend, and of a more recent publication date, are a scant handful of published examples, including a combination of coiling and pinching in the Věteřov group (See Figure 3.1) of Moravia, Czechia (Petřík et al., 2015) and possible moulding of Castelluccio-style vessels (See Figure 3.2) from Sicily (Veca, 2015). So, perhaps it is true that only coiling was practiced in the northwest, but it should be recognised that opportunities exist for clarifying details of production. After all, Stevenson (1953) also described a range of techniques across this same area (See Figure 3.9), including percussion (See Figure 2.D) and moulding (See Figure 2.B) in addition to coiling.

To the south-east, some potters were using wheel devices for production at this point. Sites at which wheel potting was identified include Maikop (See Figure 3.3) near Russia's Black Sea coast (Bauer, 2008), Bahçehisar (See Figure 3.4) (Efe, 1994) and Küllüoba (See Figure 3.5) (Türkteki, 2014) in northwest Turkey, Bulgaria's Sozopol Harbour (See Figure 3.6) (Klasnakov and Stefanova, 2009), as well as at Lerna (See Figure 3.7) (Choleva, 2013) and Lefkandi (See Figure 3.8) (Rutter, 1979) in Greece. It should be noted that the pottery wheel seems to have spread from further east, perhaps the Levant, so the proximity of these sites to the Black Sea and eastern Mediterranean accounts for the comparatively early appearance of wheel potting. In the Levant, and indeed in every context examined critically, early wheel potters were not wheel throwing (See Figure 2.G) but were instead combining existing hand building techniques with some rotation (Roux and Courty, 1997 & 1998; Jeffra, 2013; Choleva, 2013; Roux and Jeffra, 2015; Rückl and Jacobs, 2016; Jeffra in press). Where coiling formed the basis of this combination technique, it is called wheel coiling (See Figure 2.F). In general, though, wheel potting did not supplant hand building techniques at these sites. As is the case for

much of hand built pottery from the rest of Europe, the details of those techniques are not explored in great detail in the literature.

Production techniques of the Middle Bronze Age are somewhat better published than those of the Early Bronze Age (See Figure 4). An assumption of coil building seems to persist, with some pockets of either technique change or more detailed analysis of ceramics. In Normandy at Mondeville (See Figure 4.1), Nonant (See Figure 4.2), and Île Tatihou (See Figure 4.3), potters were indeed using coils but this technique was paired in some cases with moulding and in other cases with percussion (the brief mention here does not do justice to the meticulous nature of the results, and the work should be taken as an ideal standard, see Manem, 2008). Further south, a number of Middle to Late Bronze Age sites across Spain and Portugal (See Figure 4.4) are associated with hand built pottery (Blanco-González, 2018), though there is no further detail about the nature of those hand building techniques. In what is today northern Italy (See Figure 4.5), Terramare potters were also combining coiling, in this instance with moulding (Brodà et al., 2009). Further south, Sicilian potters at Thapsos (See Figure 4.6) were found to have practiced a layered coiling technique (Veca, 2014), a noteworthy example given that variability within a specific forming technique is so rarely reported upon. Across the north Adriatic, Middle Bronze Age potters of Podravina (See Figure 4.7) and Turopolje (See Figure 4.8) (Croatia) used coiling with slab (See Figure 2.A) and pinch (See Figure 2.C) construction (Kudelić et al., 2015)–a third type of combined hand technique. A combination of coil with slab and pinch has also been reported (Earle et al., 2011) in Hungary's Benta valley (See Figure 4.9), but other vessels from across a number of Hungarian sites (Fig. 4.10) were found to have been manufactured using coils or slabs or percussion (Kreiter, et al., 2006).

Combination techniques are not limited to hand built ceramics alone, as noted above. The southeastern area covered in this contribution illustrates this. Northwestern Anatolian potters continued to produce pottery using the wheel, as was observed in the EBA. In Crete (See Figure 4.11), experimental archaeology has demonstrated that a wheel coiling combination technique was increasingly employed through time (Jeffra, 2011; Jeffra, 2013; Roux and Jeffra, 2015), and the practice extended to several Cycladic islands (See Figure 3.12) as well (Davis and Gorogianni, 2008; Gorogianni, et al., 2016; Jeffra, in press).

There are a handful of potting practices which appear to have changed from the Middle to Late Bronze Age periods (See Figure 5). The literature which does report on manufacture techniques has, in many cases, described techniques spanning both periods. As such, there are relatively few 'updates' to make relating to Late Bronze Age-specific potting practices. Those updates largely relate to the expanded presence of the pottery wheel. Sites showing evidence of wheel formed pottery include Cyprus (See Figure 5.1) (Crewe, 2007; Roux and Jeffra, 2015), and Verona (See Figure 5.2) (Saracino, Maritan and Mazzoli, 2014), and Greece's Kontopigado (See Figure 5.3), Aegina (See Figure 5.4) (Gilstrap, et al., 2016), as well as its

Central Macedonia region (See Figure 5.5) (Kiriatzi, et al., 1997). It must be said that it remains unclear whether these are wheel thrown or are the products of combination wheel and hand techniques.

The fact that the remainder of Europe continued to practice different types of hand building techniques throughout the Late Bronze Age is well-enough asserted. As a base assumption, we can rely on Stevenson (1953) who went so far as to identify Iron Age pottery in the British Isles (See Figure 5.6) as coil built. Potters in Spain and Portugal (See Figure 5.7) continued using hand building techniques, though there are no further details provided for this time period (Blanco-González, 2018). Lusatian potters in the Lublin region of Poland (See Figure 5.8) were practicing a slab-coil combination technique (Kłosińska, 2017), comparing favourably against other areas which also fall under the Urnfield culture system, particularly the techniques discussed above from Hungary and Croatia with roots in the Middle Bronze Age. Similarly, those practices are observed in Eastern Bohemia (See Figure 5.9) during the Early Iron Age (Thér, et al., 2017), which could indicate the presence of slab-coil techniques during the Late Bronze Age as well.

Lingering Questions

Some key questions persist for the issue of pottery technology in the Late Bronze Age. Firstly, to what extent can we rely on the supposition that culture systems which covered huge areas had homogenous production practices? The Urnfield-related literature, for example, does not seem precise enough at present to tackle this issue. On the other hand, the areas at the margins of the spread of the pottery wheel have had more thorough coverage to date, and those cases reveal that the technological change happened across assumed boundaries of culture groups.

Secondly, to what extent can we say that identified combination techniques (such as slab-coil, for example) are comparable from one site to another, or from one publication to another? This issue is not difficult to resolve, if scholars invest a few sentences in their publications beyond the current standard practice. Roux's volume highlighted above outlines a meticulous approach, and might seem daunting to apply, but it does provide a solid foundation for creating mutually-comprehensible publications (Roux, 2016). Even if forming is described simply in terms of the two stages of rough-out and preform, it would be a significant improvement over the current status quo (for fuller explanation of these terms, see Courty and Roux, 1995).

Finally, can experimental archaeology fill these gaps in knowledge? Unequivocally, the answer is 'yes'. There is an established–and growing–body of research which involves forming vessels using different kinds of potting techniques for comparative purposes. These may or may not make use of reconstructed paste recipes to add an experiential dimension, allowing the experimental potter to share their impressions of the paste's workability. Tools may or may

not be incorporated into the experimental variables considered; perhaps some forming traces were obliterated in a specific way thanks to one or more tools used by potters, and site- or deposit-specific questions may arise.

Experimental archaeologists seeking to make a major impact in the field can take up this issue in myriad ways. In particular, the field is in great need of studies which tackle contexts across the continent, from all phases of the Bronze Age. The review above leaves rather large gaps, not just in space and time, but also in precision; Perhaps a type of pottery has already been identified with a technique, however uncertainly. An excellent set of experiments might arise by asking how consistently that technique is practiced. If Beaker vessels are indeed universally coil built, are the coils applied in the same way by all potters? Are the coils of the same size, relative to the wall thicknesses? If one interrogates our understanding of the pottery production process closely enough, it becomes clear that much work remains to be done, and that experimental archaeologists can–and should–play a key role in that work.

A final point must be made here which should be familiar to those of us practicing and communicating the results of experimental archaeology: experiments are conducted to answer questions, but the answers to those questions are not always shared or shared widely. If creating a publication is not part of the experimental process for a practitioner, then there needs to be some means by which completed projects can at least be listed, so that others might know how to better apply their attention and resources. Language barriers and publication paywalls are major obstacles to gaining access to published insights, but if an experiment is completed without dissemination of basic facts about the results then it is difficult for the field to progress. No single project alone will manage to resolve the details of potting techniques in the whole of the European Bronze Age, so it is important to take a proactive and collaborative stance. Contributing to the EXARC Journal is an excellent start, and contributions need not be long, technical, or complicated. They would, however, be invaluable additions to the collaborative effort of experiment construction to expand the boundaries of our knowledge.

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crafts
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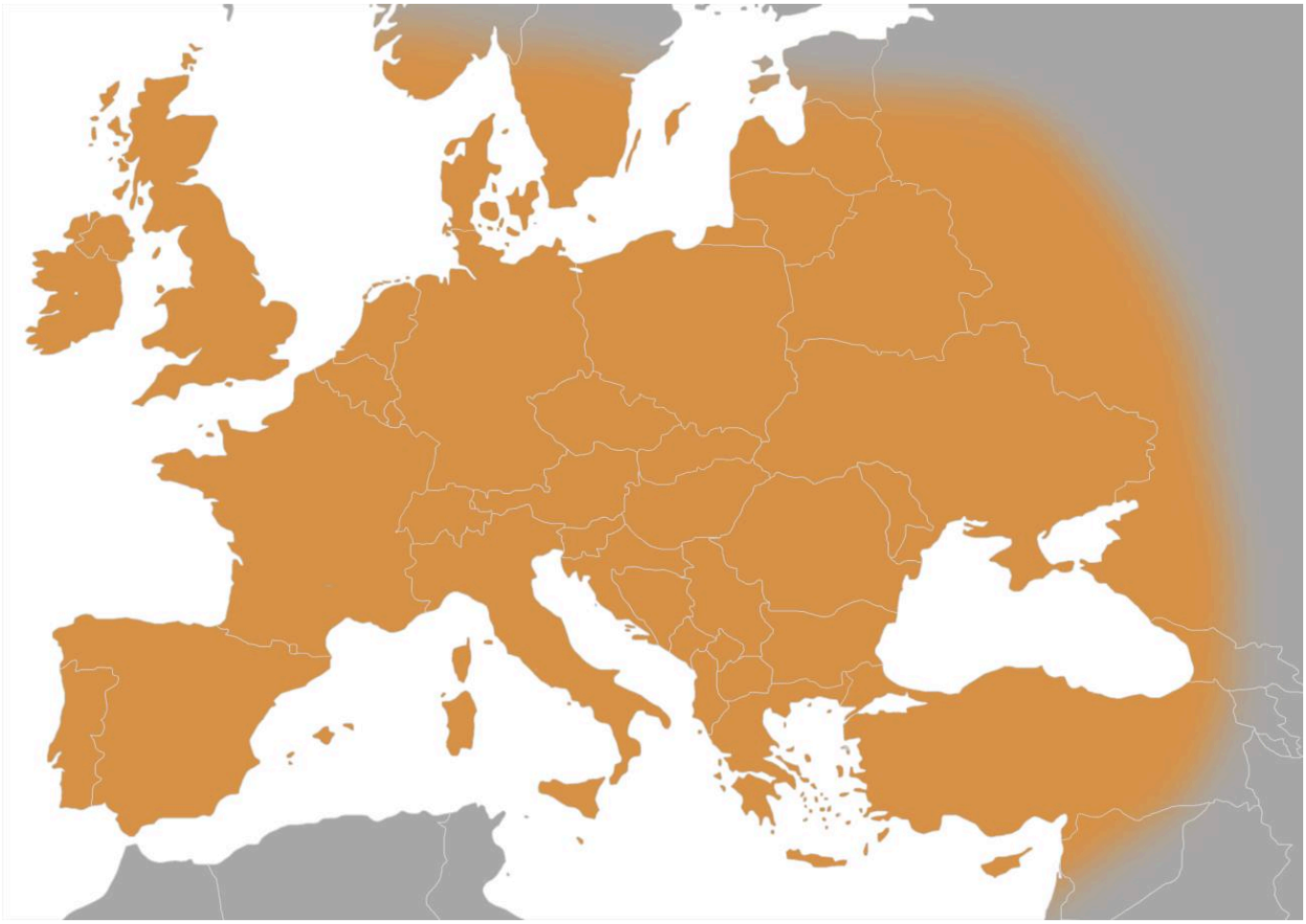

FIG 1. MAP SHOWING STUDY AREA DISCUSSED IN TEXT. IMAGE BY DÉSIRÉE CAMPOLO AND CAROLINE JEFFRA

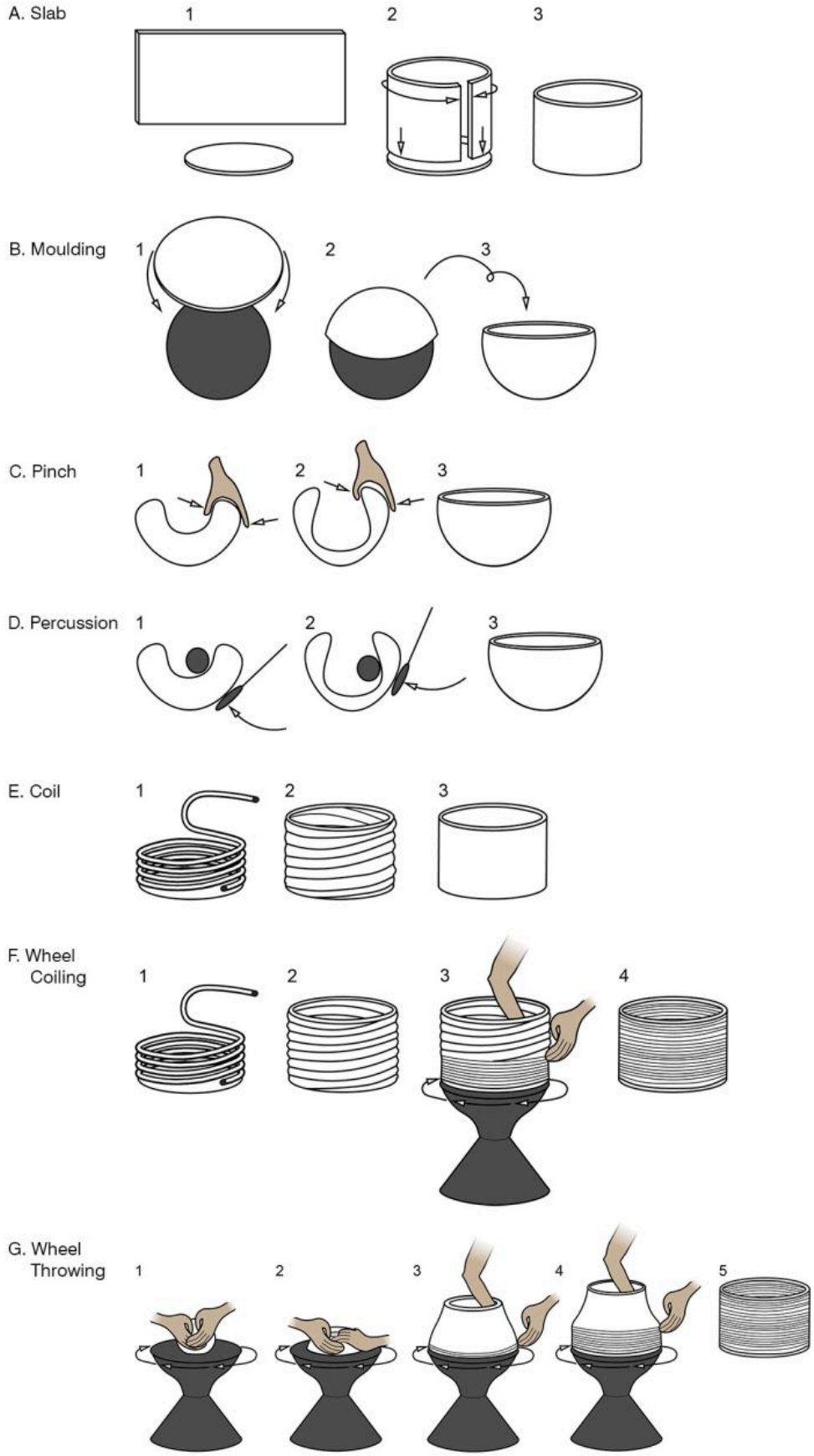

FIG 2. FORMING TECHNIQUES DISCUSSED IN TEXT: A. SLAB, WHERE CLAY IS FLATTENED INTO A SHEET (1), CURVED INTO THE SHAPE OF VESSEL COMPONENTS (2) AND SEAMS ARE SMOOTHED AFTER JOINING (3); B. MOULDING, WHERE A MASS OF CLAY IS DEFORMED OVER A LARGE, STATIONARY SHAPE (1), GIVEN A UNIFORM THICKNESS (2), AND THEN REMOVED FROM THE MOULD AND SMOOTHED (3); C. PINCH, WHERE A MASS OF CLAY IS PINCHED REPEATEDLY BETWEEN FINGERS AND THUMBS OF BOTH HANDS TO CREATE A VOID (1), THEN BASE AND UPPER WALL AND RIM THICKNESSES ARE FINISHED (2), AND THEN SMOOTHED TO GIVE FINAL SHAPE (3); D. PERCUSSION,

WHICH IS SIMILAR TO PINCHING IN ACTIONS, THOUGH THE MASS OF CLAY IS SHAPED USING A PERCUSSIVE ACTION. A STATIONARY OBJECT IS HELD INSIDE THE MASS OF CLAY AND A TOOL LIKE A PADDLE IS USED TO STRIKE THE OUTSIDE TO OPEN THE MASS OF CLAY (1), THIN AND SHAPE THE WALLS (2), BEFORE THE VESSEL IS FINISHED (3); E COIL, WHERE CLAY IS ROLLED INTO LONG THIN CORDS OF CLAY AND STACKED IN RINGS OR SPIRALS (1) AND THEN ATTACHED TO ONE ANOTHER (2) ...

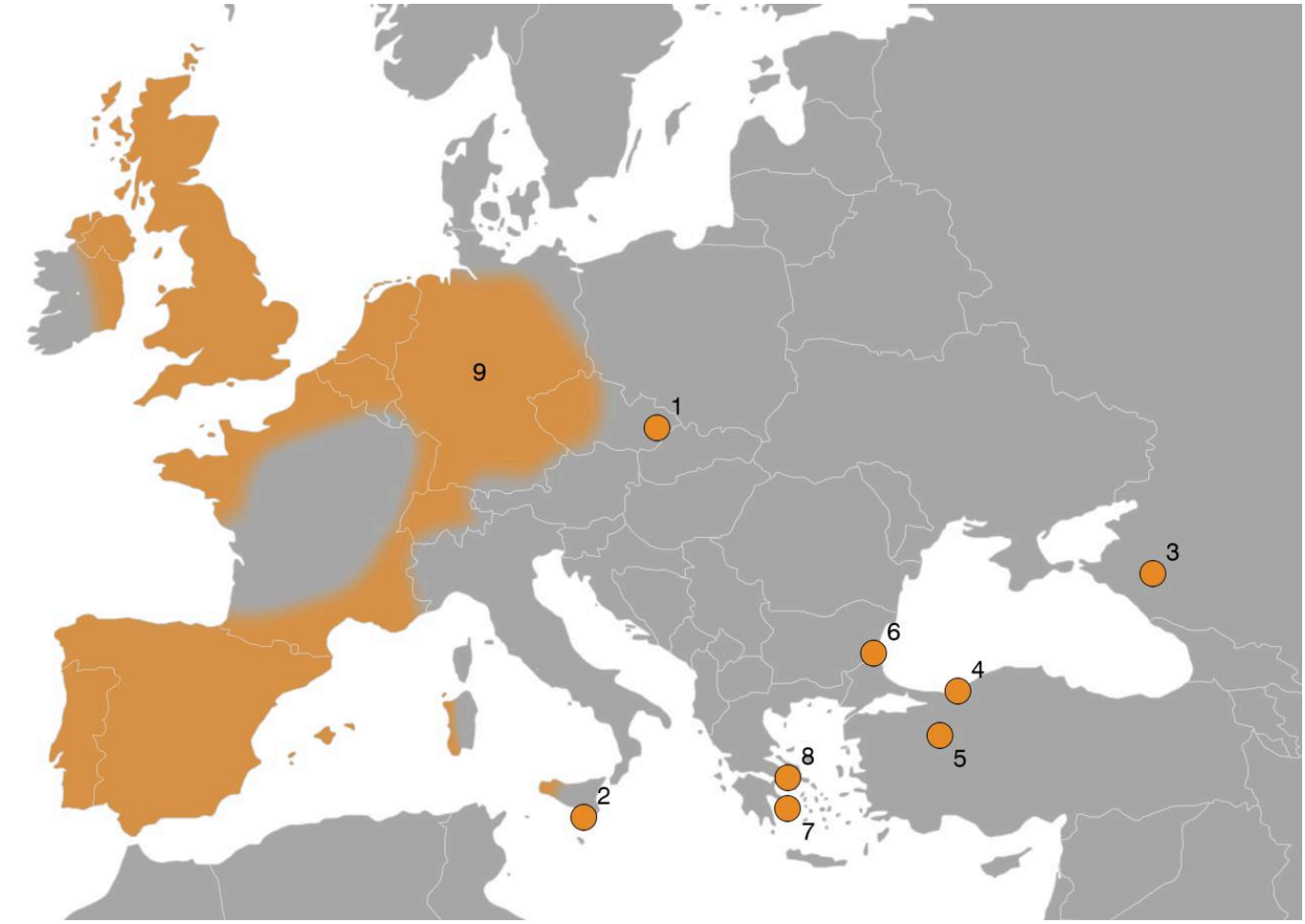

FIG 3. EARLY BRONZE AGE SITES AND REGIONS DISCUSSED IN TEXT: 1. VĚTEŘOV GROUP (HULÍN-PRAVČICE); 2. CASTELLUCCIO; 3. MAIKOP; 4. BAHÇEHISAR; 5. KÜLLÜOBA; 6. SOZOPOL; 7. LERNA; 8. LEFKANDI; 9. DISTRIBUTION OF BEAKER CULTURE AREA. IMAGE BY DÉSIRÉE CAMPOLO AND CAROLINE JEFFRA

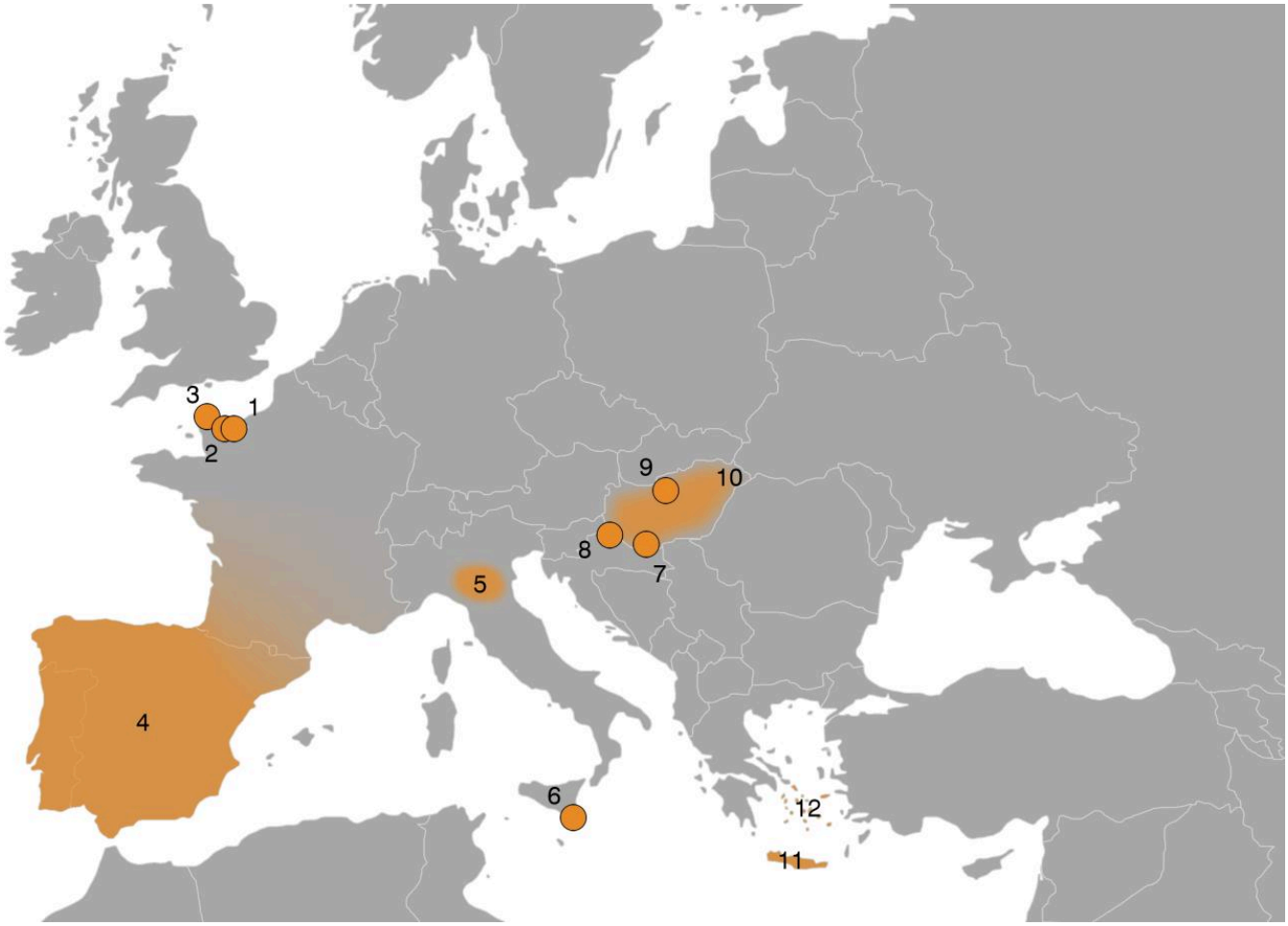

FIG 4. MIDDLE BRONZE AGE SITES AND REGIONS DISCUSSED IN TEXT: 1. MONDEVILLE; 2. NONANT; 3. ÎLE TATIHOU; 4. DISTRIBUTION OF SITES IN SPAIN AND PORTUGAL; 5. TERRAMARE AREA SITES; 6. THAPSOS; 7. PODRAVINA; 8. TUROPOLJE; 9. BENTA VALLEY; 10. DISTRIBUTION OF OTHER HUNGARIAN SITES; 11. CRETE; 12. CYCLADIC ISLANDS. IMAGE BY DÉSIRÉE CAMPOLO AND CAROLINE JEFFRA

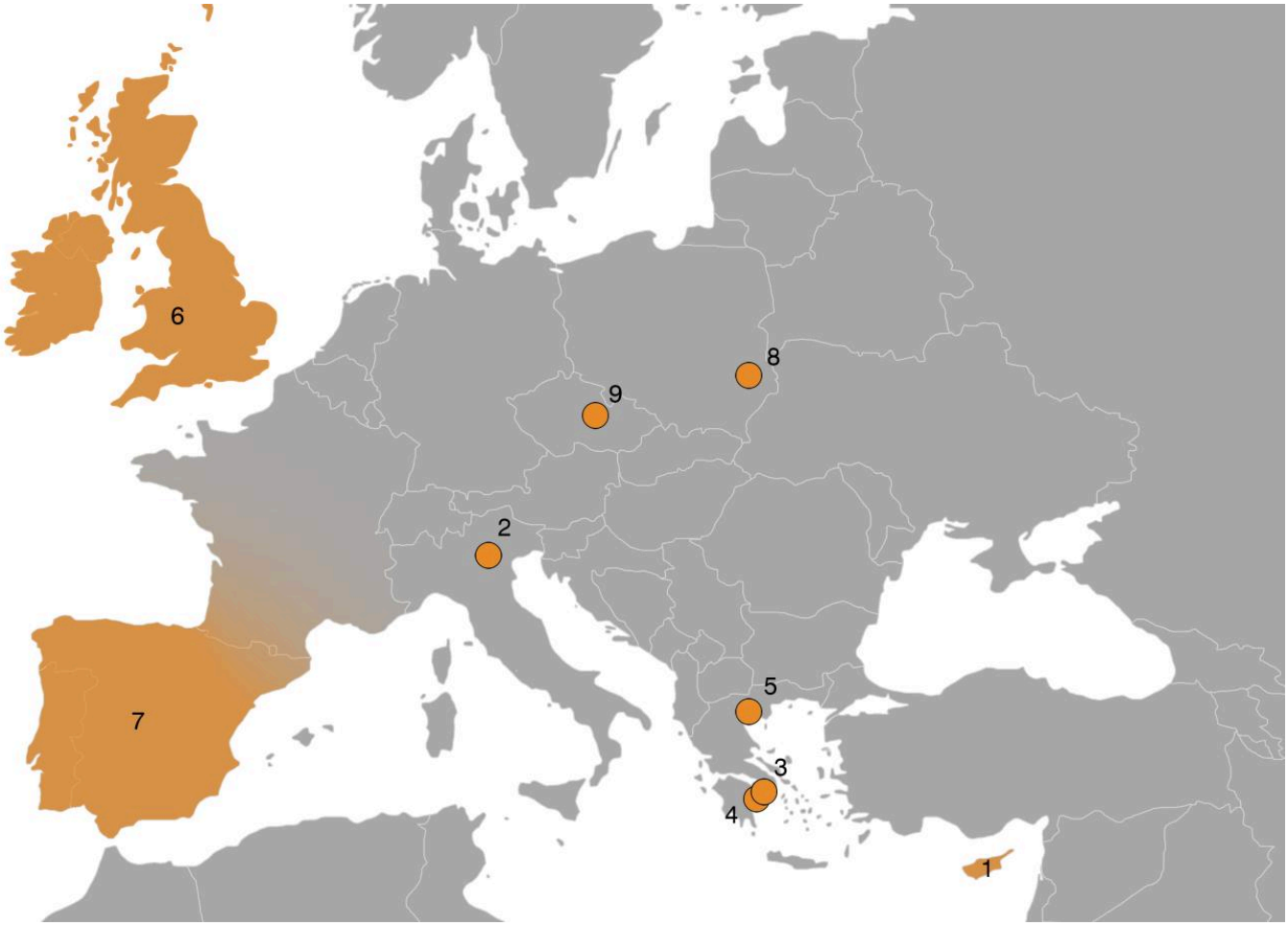

FIG 5. LATE BRONZE AGE SITES AND REGIONS DISCUSSED IN TEXT: 1. CYPRUS; 2. VERONA; 3. KONTOPIGADO; 4. AEGINA; 5. CENTRAL MACEDONIA; 6. BRITISH ISLES; 7. DISTRIBUTION OF SITES IN SPAIN AND PORTUGAL; 8. LUBLIN; 9. EASTERN BOHEMIA. IMAGE BY DÉSIRÉE CAMPOLO AND CAROLINE JEFFRA