3 The contexts of weighing: tracing weights and balances back to their users

3.1. Introduction

Acknowledging that the main purpose of weighing technology is the quantification of transaction values provides a general background to understand its significance in Bronze Age economies. It also raises a question that delves deeply into fundamental, yet poorly understood aspects of Bronze Age societies: Who used weights and balances?

Clarifying the relevance of this question requires taking a step backward, and reflecting on how economic agency is generally perceived in Bronze Age research. The substantial research investment of the last two decades has provided impressive detail on production and trade in the Bronze Age (Kristiansen 2014). As a wide range of commodities (such as copper, amber, tin, wool, salt) was in constantly high demand across the continent, regional locales seem to have specialised in the production of single commodities for export (Schibler *et al.* 2011; Harding 2013b; Earle *et al.* 2015; Ling *et al.* 2018; Sabatini *et al.* 2018; Williams/Le Carlier de Veslud 2019). Massive production and export are seen as the engines of an exchange economy of continental reach. Regional locales act as firms in maximizing output for gains in line with standard macroeconomic theory, while local elites organise the massive labour input required to sustain the system, and entertain mid-to long distance relationships with peers across the continent to maintain trade routes (Ling *et al.* 2017; Kristiansen 2018b).

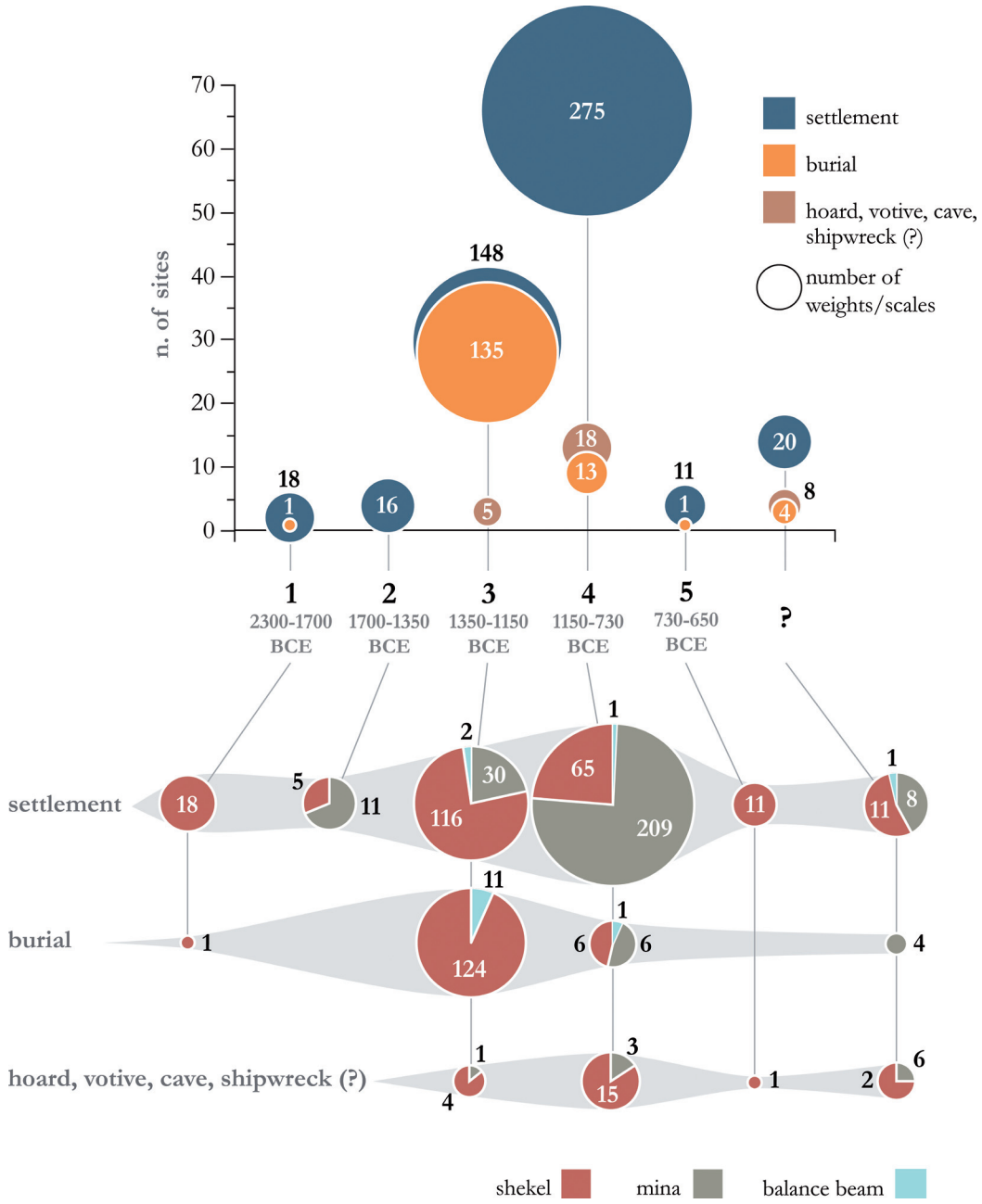
At a superficial glance, this model might appear to describe Bronze Age Europe as a fully-fledged market economy, if it were not for the conspicuous difference represented by individual agency and consumption patterns: Elites unilaterally control production and trade and are the only actors with some sort of entrepreneurial agency, sometimes joined by professional merchants (Vandkilde 2021). Everyone else – the so-called 'commoners' – is the passive recipient of redistribution mechanisms and does not directly engage in the 'commercial economy' in any significant form (Ling *et al.* 2017; Earle/Kristiansen 2020). Given such premises, then, it should not come as a surprise that the use of weighing technology in Bronze Age societies has been mostly addressed in relation with elites and with their role in administering production and trade (*e. g.*, Pare 1999; Mordant *et al.* 2021; Poigt *et al.* 2021).

3.2. Weighing technology and commercial agency

In this book, I use the terms 'trade' and 'commerce' to identify any form of sales and purchases – from long-distance shipments of raw materials to petty everyday transactions in local markets – in the same way as today we engage in commerce whenever we purchase a new phone, subscribe to an online streaming service, or buy groceries at the supermarket. There is, however, a lot of lingering ambiguity in how prehistoric archaeologists group largely synonymous terms such as 'commerce' and 'trade' under the overarching – and perhaps even more ambiguous – umbrella-term 'exchange'. It is often implied – although seldom spelled out explicitly – that 'exchange' is a prerogative of elites, something that the so-called 'commoners' would not even have the necessity to engage with, their basic needs being largely provided for by redistribution mechanisms, in turn overseen by the elites. One of the limits of this way of conceptualising economic agency is the unequal attribution of the motives for exchange, insofar as it implies that only elites have 'wants,' while commoners only have 'needs.' It is then unsurprising that only the elites are granted wide margins of entrepreneurial creativity, while the 'commoners' are somehow confined to a pattern of mechanical passivity.

Acknowledging that all human beings have wants (Bourdieu 1977; Appadurai 1986), however, also requires imagining how they might have fulfilled them: What if a farmer who does not own sheep wanted warmer clothes? What if a shepherd wanted a new dress pin? What if a bronzesmith wanted roast lamb for dinner? Pleading with the local elites to have their wants satisfied in exchange for services would have certainly been a viable option, but far from the only one: Purchase transactions provided for a solid alternative. In a world where material wants were largely limited to what was physically available in the immediate surroundings – however scarce, and regardless of how far away its original source was – many of such wants could be easily fulfilled by completing transactions with whoever it was that had whatever one wanted, and was willing to part with it in exchange for anything else of equal value. This way of exchanging things commonly goes by the name of 'monetary pattern of exchange' (Jones 1976), whereas weight was a universally recognised measure of economic value in the Bronze Age world.

The existence of local markets driven by small-consumer demand is indirectly supported by the statistical distribution of the mass values of the metal fragments that circulated in a monetary fashion in Bronze Age Europe (Ialongo/Lago 2024). As far as we assume that the mass of a metal object was proportional to its value, then the shape of this distribution is indistinguishable from that of household consumption patterns in contemporary Western economies, meaning that small everyday sales and purchases made up for the bulk of the total number of transactions in a given unit of time. It follows that, as far as the value of 'small change' was quantified by weight, at least one, if not both agents involved in a monetary transaction would have required the aid of weighing devices (Ialongo 2022).



▶ *Fig. 3.1. Weighing devices and site types: general quantification. The upper half of the chart (bubble chart) displays the number of weights and scales occurring in different site types (identified by different colours) by chronological phase. The vertical axis indicates the number of sites, the size of each circle is proportional to the quantity of objects, which is also indicated as a number inside or next to each circle. The lower half displays the distribution of shekel-weights, mina-weights, and balance beams in each site type, by chronological phase. The size of each pie chart is proportional to the number of objects.*

In this perspective, research on the early adoption of weighing devices provides the opportunity for a breakthrough: If the purpose of this technology is inherently commercial, then it is theoretically possible to extract information on the commercial agency of different categories of individuals by tracing weights and balances back to their potential users.

One way in which we can extract meaningful information on the relationship between weighing technology and its users is through the analysis of find contexts (Alberti *et al.* (eds.) 2006; Schon 2015; Ialongo/Rahmstorf 2019; Rahmstorf 2022). In this chapter, I will review the contextual evidence available for weights and balances in European contexts of the Bronze Age, and verify whether or not it is consistent with current models. In particular, I will address all cases of weights and balances found in settlements, burials and hoards for which the available documentation provides enough information to reconstruct, at least in broad strokes, the context of recovery. The contextual analysis is preceded by a general quantification of the occurrence of weighing equipment in different context types.

3.3. General quantification

As already observed in Chapter 2, the distribution of weighing equipment is highly uneven, mostly due to the discontinuous nature of the available documentation. The quantification illustrated here is intended to provide an overview of such discontinuity, with the aim of limiting interpretive bias.

The database comprises 714 weighing devices (18 balance beams and 696 weights) from 207 sites, the latter classified into three main categories: 1) settlements, including villages, open areas and sanctu-

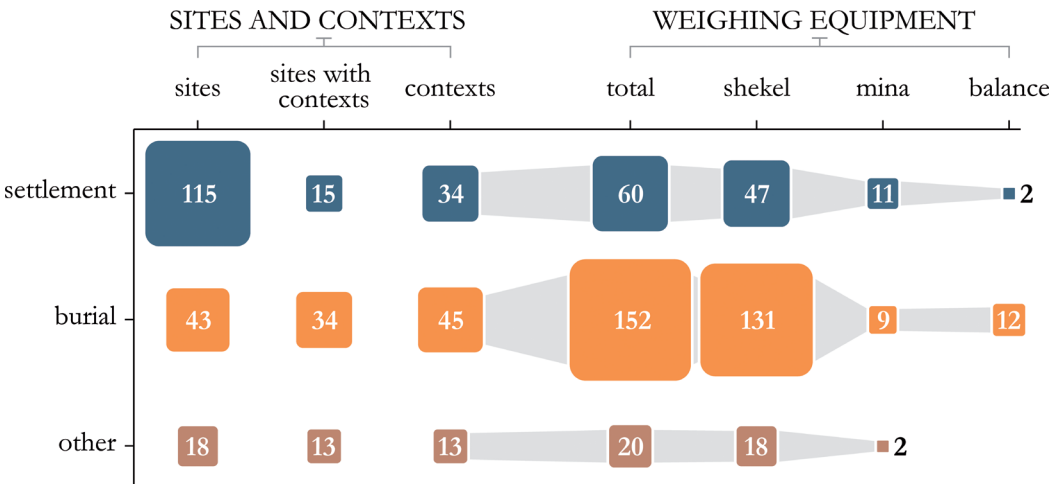


Fig. 3.2. Contexts and weighing equipment: general quantification. The left half of the chart ('Sites and contexts') illustrates the total number of sites belonging to each site-type, how many sites for each site-type have closed contexts, and how may closed contexts have been identified for each site-type. The right half displays the total number of objects that were found in closed contexts for each site-type, and further breaks down that number for shekel-weights, mina-weights, and balance beams.

aries (115 in total); 2) burials (n= 43); 3) a small, broadly-defined group made mostly of 'proper' hoards, but also including votive depositions, finds from caves (sometimes potentially part of hoards), and the remains of a potential shipwreck (n= 18). Thirty-one find spots do not provide enough information to determine their attribution to either of these categories.

The diagram in Fig. 3.1. gives an overview of how these devices are distributed in different site categories through time, offering a complimentary perspective to that illustrated in Chapter 2. The number of available data tends to grow throughout the 2nd millennium BCE, with settlements being always the most represented site category, and burials catching up only in Phase 3, thanks to the substantial amount of evidence from Central Europe. The lower part of the diagram breaks down the ratios of different categories of weighing equipment in different site types, showing that the primacy of weights in the *shekel*-range in both burials and settlements during Phase 3 is eventually upended in Phase 4, in which the *mina*-range becomes decisively more relevant.

Out of the total number of weighing devices, 446 objects (62 %) come from identifiable contexts (Fig. 3.2.). By 'context' I here intend a relatively circumscribed location within a site, with enough available information that allows one to define relevant associations. In the case of burials and hoards, the term is rather self-explanatory. In the case of settlements, 'contexts' identify all those cases in which weighing devices and/or their associated features and materials can be positioned with relative accuracy within the site plan, either indoors or in open areas. Among the 176 classified sites I could identify 92 distinct contexts, distributed in 62 sites. Of these, 45 contexts are burials, 13 are hoards, and 34 are found in settlements.

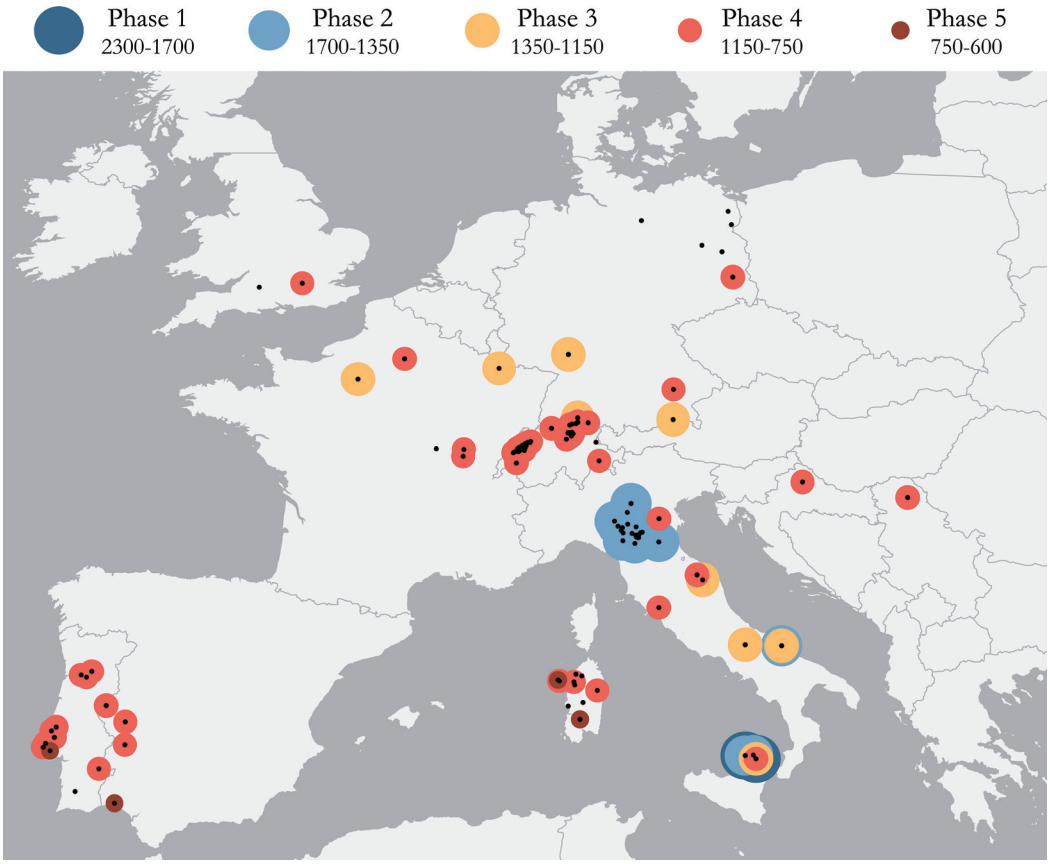
Focussing on contexts also provides the opportunity to address weighing sets. By 'weighing set' I here intend a group of two or more weighing devices, whose contextual information allows one to conclude that they were likely used simultaneously, sometimes by the same household (as in the case of sets found inside a house), sometimes by an individual (as with sets belonging to burials), and sometimes only generically (such as in the case of hoards or open areas). There are two main reasons why weighing sets are relevant: First, they document the complexity and diversity of personal weighing devices that belonged to single individuals; and second, they originally provided the first solid archaeological proof for the identification of balance weights in European Bronze Age studies. It was mostly thanks to the identification of several sets of small objects with recurrent shape and varying size, in fact, that C. Pare (1999) could confidently interpret parallelepiped weights in Central European burials as weighing devices. Shortly after, the same line of reasoning aided R. Vilaça's (2003) identification of disc weights in Portugal. In total, I could identify 31 weighing sets made up of 147 weights and four balance scales, distributed in 25 different sites. Ten sets are found in settlement contexts, 19 in burials, and two in hoards. The size of single weighing sets ranges from two devices up to a maximum of 19. All identified weighing sets are illustrated in the following pages, at the end of the section dedicated to the site-type to which they belong.

3.4. Settlements (Fig. 3.3.-4.)

In this section, I provide a description of all those archaeological contexts from settlements that provide meaningful associations, which give indications about their potential use.

3.4.1. Aeolian Islands (Italy, sites no. 3, 5-6)

The Aeolian Islands are a small volcanic archipelago, located off the north-eastern coast of Sicily. Between the 1950s and 1980s, the archipelago was the object of an extraordinary research program, leading to the extensive excavation of several settlements and cemeteries, spanning the entire arc of the Bronze Age (*ca.* 2300-950 BCE, in Italian chronology) (Bernabò Brea/Cavalier 1968; 1980; 1991).



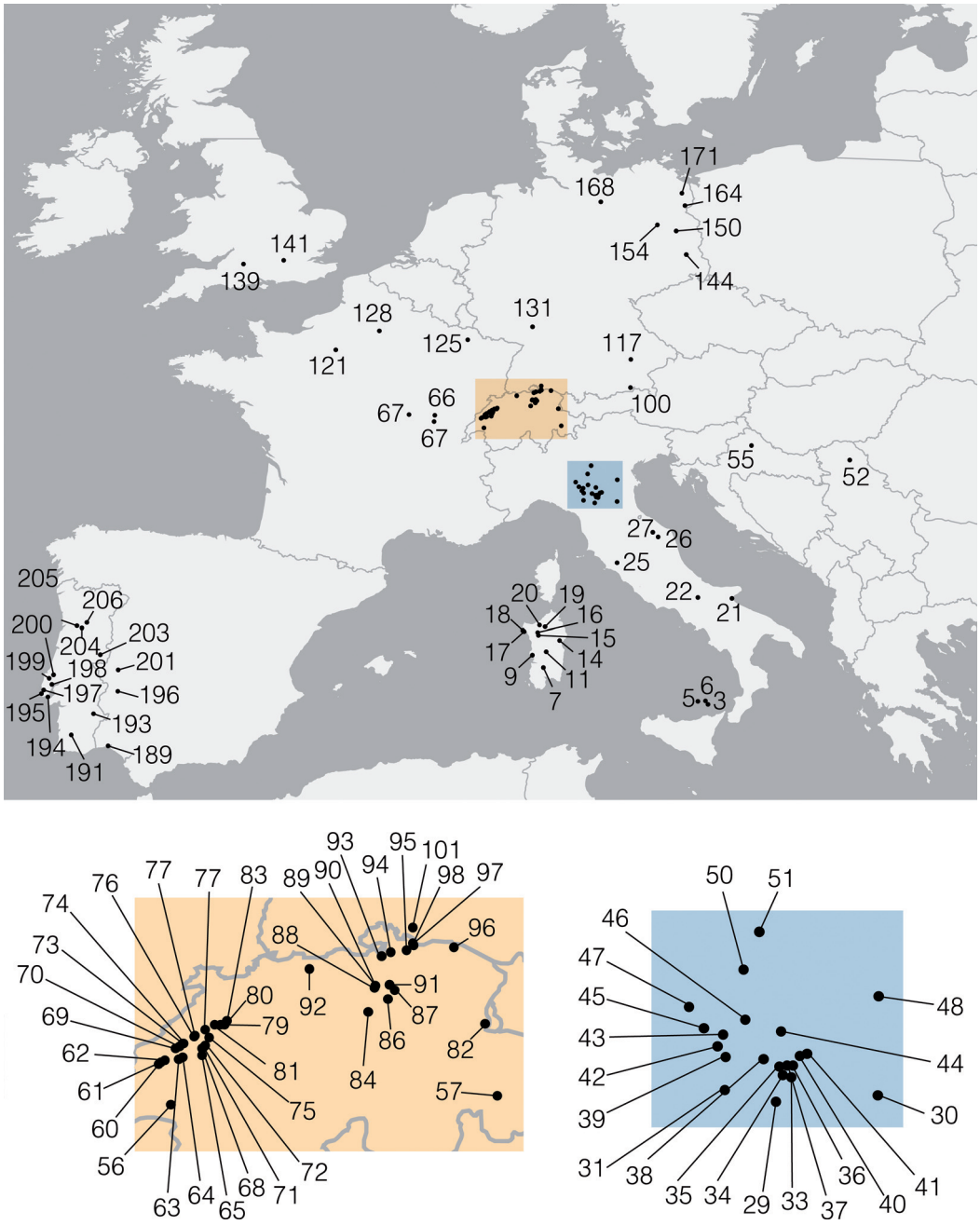
▶ *Fig. 3.3. Settlements: geographic and diachronic distribution.*

For the entire duration of the BA, the Aeolian Islands are fully integrated in Mediterranean networks. Imported Aegean vessels are attested since at least the Capo Graziano 2 phase (*c.* 1700-1500 BCE), until the Final Bronze Age (*c.* 1200-950 BCE) (Jones *et al.* 2014, 50-54); Cypriot materials are found in layers dating to *c.* 1500-1350 BCE (Martinelli 2005, 255-260); proofs of external contacts also include metal and amber, distributed throughout the entire sequence, and the exceptional recovery of a large clamp made of pure tin (*c.* 1500-1350 BCE) (Bettelli/Cardarelli 2005); finally, impasto vessels of Aeolian production, dating to the first half of the 2nd millennium BCE, were recovered in Vivara (Naples), some 260 km northwards (Cazzella *et al.* 1997).

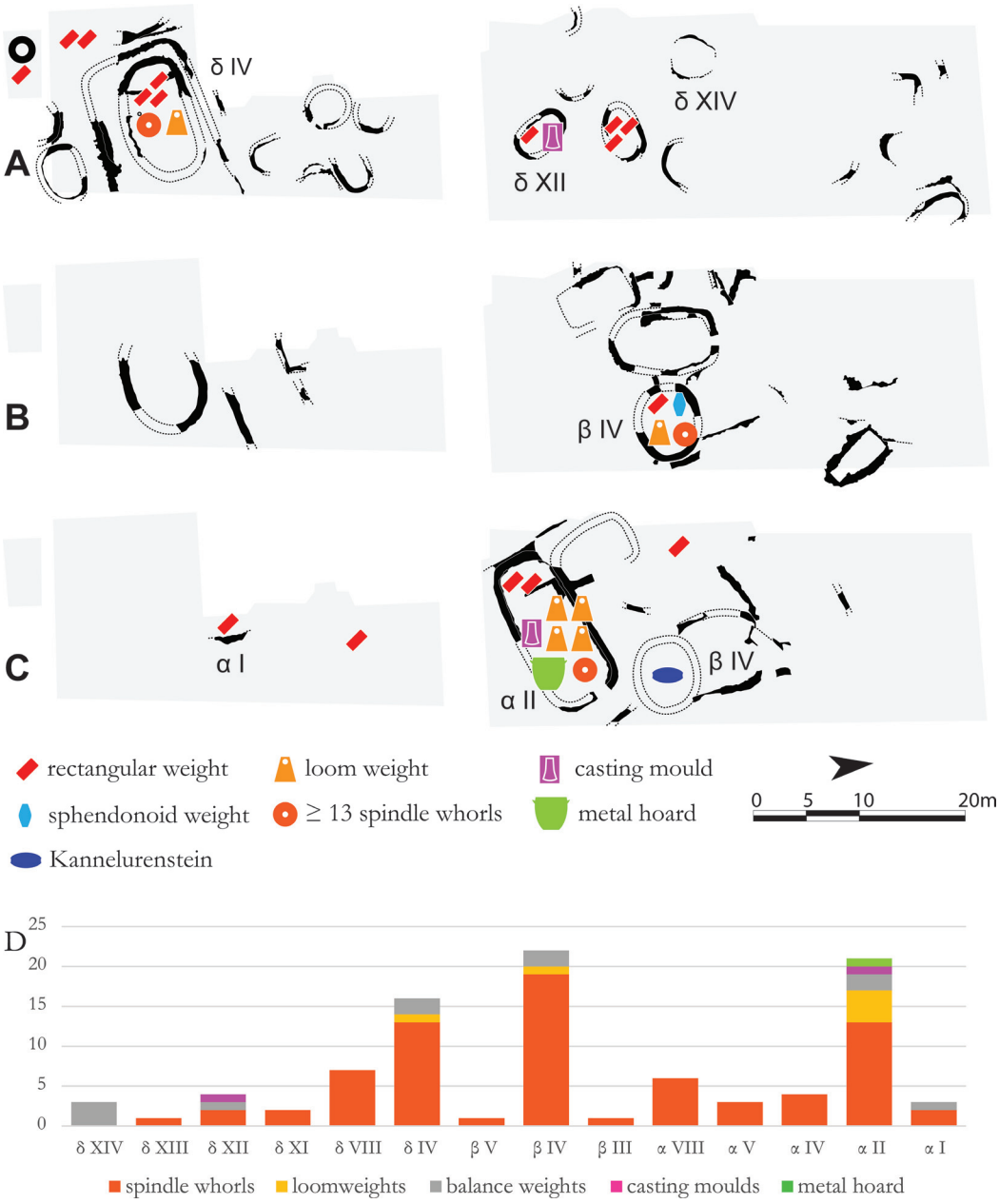
All the stone objects from L. Bernabò Brea's excavations (currently preserved in the Bernabò Brea Museum in Lipari) were sorted through, with the exception of flint and obsidian tools (Ialongo 2019). The typological range of balance weights is attested in the Aeolian Islands spans parallelepiped weights pertaining to different variants, sphendonoid weights, and *Kannelurensteine*. Parallelepiped weights are attested throughout the entire BA sequence, in three settlements located in as many different islands: Lipari-Acropolis (site no. 3), Filicudi-Capo Graziano (site no. 5), and Salina-Portella (site no. 6). Fifteen objects come from layers dated to the 'Capo Graziano' phase (*c.* 2300-1500 BCE), two from the 'Milazzese' phase (*c.* 1500-1350 BCE) and three from the 'Ausonio II' phase (*c.* 1200-950 BCE). Their occurrence in Early Bronze Age layers makes these weights the earliest known in Europe so far, outside of Greece. *Kannelurensteine* appear in the Aeolian record during the 'Milazzese' phase (*c.* 1500-1350), showing roughly the same overall chronological range attested in northern Italy and Central Europe. Four of these objects were identified in the Aeolian Islands: one from the acropolis of Lipari (Ausonio II phase, *c.* 1200-950 BCE), and three from Salina-Portella (Milazzese phase, *c.* 1500-1350 BCE). Finally, a sphendonoid weight with flat base is attested in the Ausonio I phase on the acropolis of Lipari (*c.* 1350-1200 BCE).

Contexts

The site on the acropolis of Lipari is a multi-stratified settlement with four superimposed building phases (Bernabò Brea/Cavalier 1980); balance weights are present in all occupation phases, except one (Milazzese phase, *c.* 1500-1350 BCE) (Fig. 3.5.). In the first settlement phase (Capo Graziano phase, *c.* 2300-1500 BCE), two sets of weights come from two of the best-preserved houses, while another one is associated with the casting-mould of an axe (Fig. 3.5.A). In the Ausonio I phase (*c.* 1350-1200 BCE), a parallelepiped weight is associated with a sphendonoid weight (Fig. 3.5.B). In the last occupation phase (Ausonio II, *c.* 1200-950 BCE), in the largest house of



▲ *Fig. 3.4. ID numbers of the settlements illustrated in fig. 3.3. 3 - Lipari, acropolis; 5 - Filicudi, Montagnola di Capo Graziano; 6 - Salina, Villaggio della Portella; 7 - Santu Brai; 9 - Sa Osa; 11 - Nuraghe Talei; 14 - Serra Orrios; 15 - Nuraghe Santu Antine; 16 - Monte S. Antonio; 17 - Nuraghe Palmavera; 18 - Nuraghe Sant'Imbenia; 19 - Sa Mandra Manna; 20 - Sa Tanca 'e sa Idda; 21 - Coppa Nevigata; 22 - Oratino; 25 - Sorgenti della Nova; 26 - Moscosi Piano Fonte Marcosa; 27 - Monte Croce-Guardia; 29 - Gaiato; 30 - San Giuliano in Toscanella; 31 - Bismantova, settlement; 33 - Monte Barello; 34 - Gorzano; 35 - Casinalbo; 36 - Gazzade; 37 - Montale; 38 - Scandiano; 39 - Servirola San Polo; 40 - Gaggio di Castelfranco; 41 - Redù; 42 - Basilicanova; 43 - Quingento; 44 - Savana di Cibeno; 45 - Cornocchio; 46 - Santa Rosa di Poviglio; 47 - Casaroldo; 48 - Frattesina; 50 - Bellanda; 51 - Peschiera; 52 - Bordjoš; 55 - Kalnik-Igrišče; 56 - Forel; 57 - Savognin; 59 - Ouroux-sur-Saône; 60 - Grandson-Corcelettes; 61 - Onnens; 62 - Concise; 63 - Estavayer-le-Lac; 64 - Autavaux; 65 - Avenches; 66 - Allerey-sur-Saône; 67 - Mont Beuvray-Bibracte; 68 - Vallamand; 69 - Bevaix; 70 - Cortaillod-Est; 71 - Guévaux; 72 - Haut-Vully; 73 - Colombier; 74 - Auvernier; 75 - Ins; 76 - Hauterive-Champréveyres; 77 - Saint-Blaise; 78 - Le Landeron; 79 - Mörigen; 80 - Nidau; 81 - Twann; 82 - Wartau-Herrenfeld; 83 - Port; 84 - Zug-Sumpf; 86 - Meilen; 87 - Uster-Riedikon; 88 - Zürich-Wollishofen; 89 - Zürich-Grosser Hafner; 90 - Zürich-Alpenquai; 91 - Greifensee-Böschen; 92 - Wittnau; 93 - Berg am Irchel; 94 - Andelfingen; 95 - Ürschhausen; 96 - Scherzingen; 97 - Eschenz; 98 - Insel Werd; 100 - Rachelburg; 101 - Singen, Mühlenzelgle; 117 - Landshut; 121 - Fort Harrouard; 125 - ZAC du Sansonnet, Metz; 128 - Saint-Pierre-en-Chastre, Vieux-Moulin; 131 - Mannheim-Wallstadt; 139 - Potterne; 141 - Runnymede Bridge; 144 - Klein Görigk; 150 - Friedersdorf; 154 - Groß-Glienicke; 164 - Felchow; 168 - Hitzacker; 171 - Klockow; 189 - Huelva - Plaza de las Monjas; 191 - Castro da Cola; 193 - Castro dos Ratinhos; 194 - Quinta do Almaraz; 195 - Penha Verde; 196 - Los Concejiles; 197 - Penedo do Lexim; 198 - Castro da Ota; 199 - Castro de Pragança; 200 - Abrigo Grande das Bocas; 201 - Cabezo de Araya; 202 - Monte do Trigo; 203 - Moreirinha; 204 - Santa Luzia; 205 - Nossa Senhora da Guia de Baiões; 206 - Canedotes.*



▶ *Fig. 3.5. Lipari, acropolis (Aeolian Islands, Italy) (site no. 3). Distribution of potential balance weights and of the evidence related to metalworking, metal trade and textile production (from* Ialongo *2019). A: distribution map; the position of the symbols is not accurate, having the main purpose of showing which materials were found inside the houses. B: quantification of different classes of materials inside the houses. The Greek letters identify the different phases of the settlement, from the earliest (δ) to the latest (α).*

the settlement, a pair of parallelepiped weights is associated with a casting mould and also with a hoard containing approximately 75 kg of ingots and scraps (Fig. 3.5.C).

Textile tools also show meaningful patterns of association (Fig. 3.5.D). All the loom weights found in the settlement are always associated with balance weights. The number of spindle whorls inside houses normally ranges between one and seven objects; there are only three houses – one for each phase – in which the spindle whorls range between 13-19 objects: such large amounts of spindle whorls are always associated with loom weights and balance weights.

Finally, in the site of Portella di Salina (*c.* 1500-1350 BCE), two *Kannelurensteine* were found in the same structure (R2), in association with a large clamp made of pure tin and a casting mould (Bettelli/Cardarelli 2005).

To summarize, balance weights on the Aeolian Islands often occur in small sets inside houses, and are significantly associated with evidence of metalworking, metal hoarding and textile production. The frequent occurrence inside houses suggests that balance weights were related to a household economy, rather than to professional merchants. This does not imply that specialized traders did not exist, but simply that their activity is not mirrored directly in the documentation available for the Aeolian settlements. Furthermore, the clustered distribution of balance weights, textile tools, casting moulds and hoards suggests that not every household was equally engaged in trade-dependent production. For example, the presence of the underfloor hoard, with 75 kg of scraps and ingots, hints at the capacity of a single household to gather and dispose of substantial quantities of raw metal that had to be acquired through external trade.

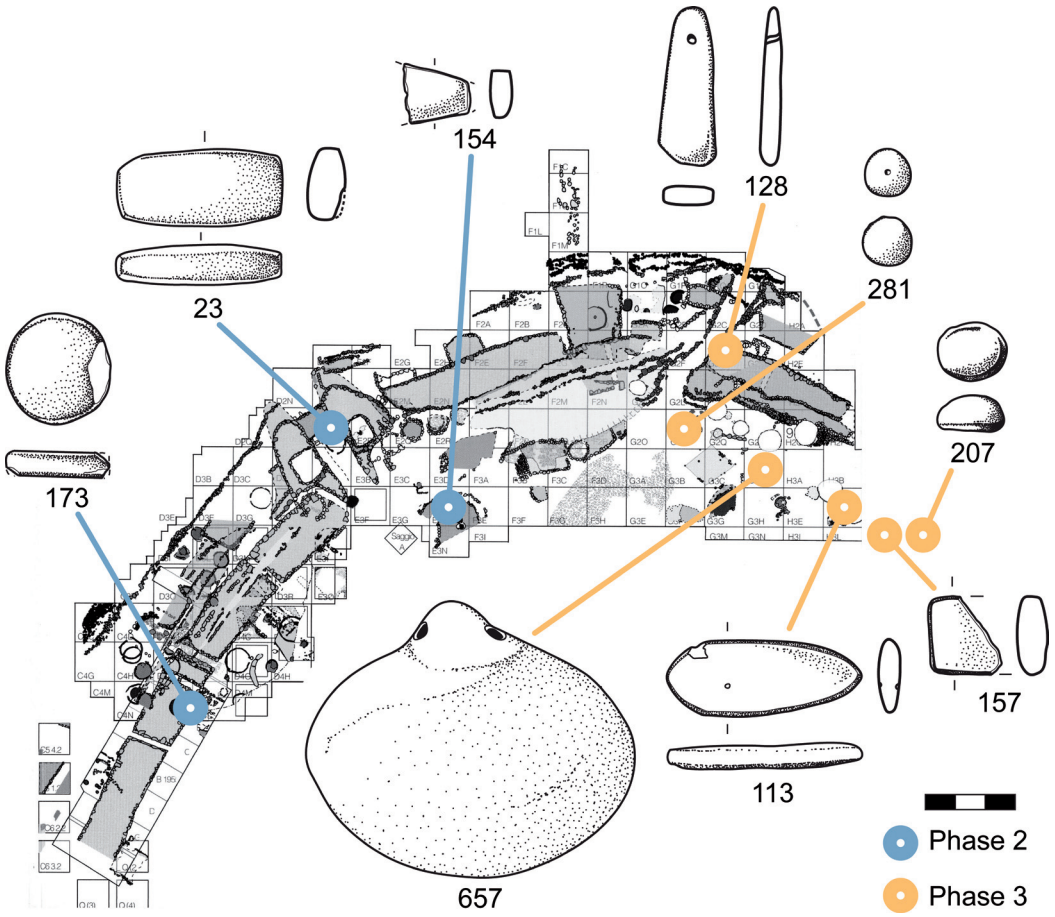


Fig. 3.6. Coppa Nevigata (Apulia, Italy) (site no. 21). Spatial and diachronic distribution of balance weights (site plan from Cazzella *et al. 2012).*

All considered, it seems plausible that one of the basic purposes of weight-based exchange within a household economy was that of acquiring raw materials to be transformed into finished products; at the same time, weight-based exchange was also likely employed to transfer transiting commodities to Mediterranean traders, and vice-versa.

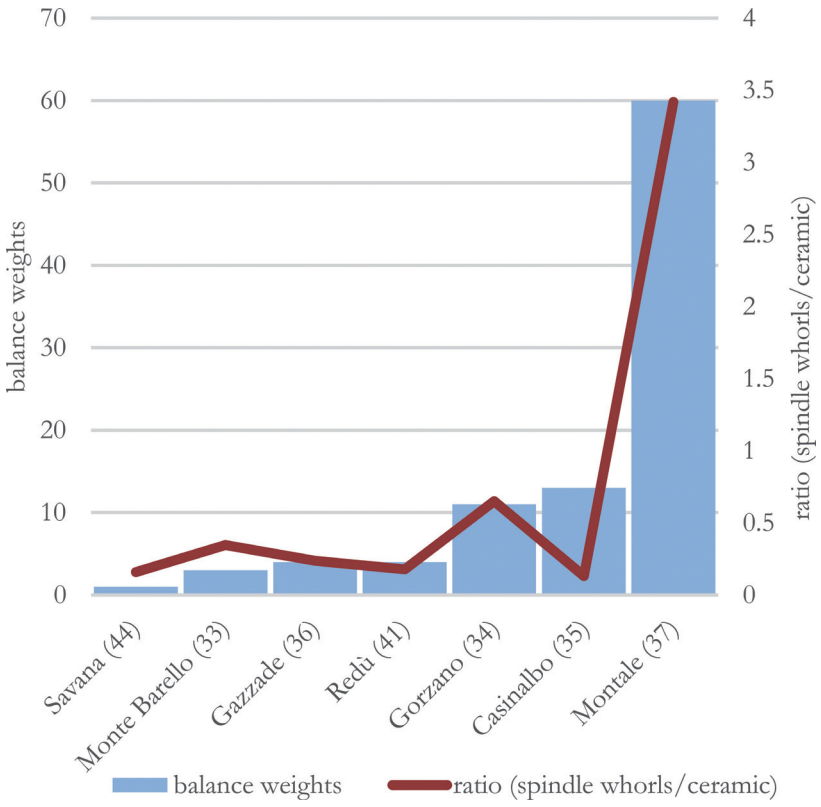
3.4.2. Coppa Nevigata (Italy, site no. 21)

Coppa Nevigata is a multi-stratified settlement close to the Adriatic coastline in northern Apulia, occupied throughout most of the 2nd millennium until the beginning of the 1st millennium BCE (Cazzella *et al.* 2012). The site was part of the Mediterranean network during the Late Bronze Age, as documented by imported and locally-produced Mycenaean pottery dating to the 13th-12th centuries BCE (LHIIIB-C) (Jones *et al.* 2014, 23). Like many other settlements in the region, Coppa Nevigata was surrounded by a massive dry-stone defensive wall guarded by towers, which was repeatedly refurbished during the Bronze Age. A unique case in the western Mediterranean, the site appears to have specialised in the extraction of purple dye from sea molluscs since *c.* 1900-1800 BCE (Cazzella *et al.* 2005; Minniti/Recchia 2018).

Regular excavations have been conducted since 1993, focussing on the north-western sector of the site (Fig. 3.6.). The sampling for this study was carried out in close collaboration with the excavation team, and in particular with G. Recchia, whom I sincerely thank for her precious help. Potential balance weights were selected after sorting through the entirety of the lithic and metallic materials currently preserved in the excavation's storerooms, located at the University of Rome "La Sapienza".

Eleven balance weights were identified, eight of which come from well-dated contexts belonging to the site's *'Protoappennine'* and *'Subappennine'* phases, roughly corresponding, respectively, to Phases 2 and 3 of the present study (Fig. 3.6.). The spatial distribution shows that the *Protoappennine* finds are only present in the western half of the site, while *Subappennine* weights are limited to the eastern half, which is probably connected to differential erosion patterns, that exposed earlier levels in the western sector.

Three weights have been found in close association with identifiable activities. A parallelepiped weight (cat. no. 23) was found in a small room inside the fortification walls, where conspicuous remains of purple-dye extraction were also identified. A fragment of a second parallelepiped weight (cat. no. 154) was recovered in an open-air area with cooking facilities. Finally, a large piriform weight was associated with a high amount of bronze and bone ornaments, a knife, and a rock crystal sphere, in a context interpreted by the excavators as connected to 'artisanal activities' (Cazzella/Recchia 2017).



▲ *Fig. 3.7. Terramare (northern Italy). Number of balance weights compared to the ratio of the total number of spindle whorls and the total number of ceramic objects for each site (data from Sabatini et al. 2018). The numbers in parentheses indicate the ID number of each site.*

3.4.3. Terramare (Italy, sites no. 29-50)

The so-called 'terramare' (sing. terramara) are characteristic settlements of the eastern Po Plain, which developed between *c.* 1600-1200 BCE along with peculiar metallurgy, pottery style, and burial rite (Di Renzoni 2006; Cardarelli 2009). A typical terramara is a relatively small settlement (*c.* 1-2 ha on average, but with outliers measuring up to *c.* 20 ha) completely enclosed by a perimetral wall and a ditch, with tightly laid-out rectangular houses which may or may not present above-ground floors. Terramare tend to grow in number and size in the course of the MBA and LBA until their definitive abandonment around 1200 BCE, which leaves the eastern Po Plain almost completely uninhabited until the end of the 2nd millennium BCE.

The terramara of Gaggio di Castelfranco (site no. 40) is the only site providing enough documentation to address the direct connection between balance weights and productive activities, indicating that three balance weights (cat. no. 34, 52, 674) are associated with metallurgical activities during the MBA (Balista *et al.* 2008). On a broader perspective, however, quantitative observations seem to suggest a connection between textile production and weighing technology in the terramare, and in particular at the site of Montale (site no. 37), near Modena. It has been recently reported that the terramara of Montale has yielded as many as 4,454 spindle whorls – mostly coming from a relatively small excavation sector – with the site of Gorzano coming second with 'only' 443 (Sabatini *et al.* 2018). The sheer number of spindle whorls is impressive in its own right, and it stands out even more when compared to other contemporary sites in the same region. The graph in Fig. 3.7. illustrates the ratio between spindle whorls and the total number of ceramic objects from seven terramare – all the sites for which S. Sabatini *et al.* (2018) could provide reliable figures. The graph shows that, at Montale, there are *c.* 3.5 spindle whorls for each ceramic sherd collected. Exploring further supporting evidence, the authors argue that this could hint that the settlement of Montale was specialised in the production of wool yarn for export.

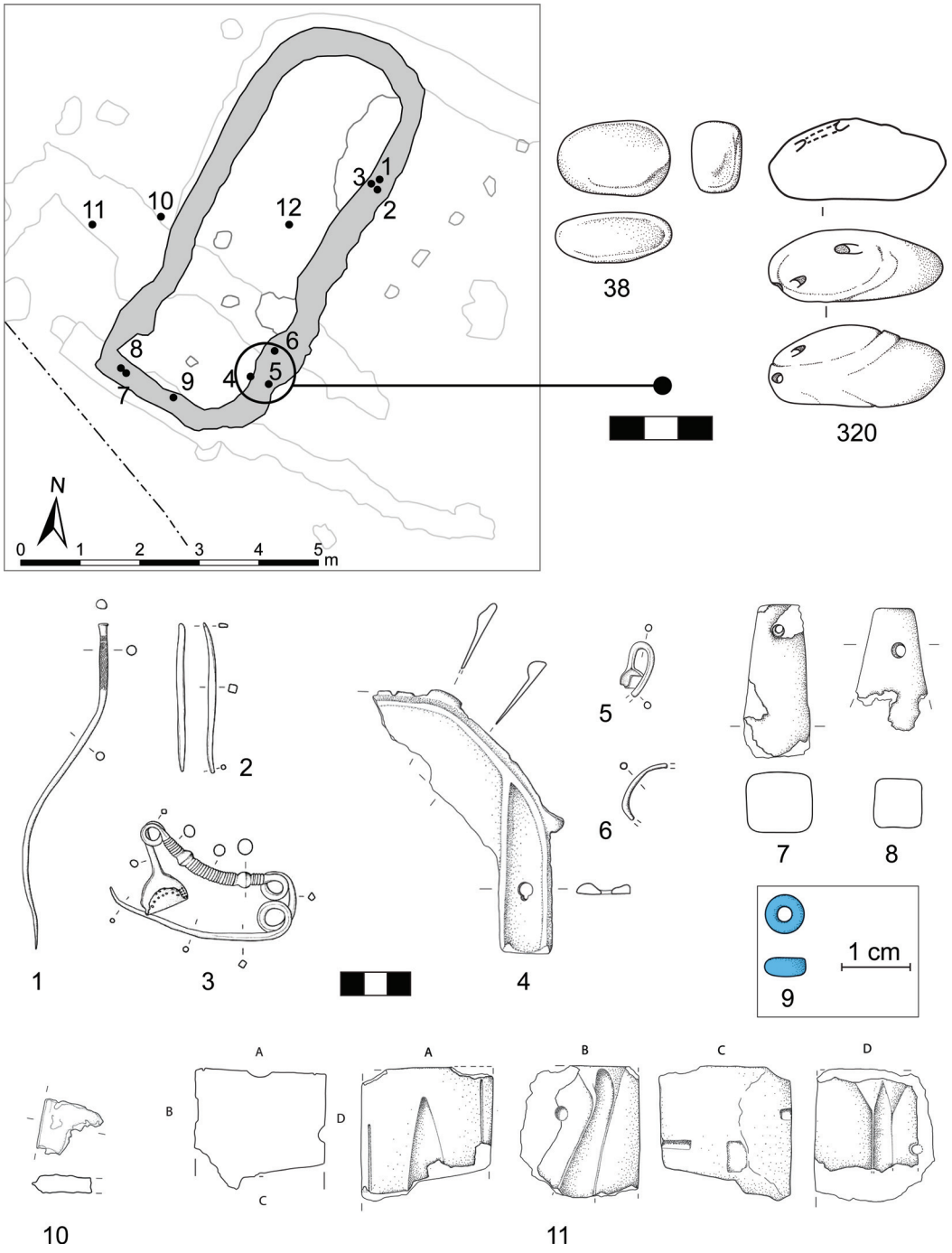
Interestingly, Montale is also by far the site with the highest number of balance weights in Europe, with 60 objects against the 29 reported for the pile-dwelling site of Zürich-Alpenquai (site no. 90), in Switzerland, which comes second. The unusually high occurrence of both spindle whorls and balance weights might suggest that a connection existed at Montale between the commercial production of wool yarn and the necessity to quantify its value. Interestingly, almost all balance weights from Montale are heavy weights in the *mina*-range (n= 56). If future research will confirm the relationship between heavy weights and wool production in Bronze Age Europe, the case of Montale would find a close parallel in Bronze Age Mesopotamia. Since the 3rd millennium BCE, wool used to ship in bulks, with the *mina* being its main unit of measurement (Michel 2014). The connection between wool and heavy weight units was so close that several researchers hypothesize the existence of a special *mina* that was exclusively used to measure wool products (Peyronel 2014). Unfortunately, all the balance weights from Montale come from very old excavations with no detailed documentation, and the existence of such a connection in Europe remains, for now, hypothetical.

3.4.4. Monte Croce-Guardia (Italy, site no. 27)

Monte Croce-Guardia is a hilltop site in the Marche region (Italy), located on the mountainous area overlooking the middle Adriatic coast. Recent excavation campaigns exposed the foundations several rectangular houses, with use surfaces largely obliterated by natural erosion (Cardarelli *et al.* 2017). A concentration of bronze objects (both complete and fragmented), a fragment of a casting mould, two loom weights, and two balance weights (cat. no. 38, 320) dating to the Final Bronze Age (corresponding to Phase 4 in this work) were identified in the residual layers associated with House 3 (Fig. 3.8.). The excavators interpret these materials as residues of weaving, hoarding and casting activities.

3.4.5. Monte S. Antonio (Italy, site no. 16)

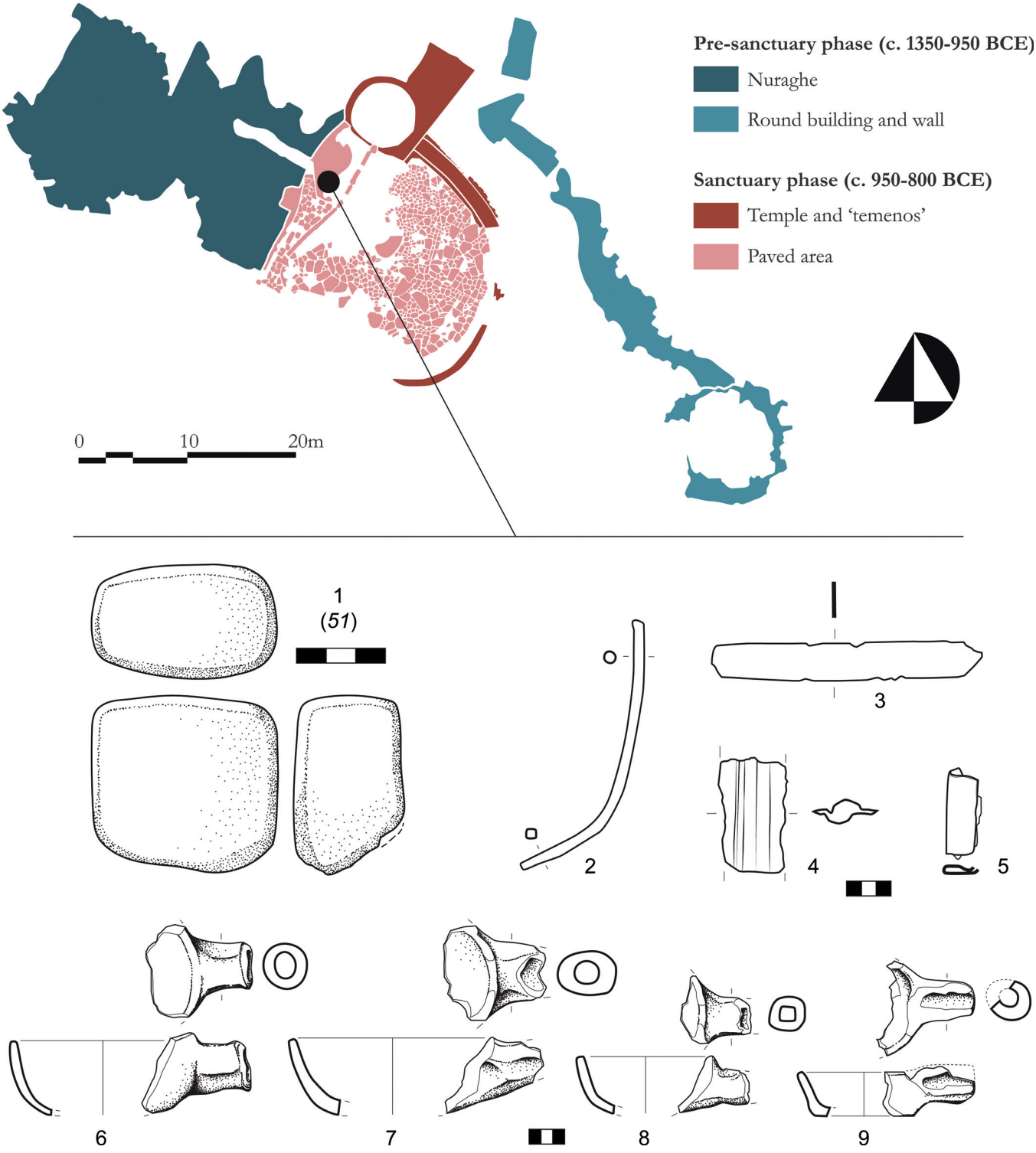
The site of Monte S. Antonio (Sardinia) was originally a Nuragic village that developed through the Middle and Final Bronze Age (*c.* 1500-950 BCE), eventually turned into a monumental sanctuary on the verge of the 1st millennium BCE (Ialongo 2011; 2018). The sanctuary – which partly oblit-



◀ *Fig. 3.8. Monte Croce-Guardia (Marche, Italy) (site no. 27). Plan of house 3 and localization of associated materials (from* Cardarelli *et al. 2017). Cat. No. 38, 320: balance weights (stone). Associated materials (all bronze, unless specified): 1) pin; 2) awl; 3) fibula; 4) fragmented sickle; 5) fragmented fibula; 6) fragment of wire; 7-8) loom weights (clay); 9) blue glass bead; 10) bronze fragment; 11) multifunctional casting mould (sandstone).*

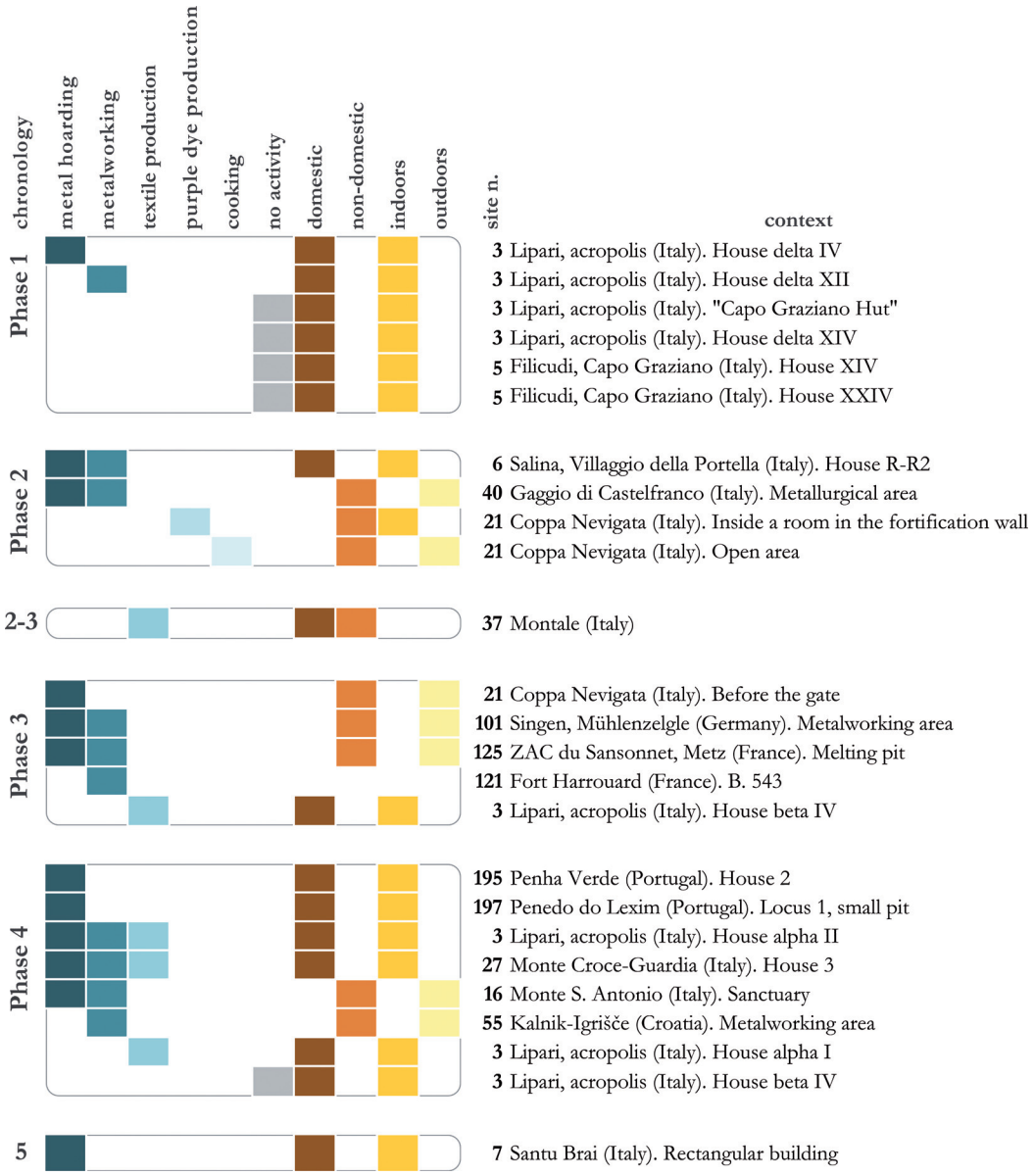
erates the pre-existing structures – is articulated into two architectural clusters, separated from one another by *c.* 100 m. The northern cluster – the one from which the balance weight comes from – presents a complex architectural sequence (Fig. 3.9.). An open-air paved area surrounded by a wall (a so-called *temenos*) with a 'well temple' on its northern side leans against a pre-existing nuraghe, and was built at short distance from a pre-existing massive wall leading to a circular house. Both the materials and the structural stratigraphy clearly show that the paved area was built much later than the nuraghe, but unfortunately the archaeological finds cannot always be easily attributed to a specific chronological phase.

The group of materials under examination here comprises a parallelepiped weight (Fig. 3.9.1, weight no. 51), four ceramic crucibles (Fig. 3.9.6-9), and four metal fragments, dated between the end of the 2nd and the beginning of the 1st millennium BCE (Phase 4). Based on what it could be possible to reconstruct from the unpublished excavation reports (Ialongo 2011), the materials formed a concentration located on the paved area right in front of the former access to the nuraghe. In itself, this group of materials would point to a connection with metallurgy and hoarding. Unfortunately, the available data are not sufficient to ascertain whether these materials pertain to the earlier village or to the later sanctuary. The typology of the materials



▲ *Fig. 3.9. Monte S. Antonio (Sardinia, Italy) (site no. 16). Plan of the sanctuary and preexisting settlement (from* Ialongo *2018), and localization of the balance weight and associated finds (from* Ialongo *2011). 1) balance weights (stone); 2) thick bronze rod; 3) fragment of bronze band; 4) sword blade fragment; 5) bronze sheet fragment; 6-9) ceramic crucibles.*

points at a rather generic horizon encompassing the end of the Final Bronze Age and the beginning of the Early Iron Age, in terms of Sardinian chronology, which is compatible with both architectural phases. At the same time, materials located in that area of the settlement could either belong to the dispersion of finds spread out on the paved area or to the deposit formerly contained within the nuraghe, which partly spread on the paved area following the collapse of the masonry closing the entrance to the nuraghe. Either way, the concentration of four crucibles is hardly accidental, as these objects were not found anywhere else on the site.



◀ *Fig. 3.10. Comparative table of different types of activities attested in well-documented contexts, in association with balance weights.*

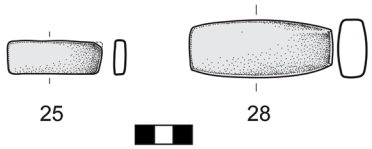
3.4.6. Other contexts

- Santu Brai (Italy, site no. 7), Phase 5. Set of four balance weights (cat. no. 164, 307-308, 316), two of which with quantity marks (cat. no. 307-308), from a rectangular house, in association with a small ceramic jug containing an awl, a small saw, a dagger, and a bronze fragment (Ugas 1986).
- Kalnik-Igrišče (Croatia, site no. 55), Phase 4. Balance weight (cat. no. 330) associated with open-air metallurgical facilities (Vrdoljak/Forenbaher 1995).
- Singen, Mühlenzelgle (Germany, site no. 101), Phase 3. Balance weight (cat. no. 105) associated with metallurgical activities (Hopert 1995).
- Fort Harrouard (France, site no. 121), Phase 2-3. Balance beam (cat. no. 8) associated with several clay tuyère (Mohen/Bailloud 1987, pl. 85.8).
- ZAC du Sansonnet, Metz (France, site no. 125), Phase 3. Set of wo balance weights associated with open-air smelting facilities (Klag/Wiethold 2020).
- Penha Verde (Portugal, site no. 195), Phase 4. Set of four balance weights (cat. no. 185, 187, 212, 219) inside a house, associated with fragment of bronze ingot, a fragment of a bronze arm ring, a gold pin, and a gold bead (Cardoso 2011).
- Penedo do Lexim (Portugal, site no. 197), Phase 4. Balance weight (cat. no. 217) found in a small pit inside a house (Sousa/Sousa 2018).

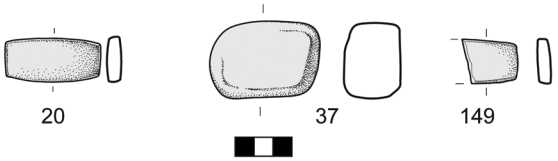
3.4.7. General observations on settlement contexts

The table in Fig. 3.10. shows a synthetic list of all contexts from settlements that provide indication of associated activities. In European settlements, balance weights are indifferently attested in connection with domestic and non-domestic spaces, both indoors and outdoors. Evidence of metal

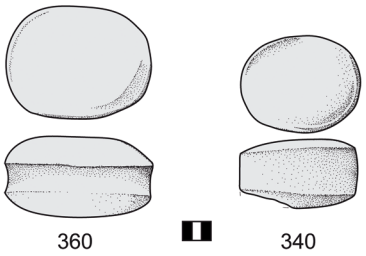
Lipari, acropolis
[3, settlement] (Italy). House delta IV (Phase 1)



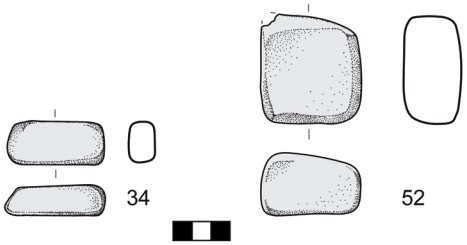
Lipari, acropolis
[3, settlement] (Italy). House delta XIV (Phase 1)



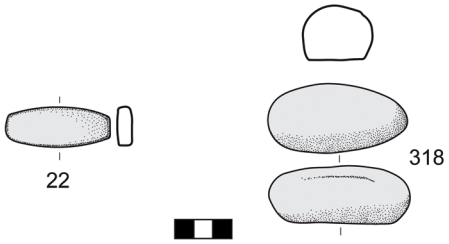
Salina, Villaggio della Portella
[6, settlement] (Italy). House R-R2 (Phase 2)



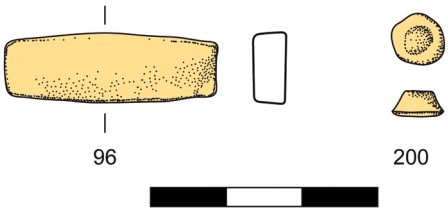
Gaggio di Castelfranco
[40, settlement] (Italy). Metallurgical area (Phase 2)



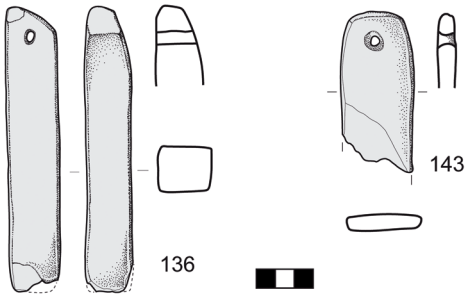
Lipari, acropolis
[3, settlement] (Italy). House beta IV (Phase 3)



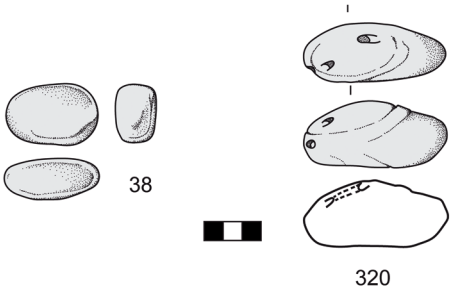
ZAC du Sansonnet
[125, settlement] (France). (Phase 3)



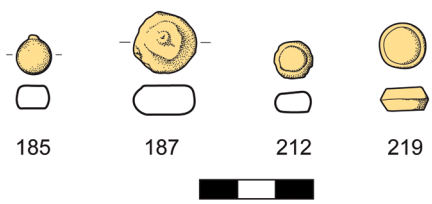
Lipari, acropolis
[3, settlement] (Italy). House alpha II (Phase 4)



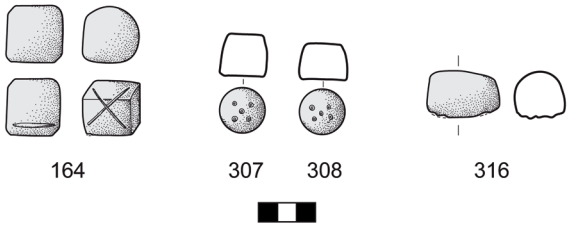
Monte Croce-Guardia
[27, settlement] (Italy). House 3, phase III (Phase 4)



Penha Verde
[195, settlement] (Portugal). House 2 (Phase 4)



Santu Brai
[7, settlement] (Italy). Rectangular building (Phase 5)



▲ *Fig. 3.11. Weighing sets from settlements. Yellow filling: bronze; grey filling: stone.*

hoarding, metalworking, and textile production is attested in connection with balance weights in all chronological phases, with two or more of these activities being often attested simultaneously. Furthermore, several contexts with balance weights do not show any clear evidence of activities connected to trade or production. At the same time, due to the highly discontinuous state of the available documentation, one cannot even be sure that the absence of any direct evidence of either of such productive activities actually means that these activities – or any other – were not carried out at all. The proxies used here to identify productive activities are, for the most part, metal objects, casting moulds and textile tools – all of which are fairly common in many settlement contexts across Europe.

While future research, supported by a much more conspicuous amount of data, may eventually reveal local and chronological trends, it would not seem that, on a European scale, balance weights are significantly associated with a specific productive activity. In synthesis, the available data seem to indicate that there is no particular functional pattern in the distribution of balance weights in in European settlements during the Bronze Age. The absence of a pattern, however, emerges as a pattern in itself. Simply put, balance weights appear as mundane tools of everyday use, which one could find in the domestic equipment of potentially any household, regardless of whether or not its members engaged in any kind of activities that archaeologists would normally classify as 'trade' or 'production'.

3.4.8. Weighing sets from settlements (Fig. 3.11.)

Phase 1

- Lipari, acropolis [site no. 3, settlement] (Aeolian Islands, Sicily, Italy).
  - House delta IV, Area O, Strata 3-4 (Capo Graziano). Phase 1 (EBA-MBA 1-2) - Set of two weights (cat. no. 25, 28). Associations: bronze awl, three bronze fragments.
  - House delta XIV, Area Bh (phase Capo Graziano). Phase 1 (EBA-MBA 1-2) - Set of two weights (cat. no. 20, 37). Associations: two bone spatulae.

Phase 2

- Salina, Villaggio della Portella [site no. 6, settlement] (Aeolian Islands, Sicily, Italy). House R-R2. Phase 2 (MBA 3) - Set of two balance weights (cat. no. 340, 360). Associations: tin ingot, casting mould.
- Gaggio di Castelfranco [site no. 40, settlement] (Modena, Emilia Romagna, Italy). T. 507, Trench 3, VP 3, US 4373, fase 1.3. External productive area, next to a fireplace. Phase 2 (MBA-RBA) - Set of two weights (cat. no. 34, 52). Associations: traces of metallurgical activity.

Phase 3

- Lipari, acropolis [site no. 3, settlement] (Aeolian Islands, Sicily, Italy).
  - House beta IV, dromos, slab pavement. Phase 3 (RBA) - Set of two weights (cat. no. 22, 318). Associations: loom weight, high number of spindle whorls.
  - House alpha II, Wall, base layer. Phase 4 (FBA) - Set of two weights (cat. no. 136, 143). Associations: nuragic pottery, four loom weights, high number of spindle whorls, bronze chisel, scalpel, bronze fragments, mould, metal hoard (*c.* 75 kg).
- ZAC du Sansonnet, Metz [site no. 125, settlement] (Grand Est, dép. Moselle, France). Melting pit (surroundings). Phase 3 (Br D) - Set of two balance weights (cat. no. 96, 200). Associations: fire pits, crucibles, metal objects.

Phase 4

- Monte Croce-Guardia [site no. 27, settlement] (Arcevia, Marche, Italy). House 3, fase III, US 402. Phase 4 (FBA) - Set of two balance weights (cat. no. 38, 120). Associations: concentration of fragmented bronze objects and a casting mould, interpreted as workshop/hoard (sickle fragment, fibula fragment, bronze wire fragment, glass bead).
- Penha Verde [site no. 195, settlement] (Sintra, Sintra, Portugal). House 2. Phase 4 (Atlantic FBA III) - Set of four balance weights (cat. no. 185, 187, 212, 219). Associations: fragment of bronze ingot, fragment of bronze armring, gold pin, gold bead.

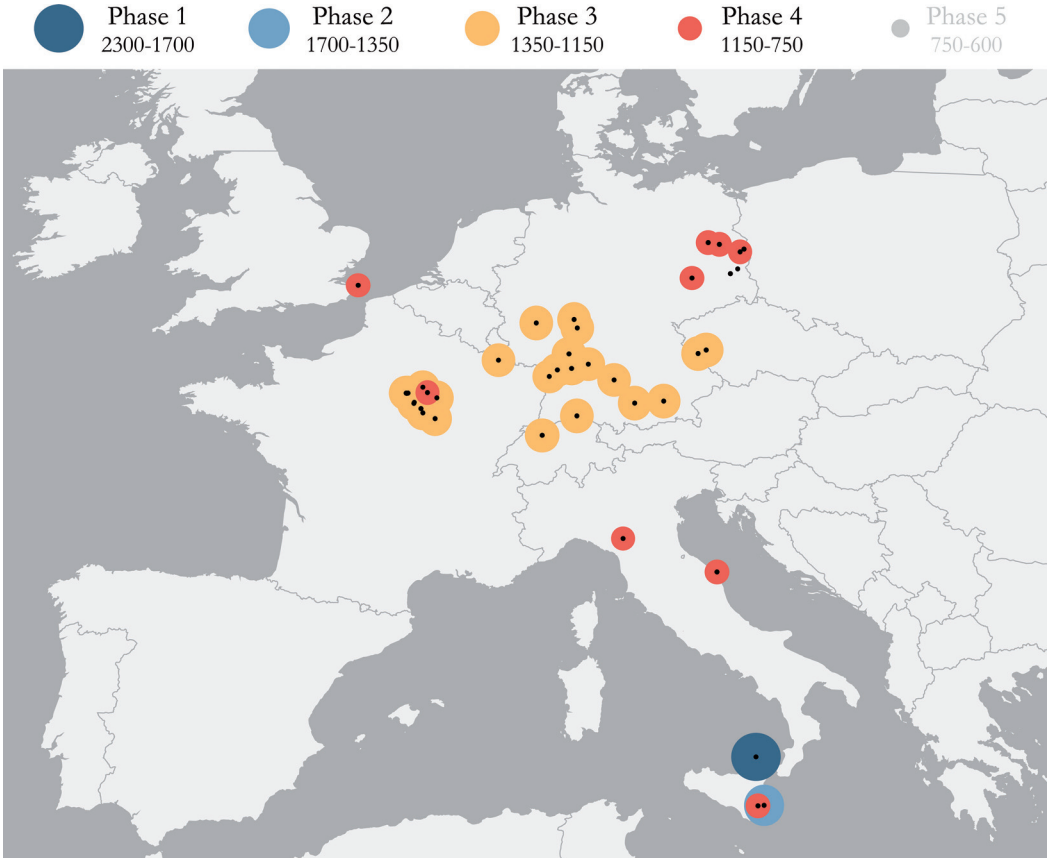
Phase 5

- Santu Brai [site no. 7, settlement] (Sardinia, Italy). Rectangular house. Phase 5 (EIA 2B-Early Orientalizing) - One incised line on one face; two crossed lines across two faces. Set of four balance weights (cat. no. 164, 307, 308, 316). Associations: small ceramic jug containing an awl, a small saw, a dagger, and a bronze fragment; Etruscan bucchero.

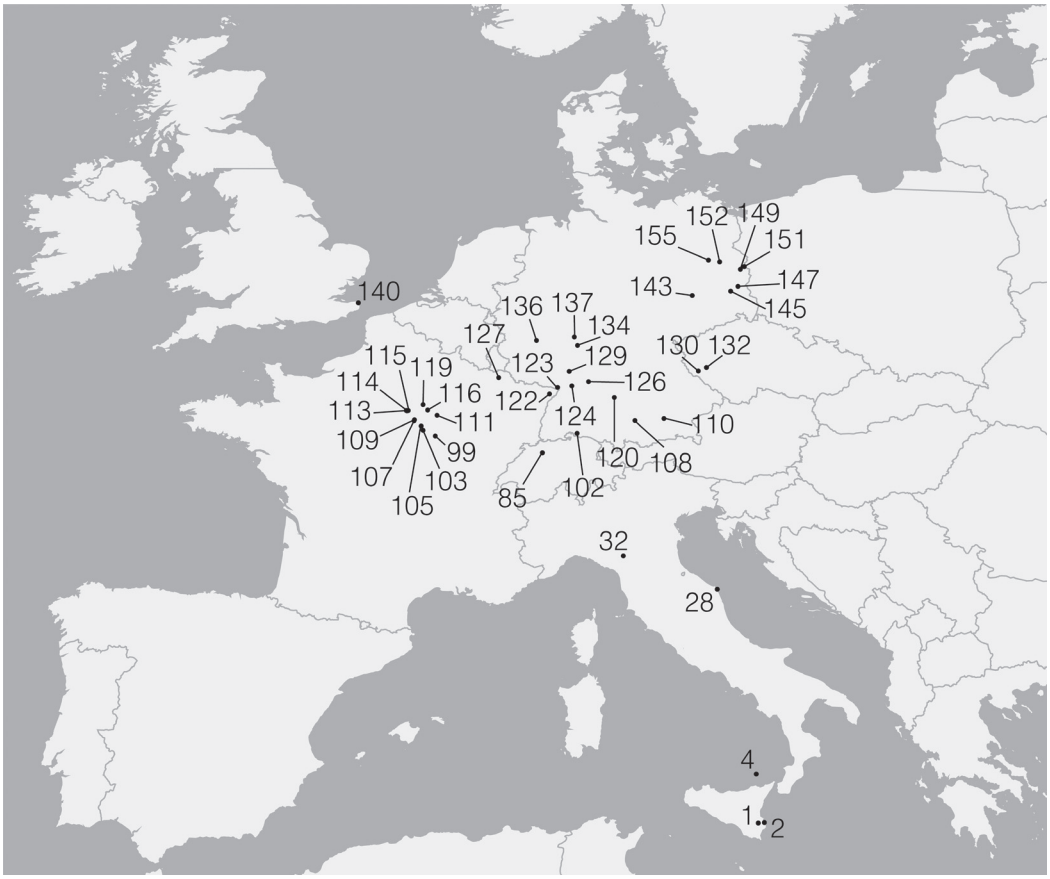
3.5. Burials (Fig. 3.12.-13.)

3.5.1. Association analysis

Examining the distribution of weighing equipment in burials offers the unique opportunity to attempt connecting weighing technology with their users. The distribution of weighing equipment in European burials has been addressed a few times in the past. C. Pare's (1999) study, published more than 20 years ago, is still the most exhaustive available to date. Pare was the first to confidently identify parallelepiped weights as the most recurring type in Central Europe starting *c.* 1350 BCE, often occurring in sets comprising up to twelve objects. Later research on French burials of the same period, albeit more limited in its geographical and chronological scope, could rely on high-quality first-hand documentation from accurate excavations (Roscio *et al.* 2011; 2018; Roscio 2018). These studies already provide excellent graphical and contextual documentation of most of the burial contexts included in this book, and while I could add a few entries to



▶ *Fig. 3.12. Burial sites: geographic and diachronic distribution.*



▶ *Fig. 3.13. ID numbers of the burial sites illustrated in fig. 3.12. 1 - Pantalica; 2 - Thapsos; 4 - Lipari, Contrada Diana; 10 - Monte Prama; 28 - Numana; 32 - Bismantova, Campo Pianelli; 85 - Galgenrain; 99 - Noyers; 102 - Singen, Widerholdstrasse; 103 - Monéteau, "Aux Bries"; 105 - Migennes, Le Petit Moulin; 107 - Passy-sur-Yonne, La Sablonière; 108 - Hurlach; 109 - Etigny, "Le Brassot" Ouest; 110 - Poing; 111 - Rosières-près-Troyes "Les Monts Hauts"; 113 - Marolles-sur-seine, la Croix-Saint-Jacques; 114 - Marolles-sur-Seine, La Croix de la Mission; 115 - Marolles-sur-Seine, Gours-aux-Lions; 116 - Marigny-le-Châtel - Le Pont de Riom; 118 - Barbuise-Courtavant, Les Grèves; 119 - Barbuise-Courtavant, Grèves de Frécul; 120 - Königsbronn; 122 - Haguenau-Oberfeld; 123 - Büchelberg; 124 - Gondelsheim-Mordäcker; 126 - Neckarsulm; 127 - Richemont-Pépinville; 129 - Waldspitz; 130 - Milavče; 132 - Horušany; 134 - Düne; 136 - Kobern; 137 - Steinfurth; 140 - Cliffs End Farm; 143 - Battaune; 145 - Pritzen; 147 - Cottbus-Schmellwitz; 149 - Müllrose; 151 - Frankfurt "Nussweg"; 152 - Berlin-Rahnsdorf; 155 - Wilmersdorf.*

site n.	Inhumation/Cremation	sex	balance weights	balance beam	sword/scabbard	bronze vessel	dagger	awl/chisel/hammer/moulds	spear head/butt	wagon/horse bits	knife/sickle/hook	tweezers/razor	pins	bronze fragments	gold fragments	organic container (?)	phase	shekel/mina
130	I	(M)	2														3	shekel
130	I	(M)	2														3	shekel
126	I	M	1														3	shekel
110	C	(M)	1														3	shekel
118	I	(M)	1														3	shekel
102	I	(M)	2														3	shekel
108	C	M+F	3														3	shekel
105	I	(M)	2	1													3	shekel
115	I	M	2														3	shekel
127	I	(M)	7														3	shekel
105	I	M	19	2													3	shekel
115	C	(M)	1	1													3	shekel
105	I			1													3	
120	C	(M)	1														3	shekel
116	C		1														3	shekel
109	I	(M)	13	1													3	shekel
132	C		4														3	shekel
136	C		1														3	shekel
123	I		9														3	shekel
129	I		2														3	shekel
107	I	(M)	5														3	shekel
143	C		1														4	shekel
28	C	(M)	1														4	shekel
32	C	(M)	1														4	shekel
2	I		18														3	shekel
99	C																3	
124	I		2															shekel
152	C		1														4	mina
110	C		2														3	shekel
137	I		12														3	shekel
119	I	(M)	3														3	shekel
118	I		4														3	shekel
103	I	(M)	2	1													3	shekel
2	I		1														3	shekel
105	C			1													3	
114	C			1													3	
134	C		1														3	shekel
147	C		1														4	mina
113	C			1													3	
122	C			1													3	
155	C		3														4	shekel+mina
1	I		1														4	shekel
4	I		1														1	shekel
149	C		1														4	mina
151	C																4	mina

▲ *Fig. 3.14. Synthetic table of the associations of grave goods and weighing devices in graves.*

the list, the limited amount of new data does not justify a detailed, case-by-case re-examination.

Here, I present the data in tabular form and attempt a comparative analysis. Any consideration on weighing equipment in Bronze Age burials must take into account the inherent limits of the available documentation, illustrated in the first part of this chapter. Fig. 3.14. shows a synthetic report of all the relevant traits of the 45 burials considered in this study that offer enough contextual information for a comparative analysis. The table records: 1) the site number; 2) the grave number, in case more than one burial from a same site is included in the list; 3) whether the burial is an inhumation or a cremation; 4) the determination of sex given in the original publication (in parenthesis if it is determined based on the grave goods); 5) type and quantity of weighing equipment (weight/balance beam); 6) grave goods (only presence/absence); 7) the chronological phase; 8) country of provenance.

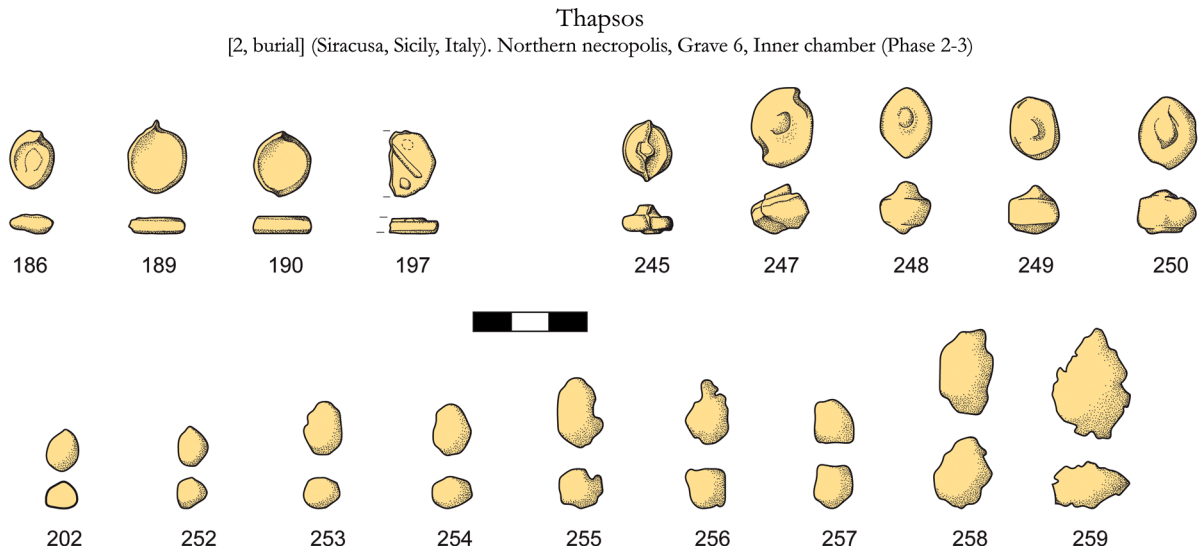
Burial contexts were grouped based on the exclusive occurrence of different categories of grave goods. The first group is defined by the exclusive presence of a sword and/or a scabbard, with the occasional occurrence of bronze vessels. The exclusive presence of working tools defines the second group with the occasional occurrence of a dagger; the tools represented in this group can be generically correlated with the metallurgical sphere, being suitable for smelting (casting moulds) and for breaking down metal objects (awl, chisel, hammer). The third group is characterised by the absence of any kind of exclusive element, while showing variable associations of grave goods also occurring in the first two groups, with the notable exception of any kind of weaponry (in particular spearheads and arrowheads), miniature wagons, and horse bits. Finally, the fourth group is formed by graves that do not present any form of grave goods, with the exception of weighing equipment.

The associations table yields a rather sharp rendition of the tiered scheme in which archaeologists often classify Bronze Age burials, with individuals with swords usually placed at the top of an ideal hierarchy, graves with less prominent armament occupying a lower position, and individuals without distinctive traits – especially those without weapons – coming last (*e. g.*, Pacciarelli 2001; Harding 2007; Meller 2017). There is of course widespread awareness that such a scheme represents an oversimplification of the highly complex interplay between the organisation and structure of living societies and their ritual representation in the burial rite (Brück/Fontijn 2013; Frieman *et al.* 2017; Pape/Ialongo 2023), and this book is clearly not the appropriate space to discuss its many facets. For the scope of this study, I will simply rely on the widespread assumption that different groups of grave goods associations – being fairly regular and recurrent – must be at least loosely correlated to real-life perceptions of rank, status or function.

I will start by outlining the limits and apparent contradictions highlighted by the available evidence. The determination of the sex of buried individuals is the first obstacle to assessing the significance of the data. Determinations based on osteological analyses are only available for four burials in the sample, three of which contain individuals determined as male, and one the remains of two individuals, one female and one male (site no. 108). Fifteen more individuals lacking osteological determinations are associated with grave goods that are usually interpreted as typical of the male equipment. Prominently among these, swords are generally assumed to be masculine attributes in European burials, as are spearheads, tweezers, and razors (Treherne 1995). Daggers, on the other hand, tend to be associated with both biological males and females (Pape/Ialongo 2023). While the data show convincing evidence of associations with male individuals, the missing sex determinations are too many to exclude that weighing equipment was commonly associated to female burials as well. As a consequence, no preferential connection can be established, for the time being, with either biological sex.

A further limit of the classic tiered scheme is its ambiguity in the distinction of socially-constructed qualities such as rank, status or prestige as opposed to the more mundane aspect of wealth, the latter gaining quite some relevance when it comes to assess the significance of tools whose main purpose was to quantify economic value in transactions. While quantifying wealth in burials is objectively difficult and perhaps inevitably tied to subjective perceptions, one can easily observe that the 'expensive material' by definition – *i. e.*, gold – occurs indifferently in the first three groups. Moreover, gold always occurs in fragments, which would appear to stress its economic value rather than its symbolic meaning. Bronze fragments recur across the first three groups as well – sometimes associated with gold fragments – suggesting a possible connection with their hypothetical monetary use, which is in turn supported by their systematic compliance with weight systems (Ialongo/Lago 2021; 2024). Finally, it should be noted that the fourth group includes mostly cremations burials which notoriously lack grave goods, due to ritual norms, and that therefore it should not be necessarily regarded as a group of 'poor' graves. Nonetheless, it is worth noting that weighing devices are the only grave goods (other than pottery) represented in these graves.

A further unifying trait between the first three groups is the frequent occurrence of traces of small containers made of organic material, identified by small bronze-sheet cylinders that functioned as hinges or closing devices (Pare 1999). When detailed excavation reports are available, such cylinders are often aligned on the edges of darker patches of soil collecting dense concentrations of small ob-



▲ *Fig. 3.15. Weighing sets from burials (Italy). Yellow filling: bronze.*

jects, including balance weights and scales (Roscio *et al.* 2011). One of these containers – containing metal scraps – has been recently identified among the remains of the Bronze Age battlefield of Tollense Valley, in northern Germany (Uhlig *et al.* 2019).

3.5.2. General observations on burial contexts

In synthesis, the tabular analysis singles out four groups of depositions that approximately correspond to the usual tiered scheme of Bronze Age burials, and weighing equipment is indifferently attested in each group, roughly in equal proportions. Based on the available data, it can be concluded that there is no evidence that status, rank, prestige and even wealth are determinant factors for the deposition of weighing equipment in European graves. Moreover, the randomness of the distribution of weighing equipment indirectly corroborates the statistical significance of the available sample, despite its small size: As weights and balances occur in equal quantities in each group, it is fair to expect that a moderate increase in the sample size will not result in a significantly different picture, at least not in the near future.

Overall, the picture rendered by burials is entirely consistent with the evidence from settlements, which shows that weights and balances indifferently occur in association with diverse productive activities – as well as with no activity at all – both in private and public spaces. In conclusion, the evidence from both burials and settlements reinforces the impression that weights and balances were rather unremarkable tools of everyday utility, that could be used in the most diverse occasions by the most diverse individuals.

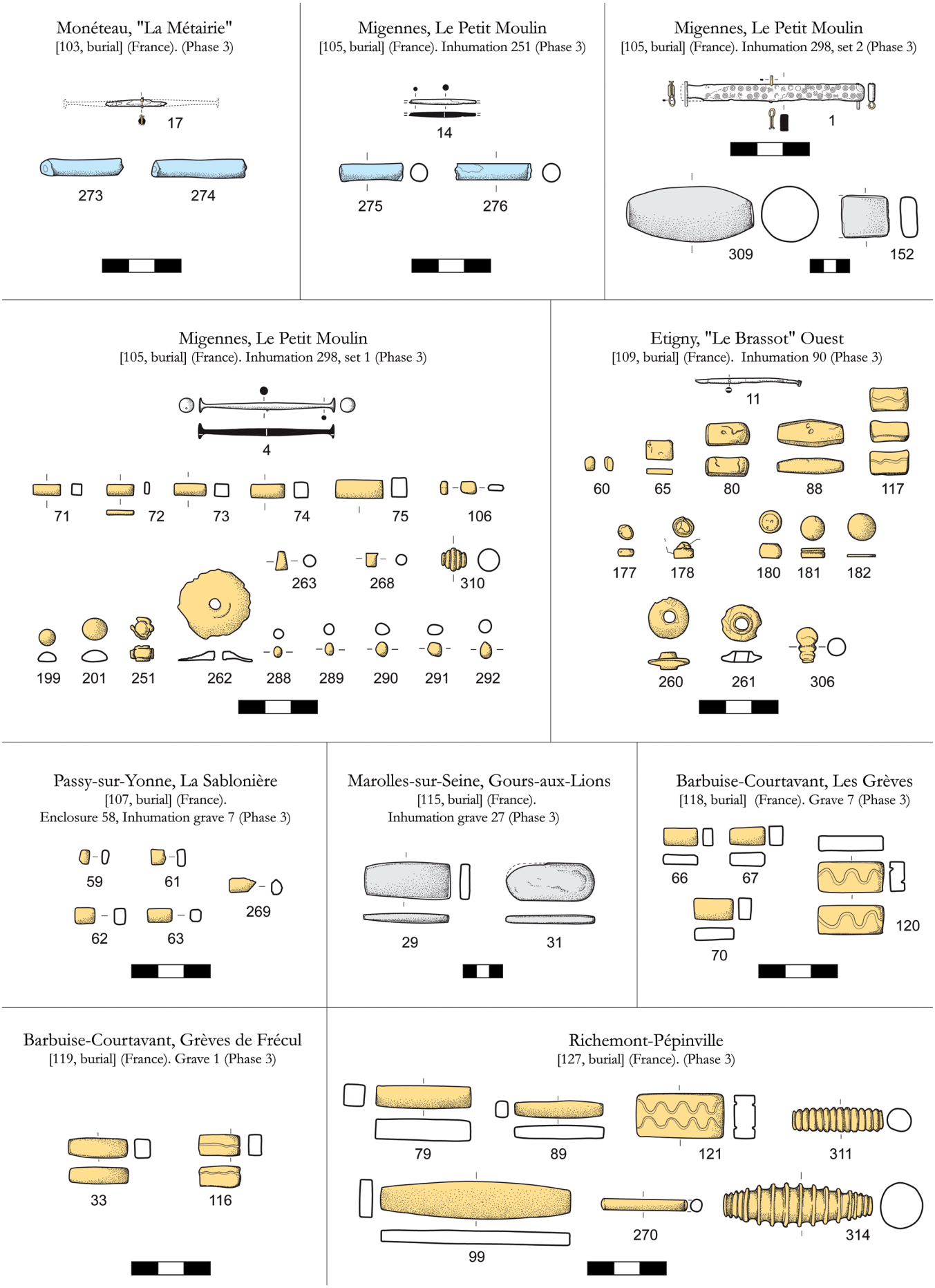
3.5.3. Weighing sets from burials

Italy (Fig. 3.15.)

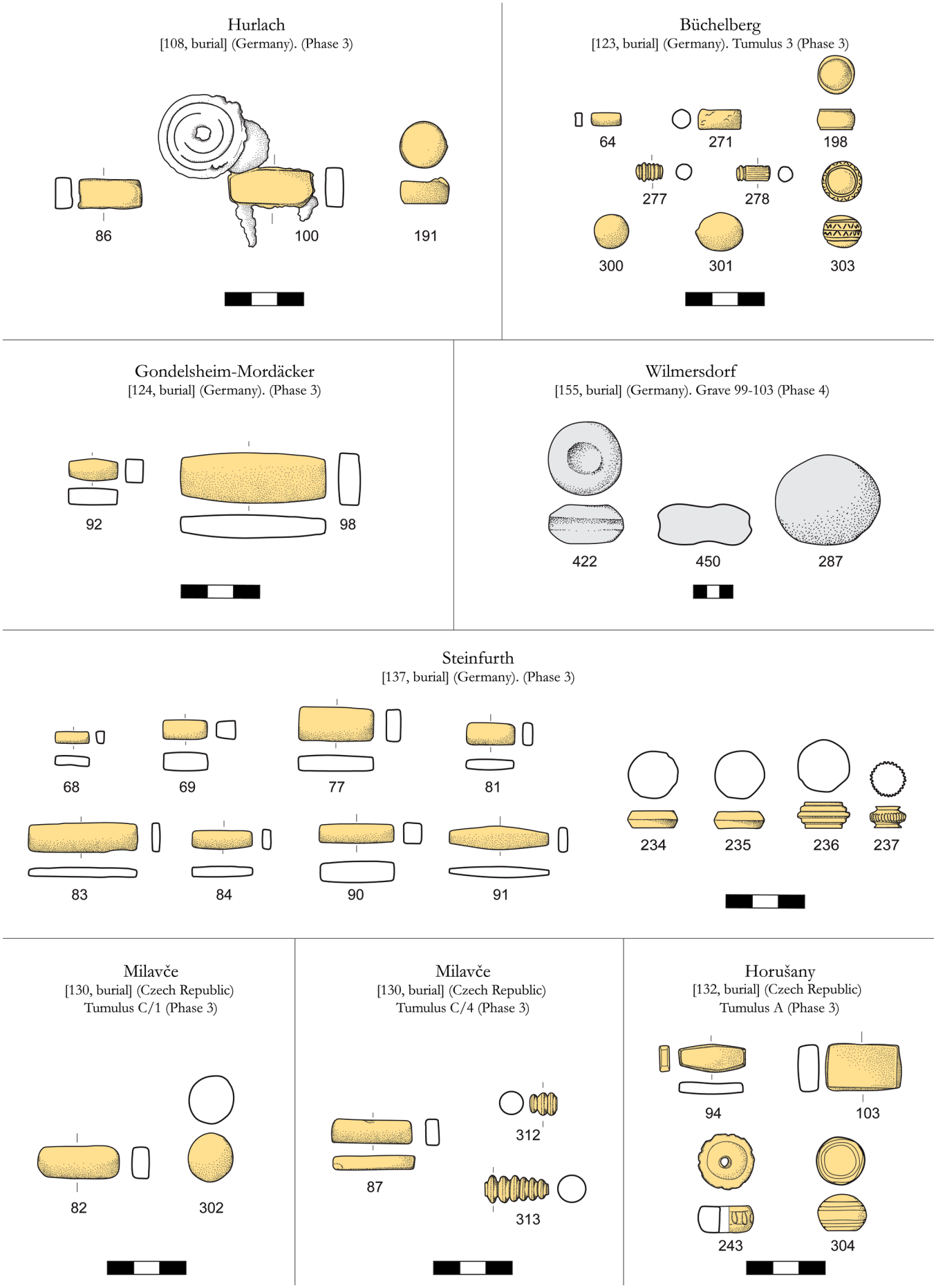
- Thapsos [site no. 2, burial] (Siracusa, Sicily, Italy). Northern necropolis, Grave 6, Inner chamber. Phase 2-3 (MBA3-RBA) - Set of 18 weights (cat. no. 186, 189, 190, 197, 202, 245, 247, 248, 249, 250, 252, 253, 254, 255, 256, 257, 258, 259). Associations: tweezers, four bronze fragments - Complete. Copper/bronze.

France (Fig. 3.16.)

- Monéteau, "Aux Bries" [site no. 103, burial] (Yonne, Bourgogne-Franche-Comté, France). Phase 3 (Br D) - Set of two balance weights and one balance beam (cat. no. 17, 273, 274). Associations: two lead weights, balance beam, razor.
- Migennes, Le Petit Moulin [site no. 105, burial] (Yonne, Bourgogne-Franche-Comté, France).
  - ▹ Inhumation 251. Phase 3 (Br D) - Set of two balance weights and one balance beam (cat. no. 14, 275, 276). Associations: two lead balance weights, fragment of a bone balance beam, sword, pin, scabbard, applique.
  - ▹ Inhumation 298. Phase 3 (Br D). Associations: six bronze hinges (organic container), dagger, hammer, awl, tweezers, three arrowheads, two rings, seven bronze fragments, twelve gold fragments, four amber beads. Two weighing sets.
    - › Set 1: two weights and one balance beam (cat. no. 1, 152, 309).
    - › Set 2: 18 weights and one balance beam (cat. no. 4, 71, 72, 73, 74, 75, 106, 199, 201, 251, 262, 263, 268, 288, 289, 290, 291, 292, 310)
- Etigny, "Le Brassot" Ouest [site no. 109, burial] (Yonne, Bourgogne-Franche-Comté, France). Inhumation 90. Phase 3 (Br D) - Set of 13 balance weights and one balance beam (cat. no. 11, 60, 65, 80, 88, 117, 177, 180, 181, 182, 260, 261, 306). Associations: three bronze hinges (organic container), razor, pin, tweezers, ornaments, awl, knife.
- Passy-sur-Yonne, La Sablonière [site no. 107, burial] (Yonne, Bourgogne-Franche-Comté, France). Richebourg, Enclosure 58, Inhumation grave 7. Phase 3 (Br D) - Set of five



▲ *Fig. 3.16. Weighing sets from burials (France). Yellow filling: bronze; grey filling: stone; white filling: bone.*



▲ *Fig. 3.17. Weighing sets from burials (Germany and Czech Republic). Yellow filling: bronze; grey filling: stone.*

balance weights (cat. no. 59, 61, 62, 63, 269). Associations: three bronze hinges (organic container), dagger, awl, razor, pin, stud.

- Gours-aux-Lions [site no. 115, burial] (Marolles-sur-Seine, Seine-et-Marne, Île-de-France, France). Inhumation grave 27. Phase 3 (Br D) - Set of two balance weights and one balance beam (cat. no. 13, 29, 31). Associations: bronze hinge (organic container?), scabbard, razor, ring, gold fragment.
- Barbuise-Courtavant, Les Grèves [site no. 118, burial] (Aube, Grand Est, France). Grave 7. Phase 3 (Br D) - Set of five balance weights (cat. no. 66, 67, 70, 120, 272). Associations: bronze hinge (organic container?), two hooks, gold fragment.
- Pépinville [site no. 127, burial] (Richemont, Moselle, Grand Est, France). Phase 3 (Br D) - Set of seven balance weights (cat. no. 79, 89, 99, 121, 270, 311, 314). Associations: sword, tweezers, knife, pin, miniature duck, two bronze fragments, seven bronze cylinders filled with lead.

Germany (Fig. 3.17.)

- Hurlach [site no. 108, burial] (Landsberg a. Lech, Bayern, Germany). Phase 3 (Br C-Br D) - Set of three balance weights (cat. no. 86, 100, 191). Associations: cremated remains belonging to two individuals, a male and a female. Three knives, sword, belt hook, several bronze studs, bronze necklace with gold pendant and three amber beads, five pins, seven pin heads, gold fragment, pottery.
- Büchelberg [site no. 123, burial] (Germersheim, Rheinland-Pfalz, Germany). Tumulus 3. Phase 3 (Br D) - Set of eight balance weights (cat. no. 64, 198, 271, 277, 278, 300, 301, 303). Associations: three bronze hinges (organic container?), dagger, awl, pottery.
- Gondelsheim-Mordäcker [site no. 124, burial] (Karlsruhe, Baden-Württemberg, Germany). Phase 3 (Br D) - Set of two balance weights (cat. no. 92, 98). Associations: bronze hinge (organic container?), two pin fragments.
- Wilmersdorf [site no. 155, burial] (Dahme-Spreewald, Brandenburg, Germany). Grave 99-103 (one of five graves). Phase 4 (Period IV-V) - Set of three weights (cat. no. 287, 422, 450).
- Steinfurth [site no. 137, burial] (Bad Nauheim, Wetterauskreis, Hessen, Germany). Phase 3 (Br D) - Set of twelve balance weights (cat. no. 68, 69, 77, 81, 83, 84, 90, 91, 234, 235, 236, 237). Associations: two bronze hinges (organic container?), pin.

Czech Republic (Fig. 3.17.)

- Milavče [site no. 130, burial] (Bohemia, Czech Republic).
  - ▹ Tumulus C/1. Phase 3 (Br D) - Set of two balance weights (cat. no. 82, 302). Associations: bronze vase on wheels, two bronze cups, sword, razor, knife, two phalerae, four rings, 23 bronze sheet fragments, four pin fragments, rod fragment.
  - ▹ Tumulus C/4. Phase 3 (Br D) - Set of three balance weights (cat. no. 87, 312, 313). Associations: sword, spearhead, knife, pin fragment, three bronze sheet fragments, bronze fragment.
- Horušany [site no. 132, burial] (Bohemia, Czech Republic). Tumulus A. Phase 3 (Br D) - Part of a set of four balance weights (cat. no. 94, 103, 243, 304). Associations: three bronze hinges (organic container?), awl, three phalerae, stud, bronze fragment, pottery.

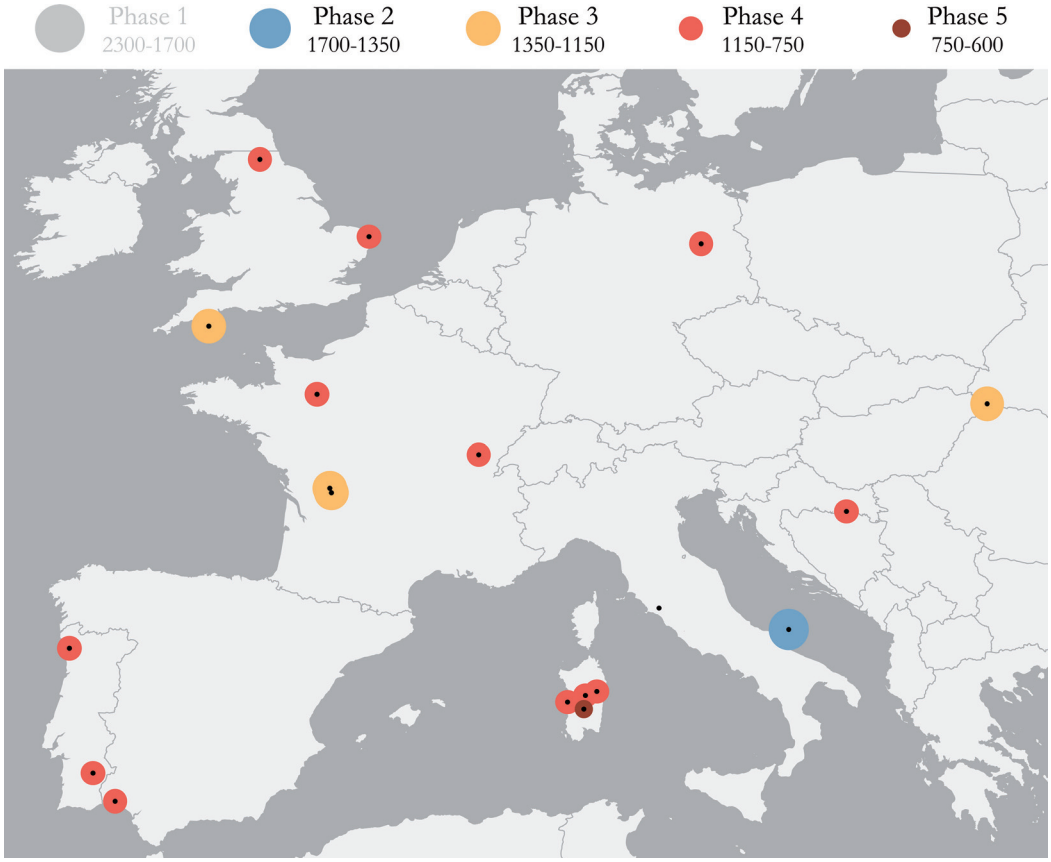
3.6. Hoards, caves, votive depositions, and potential shipwreck (Fig. 3.18.-19.)

3.6.1. General observations

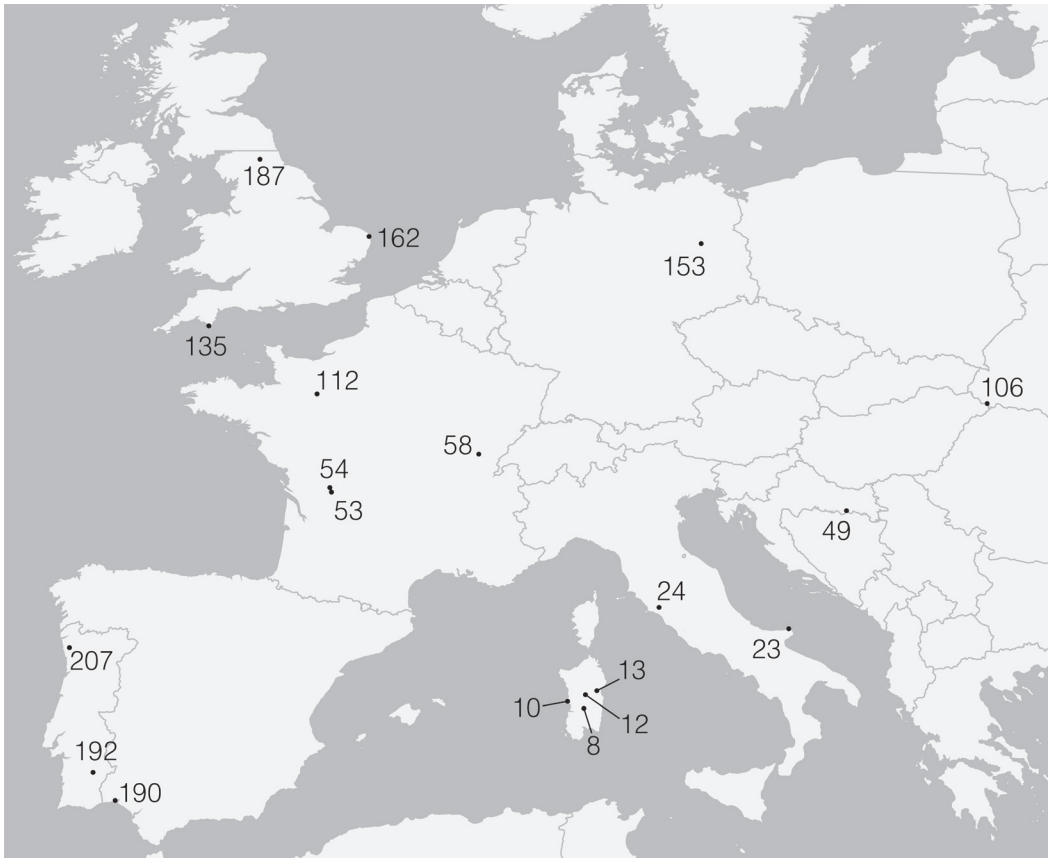
The contexts described in this section belong to the least attested site-types with weighing equipment in Europe. They are also united by their extremely elusive connection with identifiable activities and identities, unlike settlement and burial contexts.

In first instance, their classification is not always clear-cut. The majority of the contexts considered here are normally classified as 'hoards', a rather generic term widely used in Bronze Age studies to define assemblages of metal objects buried simultaneously. Some weights and balances come from caves, but it cannot be excluded that at least some of them originally belonged to metal hoards – such as the find from Heathery Burn Cave in England (cat. no. 36, site no. 187) (Britton/Longworth 1968) – or were dedicated as votive depositions – such as the balance weight found in a natural niche inside a cave at Su Benticheddu in Sardinia (cat. no. 104, site no. 13), together with two complete bronze vases and an iron clamp (Lo Schiavo 1978). Let alone that caves themselves are often interpreted as ritual spaces in the Bronze Age, and at least one balance weight is part of the votive assemblage of the Nuragic Sanctuary of Abini, in Sardinia (cat. no. 714, site no. 12), which, in turn is often referred to as 'hoard' in the literature. Finally, the assemblage from Salcombe, retrieved on the sea bed off the south-western coast of England (cat. no. 102, 123, site no. 102), represents yet a different case: Interpreted as the wreck of two different cargo-ships (Berger *et al.* 2022), its composition is not substantially different from many hoards located on both sides of the channel (Harding 2013a). If this does not necessarily rule out the shipwreck hypothesis, then one cannot even exclude that other similar contexts – that we generically classify as 'hoards' – are in fact the remains of trade-related enterprises.

In a broader perspective, the interpretive challenges of this heterogeneous group of finds are somehow encompassed by the old debate around

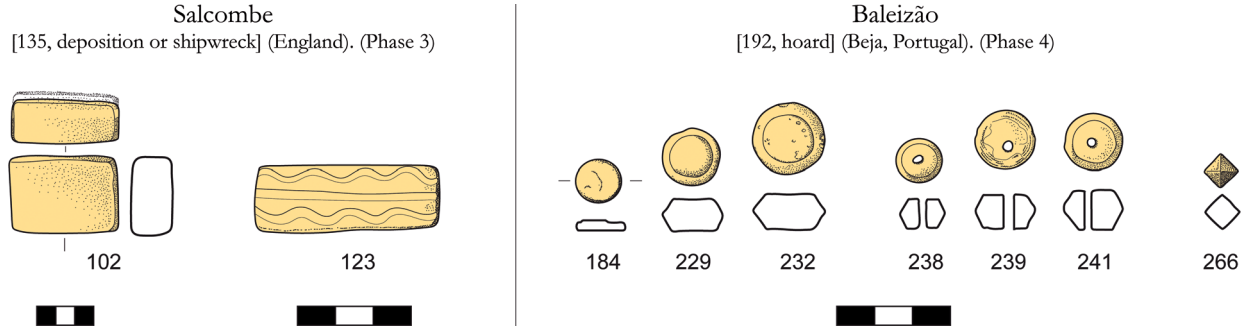


◀ *Fig. 3.18. Hoards, votive depositions, caves, and potential shipwreck: geographic and diachronic distribution.*



◀ *Fig. 3.19. ID numbers of the sites illustrated in fig. 3.18. 8 - Forraxi Nioi; 12 - Abini; 13 - Su Benticheddu; 23 - Grotta Manaccora; 24 - Grotta Nuova; 49 - Slavonski Brod; 53 - Vilhonneur, Grotte de la Cave Chaude; 54 - Agris, Grotte de Perrats; 58 - Les Genettes, Larnaud; 106 - Tiszabecs; 112 - Saint-Léonard-des-Bois; 135 - Salcombe; 153 - Krampnitz; 162 - West Caister; 187 - Heathery Burn Cave; 190 - Ria de la Huelva; 192 - Baleizão; 207 - Bouça.*

the interpretation of Bronze Age hoards writ large. To summarise, hoards are alternatively interpreted as votive depositions, metallurgists' stocks destined to be recycled, and temporary deposits of valuables which, for whatever reason, were never retrieved by their owners (Brandherm 2018; Lago 2020). While it is clearly not within the scope of this book to solve this riddle, one can nonetheless observe



▲ *Fig. 3.20. Weighing sets from a potential shipwreck (left) and from a hoard (right). Yellow filling: bronze.*

that, at least in theory, the presence of weighing equipment makes sense in either of these three scenarios, albeit in different ways. If one sees hoards as votive depositions, then weights and balances would have been selected by virtue of their symbolic significance. If the preferred hypothesis is either 'metallurgist's stock' or 'deposit of value', then the owner would have required weights to assess the value of the pieces of metal that were received or given out in payment. This is, however, nothing more than a dialectic exercise, and does not really add much to our understanding of weighing equipment in Bronze Age Europe. In conclusion, since the available evidence from hoards, in the term's broadest meaning, is scarce and scattered, it is unfortunately impossible for the time being to infer meaningful patterns.

3.6.2. Weighing sets from hoards/shipwrecks (Fig. 3.20.)

Salcombe [site no. 135, votive deposition or shipwreck] (Devon, England). Phase 3 (Penard, Ewart Park) - Set of two weights (cat. no. 102, 123).

Baleizão [site no. 192, hoard] (Beja, Portugal). Phase 4 (Atlantic FBA III) - Set of seven balance weights (cat. no. 184, 229, 232, 238, 239, 241, 266). Associations: three axes, seven bronze rings, six bronze fragments, three gold torques, seven gold fragments.

3.7. Concluding remarks

The associations between weighing devices and different types of archaeological contexts document a wide range of possible combinations. The most recurrent associations are connected to metalworking and metal hoarding, the latter intended as a generic accumulation of metal scraps. The frequent association with metals is in line with past research indicating that metal scraps in European hoards tend to comply with weight systems, and likely circulated as weighed money (Ialongo/Lago 2021; 2024). At the same time, it is very likely that the contextual evidence is affected by documentation bias in favour of metals. Metals and metalworking tools are, in fact, among the most durably preserved traces of economic activities in the Bronze Age. There are many other productive activities that may not leave as readable remains in the archaeological record, but this does not imply that they did not take place in connection with weighing equipment. The association with textile production, for example, is documented in a few cases by the association with spindle whorls and loom weights, but this association is significant only insofar as weighing devices were used to quantify the value of finished products in view of their selling. If there were, say, merchants dealing in textile trade but not in textile production, and we were to excavate their warehouses, we would probably find only balance weights and nothing else related to that same trade. Nonetheless, there is evidence of the use of weighing devices in connection with 'rare' economic activities such as dye production, which is also connected with textiles, and with simple domestic activities that do not even imply trade, such as cooking. Overall, the regular presence of weighing equipment in houses might simply mean that weights and balances were part of the standard equipment of Bronze Age households.

In burials, weighing equipment is associated with individuals that belong to all degrees of the standard tiered scheme in which archaeologists usually classify grave goods, encompassing alleged 'elite' and 'commoners' without distinction. Interestingly, gold fragments – the only proxy that can be loosely correlated with at least a vague notion of 'wealth' – occur indistinctly in high- as well as in low-rank burials, together with weighing equipment.

The comparative analysis shows that no exclusive pattern is visible in the distribution of weighing devices on a continental scale, neither in connection with their hypothetical use, nor in connection with particular social strata of the population. In other words, there is no evidence that weighing equipment was preferentially used in connection with particular economic activities, nor that it was significantly more associated with elites than with anyone else. The available data support a model of 'distributed use' of weighing devices, meaning that different economic activities and social strata had utility from the use of weighing equipment. This is in line with previous findings observing that monetary transactions carried out in weighed metal scraps tend to concentrate around low values, suggesting in turn that the bulk of monetary exchange was aimed to fulfil small-consumer demand in local markets (Ialongo/Lago 2024).