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Single Contributions

Sessions 4–5

Martin Bentz
Michael Heinzelmann (Eds.)

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Edited by

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Trading in the Multicultural *Emporia* of the Po Valley. Weighing Systems and Proto-Currencies

Lorenzo Zamboni

Introduction

This article offers an overview of the trade systems between the Alps and the Adriatic Sea during the 1st millennium BC, focusing on proto-currencies and weighing systems. In this region during the Iron Age (9th to 3rd century BC according to the local chronology), despite intensive periods of international trade towards the Mediterranean world and temperate Europe, coinage was never adopted before the Roman conquest (end 3rd–2nd century BC). I will try to explain the seeming contradiction of a 'protohistoric-type' commodification system maintained long after the introduction of money,[1] looking at alternative economic models related to possible "longue durée" phenomena and super-regional connections.

The article thus briefly resumes some recent advancements in the studies of the beginning of European weighing systems, during the Bronze and early Iron Age, followed by an insight on some case-studies of *emporia* and trading-hubs of the Po valley and the Delta region, including the site of Spina, which have yielded remarkable quantity and variety of archaeological evidence, including inscribed weighing stones, metal weights, as well as a variety of *aes*.

Moreover, the aim of this paper is to set Iron Age northern Italy into the wider ongoing debate on the ancient European metrology,[2] as a starting point for future research.

Terminology and Methods

From a terminological and methodological point of view, it should be stated that, despite the introduction of writing during the 7th and 6th centuries BC, for the purposes of a metrological research this region remained a pre-literate society until the Roman period, that is to say that we do not have contemporary, "emic", written or epigraphical sources related to weighing and commodification.[3]

As northern Italy during the 1st millennium BC has to be considered a protohistoric region, in terms of economic culture, it should be useful to recall the theoretical framework already outlined for Bronze Age Europe. According to Christopher Pare,[4] it is possible to make a distinction between 'commodity-money', 'utensil-money', and 'token-money':

1. Commodity money refers to non-countable goods of any kind (raw materials, including metal, wool, and foodstuff like salt, grain, meat) measured with precision weigh-

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ing scales and balances.[5] The commodification could take place in bulk transactions, where a large approximation of measuring could be supposed, or otherwise in small quantities, adopting relatively more precise weight scales.

2. Under the umbrella term of 'utensil-money', or *aes formatum,* lays a variety of artefact and utensils, mainly in bronze, iron, or in precious materials, including the bronze rings and ring-ingots of Bronze Age Europe,[6] the *oboloi* of ancient Greece,[7] as well as ornaments, and silver or gold vessels[8] used for exchange. Although a debated issue, imported fine ware (e.g. Attic figured and black glazed) could be considered as a form of utensil-money as well.
3. For the period and the region addressed, the conventional term 'token-money', according to Pare, could indicate rough lumps, fragmented scrap and raw metal employed as proto-currency.[9] A particular type of fragmented and signed metal ingot is that of *aes signatum,* which is known in northern Italy from the 5th century BC (see below). However, it remains unclear whether during protohistoric periods the *aes rude* worked only as weighted means (*per aes et libram*) thanks to precise and likely compatible weighing standards, or perhaps with some assigned value, like historical money.

The three systems are, of course, not exclusive neither consequential – in terms of dependency and evolution, rather being more often contemporary and complemental.

Moreover, regarding the metrological research in pre-literate cultures, it should be highlighted the importance of a critical approach that takes into account the concepts of 'indeterminacy' and 'approximation'. Any given 'unit' is, in fact, an artificial construct closely related to fixed (and often written down by some authority) rules, but approximation and deviation from the norm are everyday practices that lead to statistical dispersion.[10] As recently suggested by Nicola Ialongo and colleagues,[11] in previous metrological studies there was an "excessive focus on exactitude" and a misleading "reliance on supposedly exact units".[12] It has to be considered that a normal statistical dispersion falls within a range of ±5 and 10%, with possible overlaps between two or more different unit measuring standards. More recent statistical approach, which involves mainly Frequency Distribution Analysis and Kendall's Cosine Quantogram Analysis, points instead to concepts such as 'quantum' (the minimal amount of any physical entity employed in an interaction) and clusters, or peaks of range in logarithmic scales.[13]

Unfortunately, it must be acknowledged that, regarding Iron Age Italy, a serious lack of published and analytical data affects the possibility to apply an adequate statistics-based metrological analysis. Precise weight measurements are to date available only for a small number of weights and *aes rude,* described below, compared to a larger part of unpublished data, or without measured weights reported.

Also considering this, the present paper is merely an introductory chapter of the state-of-the-art, based on already published data. The final goal is, therefore, to urge and promote further research for a reliable description and comprehension of the 1st millennium BC exchange and trading systems.

Background – The Beginning and Spread of Weighing in Western Europe

Recent excavations and studies have provided an updated archaeological framework for an early beginning of weighing and commodification systems in the western Mediterranean and central Europe, at least during the first half of the 2nd millennium BC (fig. 1). The theoretical framework is the rising of a Bronze Age 'global' network connecting Near East, the Mediterranean and temperate Europe, engaging long-term trade and movements of people and goods, based on a rational and shared system of exchange.[14] The main evidence for this international trade is represented by a large amount of weights, of different shapes and materials, supported by the finding of several bone, antler and bronze balance beams.

The earliest presence of a rational weighing system in the western Mediterranean is so far attested in the Aeolian Islands, where twenty rectangular and lenticular stone weights, some with holes (fig. 2. 1–2), were recovered from the Capo Graziano settlement during '50 to '80 excavations by L. Bernabò Brea. The weights, according to

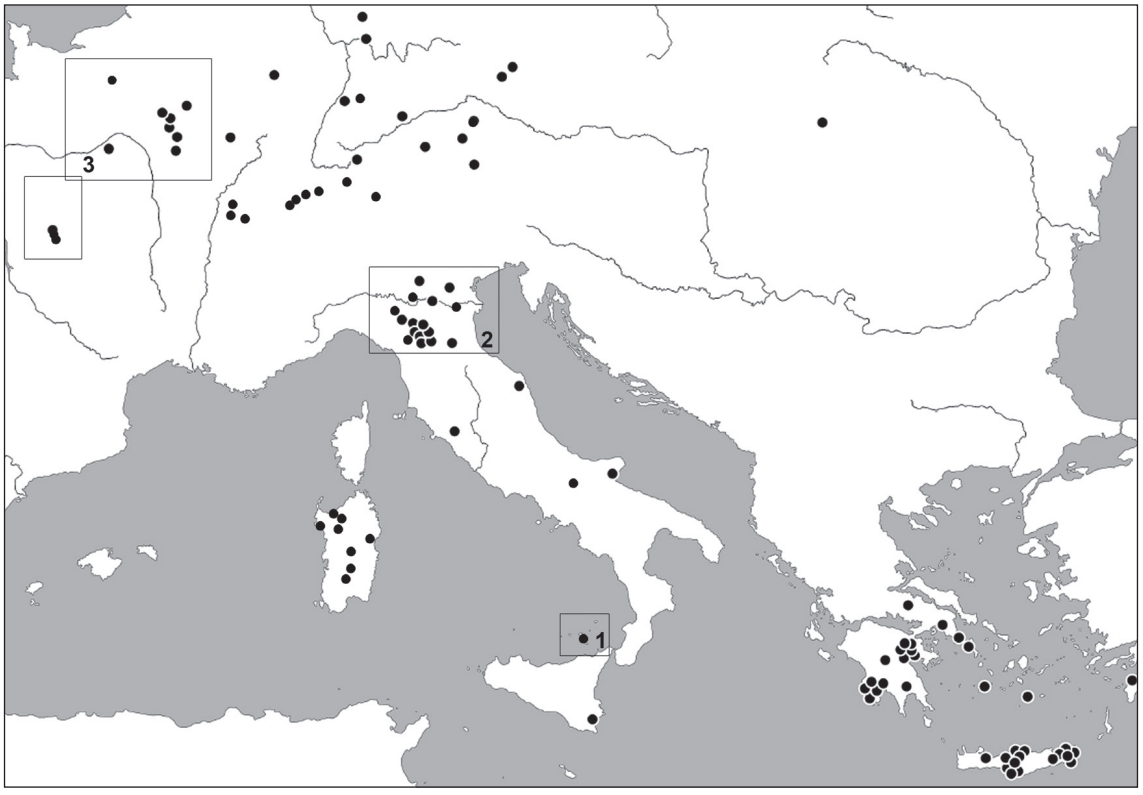

Fig. 1: Weighing equipment in Bronze Age Europe. Selected areas: 1. Aeolian Islands. 2. Terramare culture. 3. Late Bronze Age Western Europe with antler and bone balance beams.

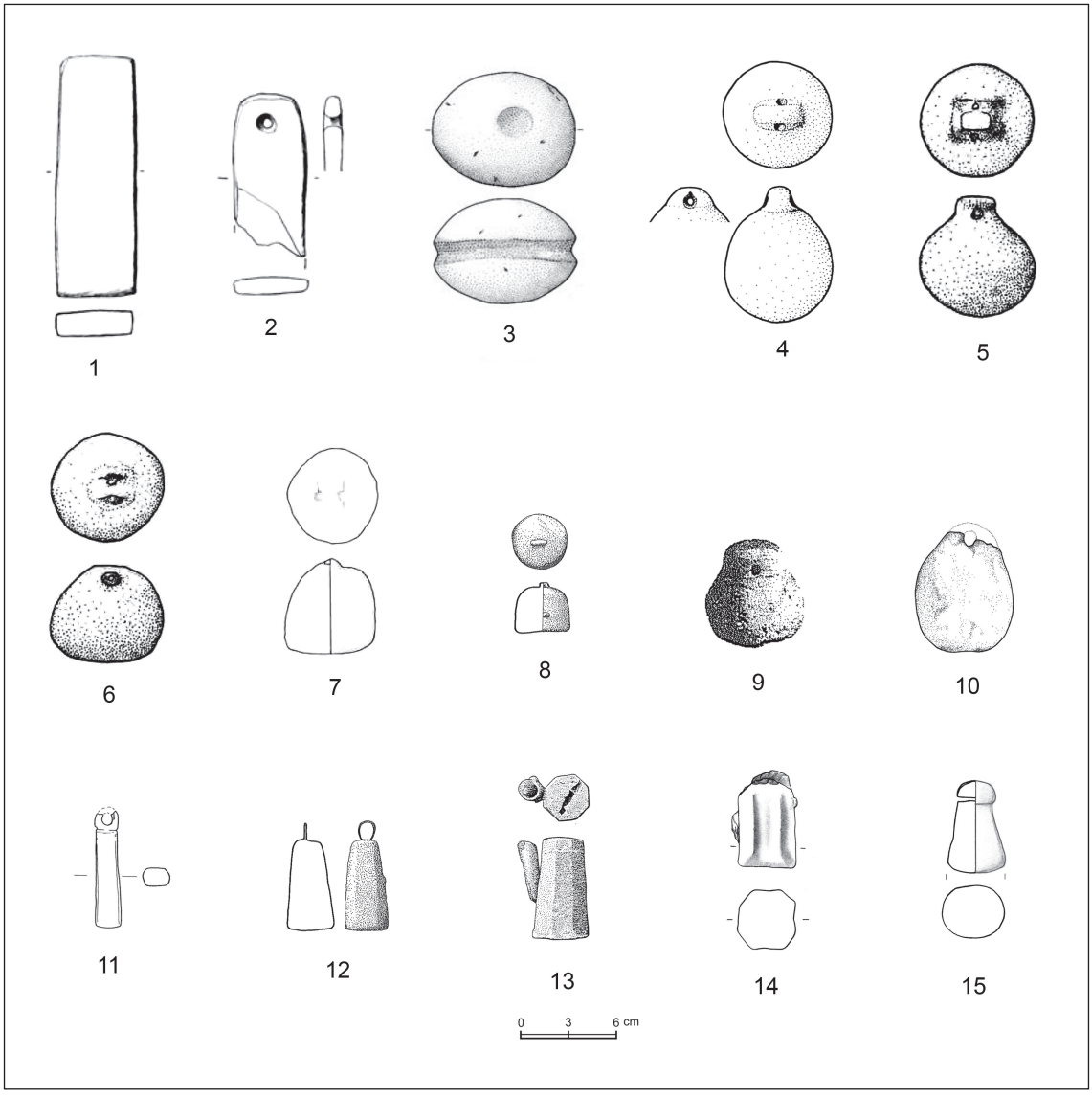

Fig. 2: 1–7 Stone weights of Bronze and Late Bronze Age Europe: 1–2 Aeolian Islands; 3 Hauterive-Champréveyres; 4 Gaggio; 5 San Giuliano; 6 Bismantova; 7 Sorgenti della Nova; 8–15 Stone and metal weights of Iron Age Italy: 8 Satricum; 9 Roma *Comitium;* 10 Spina; 11 Monteriggioni-Campassini; 12 Satricum; 13 Giglio shipwreck; 14–15 Spina.

Nicola Ialongo,[15] are dated mainly to the Capo Graziano phase (c. 2300–1500 BC), being less frequently attested until the Ausonio phase II (c. 1200–950 BC), and show a logical sequence of multiples of a common system, with the highest quantum at 19,54 g compatible with the Aegean unit of 58–65 g.

In the Italian Peninsula, the Po valley has yielded early archaeological evidence of weighing system thanks to the identification, about twenty years ago by Andrea Cardarelli and colleagues,[16] of several stone weights from the settlements of the so-called "Terramare" culture in the middle Po Valley, between 15th to 13rd century BC. These weights are mainly of spheroid shape with a suspending hole (appiccagnolo, fig. 2. 3), and also of lenticular shape (fig. 2. 4), with a suggested unit standard around 6.1 grams (again comparable with the Aegean unit).

In Central Europe, Christopher Pare[17] has suggested the compresence of different weighing systems during the 2nd millennium BC, from the 'utensil-money', like the copper and bronze rings and ring-ingots, to metal and stone weights of various shape, to the *aes rude.* Among the balance weights, the rectangular ones, similar to those seen from the Aeolian Islands, are well attested during the Late Bronze Age. In the same period, stone or lead spheroid weights seem to show some dependency from the previous "Terramare" models, with statistical clusters attested around 48,8 and 104 g.

A suggestive evidence for an early measuring system is also in the numerous equal-arm balance beams discovered in central Europe, mainly as grave goods of the Late Bronze Age connected with metallurgy, like the spectacular tomb 298 of Migennes (Yonne, northeastern France), where an entire set for weighing equipment was buried inside a wooden box, including two antler balance beams (fig. 3. 2), rectangular stone weights and unfinished bronze and gold objects.[18]

During the final Bronze Age period (12th–mid-9th century BC), despite a general lack of data from the regions south of the Alps, the previous systems based on precise stone weights, both with the spheroid shape with suspending hole and the lenticular one, seems to continue, as suggested by findings from the settlements of Frattesina, Bismantova, San Giuliano (Imola), and Sorgenti della Nova[19] (fig. 2. 7), in parallel with the framework outlined for central Europe.[20] Moreover, the possible peak of 370 g suggested for the lenticular weights from Frattesina[21] is noticeably interesting, because is near to the 'italic libbra' of 380 g identified for the later etruscan period (see below).

Balancing the Iron Age

For the following period of the early Iron Age (mid-9th–8th century BC) a serious lack of data is probably affected by the scarce number of sites exhaustively published. Only between the late 8th and the 7th century BC onwards, an increasing evidence of different weighing units comes from the Italian Peninsula. For example, an early 7th century BC finding from the island of Pithekoussai, a lead and bronze disc of 8,79 g interpreted as a

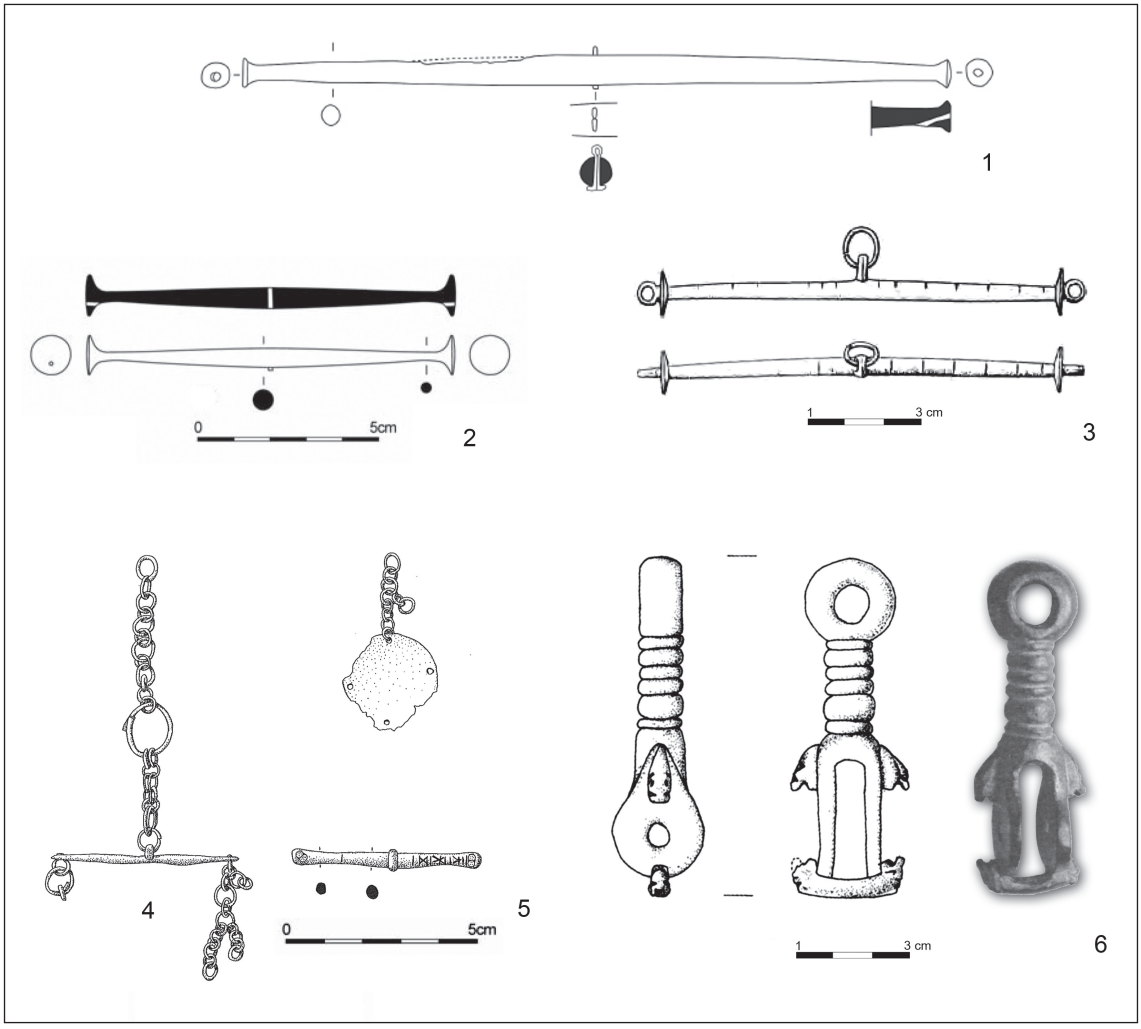

Fig. 3: 1–2 Late Bronze Age antler/bone balance beams: 1 Marolles-sur-Seine, La Croix del la Mission, grave 13; 2 Migennes, Le Petit Moulin, grave 298; 3–6 Iron Age bronze balance elements: 3 Eberdingen-Hochdorf; 4–5 Satricum; 6 Forcello.

small weight, has already been emphasized for its possible connection with the Euboic-Attic stater.[22]

In Latium, from the settlement and votive deposits of Satricum the presence of two lead weights of 267 and 340 g (fig. 2. 8, 2. 12), along with two balance beams and a large amount of *aes rude,* has been highlighted by A. Nijboer.[23] In northern Etruria, the late-8th and 7th century settlement of Monteriggioni-Campassini[24] yielded a lead weight of 109,65 g, of an elongated rectangular shape with a suspending hole (fig. 2. 11).

Metal hoards are also to be noticed, such as Ardea or the huge deposit of Bologna S. Francesco (late 8th–early 7th century BC), for which Renato Peroni has pointed out the presence of at least two comparable units of 106,4 and of 114,7 g.[25] For the 6th and

5th century BC, a metal weight of 352 g is known from the Giglio shipwreck (fig. 2. 13), while in Rome, from the old excavation in the *Comitium,* it is to be mentioned the presence of some stone and lead weights with suspending hole (fig. 2. 9), with reported measures of 321 and 327 g.[26]

Bronze balance beams of the same period are also attested, including the mentioned examples from Satricum, and also from Chiusi and Forcello (Mantua)[27] (fig. 3. 6). North of the Alps, amongst other examples, a cast balance beam with precision scale was discovered in the settlement of Hochdorf[28] (fig. 3. 3), a site that shows wider relationships with northern and central Italy.[29]

Regarding the Etruscan world, between the 6th century and the Hellenistic period, recent studies by Adriano Maggiani[30] provided a significant corpus of evidence, including metal and bronze weights. Maggiani has proposed a complex system of eleven weighing standards, all possible fractions of the unit 5,73 (close to the so-called Micro-Asiatic unit of 5,76 g). The two most relevant etruscan standards are the so-called 'light libra' of 287 g, and the 'heavy libra' of 358 g. It is possible to recognize the presence of some of these standards also north of the Apennines, for example in the sites of Marzabotto and Spina.

Spina and the *Emporia* of the Po Valley (6th–4th century BC)

During the second half of the 6th century BC the economic expansion of the Greeks in the western Mediterranean drastically changed the cultural, societal and economic picture. New urban and trading centers were established at the crossroads of multidirectional trade routes, either on the northern Adriatic coast (Adria, Spina), along the course of the Po river (Mirandola, Forcello di Bagnolo S. Vito), and also along the main Apennine valleys (S. Polo d'Enza, Marzabotto) (fig. 4).

The case study of Spina, in particular, shows a complex picture of a multicultural society, with a strong interaction between Greeks and Etruscans, which is archaeologically highly visible based on the impressive amount of Greek imports and local production. Between its foundation, during the second half of the 6th, and at least the mid-4th century BC, Spina was an international trading hub, one of the main commercial partners of Athens in the western Mediterranean, and a gateway to temperate Europe.[31]

Recent excavations and new studies on the settlement area[32] have provided a large amount of data regarding, for example, the urban regular planning, the system of water management – based on a grid of larger and minor canals, the development of building architecture, everyday life and economic activities. Regarding the latter, it is confirmed that coinage was never adopted in Spina: After more than eight decades of excavations, both in the settlement area and the cemetery, with more than 4,000 graves, just one coin was discovered from a surface layer, a drachma of the 3rd century BC.[33]

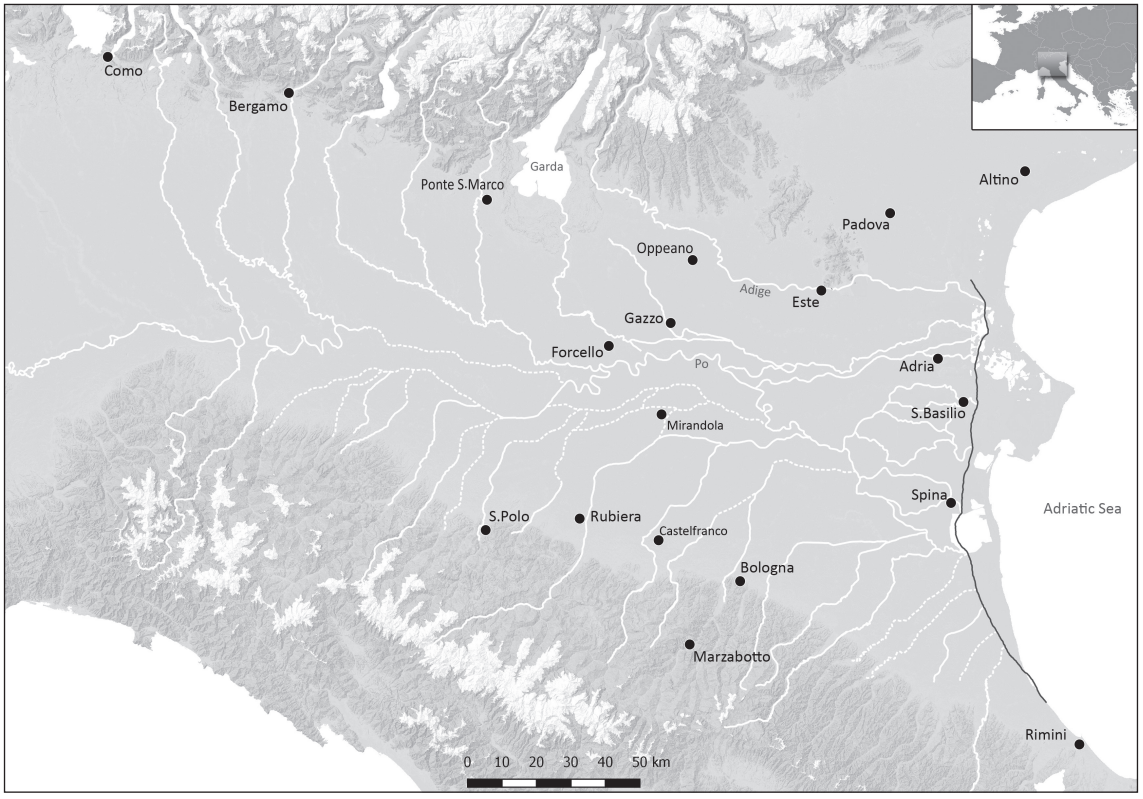

Fig. 4: Northern Italy between the 6th and 5th century BC, main sites and *emporia.*

The study of the findings from the '70s excavation in the Spina settlement has instead highlighted the presence of several metal and stone weights, along with two different types of *aes rude.*

Two lead weights were discovered from settlement layers of the late 6th and 5th century BC,[34] one of octagonal shape, of 328 g, the other truncated-pyramidal (fig. 2. 14–15), with a weight of 505 g. In addition, a stone weight of spheroid shape with a suspending hole, of 255 g.[35]

More numerous, at least eight, in Spina are pebble stones with numeral inscriptions on one face, interpreted as standard weights (fig. 5. 1–5). The different numeral signs could indicate at least three overlapping weighing units, of 353, 366 and 380 g.[36]

This type of stone weight is very common in the Po valley (fig. 5), and especially inside the main trading sites of the region between the mid-6th to the 4th century BC. According to Maurizio Cattani,[37] the specimens from Marzabotto show a peak around 360 and 380 g (the so-called 'italic libbra'), which matches with the unit VIII according to Maggiani.[38]

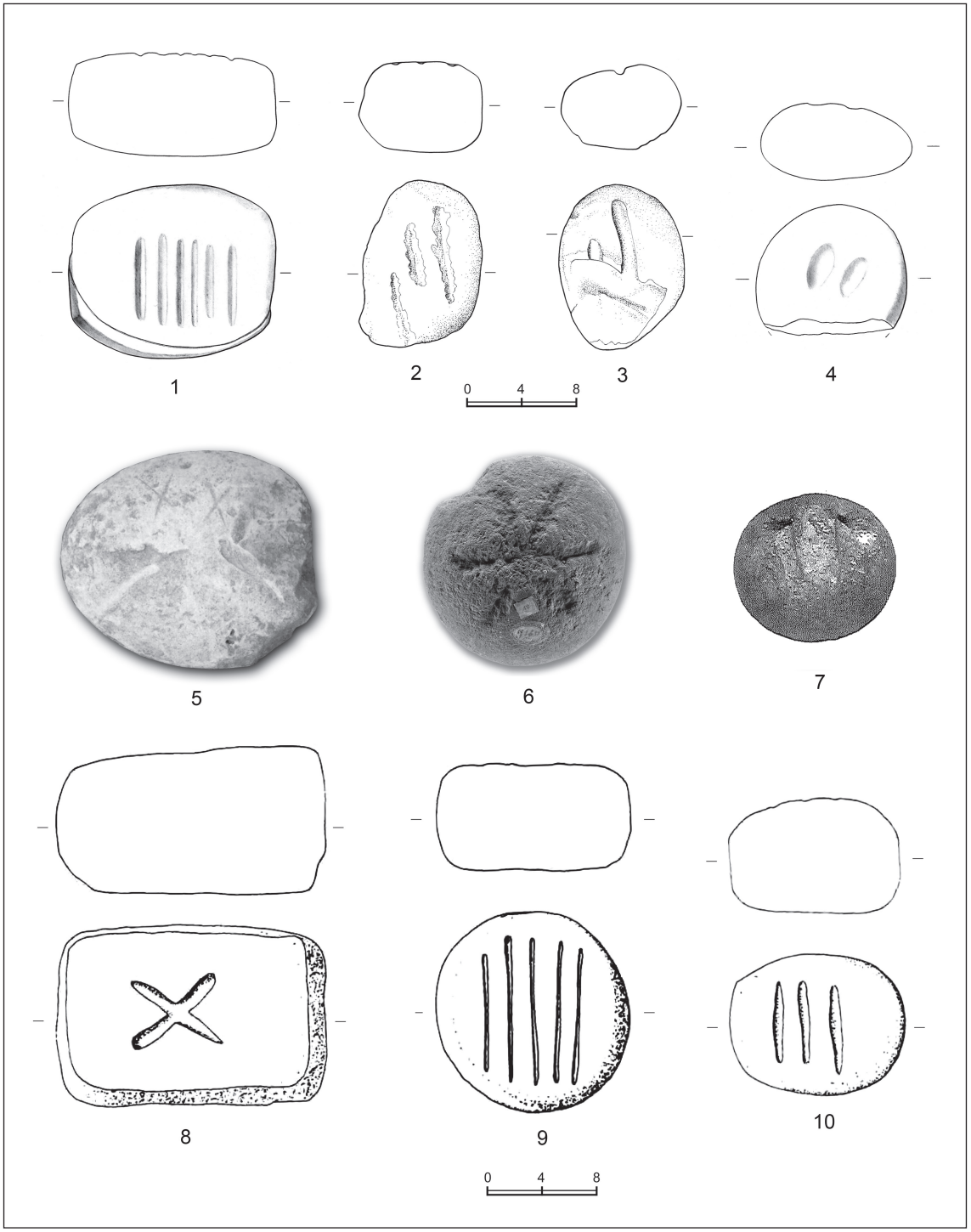

Fig. 5: Stone weights with inscriptions: 1–5 Spina; 6 Montecchio, Reggio Emilia; 7–10 Marzabotto (5–7 out of scale).

Aes rude and *signatum*

As seen before, the presence of fragmented scrap and raw metal is attested in Europe and in Italy since the 2nd millennium. Fragments of small ingots, more or less regular, or bronze lumps of various shapes and dimensions, are increasing present during the Iron Age in northern Italy. From the 7th century BC onwards, high amounts of *aes rude* are found in large 'proto-urban' and urban sites, both in settlement areas and within grave goods, where they are interpreted as 'Charon's *oboloi.*[39] Before the 3rd century BC, *aes rude* is the only form of proto-currency known in northern Italy.

The '70 excavations in Spina brought to light 34 *aes rude* from households and canals of the 5th and 4th cenury BC[40] (fig. 6, 1–9). At least 109 *aes rude* come also from burials, only considering the cemetery sector of Valle Trebba.[41]

From Spina a different type of *aes rude* is also attested, albeit not recognized in previous studies. The form is that of thin bronze sheets, in rectangular or irregular shapes

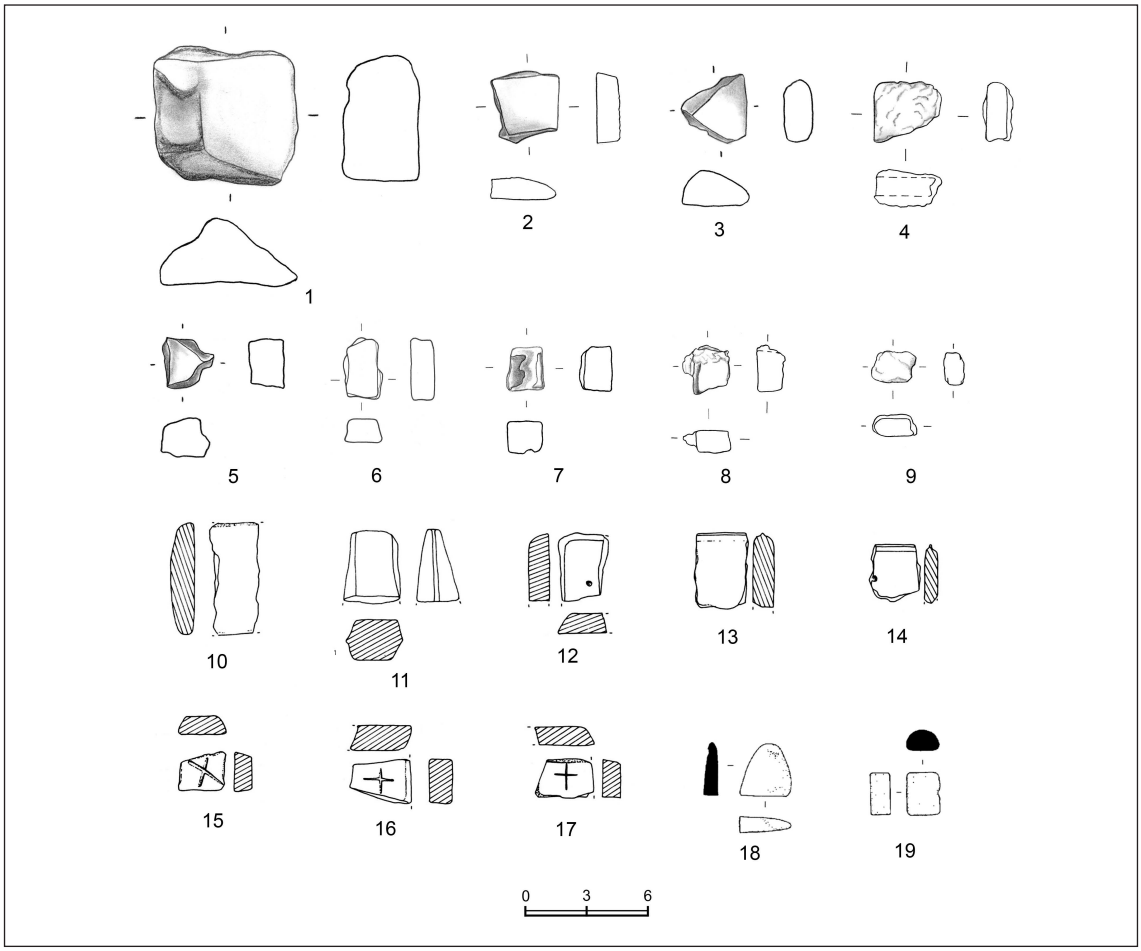

Fig. 6: *Aes rude:* 1–9 Spina; 10–18 Forcello; 19–20 Ponte S. Marco.

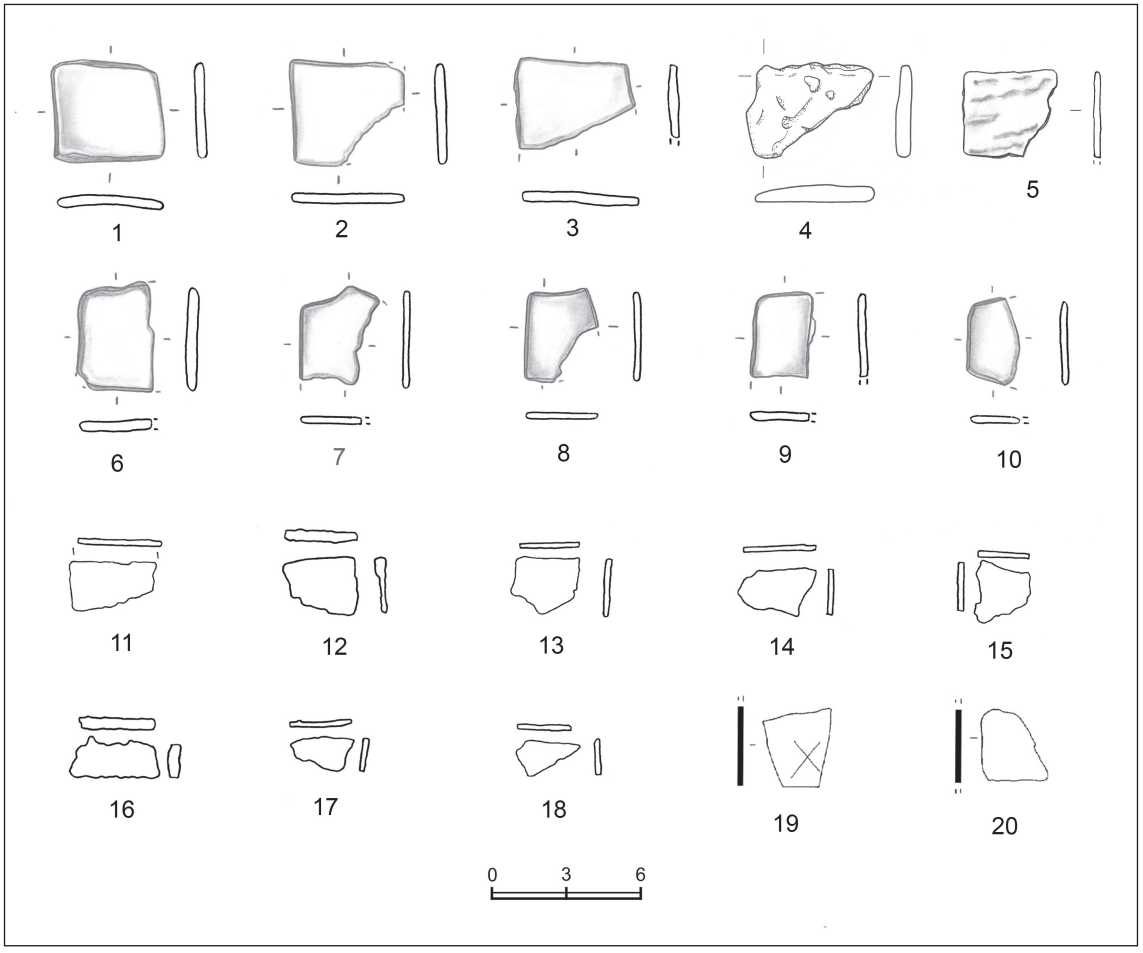

Fig. 7: Thin *aes rude:* 1–10 Spina; 11–18 Forcello; 19–20 Ponte S. Marco.

(fig. 7), probably fragmented from larger thin ingots. This special kind of thin *are rude* is attested, besides Spina, in other trade centres of the Po Valley, including Forcello,[42] Oppeano, Adria, S. Polo d'Enza,[43] Marzabotto,[44] and Ponte S. Marco.[45]

Regarding the *aes rude* metrology, several attempts have been made in previous studies to identify one or more regular weight units. In Forcello, for example, Maurizio Cattani pointed out clusters around 16 and 31 g,[46] while in Marzabotto a unit of 5,2 g (eventually related to the Phoenician system) has been proposed.[47] In Spina I suggested a possible cluster around 4 g, near to a fraction of the Euboic-Attic stater of 8,79 g. However, without a reliable statistical analysis, all the tentative identifications of weighing units so far mentioned are to be considered approximate.

Another relevant and distinctive aspect of the Po Valley is the abundance of the so-called *ramo secco* ingots, or *aes signatum* (fig. 8), namely cast lumps of bronze of measured quality and weight, with the sign of "dry branches" usually on both sides (a symbol still of unclear significance).[48] These ingots are usually made in copper-iron

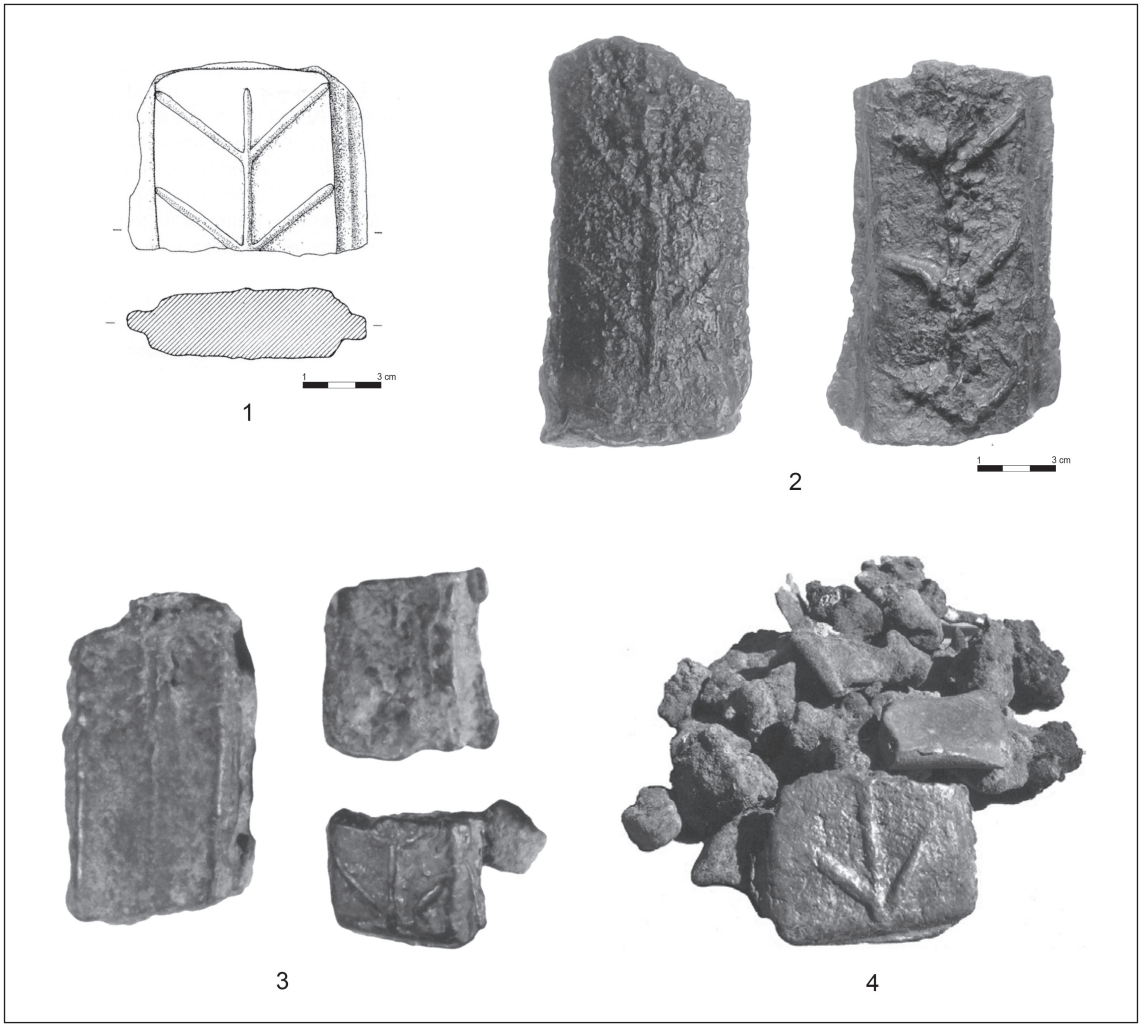

Fig. 8: *Aes signatum:* 1 Forcello; 2 Castelfranco Emilia; 3 Quingento; 4 Bitalemi (3–4 out of scale).

alloy, often with a high percentage of iron. In most cases they are found broken into subdivisions, in quarter, half or three-quarter bars. Weights clusters are approximately around 800/900 and 1,200/1,400 g.

Ramo secco ingots have been discovered across the Po Valley during the 5th century BC,[49] both in metal hoards and in larger settlements (Marzabotto, Forcello), including the northeastern Veneto region. Notably, no specimen was identified in Spina so far. Other examples come from Etruria and central Italy,[50] while the southernmost presence is in Bitalemi (Gela, fig. 8. 4).[51]

Discussion. The Absence of Coinage in the Po Valley

It is possible to explain the absence of coinage in Iron Age northern Italy by addressing different perspectives. On the one hand, we have seen that in the western world, and especially in the Po Valley, a long-term tradition of regularized barter, based on relatively accurate weighing systems, is attested at least from the mid-2nd millennium BC. Despite the scarcity of archaeological evidence for certain periods (early Iron Age), as a working hypothesis it seems possible to infer a continuity between the late Bronze Age weights (spheroid and lenticular stones) and elements (balance beams), and the Iron Age weighing tools.[52] According to this framework, the Po valley could be characterized by a well-rooted tradition of exchange, also involving wide-raging and established commercial relationship between the regions north and south of the Alps, with particular regard to metal circulation.

Even after the opening of new commercial routes during the 6th century BC, the Greeks opted for the local way of commutation, probably most flexible and suitable for local encounters. The quantity of metal and stone weights, and the variety of their weighing standards, as well as the presence of proto-currencies (*aes rude*) inside the main trade centers of the Po Valley between the 6th and the 4th century BC, are testifying a large-scale exchange, favoured by the possibility of conversion between different exchange systems.

Coinage began to circulate in northern Italy only after the La Tène 'conquest' in the 4th century BC,[53] but in few contexts, such as hoards[54] and scattered finding in settlements (as seen from Spina). Between the second half of the 4th and the 3rd centuries BC, however, the economic model still remained the same as before, and money appears to be mainly related to warfare and mercenary service.[55]

On the other hand, previous scholars who have already outlined the absence or the late appearance of mints and coinage in certain Greek cities and colonies, including Sparta, Locri Epizefiri, Tanais, Narona or Naucratis, have put forward different cultural and political explanations for the 'refuse of coinage', including the idealized, utopian and traditionalist ideas of isonomy, equality and the social stigma imposed to the ostentation of wealth.[56] Furthermore, another possible reason for Iron Age northern Italy is the absence of centralized institutional authorities, able to promote and coin money. However fascinating, these scenarios are not verifiable for the Iron Age pre-literate societies in central Europe and in northern Italy.

Conclusion

To summarize, a preliminary analysis of the archaeological evidence related to weighing and trading suggests that the exchange in Spina and in other *emporia* of the Po Valley worked with a specialized form of barter. This form of commerce seems to be rooted

in long-term traditions within the Po Valley and central Europe, at least since the late Bronze Age period, involving at the same time:

1. Different kinds of 'commodity-money', such as salt, grain, meat, and other fundamental non-countable goods and raw materials, which remain poorly visible in archaeological terms. Their commodification was possible only through the adoption of a rational system, based on stone or metal weights and equal-arm balances, referring to different weight units and, more important, to compatible multiples and fractions;
2. As suggested,[57] it is also very likely the presence of 'utensil-money', for example gold, silver and other prestige goods, and, in second place, of imported (Attic) pottery;
3. Finally, the use of proto-currency is testified by the wide presence of *aes rude,* including the special thin type, and of *aes signatum.* However, it remains unclear whether these 'tokens' were employed only as weighted means (*per aes et libram*), or perhaps with an assigned value.

Besides the absence of coinage, that is probably a misleading problem, since money remains not completely appealing and widespread in the Mediterranean world during the period addressed, as linked to specific aspects of social life (sanctuaries, mobility, warfare, prestige, centralized authority), what is more intriguing is the possibility to trace and describe 'self-regulated' international trade networks "based on customary commercial relationships",[58] on mutual interaction, and on the possibility of normalization and conversion between different commodification systems.

Only further research, based on wider and analytical data collection, along with a new approach based on appropriate and reliable statistical processing, could confirm and improve the proposed framework.

Acknowledgments

I record here my gratitude to the panel organizers for their patience and work. I'm grateful to Nicola Ialongo for the very instructive comments and suggestions, and also to Maurizio Cattani, Nino Crisà, and Chiara Tarditi for the bibliographical help.

Notes

[1] Gorini 2017.

[2] Ialongo 2018; Ialongo et al. 2021; Rahmstorf et al. 2021.

[3] As in the ancient Near East: Powell 1996; Chambon 2011; Ialongo et al. 2018a.

[4] Pare 2013.

[5] Pare 2013, 508. 523.

[6] Pare 2013, 512–514. 523; Primas 1997.
[7] Pare 2013, 523; Teržan 2004; Barello 2008, 157–158.
[8] See Vickers 1992; Gill – Vickers 1994.
[9] Pare 2013, 524.
[10] Ialongo 2018, 4.
[11] Ialongo et al. 2018a; Ialongo et al. 2018b.
[12] Ialongo 2018, 4–5.
[13] See Ialongo 2018; Ialongo et al. 2018a–b for further discussion and detailed bibliography.
[14] Peroni 2001; Alberti et al. 2006; Renfrew 2008; Rahmstorf 2010; Pare 2013; Vankilde 2016; Kristiansen et al. 2018; Ialongo 2018.
[15] Ialongo 2018.
[16] Cardarelli et al. 1997; Cardarelli et al. 2001; Cardarelli et al. 2004; Peroni 2004.
[17] Pare 1999; Id. 2013.
[18] Roscio et al. 2011.
[19] Cardarelli et al. 2001; Nijboer 2006; Pare 2013.
[20] Rahmstorf – Pare 2010, 273–275, Abb. 5.
[21] Bellintani, in: Cardarelli et al. 2001, 45, fig. 17.
[22] Nijboer 1998, 67 (with previous references).
[23] Nijboer 1994; Id. 1998.
[24] Ciacci 2004, 67–68. 80–82.
[25] Peroni 2001. The two supposed units could have the same value, considering an average error of ±5% (N. Ialongo, pers. communication). Note also the presence in the S. Francesco hoard of an *aes rude,* with the inscription *aie,* of 161,15 g (Colonna 1986).
[26] Nijboer 2006, 110–115; Rahmstorf – Pare 2010.
[27] De Marinis – Rapi 2007.
[28] Rahmstorf – Pare 2010.
[29] Verger 2006.
[30] Maggiani 2001; Id. 2002; Id. 2009; Id. 2012. Further evidence from Etruria settlements are in Cappuccini 2014, 142–143; Pulcinelli 2017. See also Cavagna 2020, with further references.
[31] Berti – Harari 2004. For a broader picture of the addressed period see also Zamboni 2021.
[32] Zamboni 2016; Id. 2017; Reusser 2017; Mistireki – Zamboni 2020.
[33] A drachma of 'celtic-padan' production, near the 'Arslan VII' type (Arslan 2006). Another possible, albeit indirect, and vague, evidence for the presence of coinage in Spina could be provided by two different stamps made, before firing, on the bottom of two bowls in the local fine ware (so-called 'Etrusco-Padana' ware): both the stamps are likely to be made with two coins, one with an hippocampus, the other with a chimera (see Zamboni 2016, 212, tav. 100, no. 1252–1253)
[34] Zamboni 2016, 226–231.
[35] Another spheroid stone with appiccagnolo comes from Forcello (De Marinis – Rapi 2007, 249, fig. 49).
[36] Zamboni 2016, 228–229; for the stone with two inscribed crosses (fig. 5. 5) from the 2009 excavation, the weight measurement is not available.
[37] Cattani 1995; Id. 2001.

[38] Maggiani 2007.
[39] Gorini 2017. Normally only one piece per grave is attested.
[40] Zamboni 2016, 224–226.
[41] Gorini 2017.
[42] Casini et al.1999.
[43] On Oppeano see Saracino et al. 2013. The findings from S. Polo and Adria are unpublished.
[44] Burgio 2010.
[45] Poggiani Keller 1994.
[46] Cattani 1988.
[47] Marzabotto 1997.
[48] Neri 1998; Pellegrini – Macellari 2002; Potts 2020.
[49] See also Zamboni 2018, 229–230.
[50] Murgan 2014.
[51] Tarditi 2016.
[52] Peroni 2001, 23–24.
[53] Arslan 2006. A silver drachma from Como, dating to the 5th cent. BC, remains so far isolated. See also Gorini 2016.
[54] For example, the hoard of Castelfranco Emilia (Neri 1998).
[55] Gorini 2017. See Rahmstorf 2016 for further general considerations.
[56] Barello 1993; Gorini 2017, 556.
[57] Vickers 2017.
[58] Ialongo 2018, 4–5.

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Fig. 1: Pare 2013, modified after data in Ialongo 2018. – Fig. 2. 1–3: Ialongo 2018. – Fig. 2. 4: Balista et al. 2009. – Fig. 2. 5–7: Rahmstorf – Pare 2010. – Fig. 2. 8: Nijboer 1998. – Fig. 2. 9: Nijboer 2006. – Fig. 2. 10: Zamboni 2016. – Fig. 2. 11: Ciacci 2004. – Fig. 2. 12–13: Nijboer 1998. – Fig. 2. 14–15: Zamboni 2016. – Fig. 3. 1: Pare 2013. – Fig. 3. 2: Roscio et al. 2011. – Fig. 3. 3: Rahmstorf – Pare 2010. – Fig. 3. 4–5: Nijboer 1994. – Fig. 3. 6: De Marinis et al. 2007. – Fig. 4: by author. – Fig. 5. 1–5: Zamboni 2016; Cornelio et al. 2013. – Fig. 5. 6: Museum of Reggio Emilia. – Fig. 5. 7: Cattani 1995. – Fig. 6. 1–9: Zamboni 2016. – Fig. 6. 10–17: Cattani 1988. – Fig. 6. 18–19: Poggiani 1994. – Fig. 7. 1–10: Zamboni 2016. – Fig. 7. 11–18: Casini et al. 1999. – Fig. 7. 19–20: Poggiani 1994. – Fig. 8. 1: De Marinis et al. 2007. – Fig. 8. 2: Neri 1998. – Fig. 8. 3: Locatelli et al. 2013. – Fig. 8. 4: Tarditi 2016.

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