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**Iron Metallurgy and the Formation of Complex
Societies in the Western Mediterranean
(1st Millennium BC)**

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Iron Metallurgy and the Formation of Complex Societies in the Western Mediterranean (1st Millennium BC)

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Introduction

The first millennium BC was a period of profound transformation in the central-western Mediterranean. On the one hand, the arrival from the 9th century BC of a large number of migrants from the eastern Mediterranean brought about major changes in the ethnic and linguistic panorama of large areas of this territory. It also led to –or at least facilitated– the introduction and dissemination of new skills and gave rise to intensive interaction with the populations previously established in those territories. This interaction took on diverse forms ranging from the establishment of authentic colonial systems –that entailed the control of the territory by the new arrivals and the marginalization and exploitation of the native population– to relations based on mutual benefit, in which the balance of forces between natives and allochthonous people clearly favoured the former from a political and demographic point of view. In this context, it is logical that there would have been intensive and diverse transformations. One of the most outstanding was the growth in the population, which is perceptible in many different regions, to the point at which it can be considered to have been generalised, albeit with different local and regional dynamics. At the same time, following experiences with a limited trajectory such as the El Argar, Terramare and Nuragic cultures, this demographic increment would have played an important role in the new development of complex societies founded on institutionalised inequality and the existence of political and administrative systems designed to perpetuate it. The hierarchized forms of territorial occupation and the formation of the first cities are one of the most obvious testimonies to this. In summary, this was a period of complex changes that saw the formation and disappearance of political entities of diverse natures and sizes. These ranged from the large Libyan territorial states to the Etruscan and Iberian city-states. Finally, there was the great conflict between Rome and Carthage that opened up the way for the emergence of a large empire covering the whole of the Mediterranean.

In this general context, one of the most important technological innovations to come about in the first millennium BC was the introduction and, more significantly, the generalization of iron metallurgy. This undoubtedly played an important, if not a crucial role in the processes of change we summarised briefly in the previous paragraph. The increase in techno-environmental efficiency that entailed the generalized use of iron tools led to an increase in the production of surpluses and, consequently, the power of the elites, as well as a sustained growth in the population. This in turn was closely linked to the development of social complexity and the expansion of cities. We cannot, therefore, underestimate the importance of the subject of this volume. However, veiled behind this generalization in the use of iron lie diverse local and regional situations that are linked both to the process involved in receiving and accepting the new technology and to the mechanism that, at a particular time, led to its large-scale use in primary production and weapons manufacture. Nobody today defends the functionalist perspectives that saw in the new technologies with the ability to improve productivity an inevitable opportunity to increase social production based on a more efficient control of the environment, reducing the input of work and, in short, favouring the “progress” of the human groups that adopted these innovations. From that excessively simplistic perspective, the adoption of technologies can be simply explained by the adaptive advantages their possession would have represented for the different societies, considered as undifferentiated entities rather than as compound, complex and internally conflicted blocks. In other cases, the introduction of iron has been seen as the chance to improve weaponry, thus endowing a decisive military advantage on the groups that possessed it. This could also have had decisive consequences for the formation of more broad-based, complex political entities.

Obviously, there is some truth to these interpretations, as alongside the internal conflicts proper to any society, there were also common interests that brought them together. However, they err by ignoring the costs involved in the introduction of new technologies and also the risks they presented for social stability. It is perfectly plausible to assume, for example, that a dominant social group would not have favoured the introduction of a technology that could have been used to improve weaponry, even though it would have helped them exercise their power, if they were not certain of being able to control the production and prevent its generalized use. Neither is there any certainty that all or most of the members of a society would have chosen to modify their ways of life by the generalized introduction of a new technology, unless they were forced to do so by circumstances linked to their survival or the imposition by a powerful elite. Such a change could have been imposed through coercion or it may have received consent based on ideology or, more frequently, a combination of the two. In this respect, we have to remind ourselves that an increase in techno-environmental efficiency did not necessarily result in a reduction in the amount of work put in, for example, by the peasants. It could simply have been used to augment the surpluses controlled by the elites, who were able to use them flexibly, both to ensure a supply for the population in the case of need (for example, in years of poor harvests) or, in normal circumstances, to further their own interests.

In other words, the adoption of a new technology and, above all, its generalized use, did not depend solely on its potential advantages from a productivity or military efficiency perspective. It would also have been contingent on the social and economic context in which it occurred and, in particular, on the interests of the dominant groups and their ability to impose them on the society as a whole. In order to fully understand these processes, it is necessary to describe and explain separately, in each region and each society, the conditions in which the process took place. This is, in fact, the objective of this volume, which aims to provide an overall perspective of this question in the central-western Mediterranean based on the particular regional processes, as well as a preface to the same question in the Aegean area.

In the studied territory, the explanation for the adoption of this iron technology by the different societies has traditionally been based on diffusionist approaches. It would have arrived from the Mediterranean Levant (the Hittite world, the Middle East or Cyprus), from where it would have reached the Aegean and the islands of the central Mediterranean and subsequently the rest of the Mediterranean. In the Maghreb and the far western Mediterranean this phenomenon is often linked to Phoenician trade; however, as Ramon and Sanmartí indicate in their contribution, we cannot rule out a dissemination route via sub-Saharan Africa, where iron technology is attested in the second millennium BC. In contrast to the diffusionist hypotheses, Kostoglou proposes as an alternative interpretation that the adoption of iron metallurgy was in fact the result of multiple innovations developed locally that would have taken place in a more or less accidental manner in diverse places and at different times. The possibility of a purely local development is also considered by Ramon and Sanmartí based on the finds made at Althiburos (Tunisia) that attest iron production in the 8th century cal BC, but the knowledge involved could date back to the previous century or even earlier.

At the current state of the research and as we can see from the studies compiled in this volume, the first iron objects are attested in diverse areas of the Mediterranean during the Bronze Age. This evidence is not only found in the Aegean (Kostoglou), but also in Sardinia (Lo Schiavo and Milletti), southern Italy and Sicily (Pacciarelli and Quondam), the Strait of Gibraltar (Suárez and Renzi), the south-east of the Iberian Peninsula (Vives-Ferrándiz and Mata) and even as far as the Atlantic. In northern Italy, apart from two doubtful cases during the Late Bronze Age, iron seems to have appeared suddenly in the 8th century BC (Paltineri *et alii*); however, in the north-western Alpine region (Switzerland and Slovenia) iron objects are documented between the mid-11th and the 9th centuries BC (Paltineri *et alii*). These early cases are undoubtedly prestige objects carried by travellers and traded for their intrinsic properties and rarity, rather than their functional value. According to the typological studies presented by Grevey and Gailledrat, this first period of dissemination of iron objects during the final stages of the Bronze Age continued into the first centuries of the first millennium BC. This would have carried on until the new technology had been adopted, under formulas and procedures that would have varied considerably, depending on the local conditions such as the effective power and interests of the elites and the nature of the relationships with the peoples of the east, such as the Phoenicians, among other possible factors.

In some of the territories studied, the chronology of the appearance of iron objects and the evidence of their manufacture is documented almost contemporaneously and even prior to the first attested colonial contacts. This is the case of Calabria and Sicily at the beginning of the first millennium BC (Pacciarelli and Quondam), as well as of Sardinia, although those first Sardinian productions are made of bronze enriched with iron or copies of bronzes, and appear to have been manufactured in domestic contexts. Significant production of iron objects in artisanal workshops in Sardinia would come in the 8th century BC (Lo Schiavo and Milletti). In general, however, the documentation of this aspect is sparse and very fragmentary in the areas occupied by the indigenous peoples of the western Mediterranean, given that in many regions the existence of workshops is not attested prior to the 6th century BC. This clearly contrasts with what occurred in Phoenician settlements or those with a strong Phoenician presence. Indeed, at various archaeological sites there is a very well documented and probably important production from the last decades of the 9th century, as Ramon and Sanmartí and Suárez *et alii* indicate for the Strait of Gibraltar region (at archaeological sites such as Acinipo and Los Castillejos de Alcorrín) and Vives-Ferrándiz and Mata for the Valencia area (La Fonteta, Baix Segura). Ramon and Sanmartí hypothetically link this production to the demand from Assyria (very well documented elsewhere) to the point of assuming that iron was one of the most important products sought by the Phoenicians in the western Mediterranean.

However, apart from iron production in the Phoenician cultural area, it is plausible to believe that from the 8th century and above all the 7th century BC in the territories dealt with in this volume there would have been a relatively important local production of iron objects, although they would have been mainly confined to prestige items used by a small number of people. These objects were often deposited in the tombs of their owners, which is where they are normally found, whereas they are only retrieved sporadically at other types of archaeological site. According to Beylier, the forging technique would have been mastered in southern Gaul from the second half of the 7th century BC, although there is very little direct evidence to show this. A similar chronology can be proposed for Catalonia, as there is definite evidence from the 6th century BC at La Serra del Calvari and Illa d'en Reixac. However, we also have to bear in mind that some scholars have defended the existence of iron production in this region as early as the 8th century BC in the settlement of Els Vilars d'Arbeca (Belarte *et alii*). In Sardinia, iron metallurgy became important from the 8th and above all the 7th centuries BC. In northern Italy it is well documented at least from the turn of the 7th to the 6th century BC, with evidence of production at Genova (Paltineri *et alii*). In contrast, and as previously mentioned, in Calabria and Sicily an earlier start for the first local productions –between the late 11th and 10th centuries BC– has been proposed (Pacciarelli and Quondam).

In terms of the categories of objects and their evolution, there was very little typological diversity in the early stages of iron production, given, as has already been stated, that they were essentially prestige items. The first were mainly fibulas, needles, razors, rings and spits (the last of these linked to the idea of the banquet), as well as the first weapons, especially in Sicily and Calabria (Pacciarelli and Quondam). An outstanding category is that of knives, which were, moreover, a new item with no precedents in other metals within the repertory of objects used by the autochthonous societies. In some areas the first iron objects were copies of those previously made of bronze, as has been described in Sardinia (Lo Schiavo and Milletti). We should also point out the presence of iron weapons in many of the territories studied, albeit documented in

variable numbers, in funerary contexts and mainly associated with tombs of males/warriors. Iron weapons are often interpreted as prestige symbols (Pacciarelli and Quondam) under the control of the elites (Beylier). However, in some cases and in various territories, weapons are found in the tombs of females, for example in Gaul (Beylier) and Sicily (Pacciarelli and Quondam). We can therefore assume that the presence of arms is not necessarily related to the gender of the deceased and that it symbolizes above all a social position and membership of an elite.

The different articles included in this volume demonstrate how the typological range of iron objects expanded, especially from the 6th century BC, when there was an intensification of the production of weapons and a consolidation of that of work tools. The data available for the 5th-4th centuries BC in the different territories studied –in some cases abundant and of remarkable quality– indicate, with local nuances, a generalized use of iron for the manufacture of objects related to all facets of human existence and activity. These include transportation, building and, above all, work tools (especially farming implements). Iron prestige objects continued to be made, although they became very much a minority item. It is therefore quite normal that, from this period on, it is common to find iron objects in habitation sites. Weapons are also found in contexts of violent destruction, and continue to be especially common in tombs.

The generalization and diversification of the production of iron objects is obviously linked to profound changes in the social and productive structures that are documented in the whole of the study area from the 6th century BC. These can be linked to various causes, above all of a demographic and political nature. These shifts were signalled by the beginning of an imperialist policy on the part of Carthage, the progressive transformation of Rome into a political and military power called to dominate the Italian Peninsula, the beginnings of the formation of the great Libyan monarchies, and the constitution on the Iberian Peninsula of hierarchized societies that evolved towards the formation of city-states and territorial states of a certain magnitude. Iron played an essential role in all these processes, which explains not only the typological diversification of the production, but also its extraordinary growth. The finds of workshops in the indigenous habitats becomes habitual from this time. They are often inside houses, in urban settlements such as Puig de Sant Andreu-Ullastret (Belarte *et alii*), Genova (Paltineri *et alii*), Lattara, Montlaurès (Beylier) and Bastida de les Alcusses (Vives-Ferrándiz and Mata), or in specialised nuclei such as Pontós, among many others. They are also found on the periphery of those towns (e.g. Ullastret), in villages and even in small rural habitats, such as those of Les Guàrdies (Belarte *et alii*) or Christol (Beylier).

Thus, from the 6th century BC, we can speak of a generalized production and use of iron. All this leads us to suspect the existence of sophisticated manufacturing systems, probably with differentiated productions in the various workshops. Above all the elites would have exercised control over this resource, which would have taken on a crucial importance for the economic production, the exercise of violence and the exaltation of power. The transformation and exploitation of iron has been studied in depth on a micro-regional scale in some areas of the Iberian culture, including the territory of Kelin/Los Villares (Valencia), with evidence from the 4th century BC until the Romanization (Quixal), and, on a strictly local scale, at the archaeological site of Les Guàrdies (El Vendrell, Tarragona) (Belarte *et alii*). However, the overall functioning of the production system, and particularly the organization introduced by the elites to prevent iron being used by the subordinated population for purposes other than production (particularly for the manufacture of weapons), is still not known in detail in any of the regions studied in the contributions compiled here (and in some of them, such as the Libyan kingdoms, it is virtually unknown). One of the major challenges facing current research is to undertake a systematic study to re-evaluate the documentation available for many settlements and to obtain new data. The objective of this would be to ascertain where the iron ore was transformed into metal, who controlled the process, how the iron was distributed to the different manufacturing workshops (aristocratic houses, village workshops, etc.) and, a crucial but particularly complicated aspect, to attempt to recognize the types of objects manufactured in each place. We trust the contributions in this volume will act as a starting point for new studies to be carried out with this focus.

Maria Carme Belarte, Maria Carme Rovira and Joan Sanmartí

The introduction of iron in northern Italy: timing and manner

Silvia Paltineri*, Michele Cupitò*, Vanessa Baratella*,
Diego Voltolini**, Ilaria Albertini*, Francesco Rubat Borel***

Abstract

Northern Italy followed a common developmental trend regarding the timing and manner of the introduction of iron. The new metal appeared in the 8th century BC. Both in the Venetian and Golasecca areas, the first iron artefacts were found almost exclusively in graves belonging to the highest-ranking members of aristocracy. In the 7th century BC, the use of iron progressively spread and underwent a differentiation. The 6th century marked a clear and general turning point: a substantial increase in iron artefacts, especially some classes, such as knives and work tools: this explosion of iron working was closely connected to the use of the new metal for its intrinsic properties.

Keywords: Iron Age, Northern Italy, metallurgy, social organization

Riassunto

L'Italia settentrionale segue una traiettoria di sviluppo comune nelle modalità e nei tempi di introduzione dell'utilizzo del ferro. Il nuovo metallo fa la sua comparsa nell'VIII secolo a.C. Sia in ambito veneto, sia in ambito golasecciano i primi manufatti in ferro ricorrono quasi esclusivamente in sepolture appartenenti alle figure apicali dell'aristocrazia. Nel VII secolo a.C. si assiste a un fenomeno di progressivo allargamento nell'uso del ferro e a una diversificazione nel suo impiego. Con il VI secolo a.C. si registra una chiara e generalizzata svolta, che si manifesta in un notevole aumento quantitativo dei manufatti in ferro in relazione soprattutto ad alcune categorie di oggetti, come i coltelli e gli strumenti artigianali: l'esplosione quantitativa dei prodotti della siderurgia è strettamente connessa a un impiego del nuovo metallo per le sue proprietà specifiche.

Parole chiave: Età del Ferro, Italia settentrionale, metallurgia, organizzazione sociale

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Introduction

Northern Italy at the passage to the Iron Age (end of the 10th century BC) appears as a highly varied cultural landscape, following the different influences of the previous chronological phases. Indeed, the north-eastern area gravitates towards transalpine Europe and the Balkans and towards the Adriatic Sea, with its maritime trade routes; the north-western area gravitates towards western transalpine Europe. Southerly, they are both closely connected with peninsular Italy (Fig. 1).

Profound differences between north-eastern and north-western Italy can be recognized in both culture and language, the latter beginning with the appearance of the first epigraphic documentation at the end of the 7th century BC. Therefore, during the Iron Age different ethnic and cultural entities emerged: Veneti on the east and Golasecca Celts and Ligures on the west. However, both areas followed a common developmental trend that impacted both the processes that led to the formation of urban societies and the timing and manner of the introduction of iron.

Sivka Paltineri

1. Methodology and state of the art

The introduction and first spread of iron in northern Italy is such a complex issue that it requires to be analysed in a long-term perspective. Moreover, this paper does not claim to be comprehensive but aims at defining general trends and models. Therefore, the research is based on the systematic analysis of contexts covering a wide chronological range, in particular those with a continuative occupation from the 9th to the 6th-5th centuries BC, and well published. Contexts with a small chronological range and/or only partially published are taken into consideration just as supportive elements to verify the reliability of both regional and general trends.

Due to the described methodological approach, intentionally highly selective, funerary contexts are prevalent. Beside the chronological issues described above, extensive and detailed publications, to this day, are available essentially only for funerary contexts. Furthermore, reliable trends can be outlined only based on these contexts, since graves provide better preservation, and thus readability, of the artefacts, as well as associations that are chronologically sound. This kind of approach, based on funerary evidence alone, is amenable to the filter of ritual and ideology. In order

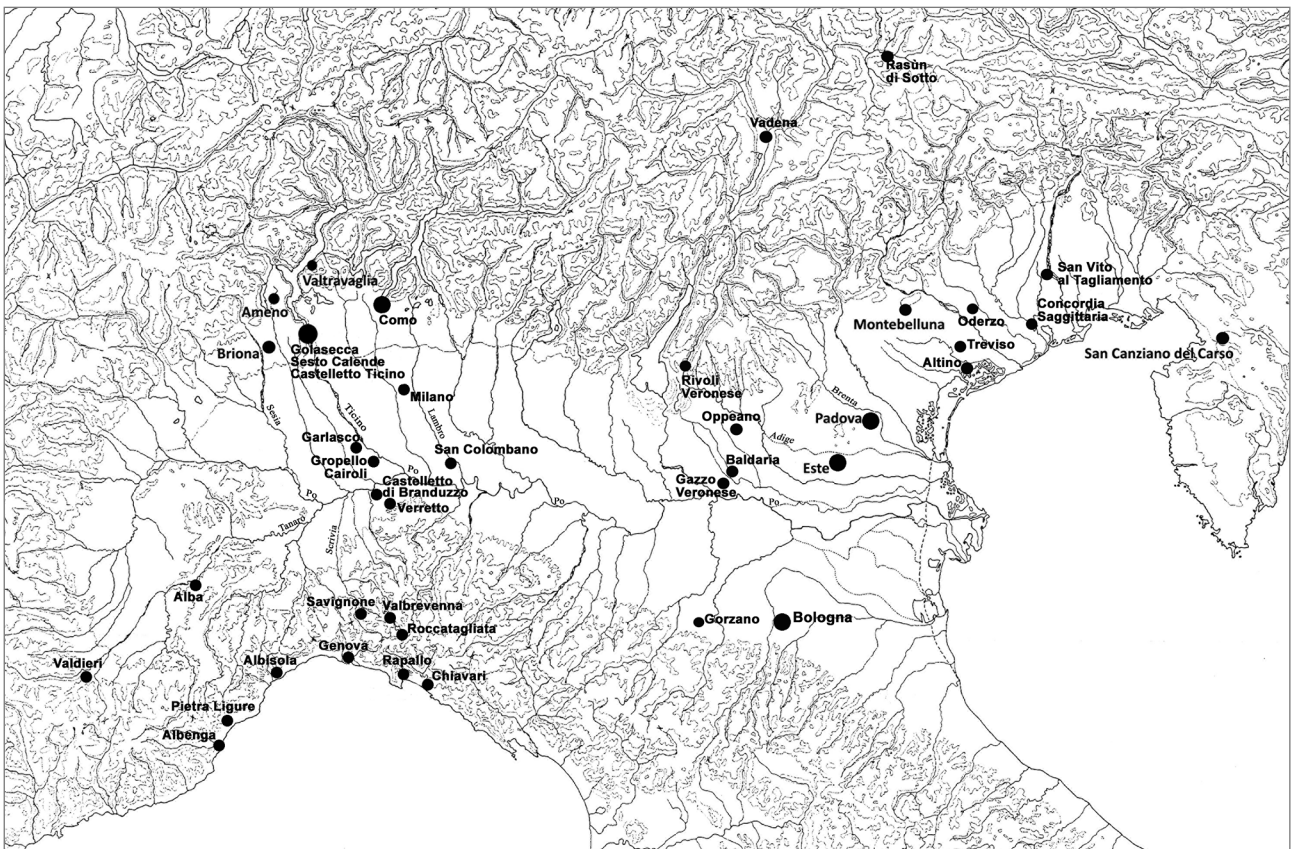


Figure 1. Northern Italy, with the sites mentioned in the paper.

to limit, and if possible correct, any resulting distortions, we took into consideration settlement evidence as well, with the same high selectivity. We took into account only the contexts with a sound chronology and a clear function; in this regard, particularly important are the contexts with evidence of iron working.

Regarding north-eastern Italy, the two main benchmarks are the large Venetian centres of Este and Padua, that arose as proto-urban entities between the end of the 9th and the beginning of the 8th centuries BC, and became fully urban starting from the 6th century BC. They are the only two centres for which the evidence (exclusively funerary for Este and more settlement-based for Padua) allows to outline homogeneous developmental trends between the end of the 9th and the 6th-5th centuries BC. Eastern and western Veneto were characterised by a very complex internal situation, with some clearly proto-urban sites alongside centres where the proto-urban model never took hold. Despite the presence of some contexts with well published and abundant data and their intrinsic significance for the issue at hand, the published data for these territories is so limited and discontinuous that only general considerations and comparisons with the trends inferable from the Este and Padua evidence is possible.

Regarding north-western Italy, the main focus are the two largest settlement concentrations, that is Como in the east, and Golasecca - Sesto Calende - Castelletto Ticino in the west; with a significant difference, however: Como emerged as a proto-urban centre already in the 9th century BC, and became fully urban at the passage to the 6th century BC, while the Golasecca - Sesto Calende - Castelletto Ticino district set off the proto-urbanisation process at the beginning of the 8th century BC but it seems to collapse at the beginning of the 5th century BC. The documentation for these centres in comparison to the Venetian ones is less satisfactory: the settlements are only partially known, while the total extent of the graves found in the last two centuries is unknown; we can estimate that the published graves are less than one sixth of the total. However, we were able to examine a significant sample, with the support of nearby cemeteries, and to identify a global developmental trend.

Data for the western lower Po Plain and the Ligurian Apennine area is very incomplete. As for coastal Liguria, the known contexts cover a time frame too short to identify any trends, with the exclusion of the Chiavari cemetery and the Genoa site; however the Pre-Roman cemetery of Genoa is still unpublished. Therefore, it is possible to outline only general trends for this area.

Michele Cupitò, Silvia Paltineri

2. The first occurrences

The first introduction and spread of iron in northern Italy dates to the beginning of the 8th century BC, based on the available data. However, to fully understand this issue, it is paramount to analyse the only two prior occurrences of iron artefacts.

The first one: a few rings from the Gorzano terramara, in the Modena province, dated to the Recent Bronze Age, from the last decades of the 14th century BC to the half of the 12th century BC. (Giardino 2005, 498). However, the actual pertinence of these artefacts to this chronological phase is dubious. Firstly, these artefacts were found during excavations carried out by Francesco Coppi between the 1860's and 1880's (Pellacani 2007), when arbitrary units were the standard method. Moreover, the Gorzano terramara, like many other Bronze Age settlements of the Po Plain, was reoccupied in the Late Iron Age, as well as in the Roman period and in the Early Middle Ages; several iron artefacts come from layers dated to the latter (Gelichi 1997, 23-25). Furthermore, up to date, no iron artefact has ever been found in contexts so old in northern Italy. The most probable explanation is that the iron rings came from later layers, therefore this occurrence must not be taken into consideration. Similar doubts can be raised for the second occurrence: the large ferrous slag (weighing 635 gr.) found by Alessandro Prosdocimi in 1883, during the excavations of the large Borgo Canevedo settlement (Prosdocimi 1887, 191), which is located just south-east of Este and is dated from the (11th?) - 10th to the 9th centuries BC (Bianchin Citton 2002; Bianchin Citton 2015, 258-259). The upper levels of the stratigraphic sequence showed a clear Roman occupation; moreover, the slag was found in a secondary context (Prosdocimi 1887, 158 e 192). Besides, no comparisons can be found in contemporary sites, such as Frattesina (Bietti Sestieri *et alii* 2015)¹ and Montagnana-Borgo S. Zeno (Bianchin Citton *et alii* 2015). Although many scholars interpreted the Borgo Canevedo occurrence as an early evidence of iron working (Bianchin Citton 2002, 93; Giardino 2005, 498), it must not be taken into consideration (Michellini 2016, 3).

The described situation demonstrates how the first introduction and spread of iron in northern Italy was not a slow and progressive phenomenon, but rather quick and sudden. This is even more evident if we compare the situation of some bordering regions: the north-western Alpine area, in particular Switzerland, and the *Caput Adriae*, in particular western Slovenia. There, iron objects, or parts of objects, appeared already from the middle of the 11th century BC to the 9th century BC. Regarding the north-western Alpine region: a series of refined bronze artefacts with iron damascene decoration (Berger 2014) and, above all, the knife with the iron blade found at Saint-Aubin, Canton of Fribourg (Pleiner 2000, 26); regarding the *Caput Adriae* area: the small knives from grave 417 of the Tolmino/Tolmin cemetery and grave 272 from the Brežec cemetery, near San Canziano del Carso/Škocjan, the blade of the axe with bronze socket from grave 158 of the same cemetery (Trampuž Orel 2012, 21, fig. 3), and finally the flange-hilted sword from the votive deposit of Grotta delle Mosche/Mušja jama, near San Canziano del Carso/Škocjan

¹ Regarding Frattesina, the find of a certain amount of iron was reported in the literature (Bietti Sestieri 1998, 49); however no further information was ever given. Since it is impossible to verify the information, this occurrence was not taken into consideration.

(Turk 2016, 107-108, tab. 14.3), which is an exceptional find, since it belongs to a type found only in Greece and Macedonia. However, this early appearance of iron objects did not equal to an early spread of the new metal, and least of all of iron working. In both regions, iron spread from the 8th century BC. Therefore, earlier occurrences can be interpreted as isolated imported artefacts, meant for high-ranking individuals, from regions where iron working had already taken hold, namely central Europe for the north-western Alpine area and the Balkans and Greece for the *Caput Adriae* area.

Michele Cupitò

3. Iron in north-eastern Italy

3.1. The centre of Este

Este arose as a proto-urban centre between the end of the 9th and the beginning of the 8th centuries BC and became fully urban from the 6th century BC (Boaro 2001, 155-159; Balista *et alii* 2002; Capuis, Gambacurta 2015, 452-456). The new centre reached an extension of around 100 hectares at its height, and was the result of a fast process of collapse of the surrounding settlement system and concentration of the population: from the Borgo Canevedo settlement (Bianchin Citton 2002; Bianchin Citton 2015, 258-259), from the Euganean Hills (Boaro 2001, 155; Bovolato 2015/2016) and the territories pertaining to the centres of Montagnana-Borgo S. Zeno (Bianchin Citton *et alii* 2015) and Monselice (Bianchin Citton 2017). The last two were developed between the 11th and the 9th centuries BC in a key point of the ancient course of the Adige river (Boaro 2001, 157; Leonardi 2010, 266-269; Cupitò, Baratella in press), where a palaeochannel, the so-called "Paleoalveo di Lozzo", flowed into the main course of the Adige river (Balista, Gamba 2013, 67-68). The cemeteries originated at the same time that the new centre – earlier graves found in the area belonged to the previous settlement system based on the Borgo Canevedo site (Bianchin Citton 2002) – and were divided into two main sectors: one to the north, beyond the Lozzo palaeochannel, and one to the south, beyond the Adige river. However, smaller cemeteries were located to the east and west as well (Zerbinati 1982; Capuis 1993, 115; Baratella 2015/2016).

Despite extensive and capillary research carried out since 1876, published data for the Atestin cemeteries lacks homogeneity. Several high-quality publications are available for the northern cemeteries: a substantial number of late 19th and early 20th centuries reports, and, most importantly, some systematic studies published between the 80's and the middle of the 2000's. On the contrary, data for the southern cemeteries is very lacking, due to the poor quality of the late 19th century and early 20th century reports, and to the scarcity of recent publications (Tagliaferro 2002).

Therefore, in this paper the analysis of the introduction and spread of iron at Este is based solely on data from the northern cemeteries, and more precisely those entirely published in recent years: the Casa di Ricovero (Chieco

Bianchi, Calzavara Capuis 1985) and the Villa Benvenuti necropolis (Capuis, Chieco Bianchi 2006). The lack of data from other northern cemeteries and from any of the southern ones is a limitation that must be taken into account when evaluating the general trend. However, considering that the analysed sample is quite ample (170 graves dated between the beginning of the 8th and the advanced phase of the 6th centuries BC)², and the homogeneity that characterises the Atestin cemeteries, the trend drawn from the Casa di Ricovero and Villa Benvenuti cemeteries can be considered as a plausible representation of the general situation (Fig. 2, a-b; Fig. 3, c-d; Fig. 4a).

At Este, iron appeared suddenly in the first half of the 8th century BC (Fig. 2a; Fig. 4a-b). However, occurrences in this phase were few and limited to a small number of exceptional graves, specifically the graves Ricovero 143 and 154 (Chieco Bianchi, Calzavara Capuis 1985, 61-68, t. 13-17 e 107-110, t. 56-57), and belonged to only two functional classes: pins and small knives. Moreover, they held an intrinsic and symbolic value as high-quality craftworks, like the small knife form grave 143, possibly linked to the loom, made up of an iron blade and a bronze handle with openwork decoration (Chieco Bianchi, Calzavara Capuis 1985, t. 16, 12).

In the second half of the 8th century BC, the situation changed (Fig. 2a; Fig. 4a; Fig. 4c). The occurrences of iron saw a slight, but meaningful, increase, they did not belong exclusively to the highest-ranking graves, but also to graves that did not include any sign of rank, and, finally, they widened the range of functional classes: besides pins and small knives, awls, knives, fibulae and bracelets. Complex objects made of iron and bronze still belonged exclusively to the highest-ranking graves³, such as the pin and the large knife, probably ceremonial (Cupitò 2017, 523), from grave Ricovero 236 (Chieco Bianchi, Calzavara Capuis 1985, t. 205, 7 e t. 209, 67)⁴. The new metal, given its rarity and the technological complexity of iron working, was a status symbol of the aristocratic elite.


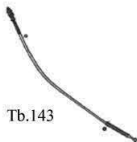

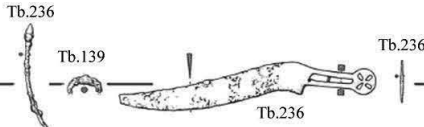

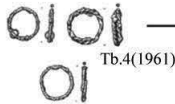

The passage between the 7th and the beginning of the 6th centuries BC marked a clear turning point (Fig. 3b-c;

² The chronological framework, based on published data, is the following: 32 graves are dated to the 8th century BC, 85 between the 7th and the beginning of the 6th centuries BC and 53 to the 6th century BC.

³ The outline described for the Casa di Ricovero and Villa Benvenuti cemeteries seems generally valid for another cemetery of the northern area, the Rebato one, although it is not possible to subject the data published by Alfonso Alfonsi in 1922 to a quali-quantitative analysis. Moreover, this context proves the introduction of iron weapons in the second half of the 8th century BC: among the rich grave goods of grave Rebato 221, belonging to a high-ranking male, the scholar talks about a "...grande lancia di ferro con manico a bossolo..." (Alfonsi 1922, 53).

⁴ A large knife with an iron blade was found in the grave goods of the grave Candeco 302 that belonged to one of the highest-ranking figures of the Atestin aristocracy of the middle 8th century BC, as testified by the presence of an antenna-sword, an axe and elements of a cuirass (Müller Karpe 1959, 64, t. 91).

a)

	CASA DI RICOVERO	VILLA BENVENUTI
IIA (800-775 BC)	 Tb.154	
IIB (775-750 BC)	 Tb.143	 Tb.143
IIB-C (750 BC)	 Tb.236 Tb.139 Tb.236	
IIC (750-700 BC)	 Tb.175	
IIC-III A (700 BC)	 Tb.4(1961)	 Tb.62 Tb.69

b)

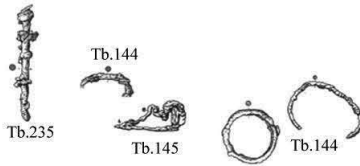
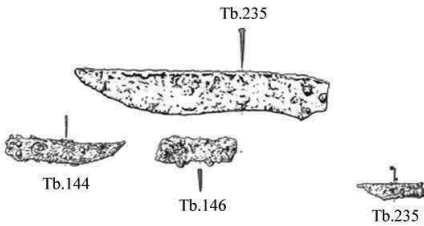

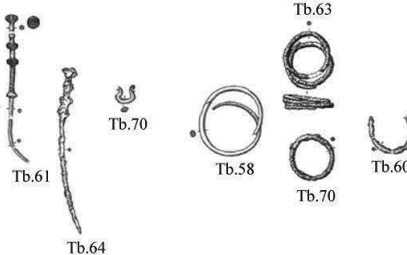
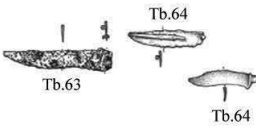

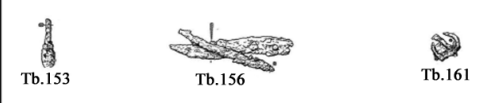
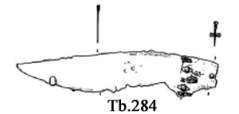
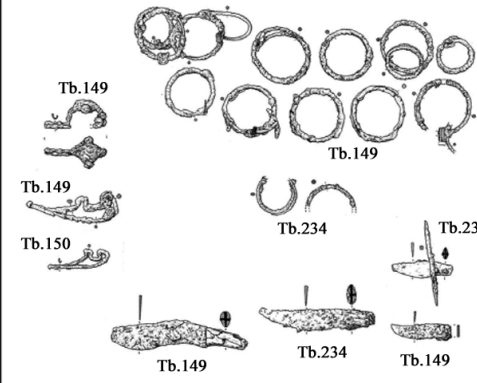
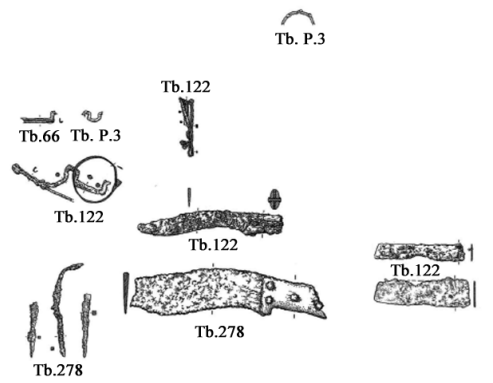
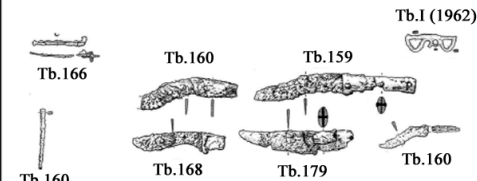
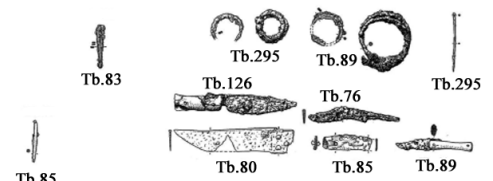
	CASA DI RICOVERO	VILLA BENVENUTI
III A (700-675 BC)	 Tb.235 Tb.144 Tb.145 Tb.144  Tb.235 Tb.144 Tb.146 Tb.235  Tb.145 Tb.235	 Tb.61 Tb.70 Tb.63 Tb.58 Tb.70 Tb.60  Tb.64 Tb.63 Tb.64 Tb.64  Tb.75 Tb.63 Tb.289 Tb.70

Figure 2. Este. Iron artefacts from the cemeteries, divided according to chronological phases: a) Este IIA, IIB, IIB-C, IIC, IIC-III A; b) Este III A.

c)

	CASA DI RICOVERO	VILLA BENVENUTI
IIIB1 (675-625 BC)		
IIIB1-B2 (625 BC)		
IIIB2 (625-575 BC)		

d)

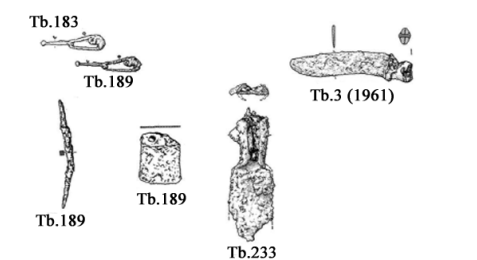

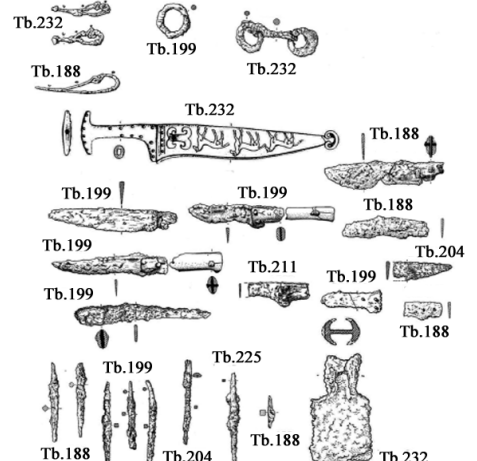
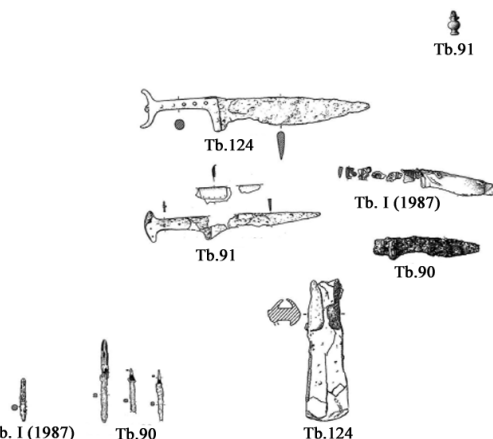
	CASA DI RICOVERO	VILLA BENVENUTI
IIIB2-C (575 BC)		
IIIC (575-525 BC)		

Figure 3. Este. Iron artefacts from the cemeteries, divided according to chronological phases: c) Este IIIB1, IIIB1-B2, IIIB2; d) Este IIIB2-IIIC, IIIC.

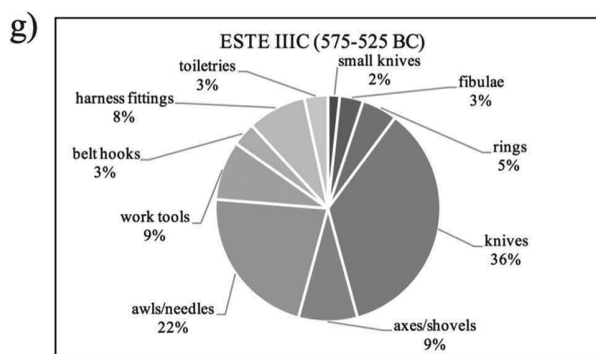
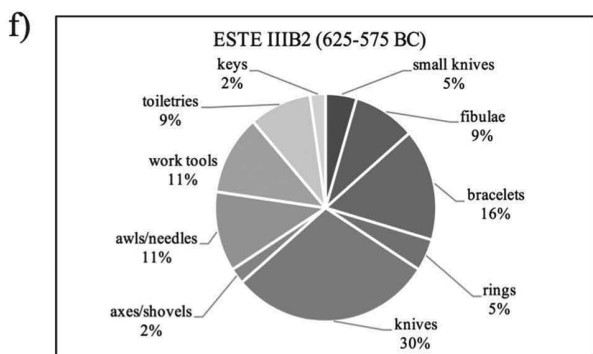
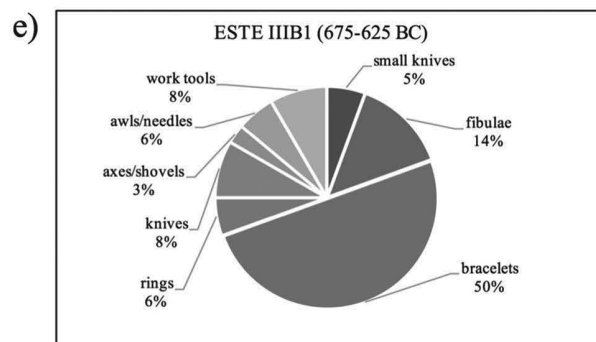
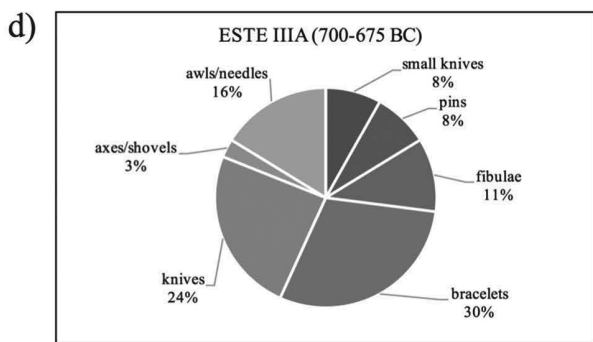
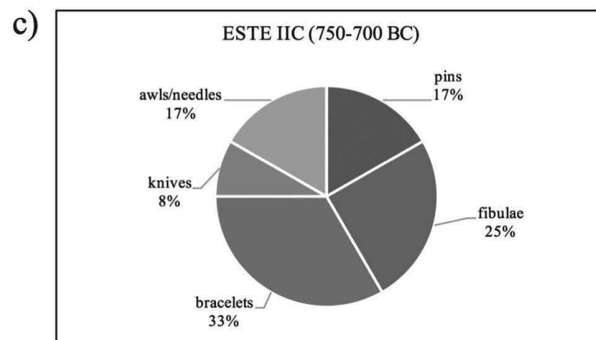
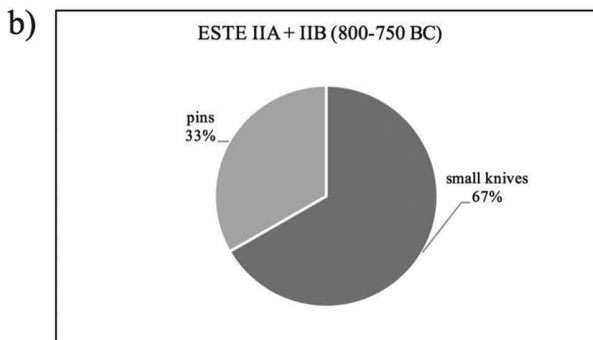
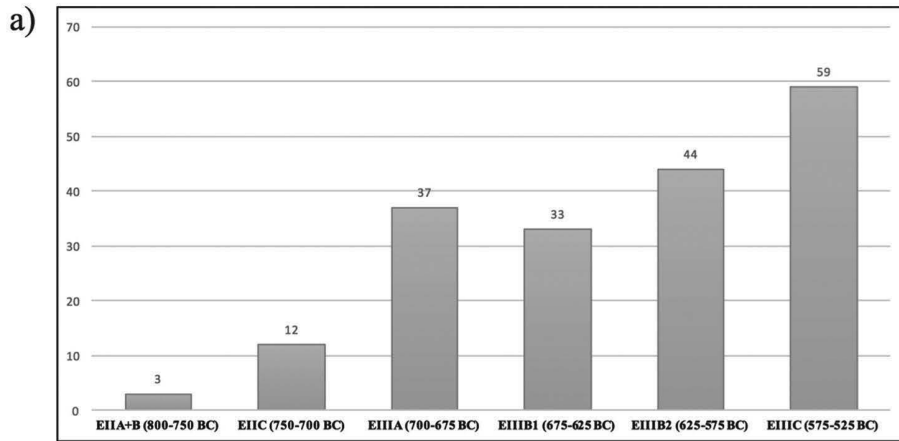


Figure 4. Este. a) Iron artefacts divided according to phases; b) Iron artefacts belonging to the phases ESTE IIA and IIB, divided into classes; c) Iron artefacts belonging to the phase ESTE IIC, divided into classes; d) Iron artefacts belonging to the phase ESTE IIIA, divided into classes; e) Iron artefacts belonging to the phase ESTE IIB1, divided into classes; f) Iron artefacts belonging to the phase ESTE IIB2, divided into classes; g) Iron artefacts belonging to the phase ESTE IIIC, divided into classes.

Fig. 4a; Fig. 4d-e-f). The occurrences rose exponentially and new functional categories appeared. New kinds of artefacts started to be made of iron, such as axes, working tools and toiletries. Moreover, valuable artefacts made of iron and bronze seemed to disappear. In this phase, iron began to be available to different segments of society beside the aristocracy, despite maintaining its status symbol value, and to be used for its intrinsic properties. Another change, even more drastic, took place in the middle and late 6th century BC (Fig. 3d; Fig. 4a; Fig. 4g). A considerable decrease in occurrences as well as a clear change in functional classes took place in this phase. Ornaments disappeared, while knives, axes, work tools and, in one instance, a horse-bit, were now made of iron, which was therefore used for its intrinsic properties. Regarding the decrease in occurrences, it is best to suspend judgement, because it could be the result of the quantity and quality of the sample. However, if we take into consideration the increase in weight of the new kind of artefacts in comparison to the previous phases, it is clear that the 6th century BC is the moment when iron shifted from an almost exclusive ideological use to a functional one.

Vanessa Baratella

3.2. The centre of Padua

Padua emerged as a proto-urban centre between the 9th and the 8th centuries BC, like Este, and became fully urban from the mid-6th century BC, with a 100 hectares extension (Gamba *et alii* 2005a; Gamba *et alii* 2005b; Capuis, Gambacurta 2015, 452-456). The settlement was established between the two meanders of the *Meduacus*-Brenta River, probably as the outcome of a synoecism process on a large territorial scale (Leonardi 2010, 266-269). Two cemeteries matched the settlement: the southern one of palazzo Emo Capodilista - via Umberto I (Michelini, Ruta Serafini 2005; Gamba, Tuzzato 2008; Voltolini 2014) and the eastern one of via Tiepolo-via San Massimo-via Ognissanti (Calzavara, Chieco Bianchi 1976, 223-296; Ruta Serafini 1990; Gambacurta 2005; De Min *et alii* 2005, 157-172; Gambacurta 2011; Millo 2014), that at the end of the 8th century BC are joined by the via Loredan one, to the north-east of the settlement (Zampieri 1975). At the end of the 6th century BC, another funerary area arose alongside these three: the CUS-Piovego one (Calzavara Capuis, Leonardi 1979; Leonardi 1990).

However, the documentation available for Padua is far less complete than that of Este: an entire edition of all the graves does not exist and only 20% of the ca. 1000 excavated graves are published. In this paper, we took into consideration the tombs dated between the 9th and the 6th centuries BC, for a total of 137⁵; we must however stress

that this sample does not give a uniform representation of the chronological phases nor of the different cemeteries⁶.

Despite the sample differences and the lack of documentation mentioned above, it is still possible to identify a trend for the introduction of iron similar to Este. The first iron artefacts date back to the second half of the 8th century BC (Fig. 5 a-b), thus with a slight chronological gap compared to Este, probably due to a lack of documentation. They are few, highly selected, objects from the two most important tombs for quality and quantity of the grave goods: the “del Re” (Calzavara, Chieco Bianchi 1976, 229-231) and the “dei vasi borchiati” (Gamba, Gambacurta 2010) graves; at least one of them is double. In both the new metal is used for the same functional classes, and, significantly, together with bronze, like at Este. These are: a large iron knife, probably ritual (Cupitò 2017, 523), with a fitting element of the pommel made of bronze (together with an iron small knife and awl), and a pin with bronze shaft and an iron head. Therefore, iron belonged exclusively to the highest-ranking aristocracy and was a status symbol.

Few contexts are dated to the subsequent phase, between the 7th and the beginning of the 6th centuries BC (Fig. 5a; Fig. 5c-d-e), but occurrences of iron increase. Alongside the progressive growth of the proto-urban centre, the use of the new metals increased and the functional classes widened: not only knives and small knives, but also ornaments (particularly fibulae), axes and work tools, as testified by the grave goods of tomb 318 of the palazzo Emo Capodilista cemetery (De Min *et alii* 2005, 154-157; Voltolini 2013, 350-352), where a set with various tools (axe, saw, file, rasp, three knives and a hammer), some of which made of iron, seem to reference an ancient tradition already identified at Este. These elements indicate that the new metal, even though it was still a status symbol, spread outside the leaders of the aristocracy, and was appreciated for its ornamental value, as well as for its technical properties. The latter indicates the beginning of a transformation of the production processes.

This transformation became manifest by the middle of the 6th century BC (Fig. 5a; Fig. 5f), when a significant increase in iron work tools coincided with a decrease in iron ornaments made of this metal, which demonstrates its use, its intrinsic properties, and its spread on a wider scale. The urbanisation of Padua began in this phase and was completed by the end of the 6th century BC (De Min *et alii*, 26). Refined and technically complex productions still existed in high-ranking graves, such as the laminated iron sheath of the knife, with iron blade and bronze hilt, from grave XLVI of the vicolo Ognissanti cemetery. Therefore, iron did not belong exclusively to aristocracy anymore, but was accessible on a large scale. The increase in production volume of iron artefacts in the urban phase of Padua is tes-

⁵ In order to analyse the data available for Padua and compare them to Este's ones, one uniform chronology had to be adopted, which resulted in the unification of some relative phases of Padua in order to match those of Este. No data were available for five graves of the via Loredan cemetery, so they were not taken into consideration.

⁶ 76 graves are dated between the 9th and 8th centuries BC, while only 23 to the 7th-beginning of the 6th centuries BC, mostly from the via Loredan cemetery, which was excavated in 1913 with a partial collection of grave goods; this phase is therefore clearly underrepresented. 38 graves are dated to the middle and late 6th century BC.

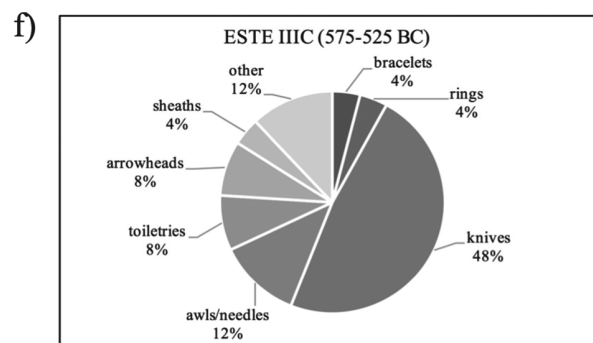
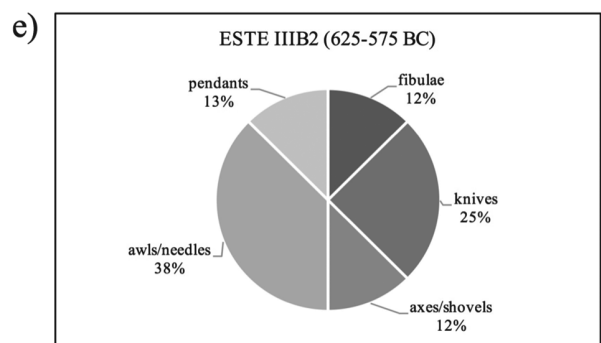
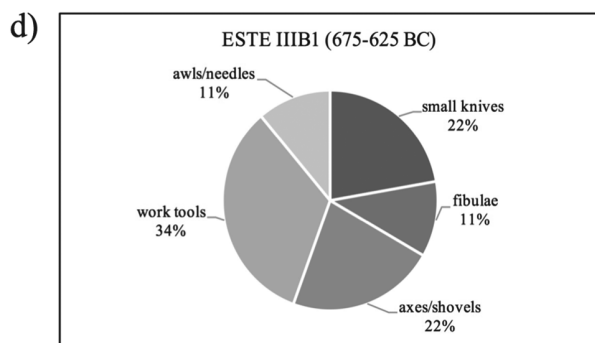
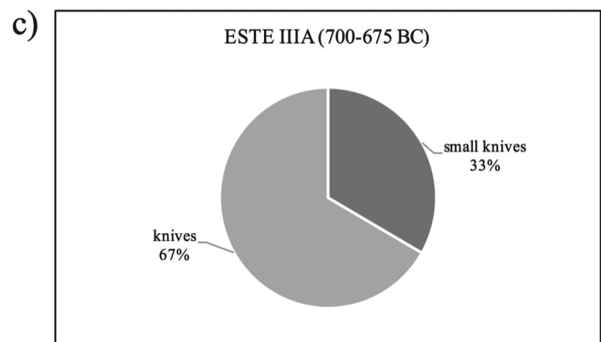
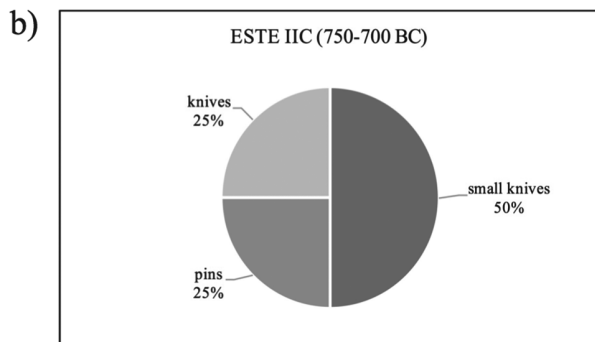
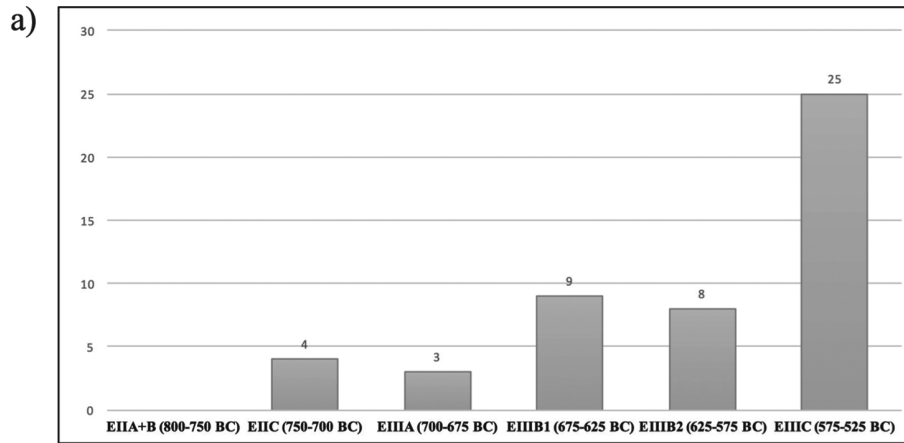


Figure 5. Padova. a) Iron artefacts divided according to phases; b) Iron artefacts belonging to the phase ESTE IIC, divided into classes; c) Iron artefacts belonging to the phase ESTE IIIA, divided into classes; d) Iron artefacts belonging to the phase ESTE IIB1, divided into classes; e) Iron artefacts belonging to the phase ESTE IIB2, divided into classes; f) Iron artefacts belonging to the phase ESTE IIIC, divided into classes.

tified by the find of iron working facilities in the settlement, starting at least from the mid-6th century BC. Although these contexts are still not well known (Michelini 2016, 69), no similar structures were identified for the previous phases.

Diego Voltolini

3.3. Western Veneto

Population dynamics and territorial organisation of western Veneto in the Iron Age, and more specifically of the Verona area, have distinctive characteristics, and the debate on the timing and manner of the proto-urbanisation and urbanisation processes in this area (Guidi 2008 e 2015; Guidi *et alii* 2008) is still open (Leonardi 2010; Ceola 2016/2017; Salamon 2016/2017). Between the 10th and 9th centuries BC a few settlements on the plain, specifically Gazzo Veronese (Gonzato *et alii* 2015) and Oppeano (Guidi, Salzani 2008; Candelato *et alii* 2015), thanks to their strategic position controlling the key junctions of the water system, became central places. However, the settlement pattern did not undergo significant transformations at the passage to the 8th century BC: no process of settlement selection and concentration, like those that led to the formation of Este and Padua, took place. The proto-urban model never reached the hill and mountain areas; here, the settlement pattern was clearly aimed at controlling the entrance to the Adige Valley, as well as the minor valleys that allowed a lateral penetration towards the Adige Valley, and was made up of a close net of settlements. On the plain, despite Gazzo and Oppeano strengthening their hegemony, settlements increased in number, developing a net of new sites, some small but still fortified (Leonardi, Bettinardi 2002), others, like Baldaria di Cologna Veneta (Rossi 2005), larger, and therefore more important in the settlement net hierarchy. The passage to the 7th century BC marks a change: the settlement pattern thinned out in both the hill and mountain areas and the plain and the population gathered around the largest hegemonic centres. Another transformation in settlement pattern occurred at the passage to the 6th century BC, but this time the territorial organisation was similar to that of the urban centres of Este and Padua (Leonardi 1992, 184), although on a smaller scale. The territories pertaining to the large sites on the plain, first of all Gazzo and Oppeano, were occupied by a close net of settlements, linked to the larger ones; while the hill and mountain areas saw a widespread reoccupation, thanks to an impulse from the centres on the plain.

Despite the general developmental trend of population dynamics and territorial organisation is quite clear for western Veneto, the record is still very problematic, especially for funerary contexts. Several cemeteries were, indeed, discovered and excavated; however, they are often unpublished, or only partially published (Salzani 2008). The only cemeteries systematically reported are Garda (Salzani 1984), Ponte Nuovo di Gazzo Veronese (Salzani 2005) and Desmontà di Veronella (Salzani 2013), but all of them are dated almost exclusively to the 10th and 9th centuries BC.

It is therefore impossible to identify a trend for the introduction and spread of iron in this area; this hinders a global understanding of the issue, since the Verona area held the role of intermediary in the relationships and trades between Europe and the Alps on one hand, and peninsular Italy on the other. A few key considerations are however possible. Firstly, given the total absence of iron artefacts in the large sample of graves dated to the 10th and 9th centuries BC, we can maintain that iron was not introduced in this area before the 8th century BC. Secondly, the flow of iron, together with other raw materials from Europe or the Alpine area, such as copper, salt and, although less than the previous phases, amber, came through the Adige Valley, therefore the sites controlling the strategic points played a key role from the start. The exceptional male grave from Rivoli Veronese, dated to the end of the 8th century BC, is clear evidence of this. Rivoli Veronese is a hill site located in defence of the Chiusa di Cearino. The grave belonged to one of the paramount chiefs of the local aristocracy; the grave goods included objects, especially weapons and bronze vessels, reminding of the late Urnfield and early Hallstatt (with comparisons from Bavaria, to Austria, Slovenia and Croatia); up to date, this context is the richest in iron of all northern Italy, including the Bolognese Villanovan culture. Moreover, the new metal appeared on objects that are not only high-ranking status symbol, but also pieces of high craftsmanship: a sword and a large spearhead, made of both iron and bronze. This trend had already been identified at Este and Padua, which is interesting because it means that aristocracy behaved in the same way regardless of the socio-political complexity reached by their communities. The sword had a bronze damascened handle and an iron blade; the spearhead is made of iron, but the socket is decorated with bronze rings (Cupitò 2017). These are the oldest iron artefacts of western Veneto⁷. The Verona area played a key role in the relationships between the Venetian centres and the Alpine area, where iron appeared at the beginning of the 8th century BC, as testified by the Vadena/Pfatten cemetery, at the confluence of the Adige and Isarco rivers (Lunz 1974), and most of all by the Rasun di Sotto/Nieder Rasen cemetery, in the Puster Valley (Faleschini 2006). Given this evidence, as well as those of Este, it is improbable that iron was introduced in western Veneto only at the end of the 8th century BC. Therefore, the lack of older occurrences is probably due only to a lack of documentation.

Michele Cupitò

⁷ The only other occurrences dated to the same period as the Rivoli grave are a bracelet from grave 13 of the Lovara di Villabartolomea cemetery, dated between the end of the 8th and the beginning of the 7th centuries BC (Salzani *et alii* 2000) and an isolated pin from the Baldaria di Cologna Veneta cemetery, dated to the end of the 8th and the beginning of the 7th centuries BC as well (Salzani 1989, 7, fig. 1, 8).

3.4. Central-eastern Veneto

Population dynamics and territorial organisation of central-eastern Veneto, that is to say the area from the Sile River to the strip between the Livenza River and the lower course of the Tagliamento River, have specific characteristics, and the timing and manner of the proto-urbanisation and urbanisation processes (Malnati, Croce Da Villa, Di Filippo Balestrazzi 1996, 25-80; 101-175; 185-305; 335-341; Bianchin Citton 2004, Capuis, Gambacurta 2015, 451 e 455-456) are yet to be clearly identified (Fraresso 2015). The most important fact is that the settlement pattern of the 10th and 9th centuries BC anticipated exactly that of later phases (Cupitò *et alii* 2015, 303-304). The settlement pattern of the hill and piedmont areas (where proto-urban and urban entities never developed), although dispersed, presented already a clear division in districts that were under the Asolo, Montebelluna and Cenedese centres. As for the plain, the settlement pattern was sparser, and its centres were Treviso (closely linked to the lagoon area of Altino, which by then was still characterised by a dispersed settlement pattern), Oderzo and Concordia. As in western Veneto, in this area, the passage to the 8th century BC did not entail any population selection and concentration like those of Este and Padua, and the existing settlement pattern continued unchanged up till the 6th and 5th centuries BC. However, a transformation occurred for the Treviso and Altino centres, that saw a reorganisation of the political balance between the two. Due to Padua's projection towards the lagoon and the Piave Valley, and the consequent entrance of Altino in its influence sphere, Treviso collapsed. This collapse may have coincided with a real temporary abandonment of the site, which lost its hegemony on the territory (Fraresso 2015).

Even though it is possible to identify quite clear general trends of the settlement dynamics and territorial organisation, published data for central-eastern Veneto is very lacking, especially for funerary contexts. Cemeteries systematically and completely published are available for just two centres: Montebelluna, located at the foot of the Montello formation, in close connection with the Piave River (Nascimbene, Manessi 2003), and S. Vito, located in a key point of the Tagliamento River (Cassola Guida 1978; Pettarin 2003). As for the rest of the hill and piedmont areas (Nascimbene 2013), and for the centres of Altino and Oderzo, only a few graves are known (Gambacurta 1996a e b); moreover, the cemeteries of Treviso and Concordia have not been identified yet.

Regarding the introduction and spread of iron, it is only possible to identify a general trend, based on the Montebelluna and S. Vito evidence, and compare the results with the rest of Veneto. Thus, despite the lack of data, two elements are very clear. Firstly, as evidenced by the S. Vito graves 1972/T and E/17 (Cassola Guida 1978, 17-18 e 29-30), iron appeared in a rather early phase of the 8th century BC; this fact supports the idea that iron spread in the entire Venetian region starting from this phase; therefore, that the lack of occurrences for Padua and the Verona area is probably due to a lack of documentation. Secondly,

the spread of iron followed a similar path to what seen for Este, Padua and western Veneto. Indeed, the analysis of the evidence of both Montebelluna and S. Vito shows the same trend: in the 8th century BC there were only small knives; in the 7th and beginning of the 6th centuries BC knives and ornaments also appeared - especially fibulae and bracelets -, and finally, in the middle and late 6th century BC ornaments disappeared, and larger and functional objects spread, such as large knives and axes.

Michele Cupitò, Ilaria Albertini

4. Iron in north-western Italy

4.1. The centre of Como

The Pre-Roman settlement of Como, unlike the future Roman centre of *Novum Comum*, was located alongside the south-western side of the Monte della Croce, a hill ridge that runs along the present-day city to the west and south-west. From the 9th century BC, at least, the proto-urban settlement developed as several dispersed finds, that grew in size and density until they occupied a wide surface, that incorporated areas previously used as cemeteries - first and foremost the via Tito Livio cemetery, used during the first phase of the settlement (Caporusso 1998) - and reached a probable extension of 150 hectares in the 5th century BC, when it also became fully urban (Casini *et alii* 2001). Cemeteries were located in different areas around the settlement, almost radially surrounding it: to the north (at Cardano, Moncucco, Val di Vico), north-west (at S. Fermo della Battaglia, S. Maria di Vergosa), west (at Prestino), south-west (at Nuovo Ospedale S. Anna), south (at Lazzago, Breccia, Rebbio, Ca' Morta, Camerlata) and finally east, for the older phases (the Vigna di Mezzo - via Ronchetto grave). Over one thousand graves were found since the end of the 19th century; however, only a small percentage of grave goods are known: the sample taken into consideration in this paper consists of little more than 100 graves, dated from the 9th to the 5th centuries BC⁸ (Bonghi Jovino *et alii* 1983; Caporusso 1998; De Marinis, Premoli Silva 1969; Rittatore Vonwiller 1966; Saronio 1969; Mordeglija, Uboldi 2017). The general trend of the introduction and spread of iron can be identified thanks to the wide chronological range considered, within the limits of a comparison with the trend identified for the centre of Este. It is also possible to compare the data from the cemeteries with the few finds from the settlement, although the published information not being homogeneous, and sometimes incomplete, even within the same context, hinders a detailed analysis.

The oldest evidence of iron, dated to the 8th century BC (Fig. 6a), is a single occurrence from the Moncucco grave (de Marinis, Gambari 2005, 204-205; 221, tab. 8),

⁸ From a chronological standpoint, according to the published data, the sample is articulated as follows: 11 graves are dated between the 8th and the beginning of the 7th centuries BC; 36 between the first phases of the 7th and the first half of the 6th centuries BC; 57 between the half of the 6th and the half of the 5th centuries BC.

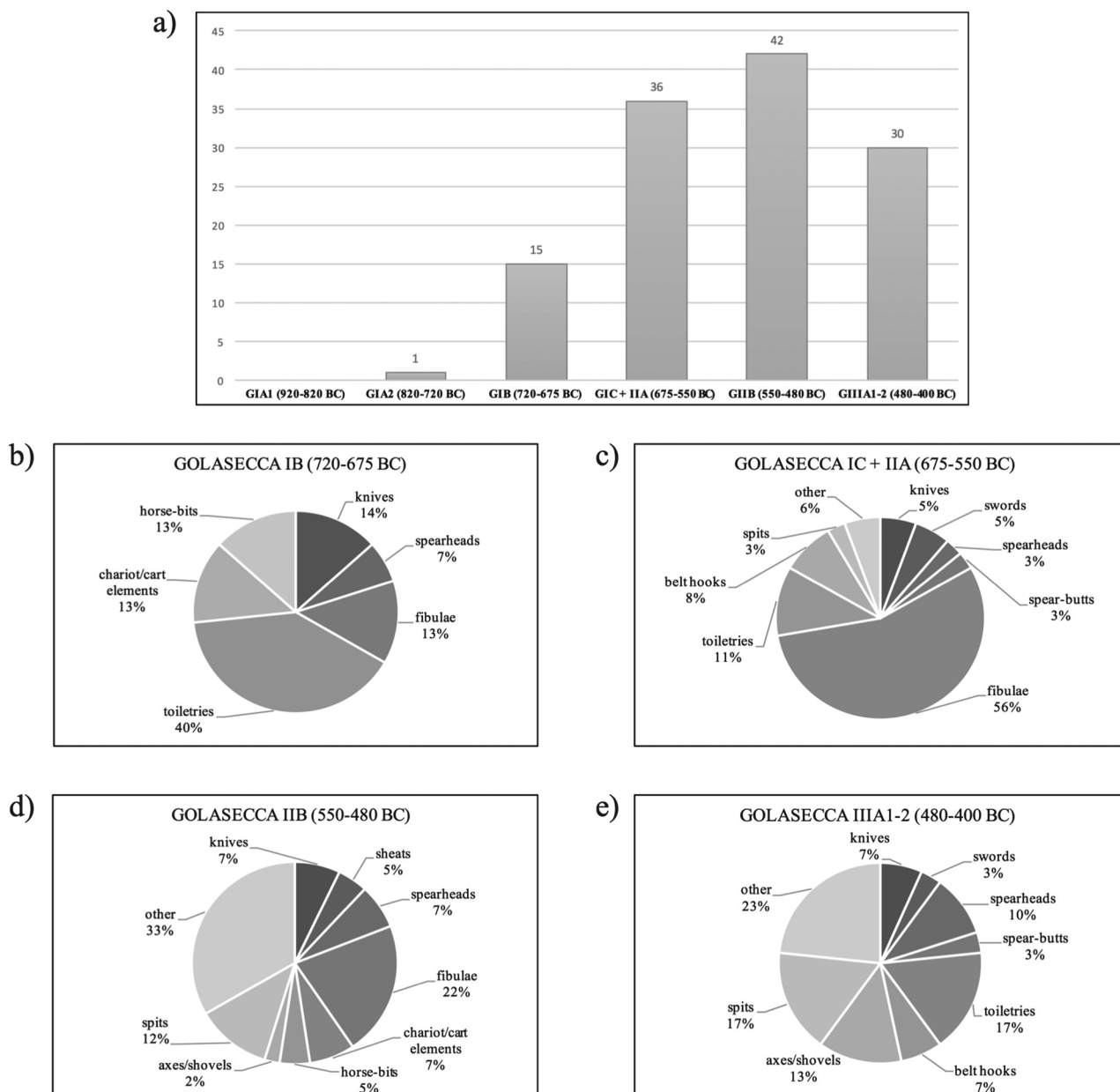


Figure 6. Como. a) Iron artefacts divided according to phases; b) Iron artefacts belonging to the phase GOLASECCA IB, divided into classes; c) Iron artefacts belonging to the phases GOLASECCA IC and IIA, divided into classes; d) Iron artefacts belonging to the phase GOLASECCA IIB, divided into classes; e) Iron artefacts belonging to the phase GOLASECCA IIIA1-2, divided into classes.

which contained a biconical ossuary and a bronze sword broken in several fragments; a small knife with iron blade and bronze handle was placed inside a small vessel beside the urn: it is the oldest known use of iron, significantly together with bronze, for the Golasecca culture. The grave is dated between the end of the 9th and the 8th centuries BC, based on the typology of the ossuary and of the sword, which is close to the Calliano type, while the small knife can be dated to the first half of the 8th century BC thanks to a comparison with a specimen from grave Ricovero 143 at Este. Thus, in north-western Italy, iron appeared in an emergent male grave - with sword -, and in an object made

of both iron and bronze, the same as Este and Padua. This confirms that initially iron was used for high craftsmanship artefacts with intrinsic value, aimed at the celebration of the proto-urban aristocracies.

At the passage from the 8th to the 7th centuries BC (Fig. 6 a-b), the use of iron varied in different ways: it was used for fibulae, toiletries, belt hooks, chariot/cart parts, horse-bits and weapons. The use of iron for ornaments is particularly significant due to the analogy with the Venetian trend, especially fibulae, although iron still belonged only to few individuals, who displayed significant openings towards peninsular Orientalising and long-distance

relationships with Bologna and Etruria. The Tomba del Carrettino grave of the Ca' Morta cemetery, dated to the end of the 8th century BC, perfectly exemplifies the trend of this phase, and the connections with peninsular Italy (Bertolone 1956-1957, 37-40; Marzatico, Gleirscher 2004, 295, fig. 2; 613-614). Although the grave goods have been only partially published, an ample repertoire of artefacts is available: a bronze-sheet amphora decorated with embossed points and bosses, a sheet-bronze ladle with open handle of Bolognese influence, a bronze socketed axe, a bronze knife with serpentine blade, two sheet-bronze ribbed bowls - one of which mounted on a small ritual chariot/cart with four wheels - a bronze key with ring handle, a pair of iron horse-bits, bronze and iron fragments of structural elements of a chariot/cart, an iron blade of a knife, a small knife with iron openwork handle and an iron spearhead.

The spread of iron at Como saw its height between the middle 7th and the first half of the 6th centuries BC (Fig. 6a; Fig. 6c), when ornaments increased exponentially, often concurrently with the corresponding bronze types. In this phase, knives continued to be produced, now generally made of iron: probably, the new metal was still reserved to an emergent group, that adopted it also for ornaments, but it began to be valued for its intrinsic properties as well. An important link to Hallstatt iron working is the iron sword of the Mindelheim type, found in a recently discovered grave at S. Anna, in the new hospital area, dated to the beginning of the 6th century BC (Mordeglia, Uboldi 2017, 68 e 92-93).

The use of iron at Como underwent another transformation between the middle of the 6th and the 5th centuries BC, at the passage to the urban phase (Fig. 6a; Fig. 6d-e). Ornaments seemed to disappear (fibulae and toiletries were now made of bronze), new kinds of objects appeared (shovels, spits and nails), while knife blades continued to be produced: this change seems to indicate that, by then, iron was used for its technical properties.

The progressive specialisation of the kinds of artefacts made of iron can therefore be linked to the transformation towards a fully urban form that took place in Como, which saw a great restructuring of the settlement as well as a redefinition of the fabric of society. We must however stress how the use of iron to produce status symbol artefacts did not completely stop, although limited to a few prestige items, such as the tripod with iron legs and bronze feet, dated to the second half of the 6th century BC, found in the Como - Rondineto settlement (AA.VV. 1986, 65-67).

Significantly, areas for metal working are recorded inside the settlement in this phase, although the data is isolated and partial (Casini *et alii* 2001, 112). In particular, furnaces for both iron and bronze working are reported in two areas: at Pianvalle (AA.VV. 1986, 90-98) and in via Isonzo (AA. VV. 1986, 128). At Pianvalle, which was occupied already in the 8th century BC, bronze metallurgy was evidenced by moulds and a founder's hoard, however, iron working is hypothesised as well due to the presence of a spatula, a chisel, two bar ingots (AA.VV. 1986, 94-98). This facility was abandoned at the end of the 5th century BC. The via Isonzo area (Casini *et alii* 2001, 111-113) was activated in the 7th century BC, but in the 5th century BC underwent a complete

reorganization of the settlement layout; canalization came to light, covered with ferrous formations (between 7 and 21.9%, which suggested the presence of an iron working facility nearby) beside a scrap heap made of fibulae, ingots, bronze plaquettes and iron lumps. Como's facilities confirm what already assessed for Padua: in the urban phase, the increase in iron artefacts, used for their intrinsic properties probably coincided with an increase in production volume; it is therefore no accident that the first evidence of these facilities appeared in concurrence with the full urbanisation.

Silvia Paltineri, Diego Voltolini

4.2. The Golasecca – Sesto Calende - Castelletto Ticino district and the other contexts of the western pole of the Golasecca culture

The second main settlement district of north-western Italy is Golasecca - Sesto Calende - Castelletto Ticino. The three localities formed one single district, that developed in the Early Iron Age, on both banks of the Ticino River, where it flows out of the Lake Maggiore, between the present-day regions of Piedmont and Lombardy (Binaghi, Squarzanti 2000; Gambari 2000). The three distinct settlements were matched by several cemeteries that were excavated in the 19th century: only a few dozen graves, of the hundreds found, have been entirely published, especially in recent years. Nonetheless, it was possible to analyse 162 graves with reliable associations, dated from 9th to the beginning of the 5th centuries BC (Spagnolo Garzoli, Gambari 2004, 256-279; Gambari, Cerri 2011; de Marinis *et alii* 2009, 155-206, 386-456, 471-491). At the beginning of the 5th century BC, the settlement underwent a profound crisis, probably due to a change in the population dynamics that led to the emergence of the centre of Milan.

At Golasecca - Sesto Calende - Castelletto Ticino, like Como, depositions of weapons were very rare in the 9th and 8th centuries BC, while metal objects were limited almost exclusively to toiletries and ornaments, placed on the pyre with the deceased: iron artefacts are therefore underrepresented because they were either absent from the grave goods or extremely damaged by the fire due to their small dimensions. The first occurrence of an iron artefact - and the only one for the mid-8th century BC (Fig. 7a) - came from the via del Maneggio cemetery, at Castelletto Ticino: beside the cinerary urn, the bowl-lid and two additional vessels, an iron pin was found in grave 1/03; the pin, with hemispherical head, was extremely damaged by the fire. According to both the pottery and the pin typology, the grave can be dated within the first half of the 8th century BC (Gambari, Cerri 2011, 147-149, fig. 130,4).

Between the end of the 8th and the beginning of the 7th centuries BC, iron artefacts were still rare⁹ (Fig. 7a-b); however, precisely due to this scarcity, their differentiation

⁹ Iron particles near an urn and a toiletry element were found in the grave goods of another grave of the Castelletto Ticino cemetery (Gambari, Cerri 2011, 201; Gambari *et alii*, 1998, tab. XCVIII,7).

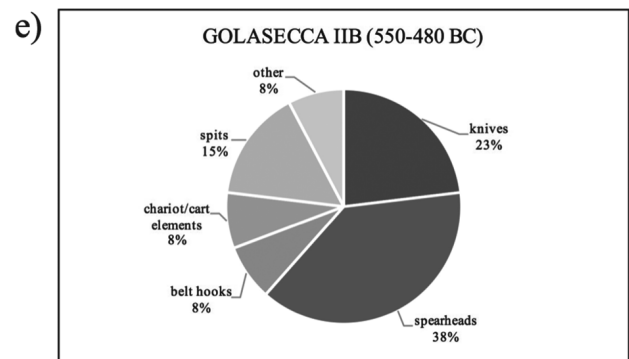
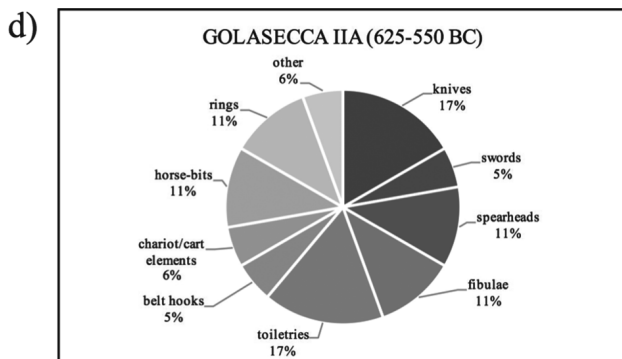
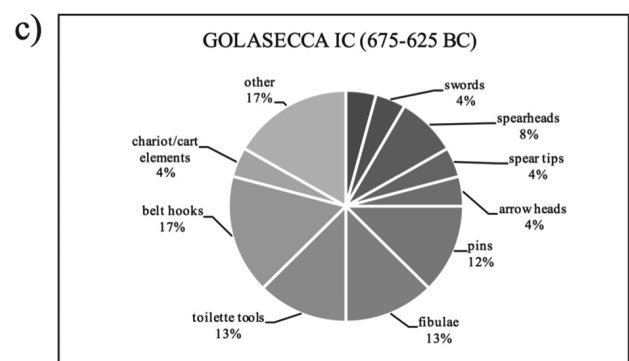
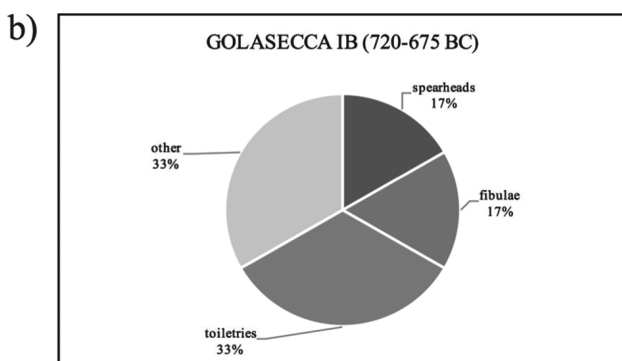
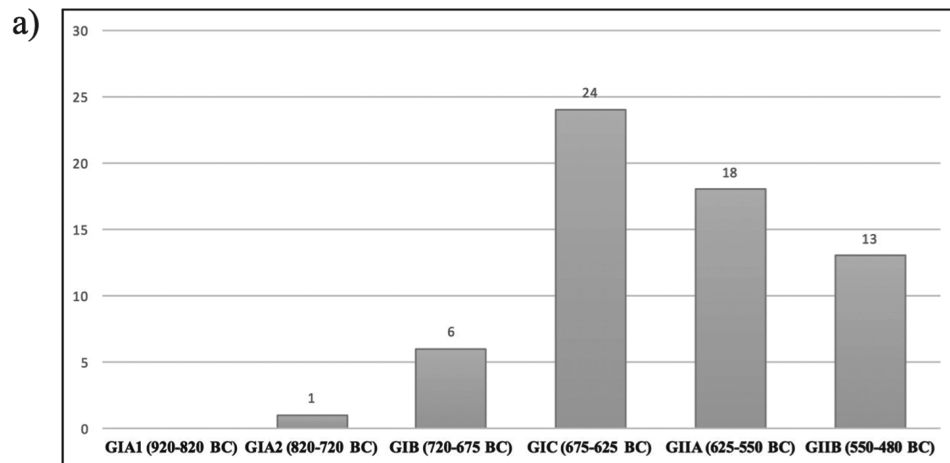


Figure 7. Golasecca - Sesto Calende - Castelletto Ticino. a) Iron artefacts divided according to phases; b) Iron artefacts belonging to the phase GOLASECCA IB, divided into classes; c) Iron artefacts belonging to the phase GOLASECCA IC, divided into classes; d) Iron artefacts belonging to the phase GOLASECCA IIA, divided into classes; e) Iron artefacts belonging to the phase GOLASECCA IIB, divided into classes.

in distinct classes is of great importance, because it signals the beginning of a trend that fully developed in the subsequent phase. In the middle of the 7th century BC, in fact, like in Veneto and Como, there is a quantitative explosion of iron products, as well as their differentiation into multiple classes (Fig. 7a; Fig. 7c). Highly representative of this phase are the two warrior graves of Sesto Calende. The first one (Frontini 2011, 77-91), dated to the third quarter of the 7th century BC, included: a decorated bronze situla, a bronze

cap helmet, a short iron sword, an iron spearhead, parts of a chariot/cart with iron tyres, a pair of horse-bits, horse harness elements and a pair of sheet-bronze greaves. Likewise, the second warrior grave (de Marinis 2009a), dated to the end of the 7th century BC, included a decorated situla and bronze and iron elements of a chariot/cart, as well as a small sheet-bronze chariot/cart with iron elements and iron horse-bits. The weaponry of this grave consisted of an iron spearhead and an antenna dagger with bronze hilt: the dagger had an

iron blade and a tang with alternate bronze and iron small discs; therefore it was a weapon made of both iron and bronze, which meant that it was difficult to make and precious.

A noteworthy phenomenon of the western pole of the Golasecca culture, although delayed compared to Como and Veneto, is the presence of objects made of both iron and bronze: the above-mentioned second warrior grave of Sesto Calende; a bronze serpentine fibula with an iron element from grave 18 of the Castelletto Ticino cemetery, dated to the 7th century BC (Pauli 1971, 138, plate 15); an incense burner with iron inserts from grave 34 of the same cemetery, dated to the 7th century BC as well (Pauli 1971, 146, plate 20), and finally, the “tomba del tripode” of the Sesto Calende cemetery, an exceptional context where a bronze tripod with iron legs was found, dated to second half of the 6th century BC (de Marinis 2009b, 440, fig. 12).

To complete this review, it should be noted that in the Belvedere settlement, at Castelletto Ticino, occupied from the 8th to the 6th centuries BC, pebble structures were found, that were hypothetically used for the fragmentation of iron ores (Gambari 2000); however, it is not possible to be more specific about the chronology.

The trend of the use of iron identified for the middle 7th century BC continued up to the middle of the 6th century BC (Fig. 7a; Fig. 7d); from that date onwards, iron fibulae and toiletries progressively disappeared, which seems to confirm what already seen for Como: iron was not used anymore for ornaments. Finally, with the beginning of the 5th century BC, we cannot follow the trend of the spread of the new metal any further: the Golasecca - Sesto Calende - Castelletto Ticino district underwent a profound crisis, and the proto-urbanisation processes came to an end. Although in recent years some evidence emerged of continuity of a few small sites in the area of Sesto Calende (Grassi 2014), it is undeniable that the large western district of the Golasecca culture lost its central role, in connection to significant changes in the settlement layout throughout north-western Italy as well: it will suffice to mention the birth of new centres - the most important one being Milan - and the capillary occupation of the low plain.

The identified trend seems to be generally valid for the other sites close to the Golasecca - Sesto Calende - Castelletto Ticino district as well. Data from the Ameno, Castello Valtravaglia and Briona cemeteries do not contradict the trend outlined above, although representative of a relatively short chronological period, from the 7th to the 5th centuries BC. In the Ameno cemetery (Pauli 1971, 133-138; Spagnolo Garzoli, Gambari 2004, 162-164) - in graves dated between the 7th and the 6th centuries BC - and in the Castello Valtravaglia one (Cavallotti Batschvarova 1969, 83-148) - in graves dated to the middle 7th century BC - iron was used exclusively for personal ornaments, such as toiletries and belt hooks; in the Valtravaglia cemetery several iron fibulae were found as well, confirming the progressive widening of iron use. In the San Bernardino di Briona cemetery, between the 6th and the 5th centuries BC, iron was used for weapons, knives and other tools, but not for ornaments (Pauli, 1971, 155-157; Spagnolo Garzoli, Gambari 2004, 218-220). These

three cemeteries, although containing different classes of artefacts - which may depend on the different ways of self-representation of the communities - seem to indicate that the use of the new metal increased considerably between the 7th and the 5th centuries BC.

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4.3. The southern interface of the Golasecca Culture

The southern area of the Golasecca Culture was an interface territory between the Golasecca Culture to the south and Ligurian one to the north, and seemed peripheral to both worlds. It was an area of low plain, directly connected, on the one hand, with the hegemonic centres of Golasecca - Sesto Calende - Castelletto Ticino and Como, and, on the other hand, with the Apennine area south of the Po River. Despite a renewed interest in this area in the last few decades, the archaeological framework is still fragmented and non-homogeneous: some sites are known only through settlement evidence, and some only through tombs; however, the cemeteries were small and covered only a short chronological span (de Marinis 1990; Pearce 1994; Paltineri 2017a; Paltineri, Rubat Borel in press).

In the first centuries of the Iron Age, at least up to the end of the 7th century BC, this area was depopulated: this lack of documentation cannot be ascribed exclusively to the fortuitousness of the finds, but instead to environmental reasons - the climate crisis that took place in northern Italy in this phase - and socio-political ones, such as the settlement pattern: the concentration of the population in large proto-urban centres did not take place in the low plain, contrary to what is attested in the northern area, at Golasecca-Sesto Calende-Castelletto Ticino and Como.

Only from the 6th century BC, evidence increased, with the establishment of centres that were in control of the Lambro and Ticino routes, such as, respectively, the Colle di San Colombano site (Negroni Catacchio, Rossi 1979) and the Gropello Cairoli and Garlasco ones. The Gropello Cairoli settlement was occupied from the Bronze Age to the Late Iron Age; here, among the housing structures, a founder's bronze workshop came to light (Ruffa 2010), with evidence of manufacturing: finished artefacts - a large sample of objects, especially ornaments - and semi-finished products, including moulds and bronze scrap. Although the Gropello Cairoli settlement showed evidence of metalworking, it is important to note that the only occurrences of iron date back to the Late Iron Age. Instead, an iron serpentine fibula was found in a grave of the Garlasco cemetery, with the urn, the bowl-lid and an accessory cup; this fibula is exceptionally big, measuring 16 cm in length (Simone 2000, 206, fig. 2, 3), and is dated to the middle 7th century BC, while all the other elements of the grave goods are dated to the half of the 6th century BC; this find confirms not only that iron was widely used for ornaments since the 7th century BC, but also that these ornaments held a value so great that they were hoarded for generations, in this case three.

Moving westbound, along the Sesia River, the available data is even more limited, since almost all materials are isolated finds (Paltineri, Rubat Borel in press). In this regard, an outstanding artefact from Pezzana, a probable funerary context, is particularly noteworthy: a tripod with sheet-bronze basin, iron legs and bronze feet (Paltineri 2017a, 304, fig. 28), dated to the second half of the 6th century BC. This artefact finds comparisons with the Como specimen mentioned above, which proves the persistence of prestige artefacts made of bronze and iron in the Golasecca culture.

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4.4 Liguria

The Ligurian territory extended from the Ligurian Sea to the Po River, and was divided into two areas: the inner one - completely occupied by the Apennines - and the coastal one, formed by mountains bordering the sea and, in a few places, by short coastal plains, suitable for landing. Although the geographical position of Liguria was strategic, given its role as a bridge between northern Etruria, the Golasecca culture and the transalpine area, the available data is still incomplete and not homogeneous (Paltineri 2016; Paltineri 2017b). However, in the Iron Age, all the Ligurian territory, except for Genoa, was characterised by the non-development of large proto-urban centres: the settlement pattern was still organised in small sites; therefore, the lack of data could be due to a dispersed and rarefied occupation of the territory.

In the small plain between the Po River and the Apennines, along the border with the Golasecca world, cemeteries are known only from the 6th century BC. A chance discovery at Verretto included, among the grave goods, iron serpentine fibulae and belt plates (Vecchi 2000, 231-234), dated between the end of the 6th and the beginning of the 5th centuries BC. An isolated grave found at Castelletto di Branduzzo included an urn, a bowl-lid, a bronze fibula and a short sword with iron blade and sheet-bronze sheath fastened with iron rivets, dated to the half of the 6th century

BC (Simone 2000, 207, fig. 3, 4-5). Both sites are quite small, and it is difficult to put forward an interpretation, especially in consideration of the lack of documentation for both the low plain north of the Po River, and the hill and Apennine areas south of the Po River which fully belonged to the Ligurian culture (Venturino Gambari *et alii* 1996; Chiaramonte Trerè 2003; Gambari 2003; Carini, Miari 2004; Venturino Gambari *et alii* 2014).

More southern, in the proper inner Liguria, funerary contexts are documented from the 6th century BC: grave 2 of the Alba-Via Terzolo cemetery (Venturino Gambari 2009) contained an iron serpentine fibula, an iron belt clasp and an iron razor without the handle. Only bronze artefacts were found in the few graves of the small Valdieri cemetery (Venturino Gambari 2008, 97-110), dated between the 6th and the 5th centuries BC, except for an iron serpentine fibula and an iron awl from grave 4/94.

Regarding coastal Liguria, instead, the available data is richer, at least from a qualitative standpoint. The oldest funerary context of Liguria, with substantial documentation, is the Chiavari cemetery (Paltineri 2010). Chiavari begun in the last quarter of the 8th century BC, however, it lasted around 130 years, which does not enable us to outline a long-term trend. The oldest graves, dated within the 8th century BC, did not contain iron artefacts. However, the first phase of the cemetery is not well represented - a very small number of graves belong to this initial phase (Paltineri 2017b, 266-267) -, therefore it is possible that this absence is ascribable to a lack of documentation. In the 7th century BC, the best represented phase of the cemetery, iron was used for several classes of artefacts: ornaments and toiletries (fibulae, bracelets, belt hooks and razors), tools and offensive weapons (knives, spears and spear-butts, an axe, daggers and a short sword) (Fig. 8). This diversification of the use of iron is similar to what seen for the other main centres of northern Italy and is confirmed by other coeval Ligurian contexts as well. In 1929, more than two hundred iron artefacts came to light in the Pietra Ligure grave (de Marinis 2004, 208); however, most of them were lost; among these items we may cite several socketed spearheads, an iron antenna sword, an iron spearhead and a fragment of a helmet; it was probably an exceptional grave belonging to a warrior, buried at the end of the 7th century BC, at the slopes of the Monte Trabocchetto. Other funerary contexts dated to the 7th century BC, although smaller, can be used as a term of comparison; in the small Albenga and Albisola cemeteries the use of iron follows the same pattern as in Chiavari, and is used for the same classes of artefacts: an iron pin, serpentine fibulae, knives and a javelin were found at Albenga (Massabò *et alii* 2014), while an iron fibula and an iron spearhead are known at Albisola (Bulgarelli 2014).

Regarding the passage between the 7th and the beginning of the 6th centuries BC, the grave goods from the Rapallo grave, although only partially known, included an iron spearhead (Melli 1996, 99). Funerary data for the 5th century BC is partial and incomplete: the isolated graves from the Apennine hinterland at Valbrevenna (Garibaldi 2004a), Roccatagliata (Garibaldi 2004b) and Savignone

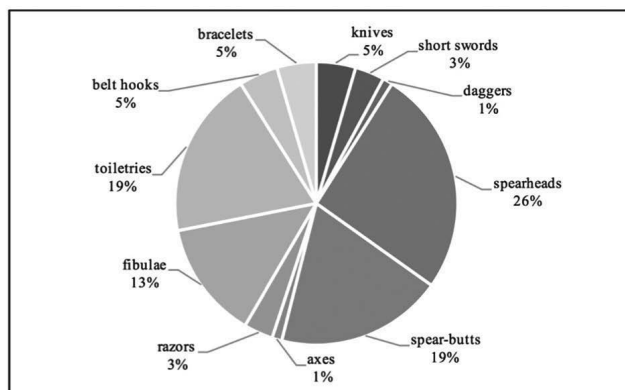


Figure 8. Chiavari. Iron artefacts divided into classes.

(Garibaldi, Traverso 2004) confirm the use of iron for offensive weaponry. Regarding the coastal area, the Genoa cemetery is still unpublished and it is therefore impossible to follow the trend of the use of the new metal in the developmental phase of the main Pre-Roman *oppidum* of Liguria (Melli 2014, 71-96; Melli 2017, 40-83). On the other hand, important evidence of metalworking came to light at Genoa, all significantly belonging to the urbanisation phase. The urban excavations of Santa Maria in Passione and of San Silvestro revealed, beside housing areas, metalworking facilities, three of which were smithies. A recent review of the excavation data, and metallographic analyses, identified an iron slag and production scrap inside dumps. The slag is hemispherical from a smithy and points to secondary smithing; no evidence of smelting *in situ* was found, which means that smiths processed only semi-finished products, in the form of blooms or bars ready to be turned into finished artefacts (Cucini 2012, 42-43). Chemical analyses showed that the provenance of these semi-finished products was close to Genoa (Monte Ramazzo mining areas, 7 km from the city), both in the Levante (east of Genoa: Libiola, Monte Loreto, Bonassola, Levanto mining areas) and in the Ponente (west of Genoa: Noli mining area); in few cases the provenance was the Elba Island (Cucini 2013, 81-117; Melli 2017, 63). Several finds from the Genoa settlement showed further evidence of the increase in production volume and of the differentiation of the artefacts in more classes: weapons and working tools (axes, knives, nails, shears and other tools) appeared from the 6th century BC. Moreover, some artefacts were quite exceptional, showing a high level of technical skills (maybe attributable to Etruscan workers?): the sheath that covered the end of a dagger was made up of iron sheets reinforced with a transverse bar, made of iron as well (Milanese 1987, 145-146, n. 197).

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Conclusions

The analysis carried out so far clearly shows that, regarding the timing and manner of the first introduction of iron and of iron working, northern Italy follows a common development, characterized by strong analogies and common trends.

Both in north-eastern and north-western Italy, the new metal appeared in the 8th century BC, probably in its first decades, although, given the lack of homogeneity of the available data, this cannot be asserted with certainty. Both in the Venetian and Golasecca areas, the first iron artefacts were found almost exclusively in graves belonging to the highest-ranking members of aristocracy, especially males, and belonged to few classes, namely ornaments, small knives, knives and, exceptionally, weapons; it is important to note that this trend is valid regardless of whether the centres were proto-urban or not. Several of these artefacts were of great value, both intrinsic and symbolic: they were very high-quality craftsmanship products, made with iron and

bronze¹⁰. Therefore, these artefacts clearly belonged exclusively to the highest-ranking aristocracy, who flaunted them as status symbols to assert their rank, wealth and power. The evidence of Bologna confirms the validity of the identified trend; Bologna, as known, was the main Villanovan centre of the Po Plain and played a key role in the relationships between northern and peninsular Italy, first and foremost with Etruria. Iron appears in the 8th century BC in Bologna as well, as evidenced in the Benacci-Caprara and San Vitale cemeteries, the absence of iron artefacts in the first half of the century may be due to a lack of documentation; moreover, iron was used for the same classes of objects: ornaments and high-ranking artefacts¹¹.

In the 7th century BC, the use of iron progressively spread and underwent a differentiation, in the whole northern Italy, in both proto-urban centres and centres that never reached that level of socio-political complexity. In this phase, in fact, the new metal was used not only for knives, ornaments and weapons - whose production increased and underwent a further differentiation - but also for toiletries, which had an ornamental value as well, horse-bits, chariot/cart parts, spits and work tools. Therefore, the new metal began to compete with bronze, which meant that the production started to increase, and that iron started to be used for its intrinsic properties, according to a trend that will develop further in the following centuries. However, despite the data showing a progressive widening of iron working, the fact that iron artefacts still belonged essentially to rich graves and that several classes of iron objects were clear indicators of rank, shows that it remained a status symbol, prerogative of an elite.

The 6th century, coinciding with the urbanisation of the major centres of northern Italy (Este, Padua and Como), marked a clear and general turning point: a substantial increase in iron artefacts, especially some classes, such as

¹⁰ The ideological significance that artefacts made with different materials - sometimes even not metals - had in the first phase of the Iron Age is clearly shown by the fact that the large knife used in archaic Rome for blood sacrifices belonged to this class of artefacts: the *secespita*, which is described by the grammarian Festus, in the *De Verborum significatu*, as follows: "...*Secespita, cultrum ferreum, oblongum, manubrio eburneo, rotundo, solido, vincito ad capulum argento auroque fixum clavus aeneis aere Cyprio, quo flamines, flaminica pontificesque ad sacra utebantur. Dicta autem est secespita a secando...*"; the *secespita*, used by Flamens, Pontiffs and Vestals, was a large iron knife with an ivory handle with golden and silver decorative elements and bronze rivets (Cupitò 2017, 523).

¹¹ From the Benacci-Caprara cemetery must be mentioned: the two fibulae from grave 4 (Tovoli 1989, tab. 8, 38), the horse-bit from grave 11 (Tovoli 1989, tab. 13, A), the spit from grave 56 (Tovoli 1989, tab. 80, 53) and, most of all, the chariot/cart parts from grave 39 (Tovoli 1989, tab. 52, 98-101, 104; tab. 55, 142-143) which is one of the highest-ranking of the Bolognese Villanovan graves; while from the San Vitale cemetery: the fibula from grave 738 (Pincelli, Morigi Govi 1975, tab. 317, 8) and the fibula from grave 776, with an exceptional gold wire decoration (Pincelli, Morigi Govi 1975, tab. 320, 28), which belonged to a highest-ranking member of the aristocracy as well.

knives, work tools and weapons, and, although limited to north-western Italy, chariot/cart parts. This phenomenon is even more significant if we take into consideration the fact that, starting from this phase, iron tended to lose its ornamental value and artefacts like the fibulae reverted to being produced exclusively in bronze. Therefore, this explosion of iron working was closely connected to the use of the new metal for its intrinsic properties. Moreover, it is highly probable that a significant increase in production volumes took place coinciding with the passage to the urban phase, thus it is not surprising that clear evidence of iron working facilities came to light starting from this phase.

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