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

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Maria Carme Belarte (ICREA and ICAC)
Maria Carme Rovira (MAC)
Joan Sanmartí (UB and IEC)
(editors)

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Maria Carme Belarte, Maria Carme Rovira, Joan Sanmartí (editors)

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Josep Maria Gurt Esparraguera, Jaume Buxeda Garrigós, Joan Sanmartí

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Departament d'Història i Arqueologia, Secció de Prehistòria i Arqueologia, Universitat de Barcelona

Facultat de Geografia i Història

Montalegre 6 - 08001 Barcelona

Tel. 934 037 540

sd.prehistoria.arqueologia@ub.edu - <http://www.ub.edu/prehist/>

Institut Català d'Arqueologia Clàssica

Plaça Rovellat s/n - 43003 Tarragona

Tel. 977 249 133

info@icac.cat - www.icac.cat

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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