

Metals in Antiquity

Edited by

Suzanne M. M. Young, A. Mark Pollard,
Paul Budd and Robert A. Ixer

BAR International Series 792
1999

This title published by

Archaeopress

Publishers of British Archaeological Reports

PO Box 920

Oxford

OX2 7YH

England

BAR S792

Metals in Antiquity

© the individual authors 1999

Printed in England by The Basingstoke Press

ISBN 1 84171 008 3

All BAR titles are available from:

Hadrian Books Ltd

122 Banbury Road

Oxford

OX2 7BP

England

The current BAR catalogue with details of all titles in print, prices and means of payment is available free from Hadrian Books

The early development of metallurgy in the north-west of the Iberian peninsula

BEATRIZ COMENDADOR REY

Area de Prehistoria. Departamento de Historia, Facultad de Geografía e Historia. Universidad de Compostela, Pza. da Universidade s/n. 15703. Santiago de Compostela. Spain

This paper discusses the metallurgy of the North-west Iberian Peninsula (NIP) (Galicia and Asturias in Spain and the north of Portugal) during the long interval from the end of the 4th millennium until mid-way through the 2nd millennium BC, the Chalcolithic and Early through Middle Bronze Age in conventional terminology. The lack of defined contexts for early metalwork and of absolute dates is such that only a partial understanding of these, first phases, of metallurgy has been possible in the past. This has generally been based on the analysis of typology and metal manufacturing techniques, largely reliant on finds from funerary contexts. The traditional interpretation proposes a linear model of evolution with successive phases of metallurgical development, articulated around the Beaker Phenomenon, which is considered to be responsible for, or the promoter of, the widespread use of metal. This investigation, 'The Early Development of metallurgy in the North-west of the Iberian Peninsula' (Comendador 1998) allows a substantial revision of this interpretation on the basis of a wider review of the available literature. The different metallurgical phases argued for in the traditional model cannot be supported, at least at present, by technological or archaeological evidence. A new interpretative model is therefore suggested.

Keywords: Europe; Iberian Peninsula; Metalwork; Chalcolithic; Early Bronze Age; Beaker Phenomenon.

Introduction: The traditional interpretation of the beginnings of metallurgy in the NIP

Typological study of metal artefacts was fundamental to the development of the chronology of the Bronze Age in the NIP because the region lacked finds from clear contexts with reliable absolute dates. Thus an interpretative model of the first metallurgical production in the NIP was developed, the *traditional interpretation*, based on the typology of metalwork from isolated finds and funerary contexts. This, together with the lack of study of manufacturing processes, has resulted in an incomplete interpretation with an over emphasis on grave goods, especially those connected to the 'Beaker phenomenon'. The Beaker phenomenon has been considered as promoting the widespread use of metal and it is unsurprising therefore that a theoretical chronological sequence has been articulated around it. The development of early metallurgy is defined as a process of long duration beginning with a pre-Beaker phase around the end of the fourth millennium and early third millennium BC. According to the model, metallurgy was rare in this pre-Beaker phase, but took off in the late Beaker period and Early Bronze Age. Metal production is thought to have reached a peak of development in the post-Beaker phase persisting into the Middle Bronze Age c.1900-1600 BC.

In relation to copper technology, the introduction of the Beaker phenomenon is considered to herald a general improvement in the process of elaboration, including the adoption of innovations such as the alloying of copper and arsenic, as well as a short term increase of production. These characteristics, together with the new artifact types or forms, characterize the so-called *Beaker Metallurgical Tradition*. This sequence supposes technological improvement to follow a linear evolutionary model, which has its culmination in the introduction of the alloy of copper and tin in the Middle Bronze Age. The scheme is

also applied to the production of gold, which is considered to have evolved from simple cold-working in the Chalcolithic to melting and casting at the end of the Early Bronze Age. The scarce examples of silver work are considered to be imports from the south-east of the peninsula (Almagro 1996).

In typological terms, rudimentary metallic objects of small dimensions are usually attributed to the first phase. The Beaker phenomenon is associated with characteristic metal types such as tanged daggers and Palmela-type points which were long-lived and widely adopted. Only on the brink of the Middle Bronze Age are new types like riveted daggers introduced. An example which illustrates this is the hoard of Roufeiro (Nocelo da Pena, Sarriaus, Ourense), which Harbison (1967) interpreted as characteristic of the juxtaposition of two different metallurgical traditions at the end of the Early Bronze Age: the *Atlantic Beaker tradition*, represented by the tanged dagger, and the *Argaric southern tradition*, represented by various riveted daggers. The introduction of bronze, the alloy of copper and tin, is attributed to the Middle Bronze Age, with the gradual appearance of relatively low-tin alloys in certain new types of axes (Ruiz-Gálvez 1984). Their appearance is considered to have been stimulated from the south-east of the Iberian Peninsula.

Revision of the traditional interpretation of the early development of metallurgy in the NIP.

The last few years have seen a considerable revision of data relating to the earliest metal production in the NIP (Galicia and Asturias-Spain-, and north of Portugal) (Comendador 1998) in which particular attention has been paid, not only to the finished objects, but to the remains of the process of manufacture found in domestic contexts. This has involved an analytical study (XRF and metallography) integrated within the program *Archeometallurgy of the Iberian*

Peninsula (D.G.I.C.Y T.PB92, N°0351). To date, 91 objects of the 378 collected in this study (Rovira *et al.* 1997) have been analyzed. The greater part of the production was of copper, although gold objects were also a high proportion of the total; in Galicia they constitute 32% of the total and in the north of Portugal 18.5%.

In relation to pre-historic mining in the NIP, Asturias and León (Spain) are important mining centres, within which the most striking examples are the Asturian copper mines of the Aramo (Cangas de Onís) and the Milagro (Riosa). Both have absolute dates within the 3d millennium BC (Blas 1996). These dates parallel those of the earliest phases of mining at Ross Island (Co. Kerry, Ireland), one of the most ancient mines in north-western Europe, itself connected with Bell Beaker pottery (O'Brien 1995). No indications of pre-historic copper mining in Galicia or the north of Portugal have been found, but copper resources are located in areas 80-100km from settlements where metallurgical activity has been documented (Comendador 1998). Gold mining is considered to have involved the exploitation of placers and unlikely to have resulted in recognisable archaeological features.

Data relating to the process of manufacture and production within domestic contexts are very scarce. In the later levels of Buraco da Pala (Mirandela, Trás-os-Montes) a blow pipe and some metallic objects have been recovered. These are associated with four radiocarbon determinations that date the site in the second half of the 3d millennium BC (Sanches 1997). Two other Galician settlement sites have produced fragments of crucibles, although their dates, within the 3d millennium BC, are problematic due to their isolation and relatively large errors: O Fixón (Cangas, Pontevedra) GaK 11188: 3930±130 BP and Lavapés (Cangas, Pontevedra) GaK-11188: 3930±120 BP (Comendador 1998).

In relation to metal manufacture, the production of copper objects appears to have been strongly conservative, limited to a repertoire of approximately twelve or thirteen generic forms. With the Beaker phenomenon two new types appear: the tanged dagger and the Palmela-type point. These are introduced into funerary contexts without a substantial variation of the other, pre-existing, forms. Regional differences can be perceived in the production and circulation of metal objects; for instance, the introduction of certain elements typical of Bell Beaker grave goods is more pronounced in Galicia (except eastern Galicia) and in the north-west of Portugal than elsewhere.

One of the most interesting results of the investigation is the technological interpretation of the copper production process. This generally consisted of smelting and melting in poorly controlled conditions and was characterized by an absence of alloys and incomplete finishing treatments, when these were applied at all. The traditional interpretation, of a chronological framework articulated around the Beaker phenomenon, appears to be unproven as it is impossible to argue for distinct phases based on the

manufacturing processes of objects. In general terms it is not possible to discern a metallurgical Beaker tradition at all, and in fact, it is difficult technologically to distinguish the early metalwork of the NIP from that of other areas of the Peninsula as the metal work presents very homogeneous characteristics throughout.

This conservatism in copper production contrasts with the diversity of forms of jewellery. As early as the mid-3rd millennium BC two systems for working in gold appear to have co-existed. This is shown by the settlement site of Buraco da Pala (Mirandela, Portugal) where gold sheets and several solid gold beads obtained by melting were found (Cavaheiro and Sanches 1996). The exceptional case of the hoard known as the Treasure of Caldas 1 (Pontevedra), which is attributed to the final phase of the early Bronze Age (Ruiz-Galvez 1978) and contains gold objects produced with different techniques (in sheets or melted), is more uncertain. The latest revisions (Ambruster 1996), show that the vases belonging to the hoard were elaborated using the lost wax technique. This is not documented in other areas of the Peninsula till the Late Bronze Age. This suggests either a reconsideration of the chronology of the hoard, or of the dating for the first use of the technique in the NIP.

Another issue of great interest is that of silver. It is rarely used in European settlement sites of the Beaker type. It begins to be documented with relative frequency at the start of the Bronze Age, in the Iberian Peninsula. In the graves of the Argar Culture, in the south-east of the Iberian Peninsula, over 300 silver objects were found, but no objects have been found which could be dated with security to the Chalcolithic. The oldest date belongs to a grave in Herrerías (Cuevas de Almanzora, Almería, Spain) CSIC-3670±70 BP (2270-1790 BC), that contemporary with the Bronze Age of the Armorican mounds (Montero *et al.* 1995: 98). In Europe there are known objects of imprecise chronology but related to the Beaker phenomenon, that seem to indicate the use of this metal at earlier dates than in the Peninsula. They are stylistically superior to those of the Peninsular, therefore could have come from very different metallurgical traditions (Montero *et al.* 1995:98).

In the NIP seven silver springs have been documented. These were found in funerary contexts as well as a group (with a weight less than 400g) from an isolated findspot. The Galician graves where they have appeared have no absolute dates, though in Atios (Porriño, Pontevedra), two springs appeared associated with two tanged daggers and two gold sheet cylinders inside a cist (Comendador 1998). In Portugal springs have been found in two monumental mounds of dates that are hard to relate to these objects: in Outeiro de Gregos 1 (Baião, Porto) they would mark a limit *ante quem* between 2140 and 1520 BC, and in Meninas do Crasto 4 (Baião, Porto) a limit *post quem* between 3308 and 2046 BC (Jorge *et al.* 1988). One of the springs could be connected with the Bell Beaker pottery in the mound of Chão do Brinco 1 (Viseu, Beira Alta) (Silva 1995). In the female burial at Santioste (Villafáfila, Zamora), in the Spanish north plateau the grave-goods

included a bracelet made of bone beads, a necklace of the same material with three small semispheric silver capsules, a button perforated in a V shape and possibly a wristguard, dated *post quem* by two dates between 2460 and 1920 BC (Beta-50709: 3780 \pm 80 BP, Beta-50710: 3750 \pm 80 BP) (Delibes 1993). These dates make it possible consider silver production in the NIP as being of a similar, if not earlier, date than that in the south-east of the peninsula.

This revision also indicates that tin bronze appeared before the Middle Bronze Age. Two awls found in the island settlement of Guidoiro Areoso (Illa de Arousa, Pontevedra) are high-tin bronzes containing more than 17% tin. Their fabrication technology is unusual for objects of similar chronology in that they were annealed to eliminate brittleness within the metal and obtain a homogenous structure. The dates for associated objects place them in the mid-3rd millennium BC making them exceptionally early bronze objects in the Iberian Peninsula (Comendador 1998). Although the site is still in the process of being studied, the materials show the presence of the bronze alloy from an early date. In the neighbouring coastal area several bronze drops were collected from the Beaker settlement site of O Fixon-A Costa da Seixeira, dated chrono-typologically to 1700-1500 BC (Suárez 1995:60).

Deposition mechanisms

Most early metal objects in the NIP are isolated finds, the majority of the remainder are from funerary contexts. The few hoards contain a greater number of objects than the grave sites. The preserved part of the hoard of Caldas 1 for instance contains 14.9kg of gold, while the gold found in all of the burial sites in the whole NIP amounts to only 2.75kg. This observation holds true even if isolated finds and other finds with badly defined contexts, that could also be isolated finds, are included. The contexts that have provided the least material are those of domestic type, where both remains of the production process and finished objects have been found.

The correlation between certain metal artefact forms and particular contexts suggest a pattern of selective deposition. Flat axes, for example, are often found as isolated finds as well as in hoards, often with equally large numbers of tanged daggers. In funerary contexts however, metal objects tend to appear together with non-metallic materials (pottery, lithics etc.). In the hoards the only non-metals that occasionally appear are ceramic vases used to contain the metalwork.

Harrison (1974a, 1974b) proposed a post/epi-Beaker horizon called *Montelavar Group*, in western Iberia that has been associated with the beginning of the Early Bronze Age in the NIP. He defines the group in terms of an association of two or more Palmela-type points with a tanged dagger in burial sites that are apparently individual and without bell beaker pottery. Given the absence of absolute dates in these contexts, a chrono-typological date between 1750 and 1500 BC has been proposed.

Further analysis of the documentation suggests that basing a chronological phase on the recurrent association of certain objects is unsound. Firstly, the concept has as a starting point the absence of Bell Beaker pottery, even though metalwork is connected with this pottery in a limited number of contexts. Furthermore, although some burials within the NIP (cists and mounds) contain large numbers of tanged daggers/swords, Palmela-type points, and silver and gold ornaments (these are the only metal types which appear to be associated with one another up to this date), grave contexts with multiple metal objects are rare. The great majority of graves contain only isolated pieces of metalwork sometimes accompanied by artifacts made from other materials. Therefore, Montelavar Group graves as defined by Harrison are exceptional in the north-west. In any case, associations of grave goods may be as a results of socio-cultural rather than temporal factors. Finally, although the concept of Montelavar Group has been defined in relation to funerary practices, this horizon has also been related to metal types, like halberds, that have never appeared in burial sites, but are found in hoards. These occur even more frequently in representations of the Galaic Group of cave paintings, which Bradley (1998) has recently related to the hoards.

For all these reasons, the concept of the Montelavar Group requires revision. It is necessary to define the beginning of the Bronze Age in the NIP on more complete information than that provided by funerary contexts alone.

Conclusions

The earliest metallurgical activity to be dated in the NIP took place within several settlement sites in the north of Portugal. These are Vinha da Soutilha (Chaves, Tras-Os-Montes) (Jorge 1986) and Buraco da Pala (Mirandela, Tras-os-Montes) (Sanches 1997), in the north and Castelo Velho (Beira Alta) on the Duero river (Jorge 1993). These appear towards the end of the 4th and beginning of the 3d millennium BC.

Local and independent invention of metallurgy in the region seems improbable. The earliest NIP dates are approximately coeval with the nearest metallurgical centres on the north Sub-Plateau of Spain (Delibes *et al.* 1996) and the horizon represented by Vila Nova de São Pedro-Zambujal in the centre and south of Portugal. The similarity of the earliest metallurgical production in all these areas makes it difficult to establish their relative chronologies. At present the earliest traces of metallurgical activity in the Iberian Peninsula are found in the South-east (BETA-90884: 5660 \pm 80 BP: 4700-4300 BC, BETA-90885: 5920 \pm 70 BP: 4940-4620 BC) (Montero & Ruiz 1996). In relation to other areas of western Europe, Ross Island has the earliest dates for copper mining in Ireland between 2500-2200 BC (O'Brien). In Britain, Northover (1996) and Needham (1996) suggest that the earliest use of copper occurs between 2500-2100 BC overlapping with the appearance of tin bronze around 2200-2100 BC. It seems likely therefore that copper metallurgy arrived in the NIP from the south.

There is no evidence for specialized metallurgical units within settlements, however the presence of metal is notable at two sites which do not appear to be strictly domestic. In the first, Buraco da Pala (Mirandela, Trás-os-Montes), the metalwork is associated with an accumulation of great quantities of cereal (wheat and barley), nuts and beans in a context interpreted as a storage silo (Sanches 1997). The deposit contains two concentrations of calaite (variscite) ore. The second site, the fort of Castelo Velho (Freixo de Numao, Beira Alta), has been interpreted as a village specialized in the production of flour and textiles, although fireplaces suggest some habitation as well (Jorge 1993). In these sites the metallurgy appears to be related to artisan activities, although perhaps as a minor component of a wider economy connected with food production and storage. In none of the settlements does it seem that metallurgy was on a large scale or dominant in the domestic economy, nor were such sites located to take advantage of copper ore resources.

Given that some of the metal artifacts recovered from these settlements are considered to be tools (awls, chisels, knives, axes), it may be that metallurgy appeared in the domestic context with metal artifacts having some functional value. However, the rarity and limited effectiveness of such tools, as well as the presence of metal ornaments, suggests that metallurgy may have fulfilled more of a social than functional role.

Although it has been suggested that metallurgy predated the Beaker phenomenon, at least in the north of Portugal, it is not clear if this is true of all areas. This study shows that it is not appropriate to single out different traditions within the Chalcolithic and Early Bronze Age. It is not therefore possible to define a *Beaker metallurgy* with particular characteristics, different from those of metal production in the periods immediately preceding or succeeding it, with the exception of the adoption of certain metal forms in funerary contexts. The difference that exists between the copper forms produced in the *pre-Beaker* and *Beaker/post-Beaker* phases was probably not as drastic as has been thought. In great measure this image is influenced by the differing natures of the contexts in which objects are found. The subjective and inconsistent nature of the term *Beaker phenomenon*, is reinforced by the results of the technological study presented here, making it a wholly inappropriate in relation to discussion of the chronological of early metallurgy.

The process by which new metal types and Bell Beaker pottery were introduced in funerary contexts should probably be seen in the light of developing social intensification, interaction and increasing complexity without necessarily implying a major discontinuity in development; even if such developments were geographically asymmetric. Developing funerary traditions may have made use of new elements (metallic, ceramic or lithic) as symbols to express growing social complexity. In this sense the NIP is integrated in a production pattern covering a large area of western Europe. The hoards indicate that certain quantities of metal, belonging to certain

specific artifact forms, are withdrawn from the system of circulation, showing a greater availability of raw materials and an interest in the accumulation of metal.

In this context the appearance of bronze in the north-west from an early date can be explained, not as a linear process, but rather emerging in certain areas, while others continued to use copper alloys. The presence of awls in Guidoiro can be interpreted as a result of importation or of sporadic exchange. It is unlikely that tin-bronze originated in south-east Iberia as bronze appears only at an advanced stage of the Argar culture. In the Peninsula the first evidence for bronze appears in the north-east, from La Bauma del Serrat Pont (Gerdna, Spain) (4020±20 BP) (Alcalde *et al.* 1997) and Monte Aguila de las Bardenas Reales (Navarrs, Spain) associated with a date placing it between 1890 and 1750 BC (GrN-19671: 3510±20 BP) (Sesma & García 1994). Fernández-Miranda *et al.* (1995) suggest that bronze technology spread through the Pyrenees, slowly penetrating the Peninsula, and reaching the south-east at a late date. This can be seen in relation to the introduction of bronze in French Atlantic regions towards the end of the 3d millennium BC (Briard 1979).

In the NIP there is evidence for the early use of bronze in a coastal area with a greater diversity of mining resources and better communications. Given that metallurgy seems to have been limited in scale, it is advisable to be prudent in suggesting exchange of minerals by long-distance journeys, as between the north-east of the Peninsula and the British Isles or French Brittany for example. Nevertheless, the appearance of silver and bronze can probably be related to a greater interaction of social groups and more widespread circulation of materials.

By the end of the 3d millennium and early 2nd millennium BC the archaeological record indicates a change in habitation and funerary practices in the NIP. Although some finds with uncertain contexts might correspond to the new funerary practices and there is evidence for the persistence of mound structures, metal objects cease to be present in burials, appearing mostly as either isolated finds or in hoards. A few recovered objects show that the production of bronze was characterized by a different technology in the Middle Bronze Age. At present, it is unclear if this was innovative in relation to the presence of Palmela-type points and other types throughout the 2nd millennium BC. This is particularly difficult given the funerary character of the earlier artefacts and the period, during which, for the whole of the NIP, there were changes in relation to both funerary and domestic expressions.

In conclusion, the first development of metallurgy in the NIP does not correspond to the traditional interpretation of a linear model of consecutive phases of growing technological complexity which are distinguishable from one another. A new model is proposed here involving production in cycles which are not distinguishable on technological grounds. The development of metallurgy in the NIP was not linear, but differed in pace on an intra-

regional scale, even becoming regressive in some areas at times. The cultural development of each area played a role in the adoption of particular artifact forms which were only occasionally understood as technological innovations.

Acknowledgements

The study is integrated in the Program: Archaeometallurgy of the Iberian Peninsula: Technology and Cultural Change during Bronze Age (D.G.I.C. y T.PB92, N°0351).

References

- ALCALDE, G., MOLIST, M., SAÑA, M. & TOLEDO, A. 1997. Procés d' ocupació de la Bauma del Serrat del Pont (La Garrotxa) entre el 2900 y el 1450 cal AC. *Publicaciones Eventuales d' Arqueología de la Garrotxa*, 2. Museo Comarcal de la Garrotxa.
- ALMAGRO-GORBEA, M. 1996. L'Eta del Bronzo in Iberia: Cronología Relativa. *Acta Archaeológica*, 67: 153-163.
- ARMBRUSTER, B. 1996. Zu den technologischen aspekten der goldfunde aus dem bronzzeitlichen sahtz von Caldas de Reyes (Prov. Pontevedra). *Madrider Mitteilungen*, 37: 60-73. Instituto Arqueológico Alemán. Madrid.
- BLAS, M. A. DE 1996. La primera minería metálica del N. Peninsular: las indicaciones del C-14 y la cronología prehistórica de las explotaciones cupríferas del Aramo y el Milagro. *Complutum Extra* (Homenaje a Manuel Fernández-Miranda), 6-Y: 217-266.
- BRADLEY, R. 1998. Invisible warriors- Galician weapon carvings in their Iberian context. *A Idade do Bronce en Galicia: Novas Perspectivas*. R. Fábregas (De.), Cadernos do Seminario de Sargadelos, 77. Sada: 243-258.
- BRIARD, J. 1979. Problemes Metallurgiques du Bronze Armoricaín: Etain, Plomb et Argent. *Proceedings of the fifth Atlantic Colloquium*. M. Ryan (Ed.). Dublin: 81-96.
- CAVALHEIRO, J. & SANCHES, M.J. 1996. Um caso de metalurgia primitiva de ouro na 1ª metade do IIIº milénio A.C.: abrigo de Buraco da Pala-Mirandela. *Actas del 1º Congreso Peninsular de Arqueología* (Porto, 1993), VIII. *Trabalhos de Antropologia e Etnologia*, 35 (4): 167-188. S.P.A.E. Porto.
- COMENDADOR, B. 1998. *Los Inicios de la Metalurgia en el Noroeste de la Península Ibérica*. CD-ROM. Universidade de Santiago de Compostela.
- DELIBES, G. 1993. Sal y jefaturas: una reflexión sobre el yacimiento del Bronce Antiguo de Santioste, en Villafáfila (Zamora). *Brigecio*, 3: 33-46.
- DELIBES, G., FABIAN, J., FERNANDEZ-MANZANO, J., HERRAN, J., SANTIAGO, J. DE & VAL, J. DEL. 1996. Los más antiguos testimonios del uso y producción de metal en el suroeste de Submeseta Norte: consideraciones, tecnológicas y contextuales. *Humanitas. Estudios en Homenaje al Prof. C. Alonso*. Universidad de Santiago de Compostela.
- FERNANDEZ-MIRANDA, M., MONTERO, I. & ROVIRA, S. 1995. Los primeros objetos de bronce en el occidente de Europa. *Trabajos de Prehistoria*, 52, 1: 57-69. Consejo Superior de Investigaciones Científicas. Madrid.
- HARBISON, P. 1967. Mediterranean and atlantic elements in Early Bronze Age of Northern Portugal and Galicia. *Madrider Mitteilungen*, 8: 100-122. Instituto Arqueológico Alemán. Madrid.
- HARRISON, R.J. 1974a. Ireland and Spain in the Early Bronze Age. Fresh evidences for Irish and British Contacts with Proto-Atlantic Bronze Age Spain in the second millennium BC *Journal of the Royal Society of Antiquaries of Ireland*, 109: 58-60.
- 1974b. A reconsideration of the Iberian Background to beaker metallurgy. *Palaeohistoria*, XVI: 63-105.
- JORGE, S. 1986. *Povoados da Pré-história Recente da Região de Chaves-Vª. Pª. de Aguiar*. Instituto de Arqueología da Faculdade de Letras de Porto. Braga.
1993. O povoado de Castelo Velho (Freixo de Numão, Vila Nova de Foz Côa) no contexto da Pré-história recente do Norte de Portugal. *Actas del 1º Congreso Peninsular de Arqueología* (Porto, 1993), VIII. *Trabalhos de Antropologia e Etnologia*, 33 (1-2): 179-216. S.P.A.E. Porto.
- JORGE, V., ALONSO, F. & DELIBRIAS, G. 1998. Novas datas de Carbono 14 para Mamoas da Serra da Aboboreira. *Arqueología*, 18: 95-98. Grupos de Estudos Arqueológicos do Porto.
- NEEDHAM, S. 1996. Chronology and periodisation in the British Bronze Age. *Acta Archaeológica*, 67: 121-140.
- NORTHOVER, P. 1996. The Earliest Metalwork in Southern Britain. *Proceedings of the International Symposium The Beginnings of metallurgy*, Bochum, April, 1995.
- MONTERO, I., ROVIRA, S. & GOMEZ, P. 1995. Plata Argárica. *Boletín de la Asociación Española de Amigos de la Arqueología*, 35: 97-106.
- MONTERO, I. & RUIZ, A. 1996. Enterramiento colectiva y metalurgia en el yacimiento neolítico de Cerro Virtud (Cuevas de Almanzora, Almería). *Trabajos de Prehistoria*, 53 (2): 55-75.
- O' BRIEN, W. 1995. Ross Island and the origins of the Irish-British metallurgy. *Proceedings of the Conference Ireland in the Bronze Age* (Dublín, 1995). J. Waddell, E. S. Towing. Dublin: 38-48.
- ROVIRA, S., MONTERO, Y. & CONSUEGRA, S. 1997. *Las primeras etapas metalúrgicas en la Península Ibérica. Y. Análisis de los Materiales*. Fundación Ortega Gasset. Madrid.
- RUIZ-GALVEZ, M. 1978. El Tesoro de Caldas de Reyes. *Trabajos de Prehistoria*, 35: 173-192. Consejo Superior de Investigaciones Científicas. Madrid.
- 1984: *La Península Ibérica y sus relaciones con el Círculo Cultural Atlántico*. Universidad Complutense. Madrid.
- SANCHES, M.J. 1997. *Pré-história Recente de Trás-os-Montes e Alto Douro*. Sociedade Portuguesa de Antropologia e Etnologia. Braga.
- SESMA, J. & GARCIA, M.L. 1994. La ocupación desde el Bronce Antiguo a la Edad Media en las Bardenas Reales de Navarra. *Cuadernos de Arqueología de la Universidad de Navarra*, 2: 89-218.
- SILVA, E.J. 1995. Megalitismo da Bacia do Douro (margem sul). *Actas 1º Congreso Peninsular de Arqueología* (Porto, 1993), V. *Trabalhos de Antropologia e Etnologia*, 35 (1): 35-46.
- SUAREZ, J. 1995. O Fixón: Una nueva perspectiva del Bronce Inicial en Galicia. *Actas del XXII Congreso Nacional de Arqueología* (Vigo, 1993), I: 57-67. Xunta, Concello. Vigo.