



The ‘Copper Age’—A History of the Concept

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Abstract

The idea that there was a Copper Age between the Neolithic and Bronze Age was inspired by the discovery of the use of native copper in prehistoric North America. Its currency in European prehistory owes much to the 1861 observations by William Wilde that copper tools preceded the use of bronze in Ireland, though Wilde did not postulate a Copper Age *per se*. Acceptance of the existence of a Copper Age was a long process, not least as it seemed to contradict the premises of the Three Age System and was conflated with arguments for the local development of copper metallurgy, but the 1876 and 1880 international prehistoric archaeology congresses were key moments in its recognition. By the mid 1880s its validity was widely accepted in Europe. In contemporary dating schemes, the definition of the Copper Age varies according to regional and national traditions. This paper touches on the debate concerning the use of technological stages as chronological periods and examines the history of alternative conceptualisations of the early periods of metallurgy in Europe, including those that posit socio-economic phases of development.

Keywords History of archaeology · Three Age System · Copper Age · Copper · Secondary products revolution

Introduction

The history of archaeological concepts is of significance in that it can show us how terms acquired their meaning and the debates that underlie them, and help us to contextualise the work of earlier authors, who may use terms in ways that differ from the ways in which they are now used, so that we can understand their discourse more fully. In this paper I shall review the history of the use in Europe of the term *Copper Age* (and its equivalents *Chalcolithic* and *Eneolithic* [or *Aeneolithic*]) to denote the period when copper was used alongside flint but (tin) bronze had not yet been

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introduced for the manufacture of artefacts. I note that in contemporary usage across Europe, the definition of the Copper Age varies according to regional and national traditions, and the term is even eschewed in some countries, which can engender confusion. Likewise, there is debate as to the validity of using technological stages as chronological periods, so that I shall briefly discuss the history of some alternative conceptualisations of the period when metallurgy emerged, such as those that posit socio-economic phases of development. Before beginning my discussion, however, it is necessary to start with some general considerations.

Firstly, the Three Age System was of course developed in Denmark between around 1816 and 1836 by Christian Jürgensen Thomsen and proved stratigraphically by Jens Jacob Asmussen Worsaae (Klindt-Jensen 1975, pp. 50–57, 72–73; Gräslund 1987, pp. 13, 17–20, 25–29), but we should not imagine that it was immediately accepted, either there or elsewhere. Indeed, it was still a matter for debate as late as the 1870s in England (Rowley-Conwy 2007, pp. 243–285) and in Germany (Lindenschmit 1876; cf. Mestorf 1878), and this continuing controversy provides a context within which to situate the reaction to proposals that a European Copper Age, between the Neolithic and Bronze Age, should also be recognised.

Secondly, many nineteenth-century workers did not really understand the distinction between copper and bronze, not least because the ancients, who provided the essential cultural references for educated people of the time, used the same names for both: χαλκός (chalkos) is Greek and *aeneus* Latin for copper or bronze. This confusion was further compounded in the English-speaking world by the use of the words ‘brass’ and ‘brazen’ in the King James Bible as a translation for the Hebrew for copper or bronze (e.g. Exod. 27:4; 38:8 & 38:10; Deut. 8:9; 2 Kgs 25:13). As John Lubbock (1865, p. 44) reminded his contemporaries, brass, an alloy of copper and zinc, was not invented until much later. The ancients’ failure to distinguish linguistically between copper and bronze explains why some antiquarians picked up Lucretius’ Three Ages (*De rerum natura* V, 1281–1288) as stone, *bronze* and iron, while others—such as Vedel Simonsen (1813, p. 76, note 1; English translation in Daniel 1967, pp. 90–91)—referred to ages of stone, *copper* and iron. Consequently, such early references should not be seen as indicating the concept of a Copper Age (*pace* Roberts and Freeman 2012, p. 27).

Thirdly, although metal analysis aimed at answering archaeological questions began in the late eighteenth century (e.g. in Britain, Pearson 1796; Pollard 2013), few artefacts had been analysed in the nineteenth century and so for many archaeologists it was difficult to distinguish between copper and bronze artefacts, except on the basis of the colour of the metal.

Fourthly, bronze metallurgy was believed to have been introduced fully developed into southern Scandinavia, so that there was no transitional Copper Age to be recognised there (e.g., Nilsson 1873; Montelius 1885, 1986, p. 115; Worsaae 1886, pp. 59–69). Indeed, it was generally held that metallurgy was introduced to all of Europe from the east (e.g., Worsaae 1886, pp. 51–58; Lubbock 1865, p. 34), an idea that long pre-dates the writings of Childe (1928, pp. 220–221; 1930, pp. 10–11, 23–27) or the influence of the German Diffusionists or the Austrian *Kulturkreis* school (Eriksen and Nielsen 2013, pp. 35–37). It was argued that since metallurgy was introduced from the east, if there was a phase when copper rather

than bronze was used, then this would be found in the area where metallurgy developed, not in Europe. As a result of this logic, to argue in the nineteenth century for a prehistoric Copper Age was to contest the diffusion of metalworking and posit the local development of metallurgy.

The Copper Age

In their account of the burial mounds of the Mississippi valley, Ephraim Squier and Edwin Davis had noted the finding of large numbers of tools and ornaments made of copper. These were cold-worked from native copper and likely originated from the Lake Superior area, where ancient mines were also known (Squier and Davis 1848, pp. 196, 202, 279–281). Their observations were noted by Old World archaeologists, so that Daniel Wilson, who was an early adopter of Thomsen's Three Age System in his *Archaeology and Prehistoric Annals of Scotland* (1851), could talk of native copper being used in 'occasional substitution for stone implements' (Wilson 1851, p. 203), but at that time he saw the Mississippi valley mound builders as Neolithic (Wilson 1851, p. 218).

In 1861, the Smithsonian Institution published Adolphe Morlot's short monograph, *General Views on Archaeology*, both within their *Annual Report* for the year 1860 (Morlot 1861a) and as a separate volume (Morlot 1861b). In this publication, Morlot provided an overview of European archaeology for American readers, arranged according to the Three Age System. Morlot states that there was a copper age in America (1861a, p. 287; 1861b, p. 4), but that 'in Europe the remains of a copper age are wanting', because metallurgy was introduced from elsewhere, probably Asia (1861a, p. 288; 1861b, p. 7). In the same year, William Wilde published the second volume of his catalogue of the Museum of the Royal Irish Academy, describing the artefacts in animal material and bronze (Wilde 1861). In this important work, Wilde, unlike Morlot, did not adopt the Three Age System (Rowley-Conwy 2007, pp. 221–224), but he made a number of observations that were to prove very influential in the debate on a Copper Age in Europe, so I shall cite them *in extenso*:

'As yet scarcely any notice has been [p. 356] taken of our Irish copper weapons, apparently the forerunners of the mixed metal – bronze or brass.... There can be little doubt that these copper celts are the very oldest metal artefacts in the Collection, and were probably the immediate successors of a similar class of implement of stone....

'we do not possess sufficiently large quantities [p. 357] of pure native copper, such as the Greenlander, Esquimaux and certain North American tribes cut and hammer ...

'a knowledge of that metal [i.e., copper] must have been the preliminary stage in the manufacture of bronze ...

Fig. 1 Copper axes from the collections of the Museum of the Royal Irish Academy (Wilde 1861, figs 245 & 246)

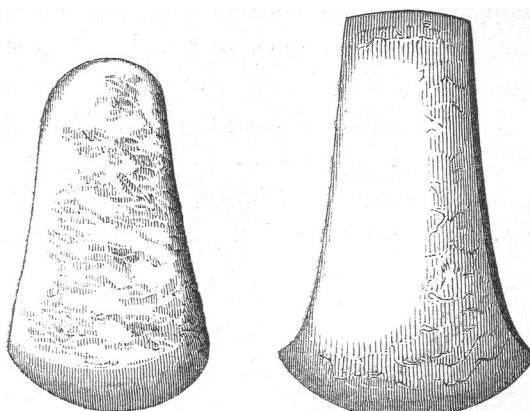


Fig. 245. No. 1.

Fig. 246. No. 10.

Upon careful examination, it has been found that thirty of the rudest, and apparently the very oldest celts, are of red, almost unalloyed copper' (Wilde 1861, pp. 355–361).

Woodcuts of two of these copper axes are reproduced in Fig. 1. Wilde's comments were picked up by Daniel Wilson in the new edition of his work, now called simply *Prehistoric Annals of Scotland* (Wilson 1863). In this greatly expanded study, written while he was based in Toronto, Canada, Wilson suggests that there was a 'transitional age of copper' in the British Isles, adducing as evidence the axes catalogued by Wilde (Wilson 1863, p. 319). Indeed, he sees this evidence as perhaps indicating the independent discovery of copper metallurgy, as it did in the New World (Wilson 1863, pp. 318–319).

Ferdinand Keller inserted an aside on the Copper Age debate in his chapter on the finds from Lake Garda at Peschiera published in his fifth report on lake dwellings (Keller 1863, p. 141). Keller's reports were collated and translated into English by John E. Lee in 1866, and it is worth citing that translation, as the book was widely read in the English-speaking world, going into a second edition in 1878:

In all the works that have come before me, treating of the development of civilisation and the introduction of metals in the western countries, it is affirmed that the use of copper necessarily must have preceded that of the mixture of this metal with tin, that is of bronze: but notwithstanding this, and even though copper tools are occasionally met with, though very rarely, yet that a copper age has never existed in Europe [p. 219] for the transition from pure copper to bronze did not take place in Europe. This assertion is partly correct with respect to Western Europe, but not for the whole of the continent, and more especially not for the east of it, such as Hungary and the countries lying east and south of it (Keller 1866, pp. 218–219; in the second edition [1878, pp. 362–363] the first sentence is the same with a note acknowledging changing opinions on the topic, while the second sentence is slightly modified).

Keller's explicit affirmation of a Copper Age in Hungary and elsewhere in eastern and southern Europe was based on the presence of a considerable number of copper objects in the collection of Hungarian prehistoric artefacts that the Swiss industrialist, Wilhelm Fehr, had donated to the Zürich museum (Keller 1863, p. 13; 1866, p. 219). As an aside, it is worth noting that in 1861 Ferencz Kubínyi, in presenting his own collection of prehistoric Hungarian artefacts, had argued that the use of copper comes before that of bronze (Kubínyi 1861, pp. 81–82), but since he wrote in Hungarian it is unlikely that his work was widely read or impacted on the debate beyond Hungary; certainly it does not seem to have been widely cited.

John Lubbock's *Pre-historic times* appeared in 1865. While Wilson had only discussed Scotland, Lubbock's canvas was worldwide (Rowley-Conwy 2007, p. 176) and his book rapidly became a best-seller, going through multiple editions. Lubbock accepted the existence of a Copper Age in North America (1865, pp. 201–202) but denied its existence in Europe, contesting Wilde's arguments, on the grounds that the axes claimed to be copper were few and that there was no analytical proof of their composition (1865, pp. 15, 32). He credits James Dana with the observation that the North American first people 'may in one sense be said to have been in an age of stone, since they used the copper, not as metal, but as stone' (1865, p. 202). Lubbock's book promoted the antiquity of humanity (only recently established, in 1859) and the Three Age System, which as he writes had still 'not met with general acceptance', even when applied solely to Europe (Lubbock 1865, p. 3). It may be that Lubbock felt that positing a Copper Age would weaken his promotion of the Three Ages as a chronological framework, but certainly, as we have seen, it could be interpreted to mean denying the posit that bronze metallurgy was introduced from outside Europe (Lubbock 1865, p. 5), which was a central tenet of the Three Age System.

The year before, 1864, had seen the publication in Spain of Casiano de Prado y Vallo's *Descripcion física y geológica de la provincia de Madrid* (de Prado 1864). A mining engineer, de Prado had a keen interest in prehistory: his book contains an appendix entitled 'Noticia sobre cavernas y minas primordiales en España' (de Prado 1864, pp. 210–219). This latter section reviews reports of caves from the whole of Spain, province by province (de Prado 1864, pp. 210–217), finishing with a discussion of the El Milagro mine in Asturias, where stone and antler tools had been found. For de Prado, this evidence suggested a very early date for the exploitation of the mine, when copper was still too precious to use for mining tools, and so he dated it to the period of transition between the Stone Age and the Bronze Age (de Prado 1864, pp. 217–219). De Prado (1864, p. 200) also tells us that he possessed a copper axe from the western part of Asturias, 'probablemente de tiempo anterior al descubrimiento del bronce' ('probably from a time before the discovery of bronze', my translation), arguing that copper was known before bronze, because it can be found as native copper, while bronze is an alloy with tin, which is not known in a native state. de Prado does not explicitly mention a Copper Age in his 1864 monograph, but in a note on 'L'anthropologie en Espagne' discussing de Prado's work, Franz Pruner-Bey (1865, p. 368) tells us that de Prado 'incline à adopter une époque de cuivre qui, en Espagne, précéda celle du bronze' ('is of the opinion that a Copper Age should be adopted, which, in Spain, comes before the Bronze Age',

my translation). Pruner-Bey adduces Wilde's (1861) catalogue as evidence for the existence of a Copper Age, 'when metal weapons and tools, at least in Ireland, were based on models borrowed from the previous age' (Pruner-Bey 1865, p. 368, my translation), arguing that copper metallurgy had a local origin in Spain and that there was a Copper Age in both Ireland and Spain (Pruner-Bey 1865, p. 369). Pruner-Bey's article is important—it appeared in the international language of nineteenth-century prehistory, French, in the *Bulletins de la Société d'anthropologie de Paris*, and in 1865 he was an influential figure, as the President of that society.

In 1868, the *Congrès international d'anthropologie et d'archéologie préhistoriques* was held in Norwich and London, and John Lubbock (1869) used his President's Address to reiterate the Three Age System. Lubbock refused to admit a Copper Age, writing,

the tumuli and the Swiss lake villages of the Bronze Age were conclusive proofs on this point [viz., that the Bronze Age comes after the Neolithic]. If the knowledge of metal had been gradually and slowly introduced by its discovery on the spot, then copper would have preceded bronze ... As far, however, as Western Europe was concerned, while we had thousands of bronze implements we had but very few of copper, and none of tin (Lubbock 1869, p. 6).

It is interesting to compare the way this speech was reported in Spain and France. Writing in the widely-read journal, *Matériaux pour l'histoire primitive et naturelle de l'homme*, Louis Lartet (1869, pp. 6–7) simply reported Lubbock's argument that the clear distinction in the Swiss lake villages between the Stone Age and the Bronze Age was proof that there was no intermediate period. In Spain, Antonio Machado y Núñez reports the same words (Machado 1869, p. 39), but adds his own comments, arguing that in Andalucía the Bronze Age is best called the Copper Age, because the artefacts found there are made of copper (Machado 1869, p. 283), though, of course, this is not the same as suggesting that a Copper Age precedes the Bronze Age.

However, the idea that there may have been a Copper Age preceding the Bronze Age was also beginning to find support in southern France. In 1869, Paul-Louis Cazalis de Fondouce and Jules Ollier de Marichard reported in the journal *Matériaux pour l'histoire primitive et naturelle de l'homme* on their excavations in the Grotte des Morts (Durfort, Gard), dating the site to an age of transition between the Neolithic and Bronze Age, which they would 'gladly call the Copper Age, if instead of just finding a few copper beads, [they] had found weapons or tools' (Cazalis de Fondouce and Ollier de Marichard 1869, p. 260; my translation). That same year, 1869, the fourth *Congrès international d'anthropologie et d'archéologie préhistoriques* was held in Copenhagen and Cazalis de Fondouce presented the results of the excavations at the Grotte des Morts. In the ensuing congress debate, Edouard Desor commented on copper as characterising the transitional period between the Neolithic and Bronze Age. The text published in the proceedings is quite similar to that of the earlier paper (Cazalis de Fondouce 1875).

In 1870, Recaredo de Garay y Anduaga, another Spanish mining engineer, described the diorite hammerstones that he had discovered at a copper outcrop at Rodeo del Mandroño (Valverde del Camino, Huelva). He argued that since the outcrop was so small it must have been exploited in the ‘Copper Age’ when copper was as precious as gold is in modern times (de Garay y Anduaga 1870, p. 1238). Juan Vilanova y Piera was to become a major advocate for a Copper Age in Spain (Ayarzagüena Sanz and Puche Riart 2012), but he was initially coy, writing of an ‘intermediate period between the Neolithic and the Bronze Age’ (Vilanova 1872, 208; my translation) without using the term ‘Copper Age’. His paper at the 1869 Copenhagen *Congrès international d’anthropologie et d’archéologie préhistoriques* uses the same phrase when discussing contexts where both polished stone axes and ‘bronze’ axes were found (Vilanova 1875, pp. 231–232). Likewise, in his 1872 monograph, *Origen, naturaleza y antigüedad del hombre*, he opines that copper preceded the use of bronze in Spain (Vilanova y Piera 1872, p. 418), but does not therefore posit a Copper Age. However, the orthodoxy in the European prehistory community was still that the use of bronze preceded that of copper, and that this was because the technology was introduced from the East and because bronze has superior properties to copper (e.g. Figuier 1870, pp. 250–254).

Meanwhile, in England, there was still controversy about the validity of the Three Age System (Rowley-Conwy 2007, pp. 248–250). In presenting an exhibition at the Society of Antiquaries which was designed to promote the concept of a Bronze Age, John Evans discussed the question of the Copper Age, arguing that ‘there must have preceded the bronze age an age in which copper alone was used’ (Evans 1873, p. 394). But he added that in England, ‘we have but very slight traces of any such copper age, for even when we find implements which consist mainly of copper there is usually a small per-centage of tin present’ (Evans 1873, p. 394), whereas in North America there was abundant evidence for such a Copper Age (Evans 1873, p. 395). In Germany too, the concept of a Bronze Age was still not universally accepted (Lindenschmit 1876; cf. Mestorf 1878).

The seventh *Congrès international d’anthropologie et d’archéologie préhistoriques* was held in Stockholm in 1874, and Wollaston Franks presented analyses of prehistoric copper artefacts from Cyprus in the collections of the British Museum. He did not go so far as to claim that they proved the existence of a Copper Age, a question which he noted had been raised on many occasions, limiting himself to saying that probably in some countries there was a time when pure copper was used for weapons and tools, but that he doubted that it was a general rule (Franks 1876, p. 350).

Evans’s paper (Evans 1873) was picked up by Ernest Chantre, who in 1875 published his four-volume *Études paléolithologiques dans le bassin du Rhône: Âge du bronze: recherches sur l’origine de la métallurgie en France*. In the first volume, *Industries de l’Âge du bronze*, he discusses theories for the origin of metallurgy (Chantre 1875, p. 14), saying that on the basis of the North American evidence some workers had argued for the existence of a Copper Age as ‘an age of transition from stone to bronze’ (my translation), on the basis of artefacts in pure copper which are skeuomorphs of stone artefacts. Chantre, however, felt that the evidence was too

scarce and limited to just a few locations, so that he too felt it insufficient proof of a Copper Age.

Perhaps the key moment for the acceptance of the concept of the Copper Age was the eighth *Congrès international d'anthropologie et d'archéologie préhistoriques* held in Budapest in 1876. Here one of the official themes put forward for discussion was 'Est-ce que on peut admettre un âge du cuivre, et quelles sont les formes caractéristiques des objets du cuivre trouvés jusqu'à présent? En quelle relation se trouvent les objets de cuivre avec les objets de bronze en Europe?' ('Can a Copper Age be accepted, and what are the characteristic forms of the copper artefacts found to date? What is the relation between copper and bronze artefacts in Europe?', my translation) (*Congrès 1877*, p. x). The Inspector General of Museums and Libraries of the Kingdom of Hungary and Director of the National Museum, Franz von Pulszky v. Lubócz u. Cselsalva, was President of the meeting, and he presented a paper on the Copper Age in Hungary. This answered the critics of such an age by showing that the types of the copper artefacts were different to those of the bronze artefacts, and that some of the copper types were skeuomorphs of stone tools, while there was no continuity of form between stone and bronze artefacts (von Pulszky 1877, pp. 223–224, 226). Unfortunately, von Pulszky had only had ten artefacts analysed and in the ensuing discussion John Evans seized on this to contest his interpretation of the data, while others intervened with observations concerning copper artefacts (von Pulszky 1877, pp. 225, 234–236). This theme was not new for von Pulszky, who had already argued for the existence of a Copper Age in Hungary in an address to the Academy of Sciences of Budapest in early 1875 (reported, for example, in Spain—von Pulszky 1875, p. 29). His thesis was picked up in Austria by the Conservator of the k. k. Central-Commission für Erforschung und Erhaltung der Kunst- und historischen Denkmale, Mathias Much, who posited the existence of a Copper Age in Austria as well (Much 1879, 1885, 1886).

In 1878, the Italian, Innocenzo Regazzoni, discussed the concept of the Copper Age in his monograph *L'uomo preistorico nella provincia di Como*. His discourse is of interest, as he clearly understood Wilde as well as Lubbock to have posited a Copper Age, but his conclusions are conventional for the period—he allowed for a Copper Age in North America, but argued that pure copper artefacts were so rare in Europe and particularly in Italy that 'if in some places this metal was known and used before bronze, this was of no importance and did not last long enough to constitute a true Copper Age' (Regazzoni 1878, p. 82; my translation). Regazzoni's book was reviewed, rather harshly and at length, by Pellegrino Strobel in the Italian national prehistory journal, the *Bullettino di Paleontologia Italiana*, and indeed Strobel explicitly mentions Regazzoni's discussion of the Copper Age question (Strobel 1878, p. 148).

The ninth *Congrès international d'anthropologie et d'archéologie préhistoriques* was held in Lisbon in 1880, and the Copper Age was again one of the official themes for discussion, except that the question was no longer whether such an age existed, but how it could be recognised: 'D'après quels faits peut-on reconnaître la transition de l'âge de la pierre polie à celui du cuivre ou des métaux en Portugal?' ('What evidence can be adduced to identify the transition from the age of polished stone [the Neolithic] to the copper or metal age in Portugal?', my translation)

(*Congrès 1884*, p. xi). Juan Vilanova y Piera presented a paper arguing for the local development of metallurgy in Spain, conflating the existence of a Copper Age with local development of metallurgy (Vilanova 1884). It is interesting that he refers to megalithic tombs dating to ‘l’âge de la pierre polie, du cuivre, du bronze etc.’ (‘the age of polished stone, of copper of bronze, etc.’, my translation) (Vilanova 1884, p. 353), a rhetorical device that suggests that he felt that the existence of a Copper Age no longer needed justifying. But in the debate that followed, the French prehistorians contested his conclusions. Chantre—while not excluding *a priori* the existence of a Copper Age in Spain—expressed the opinion that it was not proven. His argument was the lack of analyses, but also the dominant hypothesis that the knowledge of metallurgy was introduced from the East, and Chantre stressed that even in Hungary, where the most copper artefacts had been found to date, the existence of a Copper Age was still not proven (Vilanova 1884, pp. 355–356). Gabriel de Mortillet also refused to accept Vilanova’s model, on the grounds that artefacts were made in copper when tin was in short supply and (erroneously) that the axes that Vilanova claimed were copper were of forms datable to late in the Bronze Age (Vilanova 1884, p. 357). Likewise, Cartailhac, in his *Rapport sur la session de Lisbonne*, published immediately after the congress, was critical, commenting that ‘M. Vilanova parle dans les termes très-vagues de l’âge du bronze en Espagne et de l’âge du cuivre qui l’a précédé’ (‘Mr Vilanova speaks in very vague terms of the Bronze Age in Spain and the Copper Age which preceded it’, my translation) and giving much space to the objections raised (Cartailhac 1880, p. 74).

In 1881, Sir John Evans published *The ancient bronze implements, weapons, and ornaments, of Great Britain and Ireland*. This work, which followed an earlier systematic study of stone artefacts (Evans 1872), was published at the time when the Three Age System had only just come to be generally accepted in England (Rowley-Conwy 2007, pp. 235–285). It is therefore no surprise that Evans starts by reiterating the ‘three stages of progress represented by the Stone, Bronze, and Iron Periods’ (1881, p. 1). He talks of a ‘Copper Age’, saying that if it ‘existed in the Old World its home was in Asia or the most eastern part of Europe, and not in any western country’ (Evans 1881, p. 2), which seems to allow for a Hungarian Copper Age, but not for one in southern Spain. For Evans it was best documented in North America (1881, pp. 2–4). He then goes on to discuss in detail the classic formulation of the Three Age System (Evans 1881, pp. 4–26), which provided the chronological framework for his book, which discussed bronze artefacts mostly dating to the Bronze Age (Evans 1881, p. 26). Clearly, this detailed restatement of the Three Age System should be seen in the context of the slow acceptance of the scheme. It is perhaps not surprising that Evans was loath to accept a Copper Age in the British Isles, and indeed its application to the British sequence has remained controversial (Allen et al. 2012).

Evans’s work was quickly translated into French (1882)—more widely read in Continental Europe than English at the time, and the official language of the international congresses. In that language it was known and specifically cited by Gaetano Chierici in the 1884 article in which he coined the Italian term *Eneolitico* (or *Eneo-litico*, as he had it), that is, the Aeneolithic or Eneolithic, to date artefacts in the Remedello (Fig. 2) and Rinaldone grave assemblages, which he correctly placed between the

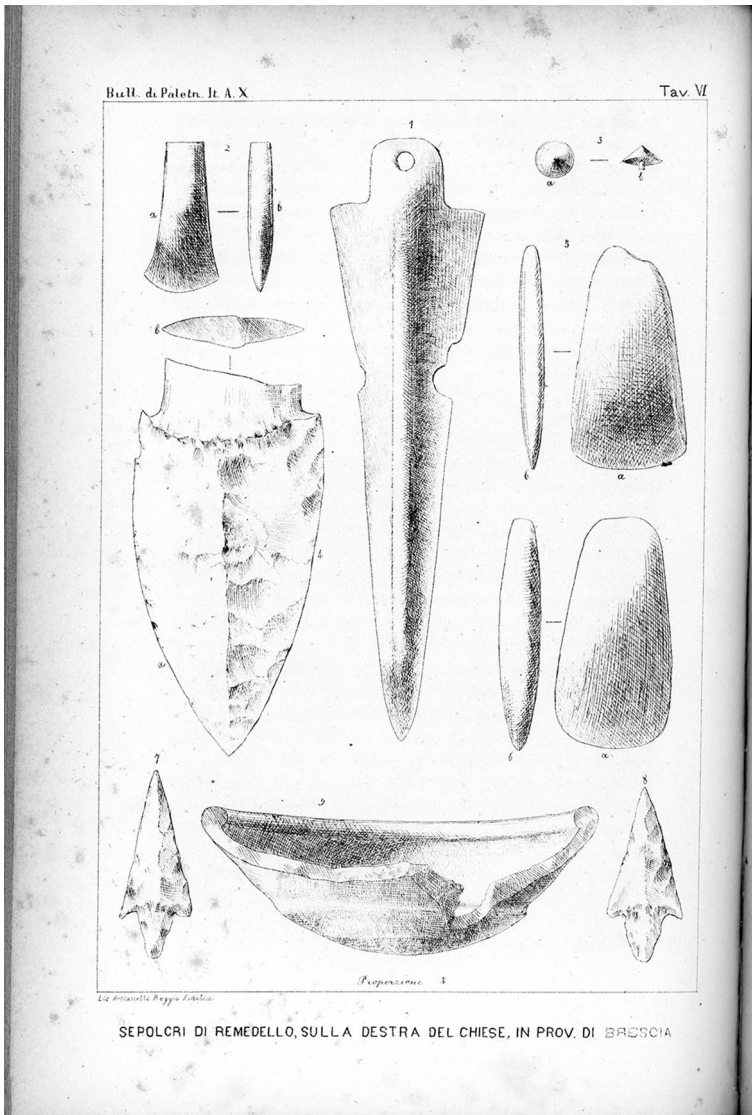


Fig. 2 Material from the Copper Age Remedello cemetery (Italy—Chierici 1884, tav. VI)

Neolithic and the Bronze Age. His term *Eneolithic* is unfortunate aesthetically, as it unites the Latin *aeneus* with the Greek root λιθικός (*lithikos*) when the philologically more correct *Chalcolithic* would have been preferable (Strahm 1982, p. 22; it is possible that Chierici did not have Greek, though this is rather unlikely as he was a Roman Catholic priest). However, both terms are unfortunate substantively because the adjective *aeneus*, like *χαλκός* (*chalkos*), can mean of either copper or bronze. This latter ambiguity may have been deliberate, as scholars were at the time

unsure whether the artefacts in the Remedello and Rinaldone grave assemblages that Chierici was discussing were made of copper or bronze, and his specific problem was to find a chronological collocation for them. For Chierici, the term *Eneolitico* denoted a period of transition, when metal and stone artefacts were used alongside each other (1884, pp. 150–151). The paternity of the concept of a Copper Age in Italy has traditionally (e.g. Peroni 1992, p. 26) been ascribed to Chierici, but as we have seen, in fact Innocenzo Regazzoni had already discussed the idea in his 1878 monograph, which was reviewed in the *Bullettino di Paletnologia Italiana*, a review that explicitly mentions his discussion of the Copper Age question (Strobel 1878, p. 148). Chierici as an editor of the *Bullettino* cannot therefore not have been aware of the discussion, not least because Strobel's review engendered a series of letters between Regazzoni and Chierici (Magnani 2010, pp. 170–172; cf. Macellari 2010, p. 12) and there was a copy of Regazzoni's monograph in Chierici's personal library. Chierici also possessed a copy of Chantre's (1875) *Âge du bronze* and the proceedings of both the Lisbon and Budapest meetings of the *Congrès international d'anthropologie et d'archéologie préhistoriques* (1877, 1884), so that he is likely to have been very well informed about the debate on the Copper Age (for an inventory of Chierici's library, see Magnani 2010, pp. 219–221 and CD-ROM 'Biblioteca').

In 1884, Adrien Jeanjean published a paper, 'L'Âge du cuivre dans les Cévennes', in which he discussed new evidence confirming Cazalis de Fondouce's (1875, pp. 188–189) hypothesis of a Copper Age in southern France, referencing the evidence from Iberia, Hungary, and Wilde's (1861) Dublin catalogue (Jeanjean 1884). In 1886, Emile Cartailhac, reviewing Iberian prehistory in his *Les âges préhistoriques de l'Espagne et du Portugal* (1886), accepted a Copper Age not only in Portugal and Spain, but also in France (specifically the Cévennes), in Switzerland and in Austria (Cartailhac 1886, pp. 210–211). The eminent anthropologist (and honorary vice-president of the *Congrès international d'anthropologie et d'archéologie préhistoriques*), Jean Louis Armand de Quatrefages de Bréau, endorsed this opinion (Quatrefages 1886, pp. xxv–xxvi): it was now acceptable to posit a Copper Age. It is noteworthy that Oscar Montelius too, in his (1885) *Om tidsbestämning inom bronsåldern med särskildt afsende på Skandinavien* (1885; English translation, *Dating in the Bronze Age with Special Reference to Scandinavia*, 1986), accepted the existence of a Copper Age 'in Hungary ... as in other European countries' (Montelius 1986, p. 64).

Troy and Knossos: An Alternative Approach to Chronology

Although Heinrich Schliemann did not attend the *Congrès international d'anthropologie et d'archéologie préhistoriques* held in Budapest in 1876, his collaborator Rudolf Virchow did, and Schliemann discusses the congress debate on the Copper Age in his *Ilios* (1880, p. 257), saying that von Pulszky placed two cases of copper objects in the Prehistoric Exhibition 'in order that they might serve as proofs of the existence of a Copper age, which he authenticated in his lecture before the Congress', a phrasing that suggests that Schliemann accepted von Pulszky's arguments. Schliemann found the two earliest 'cities' at Hissarlik to be characterised by

copper metallurgy with no evidence for bronze (Schliemann 1880, p. 258), citing W. Chandler Roberts's comment that 'it would appear that they belong to a pre-Bronze age' (Schliemann 1880, p. 251), but he did not explicitly assign them to the Copper Age, probably because he believed the second 'city' to be that of Priam and the Trojan War. Rather than adopting the Three Age System and dating the artefacts and structures that he found on the basis of technology, Schliemann provided a relative chronology based on the stratigraphy of his own excavations at Hissarlik and the succession of 'cities' that he found there. As Virchow (1880, p. x) comments in his preface to Schliemann's *Ilios*, this provides us with an 'order of succession' of the material Schliemann found, telling us 'what is older and what later'; Schliemann did not, however, find Neolithic levels at the site, so that Hissarlik could not document the transition to the use of metals (Virchow 1880, p. xi). The deep stratigraphy at Hissarlik (some 16 m—Schliemann 1880, p. vii) and the successive 'cities' of 'Troy' has since served as a reference chronology for Thrace, western Anatolia and the northern Aegean.

Sir Arthur Evans used a similar stratigraphic premise for the 'Minoan' chronology that he proposed in 1905 for Crete, based on his excavations at Knossos (Evans 1906). As he later wrote, 'the term "Minoan" as used for the present purpose embraces the Copper and Bronze Ages of Crete, but does not include the more primitive stage of culture represented by the Later Stone Age' (Evans 1921, p.13). Evans's 'Minoan' culture of Crete 'has its starting-point in the transitional Age during which the use of stone for implements and weapons was beginning to be supplemented by that of copper', but rather than 'Copper Age' or 'Chalcolithic', he preferred to term it 'Early Minoan I' (Evans 1921, p. 32, cf. p.68). In a climate of intense competition between foreign archaeologists excavating the palaces and sites of Minoan Crete, after Cretan autonomy from the Ottoman Empire opened up the island to excavation in 1898, Evans's chronology, which centred on Knossos and his excavations there, might perhaps be interpreted as an attempt to hegemonise the discourse of prehistoric Crete. Indeed, Evans's chronology does not accurately reflect the stratigraphic succession everywhere on the island, such as at the palace of Phaistos, where Italian excavations began in 1900, a few months after Evans's at Knossos (Pernier 1935, pp. xiii, xvi). While Evans concentrated on the relative stratigraphy of Knossos, Italian scholars were much more alive to the Copper Age (e.g. Mosso 1910, pp. 103–116: Chapter VI, 'The Copper Age in Crete and primitive Minoan pottery'). Recently some authors have argued for the recognition of a Chalcolithic in Greek archaeology (e.g. for southern Greece, to recognise the importance of metallurgy: Maran 1998, pp. 7–9; for Crete: Nowicki 2008), but most who work on the southern Aegean continue to follow Renfrew (1972, pp. 64, 76, tab. 5.1), who inserted a final Neolithic after the late Neolithic (Weinberg 1947) and before the early Bronze Age (Pullen 2003, p. 25).

The Copper Age in Regional Chronologies

Much work has been done since the Second World War to refine regional chronologies, both in the light of typological studies of much improved data-sets and through the integration of radiocarbon dates. However, there is little consistency in the way period labels are used (Pleslová-Štiková 1977, pp. 56–58).

Moreover, although the term has been widely used since the nineteenth century, there is no general agreement about what the Copper Age actually is. The conflation of the existence of a Copper Age with the local invention of metallurgy has been happily forgotten, though of course the presence of copper rather than bronze metalwork in an area means that copper metallurgy appeared before the use of its deliberate alloy (tin) bronze did, and where there was local invention we would expect it first to give rise to a copper metallurgy. It should be noted that use of the term in Europe does not correspond to its original application to the North American evidence, where copper seemed to be used in the same way as stone (Lubbock 1865, p. 202), that is, cold hammered from native copper. Logically, a Copper Age is either the period when copper metallurgy becomes more important than stone (though whether this means that it is the dominant or the socially or symbolically most important technology is a further question), or the period between the introduction of copper pyrotechnology and the adoption of alloying with tin to make bronze. On the other hand, the terms *Eneolithic* and *Chalcolithic* are generally used as synonyms of *Copper Age*, but taken philologically would denote the period when copper (or bronze) is used alongside stone (Pleslová-Štiková 1977, p. 58). It is perhaps best to pass over the fact that flint tools were also used commonly in the Bronze Age, indeed into Medieval times in some parts of Europe (e.g., Knarrström 2001).

These paradoxes are perhaps best illustrated by taking the Italian usage of the term *Eneolithic* (*Eneolitico*) as an example. The Italian Copper Age is conventionally held to date to about 3500–2200 cal BC (Maggi and Pearce 2014), but copper artefacts may in fact have been in circulation from the middle of the fifth millennium cal BC and copper smelting is first attested at around 4300 cal BC (Pearce 2015, pp. 48–51). The beginning of the Copper Age is held to coincide with the appearance of the Remedello (Fig. 2) and Rinaldone groups, whose burials contain metal axes, daggers and halberds, alongside flint weapons (Bagolini 1981; Barker 1981, tab.7), and it is perhaps no accident that Chierici's (1884) original positing of an Eneolithic was to encompass precisely these assemblages. That metal weapons had taken on a significant social and/or symbolic role is shown by the grave inventories, and in northern Italy by statue stelae and rock art (Barfield 1986, pp. 244–247). Although the end of the Copper Age and beginning of the early Bronze Age is conventionally marked by the appearance of the Polada culture and parallels with transalpine Europe (Peroni 1971), in reality (tin) bronze only really becomes common in the later phases of the period (de Marinis 2006, pp. 225, 248, 250). Moreover, in central and southern Italy, metalwork is not at all common until the later Bronze Age (Barker 1971, pp. 185–186; 1981, pp. 103–104; Bietti Sestieri 2010, pp. 97–98). It is therefore clear that Italian usage of the term *Eneolitico* lacks any logical consistency, but is simply the result of the national history of our discipline; indeed, it is

precisely for this reason that understanding the history of the period label *Copper Age* helps us to understand its usage.

It may be argued that ‘period structures are of value ... because they provide common templates against which the examination of cultural inter-relationships can take place’ (Needham 2012, p. 2; see also Strahm 1981, p. 191), but in reality, as we have seen from Italy, the use of chronological terms like the *late* or *final Neolithic*, the *Copper Age*, *Eneolithic* or *Chalcolithic*, or the *early Bronze Age* generally reflect regional or national traditions of scholarship (Heyd and Walker 2015, p. 675) rather than common templates. Indeed, although in theory such terms correspond to the dominant raw material that was used for tools and weapons in a given area, things are unfortunately not always so simple. This is well illustrated by Haskell Greenfield (1988, p. 747) with reference to sequences in the Balkans, where ‘the period designations ... vary from country to country, with much of the Late Neolithic of the Vinča culture of Yugoslavia ... being synchronous with the Eneolithic of Bulgaria and the Chalcolithic or Copper Age of Hungary’, while ‘the Eneolithic (Baden-Kostolac-Vučedol) cultures of Yugoslavia are often called Early Bronze Age in neighboring countries’. *Chalcolithic*, *Eneolithic* and *Copper Age* are, of course, synonymous, but this does not solve the lack of correlation between regional and national traditions of scholarship. To adduce a further complication, in many areas (tin) bronze does not come into general use at the beginning of the early Bronze Age, such as for example in Italy, where the start of the period is marked by new archaeological cultures, such as Polada, rather than the onset of the new technology. Indeed, in many areas, during what is locally called the early Bronze Age, metal still plays a subordinate role and it can be argued that the society can still be seen as Neolithic in character (see e.g., Strahm 1996, pp. 671–673).

Technological Stages as Chronological Periods

As originally proposed, the Three Age System of Stone, Bronze and Iron Ages conflated technological stages with chronological periods. This system worked in its original context, but there were a number of methodological and conceptual problems. These were well expressed by Gordon Childe in a perceptive address to the British Prehistoric Society, published in 1935.

Childe (1935, pp. 2, 7) noted that the Ages did not equate to periods of absolute time of even continent-wide validity, so that for example parts of Europe were still in the Stone Age while others were in the Bronze Age. This means that as a relative chronology, the Three Age System works best when used in the discussion of regional developments. He proposed that the Ages be used instead to denote ‘stages in human progress’ (Childe 1935, p. 7), and he followed Vayson de Pradenne (1934, p. 722; 1935, p. 309; cf. Peake 1927, pp. 21–22) in equating the origin of the Neolithic not with the appearance of polished stone axes and pottery, as in the traditional definition, but with that of food production, agriculture and animal husbandry. The Bronze Age, on the other hand, corresponded to another ‘radical change in economic structure ... It indicates specialization of labour and the beginnings of regular foreign trade’ (Childe 1935, pp. 7–8; cf. 1930). He described his system as

a ‘functional-economic’ classification of stages in human prehistory (Childe 1935, pp. 8–9). Childe further developed this concept in his paper ‘Archaeological Ages as technological stages’ (1944).

It may, however, be debated whether these changes in technology really do correspond to significant changes in prehistoric society, that is, whether they are simply chronological divisions of convenience for the modern archaeologist or whether they reflect important developments in the past.

Post-Second World War Conceptualisations of the Copper Age

Various workers have produced chronological schemes based on the adoption of metallurgy. Such schemes do not necessarily imply that metallurgy was locally developed or introduced, though the absence of what are perceived to be the early stages may have a bearing on the question of whether the technology had been introduced from elsewhere, as indeed the early workers argued in the nineteenth century.

One scheme was proposed by Gordon Childe (1944, p. 9), who suggested ‘four modes in the use of copper and bronze’. This was partly a response to Glyn Daniel’s criticism of the concept of the Bronze Age; Daniel argued that it should be substituted by a ‘Full Metallic Age’ comprising the late Bronze and early Iron Age (1943, pp. 51–52; cf. Rickard 1944, who preferred the term ‘Metallurgic Age’, arguing that the discovery of smelting was the critical development). Childe’s ‘Mode 0’ was considered to be part of the Neolithic, and he opined that ‘in so far as its products were only small ornaments, or slavish copies of Neolithic forms ... the Copper Age has no significance as a progressive Stage in technological evolution’ (Childe 1944, p. 9). ‘Mode 1’ was equivalent to the Early Bronze Age of Europe and saw metal weapons and ornaments, ‘but no mutant tools and hardly any implements adapted exclusively to industrial use’, with stone tools, including axes, still in use (Childe 1944, p. 10). In his ‘Mode 2’, ‘copper and bronze are regularly used in handicraft, but not in husbandry, nor for rough work’ and polished stone axes and flint tools were still common. Finally, in ‘Mode 3’ metal was used in agriculture and ‘rough work’, with the appearance of bronze sickles, hoes and hammer heads; lithic industries decline but do not disappear (Childe 1944, p. 10). Childe (1944, p. 17) argued that the fact that copper or bronze is used is less important than what the metal is actually used for.

In his *Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium B.C.*, Colin Renfrew (1972, p. 308) argued that ‘the invention of metallurgy was one of those decisive steps which led directly towards the emergence of civilisation in the Aegean’, and that it was one of a suite of interconnected causes of social change. Renfrew’s book, a key text of the ‘New Archaeology’, was dedicated to the memory of Gordon Childe, and clearly applies Childe’s idea that the adoption of metallurgy constituted a key development, being bound up with the appearance of craft specialization and increasing trade (see above; Childe 1935, pp. 7–8) in a ‘multiplier effect’ (Renfrew 1972, p. 43). Renfrew eschewed the Copper Age as a chronological period in his monograph, and as we have seen, preferred instead to insert a

Final Neolithic between the Late Neolithic and the Early Bronze Age of the traditional Aegean chronology (Renfrew 1972, pp. 64, 76, tab. 5.1; cf. Weinberg 1947), but he refers to the concept, for example, ‘the final Neolithic of east Macedonia thus covers the transition from a typically “chalcolithic” culture ... to ... the early bronze age’, using the label as a description of a phase in cultural development rather than to denote a chronological period, a distinction to which we will return.

Emilie Pleslová-Štiková (1977) and then Jan Lichardus (Lichardus and Lichardus-Itten 1985, p. 514; Lichardus 1991; cf. Strahm 1995, p. 35, note 1) advocated moving away from a technological definition of the Copper Age based on the presence or absence of copper metallurgy. They preferred to see it as a chronological period characterised by a complex of economic, social and religious changes distinguishing it from the preceding Neolithic—changes which Lichardus argued derived from the pastoral societies of the Pontic steppe zone (e.g. Lichardus and Lichardus-Itten 1985, pp. 504–507). For Pleslová-Štiková (1977, p. 58), copper was not necessarily the most important aspect of the economy of the period, nor the cause of social differentiation, but was a major stimulus for exchange.

The idea that the Copper Age is characterised by an interrelated suite of changes is similar in conception to Andrew Sherratt’s ‘secondary products revolution’, first put forward in 1981. It has a bearing on the debate concerning the impact of metallurgy on society, and would tend to play down the role of metals in stimulating socio-economic change, seeing the new technology as part of a bigger complex of factors operating in Copper Age Europe. For example, in Copper Age Liguria (northwest Italy), the upland pastures begin to be exploited for short-range, summer transhumance, and this new pastoral economy correlates with (and may be argued to be the cause of) the discovery and exploitation of other mountain resources: chert (radiolarite) for arrowheads, and copper ore (Maggi and Pearce 2010). It is worth noting that this link between pastoralism and metallurgy had been adduced by Childe (1958, p. 144).

Because metallurgy was not adopted at the same time across Europe, Christian Strahm rejects the idea that the Copper Age is a chronological period, characterised by a range of socio-cultural innovations, preferring to see it simply as a *phase* of technological development, starting when copper is melted and local production can be assumed (Strahm 1981, p. 200; 1982, pp. 16–19), followed by a *Metallikum* (which we might translate as ‘Full Metal Age’, to borrow Glyn Daniel’s [1943, pp. 51–52] term), when metalworking shapes society, generally during the Bronze Age (Strahm 1981, pp. 196–200; 1982, p. 18). He has developed his ideas in a series of articles, underlining the ‘fundamental historical importance of metallurgy’, which led to a stratified society with central direction, an executive and a base, with division of labour (Strahm 1996, p. 673, my translation). The *Metallikum* can be based on a copper, bronze or iron technology (Strahm 1996, p. 674). On the other hand, Evgenii Chernykh (1992) prefers to conflate the Copper Age and the Bronze Age into the *Early Metal Age*, eschewing criteria other than ‘historico-metallurgical phenomena’ (Chernykh 1992, p. 11); he distinguishes the Copper Age as being characterised by ‘tools and weapons [made] from metallurgically “pure” copper or alloys of accidental origin’ (Chernykh 1992, p. 15).

More recently, many scholars, particularly those working in the Iberian peninsula, have called into question the importance of copper metallurgy as a driver of social change (Bartelheim and Krauß 2012, pp. 91–92; Bartelheim and Pearce 2015, pp. 696–697); this extensive and important debate has not led to abandonment of the term *Copper Age* in Iberia. However, debating whether the term *Copper Age* or *Chalcolithic* should be adopted to denote a specific phase in the British prehistoric sequence, a number of papers in a recent conference proceedings volume, *Is there a British Chalcolithic?* (Allen et al. 2012), explicitly reject the adoption of the term precisely because they see it as having ‘social implications’ (e.g. Roberts and Freeman 2012, pp. 28, 35; cf. Sheridan 2012, p. 53).

Conclusion

The idea that there was a Copper Age in Europe between the Neolithic and Bronze Age was inspired by the discovery of the use of native copper in prehistoric North America. Its currency in European prehistory owes much to the 1861 observations by William Wilde that copper artefacts preceded bronze tools in Ireland, though he himself did not postulate a Copper Age *per se*. Acceptance of the existence of the Copper Age was a long process, because it was perceived to imply local development of metallurgy and to undermine acceptance of the Three Age System, but the 1876 and 1880 international congresses of anthropology and prehistoric archaeology were key moments in the adoption of the term. By the mid 1880s its validity was widely accepted. However contemporary usage of the term varies across Europe, and there can even be significant differences in its use in contiguous areas, as in the Balkans. In part because of disquiet about basing chronological distinctions on changes in technology, some authors have proposed alternative conceptualisations, but most European prehistoric archaeologists continue with regional Neolithic—Copper Age/Chalcolithic/Eneolithic—Bronze Age dating schemes, not least because of their apparent simplicity. As radiocarbon dates for the period become more widely available, and uncertainties are reduced through the application of Bayesian modelling (e.g., Maggi and Pearce 2014), it is likely that absolute dates will increasingly take the place of chronological schemes for the dating of the period, but in heuristic terms, labels like Copper Age will perhaps remain useful shorthand for stages in technological—and perhaps socio-economic—development.

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