

## Interwoven Traditions in Bell Beaker Metallurgy: Approaching the Social Price of Copper at Bauma Del Serrat Del Pont (Northeast Iberia)

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### Abstract

Debates on early scientific discipline in Western Europe have often centered on the social price of copper (between utilitarian and symbolic) and its acknowledged role within the emergence and consolidation of hierarchies. Recent analysis shows that generalisations are progressively indefensible and highlights the requirement for comparative regional studies. Given its location in associate intermediate space, the first scientific discipline of Northeast Iberia provides a remarkable case in purpose to explore the interaction between the well-characterised traditions of southern Iberia and southern France throughout the third and 2d millennia BCE. Here the analytical study of seven Bell Beaker (decorated and undecorated) vessels reused as crucibles at Bauma Del Serrat del Pont is bestowed [1]. We tend to used pXRF, metallography, SEM-EDS and lead atom analyses. The results show proof for copper smelting using a noteworthy kind of ore sources, together with Solana del Bepo Turquesa and Les Ferreres mines, and an additional unknown space. The smelting vessels were factory-made mistreatment similar clay that contained each mineral and organic inclusion. Our results ar mentioned with relevance all the proof obtainable for metals and scientific discipline within the Northeast and additional broadly speaking compared to southern Iberia and southern France, with special stress on problems with production organisation and social quality. Taken along, our results support the notion that copper scientific discipline vie a preponderantly utilitarian role in Bell Beaker societies and highlight individual aspects of the scientific discipline flight within the Northeast [2]. Variations between territories challenge unilinear explanations of technological and social development once the introduction of scientific discipline. Separate trajectories will solely be explained in relevancy area-specific socio-cultural and environmental factors.

**Keywords:** Bell Beaker metallurgy; Carbon-14; Polymetallic ores; Ceramic pastes

### Introduction

Bauma Del Serrat del Pont could be a key website for understanding the origins of copper extractive scientific discipline within the peninsula northeast, because it presents the earliest assemblage associated with scientific discipline activities within the space. Its location between 2 distinct regional technological traditions stimulates questions about the parallel influence of those traditions during this intermediate space throughout the tip of the third millennium BCE, which might be approached through careful microstructural and integrative analyses of the crucibles recovered [3]. The differential socio-cultural dynamics operative in southern Iberian Peninsula, northeaster Iberian Peninsula and southern France throughout the late 3rd–early 2d millennium BCE resulted in differential methods towards social quality [4-6]. These methods area unit to some extent mirrored within the totally different role of copper among these societies, as shown by ancient approaches to finished aluminous objects. By characterising copper production dust at La Bauma and discussing these finds in relevancy alternative proof from the Northeast and on the far side, we tend to aim to contribute to the narrative of non-linearity towards social quality. Our study shows that the social worth of copper is additionally interlinked with its production and therefore the organisation of those activities, that ultimately contributes to a far better understanding of Chalcolithic societies within the Northeast [7-9]. The last twenty years have witnessed a serious surge of interest within the origins of copper mining, smelting, and dealing within the peninsula. The new analysis season was inaugurated by munition and carbon-14 dating at Libiola and cards Loreto, 2 copper mines from jap Italian region. Investigations dropped at lightweight prehistoric workings and galleries for the extraction of mineral (presumably supplemented by near-surface deposits of copper oxides/carbonates) qualitative analysis from the

mid-4th millennium BC. This pushed back considerably the beginnings of copper mining south of chain [10]. Such a shocking discovery crystal rectifier to reconsidering the chronology of early Italian metals that at the time were irresistibly dated to the third millennium BC. A review of the proof showed instead that Italian copper production possible commenced within the late fifth or early fourth millennium BC (i.e. the late/final Neolithic). It additionally showed that Neolithic metalworkers failed to simply manufacture little awls and points, as was till then believed, however additionally giant, technologically advanced axe-heads. the invention of ultimate Neolithic smelting proof from Orti Butanone, Tuscany, additional verified the new image, showing that copper wasn't solely forged and worked, however additionally smelted (and presumptively mined) within the space from the first fourth millennium BC [11].

### Discussion

The variations within the alloying practices were possible associated with the provides used and/or native conservative traditions individual to a production zone. This argument is very valuable in Anatolia, wherever polymetallic ores area unit immensely on the market [12,

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13]. The corpus introduced here composed of largely pins and beads with the exceptions of 3 seals, a figurine, a dagger, and an axe. Seals and figurines particularly align with symbolism than utilitarian use that finds proof at the Chalcolithic Levant. Copper alloys with high Sb and arsenic for a lovely surface colour area unit famed largely from the region, wherever such alloys were wont to turn out elaborate and symbolic objects instead of utilitarian tools. Whereas an identical surface colour is visible at Gözlükule seals, a close examination of Alaca Höyük figure is important. The Sb levels of the dagger and therefore the axe area unit below the bounds of making a colour result [14].

## Conclusions

The analyses of the melting pot pastes show that La Bauma crucibles were factory-made victimization identical clay. If unadorned vessels were purposeful vessels factory-made for scientific discipline operations (still a not conclusive question), these were created within the same manner as standard embellished pots (G11 and F12) that were repurposed for scientific discipline functions [9]. A parallel development are often found within the Bell Beaker assemblage from El Ventorro (Madrid), wherever unadorned and embellished crucibles have terribly similar pastes between {each alternative one another} and compared to other non-metallurgical vessels.

Ceramic pastes from La Bauma mix varied poorly sorted mineral inclusions further as some organic spent materials. The paste was refractory enough to carry till the tip of the operation that was most likely conducted at temperatures in far more than 1100°C (i.e. higher than the temperature of copper). By then, it absolutely was getting ready to chemical and thermal collapse, as indicated by the bloating pores and therefore the scum layers systematically enriched by liquefied ceramic [10-11]. Presence of mineral inclusions of various size and of low temperature (such because the metal minerals dissolved in a number of the slag), suggests that no specific treatment of the clay or acutely aware choice of tempering material was conducted. These results enable to technologically classify La Bauma scientific discipline as associate example of peninsula crucible-based operations common throughout Chalcolithic times (see Chalcolithic scientific discipline within the Northeast: between 2 technological traditions). Our microstructural analyses have confirmed the first look of smelting within the Northeast throughout the center of the third millennium BCE [12-13]. except victimization open vessels, the process of a spread of regional oxidic ores in moderately reducing conditions would appear coherent with the southern peninsula technological tradition, though it's freelance from it in terms of cultural connected spheres (see Chalcolithic scientific discipline within the Northeast: between 2 technological traditions). Smelting operations were developed across activity moments that gave different uses to space: from habitational contexts (levels III.1 and II.4) to a production context (level II.5). Within the latter, production was higher, as deduced by the bigger quantity of melting pot sherds recovered (see Materials analysed and their archaeological contexts). As a result of this level is between 2 terribly similar surround settings, II.5 are often understood as a happening moment during which this

community required to provide additional copper. Production so, was tailored to the widely low social demand that was sometimes consummated in domestic settings. These units integrated scientific discipline in their alternative daily routines. Multiplying the quantity of scientific discipline operations administered in inefficient-but sensible enough-infrastructures (i.e. melting pot metallurgy) once demand periodically rises, instead of investment in up potency to accumulate additional copper during a single operation, would stay a shaping characteristic of peninsula scientific discipline till IA times.

## Acknowledgement

None

## Conflict of Interest

None

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