

DEUTSCHES ARCHÄOLOGISCHES INSTITUT
ABTEILUNG MADRID

MADRIDER MITTEILUNGEN

59 – 2018

Documento pdf del artículo publicado

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THE USE OF GOLD AT THE ROCK-CUT
TOMB NECROPOLIS OF
CASAL DO PARDO
(QUINTA DO ANJO, PALMELA,
3200–2000 BCE)

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REICHERT VERLAG WIESBADEN

MADRIDER MITTEILUNGEN

erscheint seit 1960

MM 59, 2018 · VIII, XX Seiten mit 192 Abbildungen

Herausgeber

Erste Direktorin · Zweiter Direktor

Deutsches Archäologisches Institut, Abteilung Madrid, Calle Serrano 159, 28002 Madrid, Spanien

Wissenschaftlicher Beirat

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ISBN: 978-3-95490-381-8 · ISSN: 0418-9744

Gesamtverantwortlich: Deutsches Archäologisches Institut, Redaktion der Abteilung Madrid

Layout und Satz: Imprenta Taravilla, S.L., Madrid

Herstellung und Vertrieb: Ludwig Reichert Verlag, Wiesbaden (www.reichert-verlag.de)

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Printed in Germany · Imprimé en Allemagne

Printed on fade resistant and archival quality paper (PH 7 neutral) · tcf

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Victor S. Gonçalves – Ana Catarina Sousa – Michelle Santos –
Carlo Bottani – José Mirão

THE USE OF GOLD AT THE ROCK-CUT TOMB NECROPOLIS OF CASAL DO PARDO (QUINTA DO ANJO, PALMELA, 3200–2000 BCE)

1 Foreword

Thanks to extensive research on the site and its architecture, and remains, Casal do Pardo is a type site for European prehistory, a true archetype of European Bell Beaker culture. Although there are many topics related to Casal do Pardo, this paper focuses exclusively on gold metallurgy and the recent findings of a 2017 archaeological campaign.

The group of rock-cut caves at Casal do Pardo is located in the parish council of Quinta do Anjo (municipality of Palmela, district of Setúbal). Although the site is also referred to as simply Palmela¹ and Quinta do Anjo², its right name is Casal do Pardo³.

The necropolis is located in an inner part of the Pré-Arrábida mountain range, as identified by Orlando Ribeiro⁴, in the valley immediately to the north of Serra do Louro. Its geographical coordinates are Hayford – Gauss Datum 73 – 70204. 3664 / 122261. 468 (Portugal's Military Chart no. 454, 2009). The rock-cut caves, dug into soft limestone, are located in a region with different overlapping geological formations, more precisely a Miocene formation of the Langhian-Serravallian and Tortonian stages⁵.

All the field and laboratory work have been supported by the municipality of Palmela.

2 History of Research at Casal do Pardo

The rock-cut caves of Casal do Pardo are one of the few sites in Portugal that have seen continued if intermittent research since the 19th century (fig. 1). In Portugal, only Alcalar has a similar history of consecutive stages of excavation, the remains from the site now scattered between several museums with no digital inventory, hindering studying them as a whole.

¹ Cartailhac 1886; Schuhmacher – Banerjee 2012; Schuhmacher 2017.

² Costa 1905; Costa 1907; Soares 2003.

³ Leisner et al. 1961; Leisner 1965.

⁴ Ribeiro 2004.

⁵ Manupella et al. 1999.

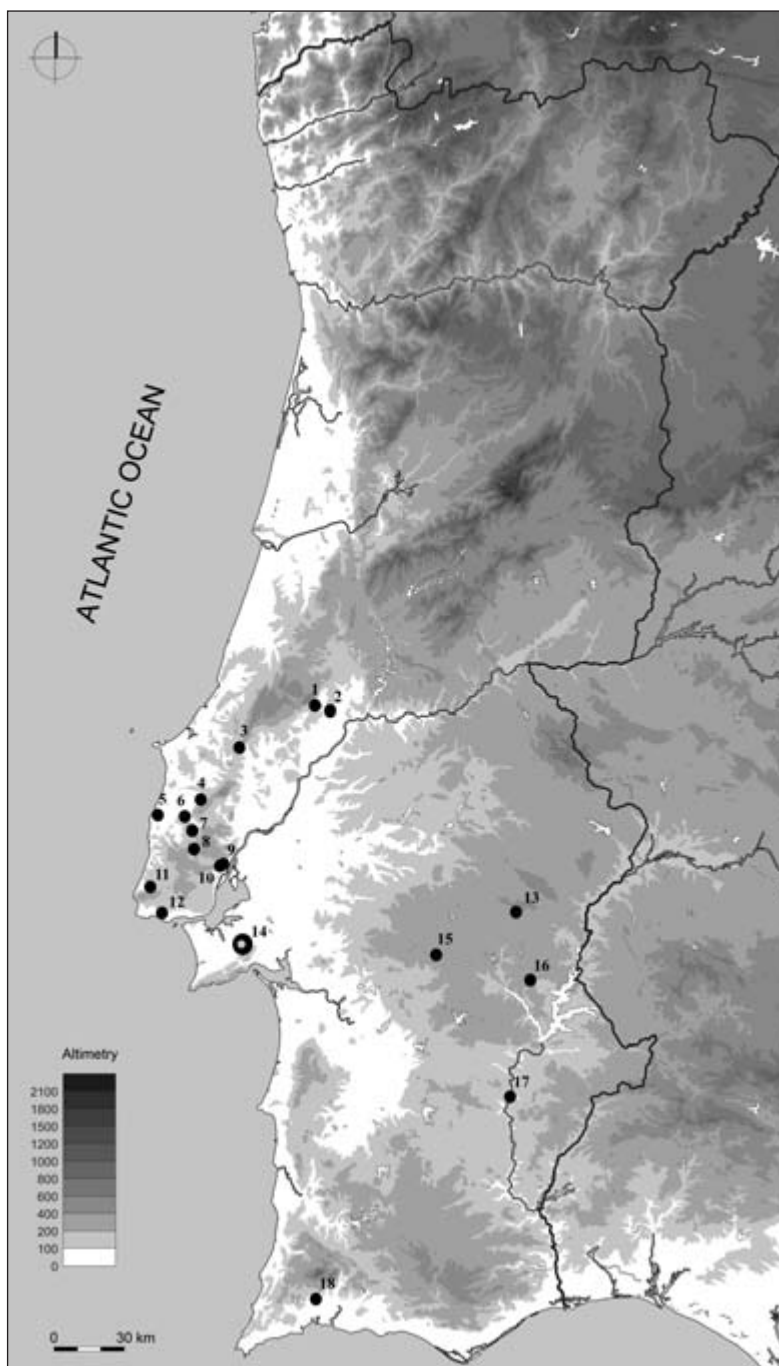


Fig. 1 Distribution of Portuguese Chalcolithic archaeological sites with evidence for gold metallurgy. 1. Almonda (Torres Novas); 2. Convento do Carmo (Torres Novas); 3. Senhora da Luz (Rio Maior); 4. Ermegeira (Torres Vedras); 5. Cova da Moura (Torres Vedras); 6. Barro (Torres Vedras); 7. Zambujal (Torres Vedras); 8. Tituaria (Mafra); 9. Moita da Ladra (Vila Franca de Xira); 10. Verdelha dos Ruivos (Vila Franca de Xira); 11. Belavista (Sintra); 12. S. Pedro do Estoril (Cascais); 13. Godinhos (Redondo); 14. Casal do Pardo (Palmela); 15. Anta Grande do Zambujeiro (Évora); 16. Perdigões (Reguengos de Monsaraz); 17. Três Moinhos (Beja); 18. Alcalar 9 and 11 (Portimão).

Although this paper exclusively focuses on the topic of gold artefacts from the necropolis, we must review the long history of archaeological excavations, the first of which began 142 years ago.

2.1 1876: The Geological Services Committee – António Mendes, Carlos Ribeiro

Following the necropolis's identification in 1876, research at Casal do Pardo began with an investigation by the Geological Services Committee (Comissão dos Serviços Geológicos), driven by late 19th-century quarrying works that had partially destroyed Caves 3 and 4 and shaken the corridor of Cave 1. The first investigation of the necropolis began at this date, carried out by António Mendes and Agostinho da Silva under the supervision of Carlos Ribeiro⁶.

Findings and artefacts from these archaeological works were exhibited in Paris at the 1878 Anthropological Exposition⁷. Ribeiro, however, died in 1882, thus halting the publication of the Casal do Prado necropolis, which would possibly have been included in volume 2 of *Estudos pré-históricos de Portugal*. In fact, at the end of this book, we find the announcement: »Here we finish this part of our memory. Soon we shall describe the man-made caves of Palmela, which are highly interesting in many aspects«⁸.

Casal do Pardo achieved international fame at a very early stage due to Ribeiro's presentation in 1878 at the Anthropological Science Exposition⁹ and, subsequently, at the exposition held on occasion of Lisbon's 1880 Congress¹⁰. Data provided by Ribeiro and Mendes's field documentation enabled Emile Cartailhac to publish the first cave plans and rock cuts, placing special emphasis on Bell Beaker pottery¹¹. This may have been the origin of the »Palmela« label given to copper points and Beaker pottery.

Later on, José Leite de Vasconcellos partially published the data recorded by Mendes¹². The available information would not be fully presented until 1906 in P. Belchior da Cruz's contribution in *Boletim da Sociedade Archeologica Santos Rocha*. In 1968, the short notes of Mendes were republished in *Arqueólogo Português*¹³.

During the first phase, archaeological works at Casal do Pardo focused essentially on the monuments' chambers, from which was collected a highly significant assemblage of artefacts, currently housed at the Geological Museum.

It is widely accepted that the remains now at the Geological Museum are the finds recovered by Mendes under the supervision of Ribeiro. The remains from Casal do Pardo have been permanently exhibited for 137 years in the building of the Academy of Sciences, where they were placed on occasion of the IX Congrès International d'Anthropologie et d'Archéologie Préhistoriques, as reported by Cartailhac: »(...) j'avais admiré de nouveau, en 1880 et 1881,

⁶ Belchior da Cruz 1906.

⁷ Ribeiro 1878.

⁸ Ribeiro 1880.

⁹ Ribeiro 1878.

¹⁰ Cartailhac 1886.

¹¹ Cartailhac 1886.

¹² Vasconcellos 1897.

¹³ Mendes 1968.

dans les galeries de la Section géologique, à Lisbonne, les précieux mobiliers funéraires des cryptes dites de Palmella»¹⁴.

Although the collection includes many categories of votive artefacts as well as some bones and shells, the 19th-century excavations found no gold artefacts nor is there any reference to their presence.

2.2 1907: António Inácio Marques da Costa

In the early 20th century, excavations were resumed at Casal do Pardo, led by Army Captain António Inácio Marques da Costa (1857–1933), who undertook significant archaeological activity in the Setúbal region¹⁵. No personal records remain that could clarify Marques da Costa's activity in the Setúbal region, but it is commonly noted that his personal archives were incorporated into the Library of Setúbal. These archives were seen first-hand by one of this paper's author (VSG) in the early 1960s. Back then they were kept inside a chest in a room adjacent to the library's reading room. Correspondence between Marques da Costa and Leite de Vasconcellos began in 1896¹⁶, before the first scientific field work began. The extensive research activity undertaken in the Setúbal region was regularly published on in *Archeologo Português*, in 1903 (volume 8), 1905 (volume 10), 1907 (volume 12), 1908 (volume 13), and 1910 (volume 15)¹⁷. Three years after his death, Marques da Costa's artefacts collection was bought from his widow by the National Museum of Archaeology.

Marques da Costa's work at Casal do Pardo lasted from 1906 to 1907, focusing on the excavation of the corridors in Caves 1 and 2 and concluding the excavation of the caves' chambers. Marques da Costa drafted new plans (fig. 2)¹⁸ and interpreted the rock-cut tombs in the context of their regional setting, namely in connection with the neighbouring settlements of Chibanes and Rotura.

Gold artefacts were collected from rock-cut Caves 1 and 3 during the campaigns of Marques da Costa, who left a detailed description of the finds:

»In Cave 1 (...): d) three small rolled rectangular leaves, of high-quality gold. These rolls formed tubes, as shown by the manner in which one leaf's widest edge overlaps and perfectly fits the opposite edge without any welding.

These gold tubes are similar to the nozzles that coat the tips of [shoe] laces today. Perhaps they served the same purpose. In my view, however, they probably were tubular beads, similar to those formed from dentalia shells, which I have also found in this cave. I shall address them further below.

Two of these gold tubes (figs. 320 and 321) have a 0.003 m section and a length of 0.025 m.

Figures 322 and 323 show the leaf of the third tube, almost entirely unfolded and seen from both sides. I personally witnessed the unfolding by the worker who found it at the sieve.

¹⁴ Cartailhac 1886, 181.

¹⁵ Costa 1910b.

¹⁶ Cardoso 2014a, 16.

¹⁷ Costa 1903; Costa 1905; Costa 1907; Costa 1908; Costa 1910a; Costa 1901b.

¹⁸ Costa 1907.

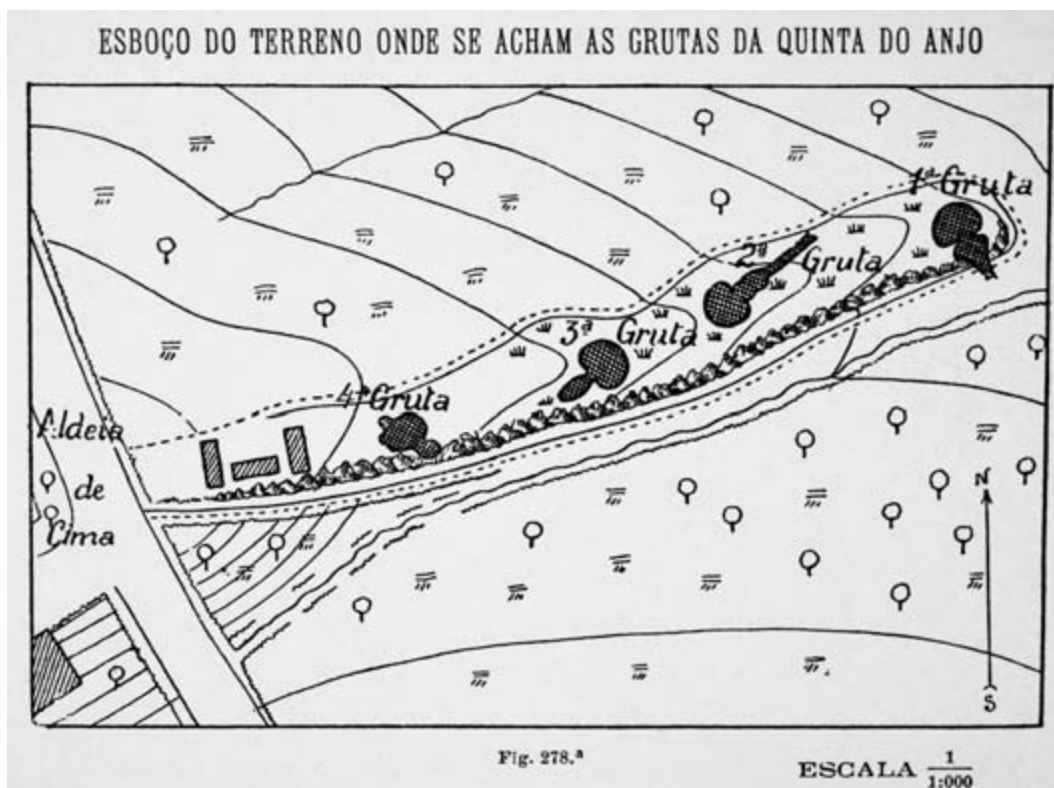


Fig. 2 General plan of the four monuments at Casal do Pardo, according to Marques da Costa.

This leaf is 0.021 m long and 0.017 m wide. It has the same thickness as the other two tubes, i.e., 0.00017 m.

e) A small gold serpentine (fig. 324^a).

This two-gram object consists of a helix-shaped spiralled strip or a four-coiled cylindrical spiral. This helix possibly encircled a cylinder with a 0.008 m section, and each of the four coils measures 0.003 m¹⁹.

»In Cave 3 (...) f) a flat-surface rectangular platelet of high-quality gold, with the two larger edges forming a right angle. Each edge has two holes, opposing one another, which might be two canals that linked them (fig. 387^a).

I think this platelet adorned a flattened bead made of some material, crossed by two bores matching the aforementioned holes. Similar glass beads are still manufactured today.

Another, smaller platelet was found next to the abovementioned platelet, also made of the same high-quality gold, without bore holes and rolled to form a small tube similar to the gold tubes I found in Cave 1 though much shorter.

Various gold items such as those found in this cave probably formed a composition, displayed in hypothetical form in fig. 389^a, that could possibly have been used as a bracelet²⁰.

¹⁹ Translated from Costa 1907, 329 f.

²⁰ Translated from Costa 1907, 335.

In spite of the interesting information provided – e. g., the unfolding of one Cave 1 tube, or the link between two platelets from Cave 3 – the exact location of the artefacts is never mentioned, and there is no way of clarifying whether the objects were found either in the chamber or the corridor.

2.3 1907–2013: Casal do Pardo Revisited

From the period between the last excavation in 1907 and 2007, special reference should be made to the monograph entitled *Les Grottes Artificielles de Casal do Pardo (Palmela) et la Culture du Vase Campaniforme*²¹. This work by Vera Leisner, George Zbyszewski, and Octávio da Veiga Ferreira gathers all the existing information and studies the collections remaining at the Geological Museum and the National Museum of Archaeology together. Although this work was published in 1961, the Leisner couple had been interested in this topic since the beginning of their research in Portugal. The Leisner Archives, preserved at DGPC (Direcção Geral do Património Cultural), include field photos, drawings, and lists of objects dating as far back as 1944.

The full inventory of the remains was completed after the chance discovery of the finds, including a few more fragments of Bell Beaker pottery with deer representations, from Casal do Pardo in the reserves of the National Museum of Archaeology by Maria Amélia Horta Pereira²².

Other research includes interdisciplinary studies – namely on anthropological finds²³ and absolute chronology²⁴ – or studies related to general corpora, such as those on gold metallurgy²⁵ or ivory²⁶.

In recent decades, research on the rock-cut caves has continued actively with the publication of some texts about the topic. Special reference should be made to the site's re-interpretation by one of the authors of this paper in *Sítios, Horizontes e Artefactos*²⁷, and a monograph by Joaquina Soares, entitled *Os Hipogeus pré-históricos da Quinta do Anjo (Palmela) e as economias do simbólico*²⁸.

We should also mention geoarchaeological studies that include some contributions to the study of the construction process of the caves²⁹.

2.4 2013–2020: The PRAARRÁBIDA Project and New Data

The year 2013 marked a new era in the research on (and the appreciation of) the rock-cut caves after the launch of the PRAARRÁBIDA Project. This project was developed un-

²¹ Leisner et al. 1961.

²² Pereira – Bubner 1974–1977.

²³ Bubner 1979.

²⁴ Cardoso – Soares 1990–1992.

²⁵ Hartmann 1970; Hartmann 1982; Pingel 1992.

²⁶ Schuhmacher et al. 2009.

²⁷ Gonçalves 1995, reissued in 2003.

²⁸ Soares 2003.

²⁹ Jordão – Mendes 2006/2007; Mendes 2011.

der the scientific supervision of Victor S. Gonçalves, and it is managed and financed by the municipality of Palmela.

In 2013, with Arrábida's application for World Heritage status, diagnostic excavations were made in an area where geophysical survey had revealed an anomaly. The fieldwork allowed the discovery of important geoarchaeological information.

Field investigations were resumed in 2017, within the framework of an integrated project including the landscaping, enhancing, and conservation of this monument. In this context, an excavation campaign was carried out in Cave 1 whose corridor was almost entirely filled with sediments that had been deposited since the excavations of Marques da Costa.

The 2017 campaign used new data that enabled a re-assessment of the available stratigraphic information. In addition to the usual stratigraphic study, true archaeology of archaeology regarding previous excavations was conducted. The 2017 excavation covered a total area of 28 m², including the full extent of the Cave 1 corridor.

According to the plans drafted by Marques da Costa, the corridor of Cave 1 was severed by 19th-century quarrying works; as a result, only 4.8 m has survived, with an antechamber measuring 1.80 m and a short narrow corridor³⁰. There are no known photographs of the site taken by Marques da Costa, and the corridor was probably covered immediately after the excavation. We can confirm that the corridor had already been covered by 1944, when Leisner recorded her visit to the site with some images.

Data from the 2017 campaign are still under study³¹, but we can put forth some information:

1. As regards archaeological history, we found the excavation trench used by Marques da Costa (1906, 1907) that cut the sediments that had been removed by the Geological Committee's team (1876). Marques da Costa's trench focused exclusively on the corridor, i.e., it did not probe the surrounding area or the start of the corridor.
2. No materials were visible on the surface. Even so, the 2017 campaign identified a significant set of materials, totalling 437 individual records and including flaked stone (29), polished stone (6), unadorned and decorated pottery (131), 127 anthropological remains (teeth, cranial and post-cranial fragments), 75 malacology, polished bones (2), necklace beads (3), symbolic items (10), and 13 metallurgical objects, one of which is a small gold tube (CPR 1 – G.22-32) (fig. 3).
3. The corridor area presented a complex stratigraphy related mainly to the old archaeological excavations and the quarry but still yielding some archaeological materials (figs. 4–8).

On the surface, S.U. 2 and 7 are layers related to the old road and modern landfill. Above these layers, S.U. 3 and 4 form upper strata located on both sides of the corridor, possibly corresponding to old archaeological sediments removed from the chamber and the vestibule in the 19th century and from the corridor in 1906 during excavations. These strata yielded some artefacts related to the Beaker phenomenon. These strata cover a sandy layer associated

³⁰ Costa 1907.

³¹ Gonçalves et al. 2018.

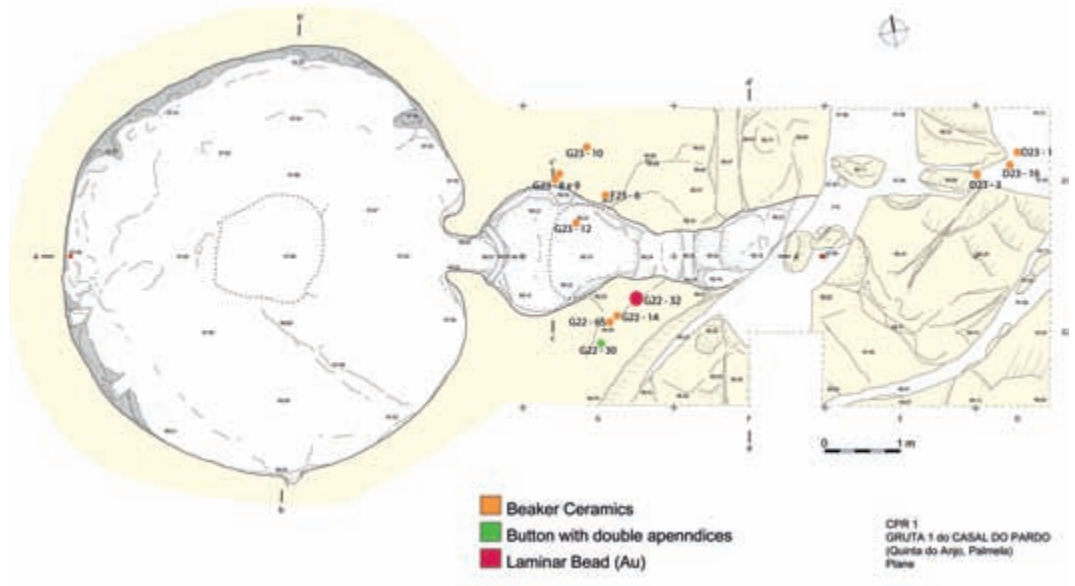


Fig. 3 The three-dimensional locations of Beaker artefacts collected from the Cave 1 corridor: tubular gold object, small ivory button fragment, and Beaker ceramics.

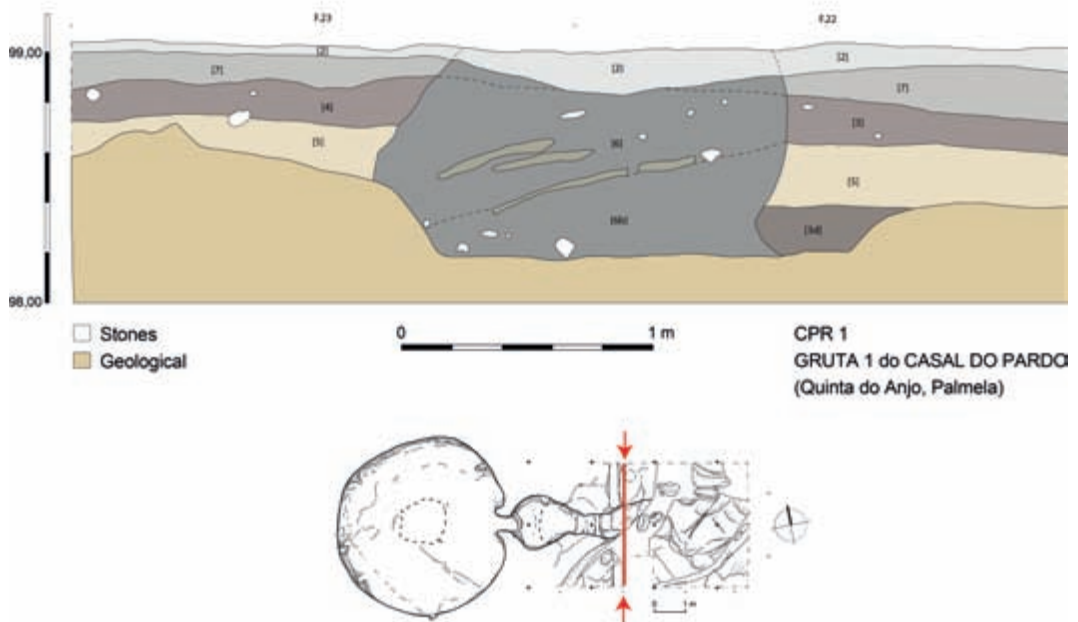


Fig. 4 Stratigraphic section drawing with an indication of Marques da Costa's excavation trench in the middle of the corridor.



Fig. 5 Stratigraphic section photo with an indication of Marques da Costa's excavation trench at the edge of the preserved corridor. Excavations of 2017. West-east view.



Fig. 6 Stratigraphic section photo with Marques da Costa's trench in the middle of the corridor. Excavations of 2017. West-east view.



Fig. 7 Final phase of the Cave 1 corridor excavation (October 2017). East-west view.

with quarrying (S.U. 5). Marques da Costa's excavation trench (S.U. 6a, 6b) cuts the layers 3, 4, and 5 precisely in the area of the corridor. In the adjacent areas of the corridor, on the rocky outcrop, accumulated materials had been preserved in several places. The small gold tube was found precisely in one of the areas with accumulated materials (S.U. 3). Placed in a concavity of the outcrop east of the antechamber, the tube was associated with other materials, namely human bones and teeth, a fragment of an ivory button (according to a preliminary



Fig. 8 Final phase of the Cave 1 corridor excavation (October 2017). West-east view.



Fig. 9 Section with the full stratigraphic sequence (October 2017). North-south view.

test by Thomas Schuhmacher, whom we thank), and a fragment from the rim of a cup of the Palmela type with engraved metopes decoration.

The first layer, S.U. 13, was located under Marques da Costa's trench. It had been affected by the work of the 19th-century quarry, yielding limestone blocks as well as some archaeological materials that should have been at the entrance to the corridor. Thus, the base layer (S.U. 13) included materials from the Late Neolithic, such as geometric armatures, fragments of engraved schist plaques, and pottery with small protuberances (fig. 9).

2.5 The Casal do Pardo Necropolis: the Actual State of the Art

We know, in light of the available data, that the Casal do Pardo necropolis is composed of four rock-cut caves, labelled Caves 1 to 4, running northeast to southwest. In spite of extensive archaeological work, the number of hypogea has remained the same since 1876. Geophysical surveys were conducted³², and after this the site was probed in 2013 under the supervision of Gonçalves and Michelle Santos. The results remain inconclusive for the moment, although the geophysical survey must be fine-tuned and amplified to confirm the measurements. In fact, no necropolis with more than four hypogea exist in the Lisbon and Setúbal peninsulas.

³² Serra et al. 2010.

Architecturally speaking, only the structure in Cave 2 remains intact because it was not harmed by the 19th-century quarrying works. The structure is of the 'rabbit hutch' type, characteristic of the Lisbon and Setúbal peninsulas³³, and it includes a chamber with an upper opening, an antechamber, and an access corridor. Oval-shaped antechambers exist between the chamber and the corridor, sharply sloping toward the corridor; the floor level descends toward the antechamber. Caves 3 and 4 could probably be included under the same type, but the destruction caused by quarrying operations hinders the reconstruction of their domes and even of the direction of the corridors.

Casal do Pardo's funerary structures have relatively regular dimensions, consisting of subcircular chambers whose diameters vary, in general, between 4.60 m and 5.50 m.

The date of the structures must be estimated by way of a radiocarbon dating; however, the structures surely date to the last centuries of the fourth millennium B. C. E. and probably continued to be used as a space for the dead until the end of the third quarter of the third millennium.

Remains from the group of rock-cut caves of Casal do Pardo are currently scattered between the Geological Museum (the Geological Commission's excavations), the National Museum of Archaeology (excavations of Marques da Costa), and the Museum of Archaeology and Ethnology of the Setúbal Region. Even though they have been the subject of two monographs³⁴, there is a clear need for a restudy of the collections – including using a systematic analytical approach, as has been done in this paper regarding gold metallurgy.

Results of the 2017 campaign from Cave 1 also demonstrate the need to revisit this necropolis, not only by way of a systematic study of the remains but also by conducting new fieldwork, e. g., geophysical surveys and excavations.

3 The Gold Artefact Assemblage from Casal do Pardo

3.1 Description

3.1.1 Spiral-shaped ring

Inventory number – National Museum of Archaeology: Au 404

Place of origin: Cave 1 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa's excavations.

Label: Spiral-shaped ring.

Description: Four-coiled spiral made of an unadorned sheet with a rectangular section. It was possibly deformed at a later stage. The coils are very close to each other and form an oval shape, in contrast to other coils which are usually more distant from each other and have a rather circular shape. Its current small size may be due to the possible deformation.

³³ Gonçalves 2003; Gonçalves 2010.

³⁴ Leisner et al. 1961; Soares 2003.

3.1.2 Tubular Beads

Inventory number – National Museum of Archaeology: Au 405

Place of origin: Cave 1 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa's excavations.

Label: Tubular object.

Description: Tubular object formed from a rolled rectangular platelet, adjusted at both ends.

Inventory number – National Museum of Archaeology: Au 406

Place of origin: Cave 1 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa's excavations.

Label: Tubular object.

Description: Tubular object formed from a rolled rectangular platelet, adjusted at both ends. The object has been slightly deformed, possibly during the excavation process.

Inventory number – National Museum of Archaeology: Au 407

Place of origin: Cave 1 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa's excavations.

Label: Tubular object.

Description: Tubular object formed from a rolled rectangular platelet, adjusted at both ends. According to Marques da Costa, this piece was collected at the sieve and was unfolded by one of the workers³⁵. It was possibly this worker's intervention that caused the two dents visible at each end.

Inventory number – UNIARQ: CPR1 – G.22-32 [3]

Place of origin: Cave 1 at Casal do Pardo, outside the east façade of the antechamber (see plans).

Research history: July 19, 2017, excavations by this paper's authors (VSG, ACS, MS).

Label: Tubular object.

Description: Tubular object formed from a rolled rectangular platelet, adjusted at both ends. Possibly placed in a secondary position, which is why the object also shows some dents.

3.1.3 Platelets

Inventory number – National Museum of Archaeology: Au 408

Place of origin: Cave 3 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa's excavations.

Label: Drilled platelet.

Description: Rectangular platelet, with four holes drilled at each corner. The two longer sides of the platelet have been folded, and one of the folds is chipped.

³⁵ Costa 1907, 330.

Nº	Description	Cave	Width	Height	Thickness	Weight	Comments
Au 406	Tubular component	1	24,99	3,51	0,24	0,67	Ø 3,74, Broken
Au 405	Tubular component	1	26,86	4,42	0,14	0,76	Ø 1,36
Au 408	Drilled platelet	3	12,88	9,66	0,25	0,45	Folding
Au 409	Tubular component	1	6,06*	4,50	4,81*	0,14	Unfold
Au 407	Platelet	3	20,53	12,30*	0,12	0,66	Used to make tubular component?
Au 404	Spiral-shaped ring	1	9,32	7,35	1,42	1,91	5 Spires
CPR G.22-32	Tubular component	1	24,10	4,35	0,35	0,85	

* Measurements subject to confirmation, due to fragmentation of the original piece.

Note: As regards the »small tubes«, width is the larger measurement, with the piece displayed in horizontal position.

Table 1 Description of gold artefacts from Casal do Pardo*.

Inventory number – National Museum of Archaeology: Au 409

Place of origin: Cave 3 at Casal do Pardo.

Research history: 1906–1907, Marques da Costa’s excavations.

Label: Platelet.

Description: Rectangular platelet with its two longer sides folded.

3.1.4 General Remarks

The Casal do Pardo gold assemblage is currently composed of seven artefacts: one spiral ring, four tubular objects, and two platelets; of these, one small tube was collected during the 2017 excavations (figs. 10–12).

We can, despite the scarcity of stratigraphic data, expand some on the contexts from which the gold materials were found.

As mentioned above, the absence of such artefacts from the 19th-century excavations deserves to be highlighted. Different explanations may account for this absence.

It could reflect the nature of the possible lack of systematic fieldwork. Nevertheless, the Geological Commission’s team’s fieldwork was always accurate and there are several documents that refer sieving was made.

Other explanation could be also explained by thefts that would have affected the original assemblage.

The absence may also be related to a specific spatial distribution, i. e., gold objects only appear in certain caves. We can consider two kinds of differentiated spatial distribution: chronological and social.

As regards chronology, it should be highlighted that so far gold metallurgy in Portugal is associated with the Bell Beaker people during the latter part of the third millennium³⁶. Direct associations with Bell Beakers are scarce due to the fact that many objects were found during old excavations, for which records include few or no details (tab. 2). We should add to this lack of knowledge the fact that most necropolis in central and southern Portugal generally

³⁶ Valério et al. 2017a.

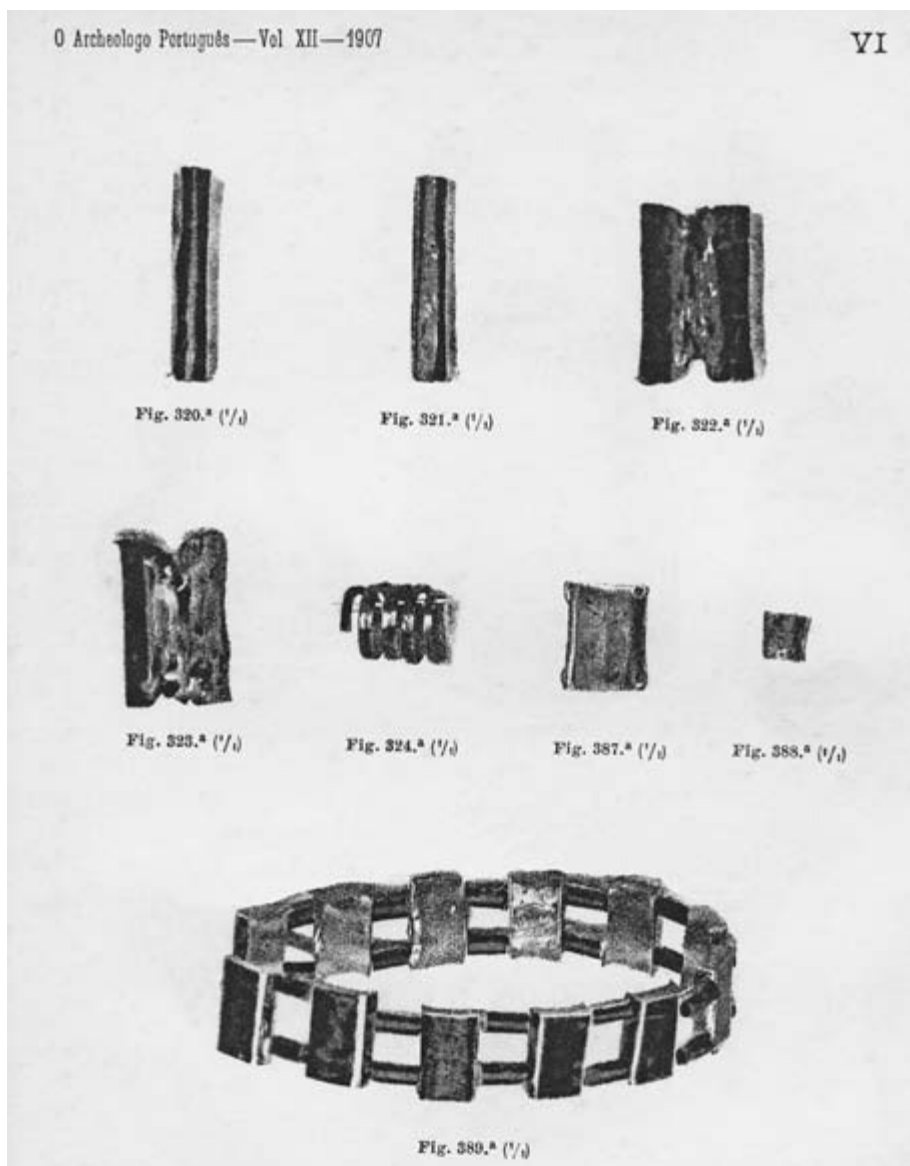


Fig. 10 Gold artefacts from Casal do Pardo, collected by Marques da Costa, and a suggested reconstruction of them.

have a long history of funerary use, spanning from the late fourth millennium to the late third millennium B. C. E. This was also the case at Casal do Pardo, where bodies were continuously buried for at least a thousand years (tab. 2).

Dates clearly associated with gold artefacts are therefore very scarce. Out of those available, we highlight, due to its reliability, the direct association of a phalanx associated with one of the gold spirals from S. Pedro do Estoril³⁷. Dates for the so-called *tholoi* from Perdigões fit

³⁷ Gonçalves 2005.

into the same chronological frame³⁸, although we must note that in these tombs gold materials, buttons with V-shaped perforations, and ivory are not associated with Bell Beaker pottery³⁹.

The newly identified tubular object from Casal do Pardo may allow future indirect radiocarbon analysis of both the button fragment and the human bones found in the area adjacent to the set of materials that included the tubular bead G.22-32.

Only two dates are available for Casal do Pardo. They were established from materials unearthed during the 19th-century excavations, housed at the Geological Museum⁴⁰. One of the dates is obtained from a human femur that was probably found inside a maritime vase from Casal do Pardo, though we do not know which cave it came from. The date (GrN-10744) has a large standard deviation (4040 ± 70 ; 2880–2350 cal BCE, two sigmas). We cannot use it as a chronological parameter for the Bell Beaker culture due to the uncertain nature of the context and the large standard deviation. The other date was determined from a hairpin (OxA-5508), but this artefact is not related with gold or Bell Beaker, dating it to the first half of the third millennium.

In light of these circumstances, we must consider the ›fossils directors‹ potentially associated with gold metallurgy at Casal do Pardo (tab. 3).

Bell Beaker pottery was found in all the rock-cut caves at Casal do Pardo, but Caves 1 and 3 contained a higher number of items. Gold artefacts that can be associated with the Bell Beaker culture were also found in these two caves. It should be noted that a large number of objects deposited at both the National Museum of Archaeology and the Geological Museum do not identify the cave of origin, thus hindering the significance of relative quantification in the different caves. Still, we can cautiously state that Caves 1 and 3 had a higher concentration of materials from the Bell Beaker package.

Ivory does not seem to be an effective indicator, considering that ivory artefacts were found in all the caves. Sequencing the materials by type, Schuhmacher has identified two periods: (i) ivory materials of the Late Neolithic/Early Chalcolithic in Cave 2 (one) and Cave 3 (one), with which we can associate materials such as the large barrel-shaped bead, and (ii) materials that can be associated with Bell Beaker culture, in Cave 1 (six) and Cave 4 (three), mainly the buttons with V-shaped perforations for fixing⁴¹.

As regards prestige materials, such as gold, we can also envisage the possible existence of social inequities, with burials associated with a local elite.

Mendes has underscored the exceptional character of Cave 3: »(...) both the wares and all the man-made objects rank among the most perfect; for this reason, and because of the rooms made of tuff, discussed above, they belonged to the lords of that hill«⁴². It has also been mentioned that Caves 1 and 2 were already significantly affected by the earth removal previously done by workers, which might have reduced the number of objects and fragmented them.

In spite of such scarce stratigraphic information, we can clearly identify specific artefact associations.

³⁸ Valera et al. 2015, 22.

³⁹ Valera – Basilio 2017.

⁴⁰ Cardoso – Soares 1990–1992.

⁴¹ Schuhmacher 2017.

⁴² Mendes 1968, 171.

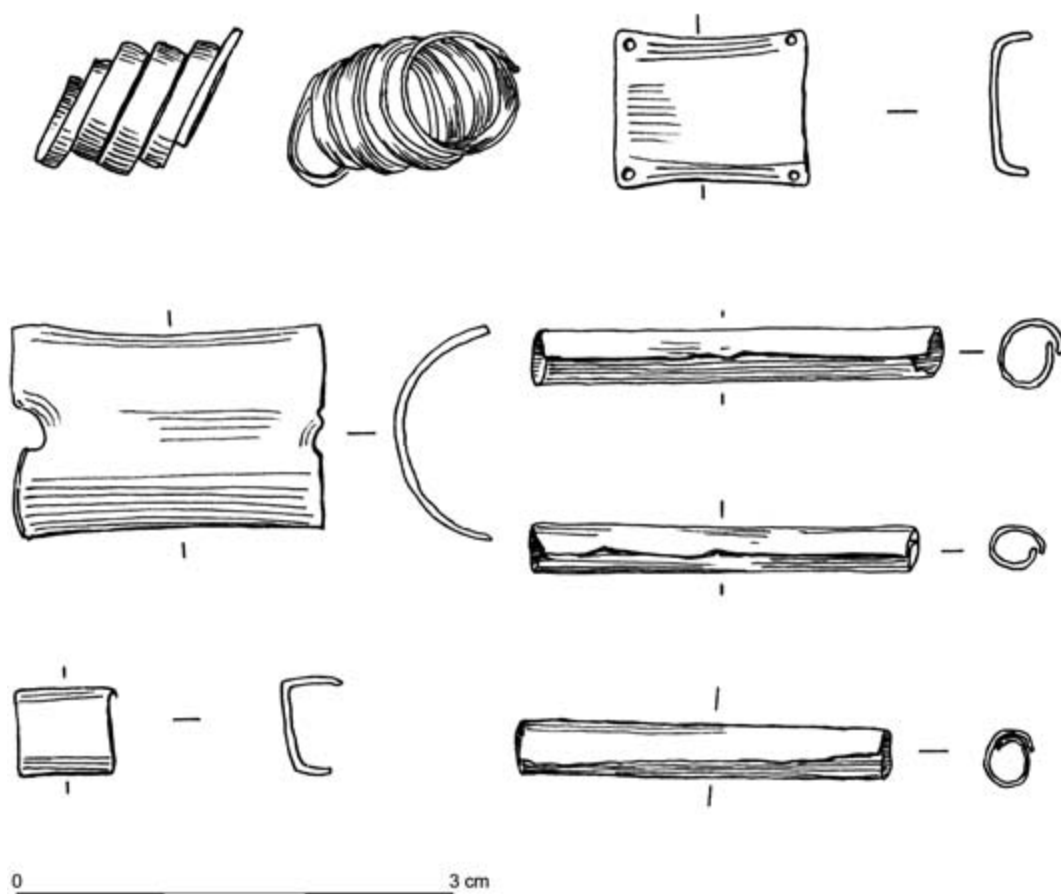


Fig. 11 Gold artefacts collected from Casal do Pardo (scale 2 : 1).

All tubular objects were found in Cave 1. They probably belonged to the same assemblage, as did the spiral rings in São Pedro do Estoril 1⁴³. It is not unlikely that the tubular objects collected by Marques da Costa were found in the entrance hall or the corridor, as these sectors had not been touched by the excavations of Mendes and Ribeiro. The discovery of a tubular object in 2017 might confirm this hypothesis.

The platelets might also be interrelated. According to Marques da Costa, they were found together⁴⁴. He also proposed a functional association, even proposing that the platelets should be reconstructed and combined together with the tubular beads.

Of all the prehistoric sites with gold artefacts in Portugal, eleven have yielded gold platelets or leaves. Apart from Casal do Pardo (MNA Au 408), in no other case do we find the presence of platelets drilled with perforations at their ends. It has been hypothesised, considering their reduced thickness and the position of a few recent finds, that these were

⁴³ Gonçalves 1995; Gonçalves 2003.

⁴⁴ Costa 1907.



Fig. 12 Gold artefacts collected from Casal do Pardo (scale 2 : 1).

components of gold diadems and were used to coat fabric. Analysis of the gold platelets from Perdigões has shown that one side was duller, with traces of clay and bee wax, possibly used for making the platelet adhere to the fabric⁴⁵. Such a function has also been proposed for the folded platelet from the Godinhos tomb⁴⁶.

⁴⁵ Soares et al. 2014.

⁴⁶ Mataloto et al. 2015.

Site	Laboratory reference	Sample type	Radiocarbon date (BP)	Calibrated date (2 σ) ** (cal BC)	References
Perdigões >Tbols< 2	Beta-308789	Human bone	3840 \pm 30	2456–2202	Valera et al. 2014
Perdigões >Tbols< 2	Beta-308792	Human bone	3890 \pm 30	2468–2291	Valera et al. 2014
S. Pedro do Estoril 1	Beta-178468	Human hand phalanx enveloped by a spiral ring	3790 \pm 40	2401–2045	Gonçalves 2005, (recalibrated with Calib. 7.1).

Table 2 Absolute chronology of the contexts associated with gold materials.

The most representative find, however, came from a hypogeum at Camino de las Yeseras; a set of 22 tubular gold beads and two sub-trapezoidal beads was collected near the skull of a young male⁴⁷. The hypothesis suggesting a combined use of tubular beads and platelets in a similar layout had been previously proposed by other authors, including Marques da Costa⁴⁸, but it was only at Camino de las Yeseras that stratigraphic evidence was found supporting their function as a diadem. A possible function as a necklace or a bracelet has not been rejected, but materials from the same context are scarce. Therefore, the recent finds from the region of Madrid are extremely relevant. Reference should also be made to the fact that the assemblage of 22 tubular objects from Camino de las Yeseras includes pieces of different sizes (ranging between 4 and 13 mm)⁴⁹. The fact that the tubular objects from Casal do Pardo are of different lengths does not exclude their integration into a single object, e. g., a diadem or a necklace.

3.2 Chemical Composition⁵⁰

3.2.1 Methodology

Portable X-ray Fluorescence (pXRF) was used to non-destructively determine the elemental composition of seven gold artefacts: six artefacts from the excavations of Marques da Costa, previously published by Axel Hartmann⁵¹, and the tubular object identified in 2017. A Bruker Tracer III handheld spectrometer equipped with a rhodium source and an Si drift detector was used. The operating conditions were 40 kV, 11 μ A, Al/Ti filter (304.8 μ m aluminium and 25.4 μ m titanium), and a 120s acquisition time.

Scanning electron microscopy coupled with X-ray spectroscopy (SEM-EDS) was used as well to provide information about the presence of possible heterogeneities. The analysis was performed with a Hitachi S3700N, interfaced with a Quantax EDS equipped with a Bruker XFlash 5010 XFlash Silicon Drift Detector (129eV spectral resolution at FWHM/Mn K α).

⁴⁷ Liesau et al. 2008, 15; Blasco – Rios 2010, 367.

⁴⁸ Costa 1907.

⁴⁹ Blasco – Rios 2010.

⁵⁰ By José Mirão and Carlo Bottani, Hercules Lab, University of Évora.

⁵¹ Hartmann 1982.

Materials	Cave 1	Cave 2	Cave 3	Cave 4
Gold metallurgy	4+1*	?	2	?
Beaker ceramics	13+16*	4	15	3
Palmela points	5	?	?	?
Archers arm wrists	1	?	?	?
Bone buttons	15+1*	?	4	4

* 2017 excavations.

Table 3 Presence of Bell Beaker package materials at Casal do Pardo.

3.2.2 Results

The summarised results are presented in table 4 and 5 below.

According to the data depicted in table 4, the seven artefacts consist of an alloy of gold (avg. 90.6 %) and silver (avg. 8.65 %) as their main constituent and copper (avg. 0.72 %) as a minor element (fig. 13). The overall data show a rather homogeneous composition and no specific differences can be observed on a morphological basis. It should also be stressed that the composition of the seven artefacts selected for this study is very similar to the data presented by Hartmann⁵², and the copper enrichment could be likely due to the penetration capacity of the rhodium X-ray source. Furthermore, the results are in accordance with the gold metallurgy used in Portuguese Estremadura⁵³.

Although SEM-EDS is essentially a surface technique, the data obtained in back-scattered mode also show that the alloys are quite homogeneous. Elemental composition analysis carried out with EDS indicates a gold alloy with approximately 3 % Ag (fig. 14) and possibly some silicon due to soil contamination. Copper was not detected.

The analysed composition is identical to the one described by Hartmann⁵⁴ using destructive analysis techniques, although it shows copper enrichment to some extent. This difference might be due to the penetration capacity of the rhodium X-ray source.

Be that as it may, the chemical composition of the seven artefacts is quite similar and can be described as a gold alloy with approximately 9 % of silver and less than 1 % of copper (fig. 13). This description also applies to the piece CPR 1 – G.22-32, found during the 2017 excavations. This fact demonstrates that all gold-alloy pieces were made using similar metallurgical procedures and raw materials. It should be added, as already noted⁵⁵, that this composition is compatible with the gold metallurgy used in Portuguese Estremadura. The relative proportion of copper and silver may result from the impoverishment of these elements on the surface (fig. 14).

Likewise, there is no difference in the alloy composition when we consider artefact morphology.

⁵² Hartmann 1982.

⁵³ Valério et al. 2017a.

⁵⁴ Hartmann 1982.

⁵⁵ Valério et al. 2017a.

Reference	Morphology	Cu (%)	Au (%)	Ag (%)
CPR G.22-32	Tubular component	0,67	91,44	7,88
Au 404	Spiral	0,63	90,37	9,00
Au 405	Tubular component	0,79	90,53	8,69
Au 406	Tubular component	0,85	89,59	9,56
Au 407	Tubular component	0,57	92,00	7,43
Au 408	Platelet	0,57	90,86	8,57
Au 409	Plateler	0,96	89,65	9,39
	Average	0,72	90,63	8,65
	Major	0,96	92,00	9,56
	Minor	0,57	89,59	7,43

Table 4 Chemical composition of gold artefacts.

In order to better understand the presence of possible heterogeneities, we used scanning electron microscopy (SEM-EDS) coupled with X-ray spectroscopy. We used a Hitachi S3700N machine and a Bruker XFlash 5010 spectrometer.

Images taken in retro-diffused electron mode show the alloy's homogeneity. The chemical composition indicates a gold alloy with approximately 3 % of silver (figs. 13. 14) and possibly some silicon due to soil contamination. Copper was not detected (table 5).

4 Casal do Pardo and Gold Metallurgy in Central Portugal in the Third Millennium

Until Marques da Costa's discovery in 1907, very little evidence of gold metallurgy had been found in the Portuguese territory. Artefacts from the period of Casal do Pardo had virtually been found only at Alcalar. Today, the number of archaeological sites is substantially higher (fig. 1).

To this date, gold artefacts have been found from 21 sites, of which only three were settlements (Zambujal, Moita da Ladra, and Três Moinhos) (table 6). The finds from Penha Verde are not considered here, as they have been attributed to the Late Bronze Age⁵⁶.

The number of gold artefacts per site is very small, and all sites from central and southern Portugal taken together have only yielded 72 objects; however, if we compare this with France, which has yielded 74 gold artefacts⁵⁷, the Portuguese set of materials is obviously considerable, despite the numbers. In Spain, we find a concentration of items at the two largest Bell Beaker regions, i. e., Bell Beaker Meseta⁵⁸ and Andalucía⁵⁹.

Of special importance are the recent discoveries related to the Ciempozuelos culture from Madrid, from the necropoleis of Camino de las Yeseras, Salmedina, and Humanejos where gold gifts are exclusively associated with male individuals and have been interpreted as symbols of power⁶⁰. At S. Pedro do Estoril, interment with gold spirals, considering the usable diameters of the rings, corresponds to the burial of a subadult⁶¹, evidencing a different

⁵⁶ Cardoso 2010/2011.

⁵⁷ Labaune 2013.

⁵⁸ Liesau et al. 2008; Blasco – Rios 2010.

⁵⁹ Murillo et al. 2014.

⁶⁰ Liesau et al. 2008; Liesau et al. 2016.

⁶¹ Gonçalves 2005.

Element	[norm. wt.%]	[norm. at.%]
Silver	3,1	5,6
Gold	96,9	94,4
	100,0	100,0

Table 5 Chemical composition of the metal alloy.

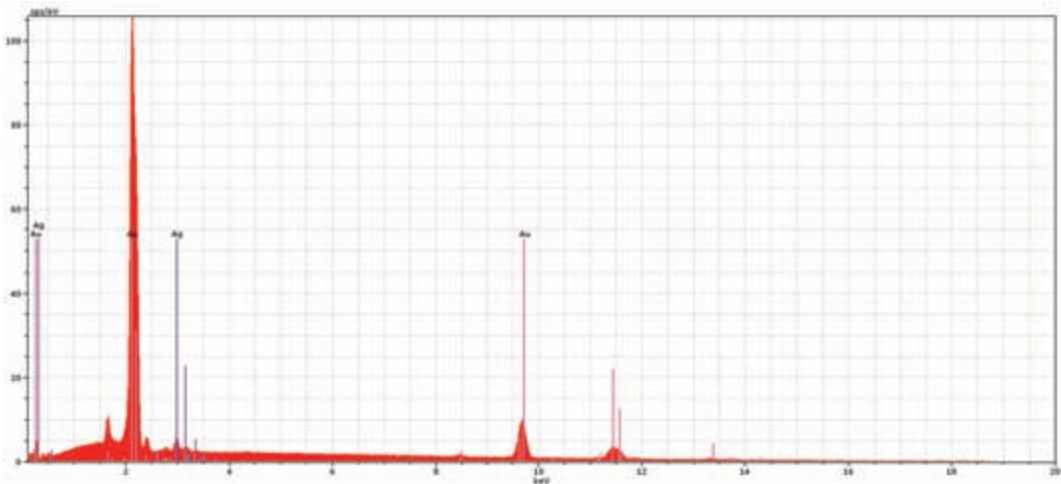


Fig. 13 Composition of the gold alloy: copper (Cu) and silver (Ag).



Fig. 14 Back-diffused electrons and the chemical composition of the alloy (table and spectrum).

Site	Region	Type	Nº	Morphology	Analysis	References
Casal do Pardo	Estremadura	Rock-cut cave	1	Spiral ring, 4 coils	x	Costa 1907
			3	Tubular component	x	
			2	Platelet	x	
			1	Tubular component	x	This article
Ermegeira	Estremadura	Rock-cut cave	2	Earring	x	Heleno 1942,449
			5	Tubular component	x	
Convento do Carmo	Estremadura	Rock-cut cave	1	Spiral ring, 2 coils	x	Valério et al. 2017
			1	Bead	x	
			1	Spiral	x	
			11	Tubular component	x	
S. Pedro do Estoril	Estremadura	Rock-cut cave	4	Spiral rings	x	Gonçalves 2005; 2009
Almonda	Estremadura	Natural cave	1	Spiral?; Tortillon?	x	Zilhão 2016
Senhora da Luz	Estremadura	Natural cave	1	Spiral ring – 5 coils =	x	Heleno 1935; Hartmann 1982
Cova da Moura	Estremadura	Natural cave	1	Earring	x	Belo et al 1961; Hartmann 1982
Senhora da Luz	Estremadura	Natural cave	1	Spiral ring, 4 coils	x	Heleno 1935
Verdelha dos Ruivos	Estremadura	Natural cave	3	Spiral / Tortillon		Zbyszewski et al. 1981
			1	Spiral ring		
Belavista	Estremadura	Megalithic monument	3	Spiral/ Tortillon		Mello et al. 1961
Barro	Estremadura	<i>Tholos</i>	1	Spiral ring, 4 coils		Heleno 1935, 230
Tituaria	Estremadura	<i>Tholos</i>	3	Platelet		Cardoso et al. 1996
Moita da Ladra	Estremadura	Fortified settlement	1	Platelet		Cardoso 2014b; Cardoso – Caninas 2010
Zambujal	Estremadura	Fortified settlement	1	Bead	x	Hartmann 1982
Godinhos	Alentejo	Small dolmen	1	Leave	x	Mataloto et al. 2016
Estremoz	Alentejo	Undetermined	1	Earring		Heleno 1942
			1	Platelet / diadem		Heleno 1942
Anta Grande do Zambujeiro	Alentejo	Dolmen	2	Decorated platelet (Diadem?)		Soares – Silva 2010, 127
Perdigões	Alentejo	Tholos 2	14	Platelet	x	Soares et al. 2014
Três Moinhos	Alentejo	Settlement	1	Platelet	x	Soares et al. 2004
Alcalar 4	Algarve	<i>Tholos</i>	1	Platelet	x	Veiga 1886/1887; Correia et al. 2013; Hartmann 1982
			1	Decorated Platelet	x	
Alcalar 11	Algarve	<i>Tholos</i>	1	Platelet		Veiga 1886, 1887; Correia et al. 2013

Table 6 Chalcolithic sites with evidence for gold metallurgy in central and southern Portugal.

association, possibly for the spirals. No direct associations have been made between the gold platelets from the so-called tholos 2 at Perdigões and any specific inhumations⁶².

A direct association of gold metallurgy with deer-decorated Beaker pottery from Camino de las Yeseras is also possible⁶³. In the tholos at Tituaria⁶⁴, a bowl with a representation of a deer was associated with gold platelets, which were found in the immediate vicinity⁶⁵. We do not know whether cups decorated with deer and gold materials are associated at Casal do Pardo, all the more so because the find spot is indicated for only one cup (MNA.984.668.3). Nevertheless, it is highly significant that the cup was found in Cave 3, which also included gold platelets.

Given the rarity and prestige of gold materials, we would certainly prefer to have deeper insight into the contexts regarding the individuals interred and other associated materials. Separating gold from its context undoubtedly results in a very limited understanding.

We should also underscore the diversity of the gold assemblages. Among the contexts with the highest numbers of artefacts, reference should be made to a rock-cut cave at Convento do Carmo with 14 artefacts⁶⁶, tomb 2 at Perdigões, also with 14⁶⁷ objects, and Casal do Pardo – now with 7 artefacts. Ermegeira probably originally had more objects which Manuel Heleno could not recover from raiders⁶⁸.

Estremadura has yielded the highest number of archaeological sites and artefacts – i. e., 14 sites and 48 artefacts. Many dolmens have been excavated in the Alentejo area, but gold materials were found in only two megalithic monuments, interestingly with very different architectural features and scales: Anta Grande do Zambujeiro⁶⁹ and the tomb at Godinhos⁷⁰. In Algarve, gold objects have been found only in the Alcalar complex.

The great diversity of tombs with gold artefacts clearly illustrates the widespread nature of Bell Beaker culture, which reused previously existing tombs. In spite of such diversity, the presence of metals is stronger in tholoi, the only megalithic structures of the Chalcolithic period, attested in Estremadura (Barro and Tituaria), Alentejo (Perdigões), and Algarve (Alcalar). In Estremadura gold artefacts are also strongly present in rock-cut tombs (Carmo, Ermegeira, São Pedro do Estoril, and Casal do Pardo). Curiously, gold and evidence for Bell Beaker culture are absent from the recently identified Alentejo hypogea, although exotic materials, such as ivory found at Sobreira de Cima⁷¹ dating to the late fourth millennium B. C. E., were found from them.

The typology of and the technologies used to make the gold objects are rather limited. There are five major categories: (1) spirals, (2) tubular objects, (3) solid beads, (4) platelets/plaques, and (5) earrings.

⁶² Soares et al. 2014.

⁶³ Liesau et al. 2008.

⁶⁴ Cardoso et al. 1996.

⁶⁵ Cardoso et al. 1996, fig. 3, 7, 8.

⁶⁶ Valério et al. 2017a.

⁶⁷ Soares et al. 2014.

⁶⁸ Heleno 1942.

⁶⁹ Soares – Silva 2010.

⁷⁰ Mataloto et al. 2015.

⁷¹ Valera 2013.

The strong typological and technical homogeneity of Iberian gold metallurgy deserves to be highlighted⁷². A similarly homogeneous typology is also encountered in France⁷³ and even in the United Kingdom – for example, at the burial site of the Amesbury bowman⁷⁴. This repetitiveness has led some authors to suggest that production was standardised⁷⁵, with networks of exchange occurring between different groups. Indeed, the earrings from Ermegeira and Amesbury are unquestionably similar.

We only find three of the aforementioned categories at Casal do Pardo: the spiral (1), the tubular objects (4), and the platelets (2). In central and southern Portugal, these three categories are only found together at Convento do Carmo⁷⁶. At other sites, only one category has been found at each, either as one-off finds, such as the spiral from the Barro *tholos*, or in groups of finds, such as the platelets at Perdigões.

We only find spirals in the region of Estremadura, in rock-cut tombs (Carmo, Ermegeira, and Casal do Pardo) and the Barro *tholos*, but they are never present in the Alentejo or the Algarve areas. The Carmo spiral is the only short one, with only two coils, while the remaining ones have four or five coils and sometimes have pointed tips. We can also single out the thin spirals found at Verdelha dos Ruivos, Bela Vista, Carmo, and, possibly, Almonda. Very elongated and narrow, we call them «tortillons» and they abound in French Bell Beaker culture⁷⁷. It seems highly implausible that the latter were used as rings.

Tubular objects are also found only in Estremadura and always in rock-cut tombs, namely at Convento do Carmo, Ermegeira, and Casal do Pardo. As stated above, these pieces could belong to sets. The set from Convento do Carmo is particularly important as it was found in a recent excavation⁷⁸. Here, platelets are absent and tubular beads seem to have different dimensions.

These slight typological differences between Estremadura and southern Portugal also exist in terms of chemical composition. A recent study on gold metallurgy in Estremadura states: «(...) Chalcolithic gold artefacts in Portuguese Estremadura present more regular silver contents than their counterparts of Southwestern Iberian Peninsula due to the distinct alluvial gold sources used in these neighbouring regions»⁷⁹.

5 Discussion and Future Directions of Research

The discovery of a single artefact cannot substantially change our specific understanding of Chalcolithic gold metallurgy in central and southern Portugal. Even so, new data obtained from stratigraphic contexts and analysis of the Casal do Pardo material enabled us to revisit a necropolis used as a reference for the European Bell Beaker people and to draw up new syntheses on central and southern Portugal.

⁷² Blasco – Rios 2010.

⁷³ Labaune 2013.

⁷⁴ Fitzpatrick 2011.

⁷⁵ Blasco – Rios 2010.

⁷⁶ Valério et al. 2017a.

⁷⁷ Zbyszewski et al. 1981; Labaune 2009–2010.

⁷⁸ Valério et al. 2017a.

⁷⁹ Valério et al. 2017a, 6.

Preliminary results from the new excavations at Casal do Pardo show the importance of carrying out new archaeological investigations to recover stratigraphic information for old excavations, as has been previously done in the Alapraia caves at Cascais⁸⁰.

Stratigraphic data collected during the 2017 excavations in Casal do Pardo's Cave 1 have enabled us to hypothesise that the set of gold tubular objects was associated with a burial placed in the corridor. Gold artefacts were found only during the 1907 and 2017 excavations, both focused on the corridor area. The piece found in 2017 was collected from a lateral rock crack on the right side of the corridor. We can hypothesise that this object was displaced during the 1907 excavation or its location resulted from its placement outside. In any case, it came from a burial placed outside the chamber.

In central and southern Portugal, the long-term funerary use of hypogea and the early date of fieldwork records make it difficult to establish direct associations between burials and votive remains. The use of these tombs by the Bell Beaker people at the end of the Chalcolithic is attested mainly in corridors, as seen in the dolmen of Casas do Canal at Estremoz⁸¹, but also at the centres of the chambers, as at S. Pedro do Estoril⁸².

An analysis run on the set of materials collected in 1907 and the artefact unearthed in 2017 revealed a strong homogeneity, not only among tubular objects but also the other gold artefacts, including those from Cave 3. We found it pertinent to test all the materials from Casal do Pardo anew in order to better integrate the tests. Having established a compatibility between our tests and those of Hartmann⁸³, we can now safely interpret the whole assemblage.

The gold artefacts, like other pieces of material culture from the same period, show a strong homogeneity in Estremadura (including the Lisbon and Setúbal peninsulas) but reveal considerable differences vis-à-vis southern Portugal. In the case of gold artefacts, differences are observed in typology and composition. Typology-wise, spirals are absent in southern Portugal, relatively abundant in Estremadura, and very rare in southern Iberia (Cerro de la Virgen)⁸⁴. In terms of the chemical composition, materials from Estremadura have a higher percentage of silver, in contrast to the pieces from Alentejo⁸⁵. Such homogeneity probably indicates that gold was mined from locations very close by⁸⁶.

A chronological explanation may also be proposed at the interregional and intraregional level in order to understand whether differences between Estremadura and the South imply possible chronological differences, as is true, for example, in the case of ivory. Perhaps the origin of the materials during the Late Neolithic or the Chalcolithic periods was different from that of the Bell Beaker Chalcolithic⁸⁷. Although chronometrical data are very scarce, they prove that the contexts from Alentejo (Perdigões) and Estremadura (S. Pedro do Estoril) are contemporary, both dated to the third quarter of the third millennium B. C. E. This might confirm that the differences in composition and morphology actually reflect regional cultural

⁸⁰ Gonçalves 2005.

⁸¹ Leisner – Leisner 1955.

⁸² Leisner et al. 1964.

⁸³ Hartmann 1982.

⁸⁴ Murillo et al. 2014.

⁸⁵ Valério et al. 2017b.

⁸⁶ Valério et al. 2017a.

⁸⁷ Schuhmacher 2017.

and social identities. Hopefully, the project developed at Casal do Pardo will help clarify this issue, as the 2017 excavations have allowed us to establish new dates associated with the human remains recovered during the season.

At this moment, all the data indicate that gold metallurgy appeared in central and southern Portugal in the Late Chalcolithic when the world of walled settlements and hierarchy-driven settlements had failed and a new lineage-guided social order had emerged, possibly with new social differentiations. This late chronology associated with the Beaker phenomenon seems common in the Iberian Peninsula, although there are very few sites, such as Montelírio⁸⁸ or Cau del Tossal Gros⁸⁹, that might indicate a deeper chronology. The chrono-stratigraphic data for the materials from these sites are, however, not absolutely unequivocal⁹⁰.

In Portuguese Estremadura, the extended use of tombs and the extreme scarcity of burial sites built from scratch complicate the interpretation of this transitional phase. Gold is therefore just another component of this complex phase including different models of settlement, economy, technology, and material culture, evidencing the exchange patterns and consumerist mindset of local elites.

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⁸⁸ Murillo Barroso 2016.

⁸⁹ Soriano et al. 2012.

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Provenance of illustrations: Fig. 1: Cartographic base revised by Rui Boaventura, georeferencing by Filipa Bragança. – Fig. 2: Costa 1907, 211. – Figs. 3–4: Drawings by André Pereira and Gonçalo Bispo. – Figs. 5–8: Photos by Ana Catarina Sousa. – Figs. 9, 12: Photos by V. S. Gonçalves. – Fig. 10: Costa 1907, figs. 320–324, 387–389. – Fig. 11: Drawings by Guida Casella. – Figs. 13, 14: Authors.

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ZUSAMMENFASSUNG – RESUMEN – SUMMARY – RESUMO

Die Felskuppelgräbernekropole von Casal do Pardo (Quinta do Anjo, Palmela, Setúbal) ist ein typischer Ort für die Vorgeschichte der Iberischen Halbinsel und wurde bereits im 19. Jh. als archetypischer Fundort für Metallspitzen und Schalen der Glockenbecherkultur bekannt.

Bei der Rückkehr an den Fundort, 100 Jahre nach den ersten Ausgrabungen von Carlos Ribeiro und António Mendes (1876) und den Kampagnen von António Inácio Marques da Costa (1906/1907), zeigt sich, dass durch neue Feldkampagnen und durch eine Analyse des archäologischen Fundmaterials immer noch wichtige Informationen gewonnen werden können.

In dem vorliegenden Aufsatz werden summarisch die Ergebnisse der im Jahr 2017 im Gang des Felskuppelgrabes 1 durchgeführten Grabungskampagne vorgestellt, wobei in diesem Zusammenhang auch die Frage der Goldmetallurgie diskutiert wird. Außerdem werden die neuen Daten und die sieben in Casal do Pardo durchgeführten Analysen im Kontext des »Glockenbecher-Phänomens« in Zentral- und Südportugal erörtert.

Schlagnworte: Goldmetallurgie – Glockenbecher – künstliche Bestattungshöhlen – Casal do Pardo – Palmela

Las cuevas artificiales de Casal do Pardo (Quinta do Anjo, Palmela, Setúbal) constituyen un sitio arqueológico paradigmático en la Prehistoria peninsular, reconocido en el siglo XIX como yacimiento epónimo para artefactos del universo campaniforme: tazas y puntas de cobre.

Transcurridos mas de 100 años desde las primeras excavaciones de Carlos Ribeiro y António Mendes (1876), y de António Inácio Marques da costa (1906/1907), existe todavía información relevante para investigar en nuevos trabajos de campo y de estudio de material arqueológico.

Se presentan sucintamente los resultados de la campaña de excavaciones efectuada en 2017 en el Corredor de la Gruta 1, discutiéndose la cuestión específica de la metalurgia del oro. Los nuevos datos y las siete análisis de Casal do Pardo se debaten en la escala del Centro y Sur de Portugal, en el contexto del llamado fenómeno campaniforme.

Palabras clave: Metalurgia del oro – Campaniforme – cuevas artificiales – Casal do Pardo – Palmela

The rock-cut cave necropolis at Casal do Pardo (Quinta do Anjo, Palmela, Setúbal) is a type site for the prehistory of the Iberian Peninsula, and it was recognised as early as the 19th century as an archetypal locale for metal points and bowls belonging to the Beaker culture.

More than 100 years after the first excavations by Carlos Ribeiro and António Mendes (1876) and António Inácio Marques da Costa (1906/1907), new fieldwork and the study of the archaeological materials still have important questions to investigate.

The results of an excavation campaign carried out in 2017 in the corridor of the rock-cut Cave 1 are summarily presented, discussing the specific issue of gold metallurgy. The new data and seven analyses conducted at Casal do Pardo are discussed in the context of central and southern Portugal and of the so-called Beaker phenomenon.

Keywords: Gold metallurgy – Beaker – Rock-cut caves – Casal do Pardo – Palmela

As grutas artificiais do Casal do Pardo (Quinta do Anjo, Palmela, Setúbal) constituem um sítio paradigmático na Pré-história peninsular, tendo sido reconhecido logo no século XIX como sítio epónimo para artefactos do universo campaniforme: taças e pontas metálicas.

Volvidos mais de 100 anos após as primeiras escavações de Carlos Ribeiro e António Mendes (1876) e de António Inácio Marques da Costa (1906/1907), existe ainda importante informação para investigar em novos trabalhos de campo e de estudo do espólio arqueológico.

Apresentam-se sumariamente os resultados da campanha de escavações efectuada em 2017 no Corredor da Gruta 1, discutindo-se a questão específica da metalurgia do ouro. Os novos dados e análises do Casal do Pardo são debatidos à escala do Centro e Sul de Portugal, no contexto do chamado fenómeno campaniforme.

Palavras-chave: Metalurgia do ouro – Campaniforme – Grutas Artificiais – Casal do Pardo – Palmela