

Fire and Bones: Bronze Age III in the North-Eastern Iberian Peninsula

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ABSTRACT

Between the third millennium BP and the fifth century AD, there are numerous necropolises that house urns in the Iberian Peninsula. One example is the »Pi de la Lliura« (Vidreres, Girona). However, there is a dearth of research concerning these structures. The »Pi de la Lliura« housed 43 structures, which contained a total of 47 vessels with human remains. Of these 43 structures, 22 were totally or partially excavated at the laboratory. The evidence from the fragments indicates cremation at a temperature of 650–700 °C. Part of the cremated corpse was then deposited in an urn. One of the most unique characteristics of the necropolis is the high frequency of individuals younger than 20 years old. The mortality of sub-adults is high in any prehistoric necropolis, but it is even higher in a cremation necropolis. »Pi de la Lliura« is a very small necropolis, where corpses were treated similarly over a short period.

Key words: human cremation, Bronze Age, NE Iberian Peninsula, Urn field

Introduction

Around 1.200 BC, cremation rituals, which had been practiced occasionally throughout Central Europe and the British Isles, became a generalized ritual throughout Europe. From North to South and from East to West, the cremation of corpses, a novel funeral treatment, spread. Some authors associate this phenomenon with the movement of people. For example, successive invasions of the southern part of Eastern Europe transplanted a unique civilisation from North Germany to the Mediterranean and from Danube's plains to the Atlantic shores. This new funeral ritual was adapted in various ways at the local level to address new religious concerns. People assimilated and also adapted to these new rituals involving cremation. The practice of placing remains in urns and forming a necropolis or an urn field seems to be relatively rare. Cremation became common, but was not universally accepted¹.

Interest in the cremated remains in Europe has become widespread^{2–8}. However, few studies have been conducted about the Iberian Peninsula and the NE peninsula. The first studies, which were generally written by archaeologists, focused on the types of containers and the artefacts found in graves. Later, anthropological stu-

dies were only concerned with the age and sex of individuals, whether the tomb was associated with a trousseau, or whether there were ancient excavations where urns had been emptied. This resulted in the loss of a lot of information^{9–13}. Most recent reports incorporate data of urn excavations and, in some cases, there are studies carried out on a few urns^{14–16}, or first approximations of a larger necropolis, which is still being studied^{17,18}.

The most recent studies consider the importance of the excavation of the urns, the spatial distribution of the remains inside, and the possibility of the presence of perishable grave artefacts. These factors help us to have a better understanding of the funeral act and contribute to our knowledge of the society.

One of the contributions of the current study is the finding of children in the urns. Traditionally it had been considered that, through the end of the Bronze Age and Iron Age, children were not subjected to the same funeral rituals as adults, especially perinatal individuals who were buried at home¹⁹.

The study of a full necropolis allows us to analyse social and demographic factors and the distribution of indi-

viduals in the site. To fully understand the settlements of the East Iberian Peninsula from the end of the Bronze Age to the end of the Iron Age, this study of a necropolis of urn fields that have been completely and recently excavated is indispensable.

This report shows the data from a full necropolis at the beginning of the third millennium BP. It is well known that each site had its own specific characteristics. Therefore, the method of urn excavation will depend on factors such as ground type, sedimentation, and ritual characteristics. It is necessary to adapt the methodology to each type of material.

The data allow us to evaluate demographic aspects of the necropolis and how it functioned. It also reveals information about certain aspects of the group who used the funerary space, and in particular, some aspects of their social, economic and cultural specificities. Finally, these data will be contrasted with other sites from the area and the same period.

The studied necropolis, »Pi de la Lliura«, was totally excavated recently (1999–2007), and several methods of urn excavation were used.

Material and Methods

The »Pi de la Lliura« site (Vidreres, Catalonia) is located along 100 m of mountain peak at a height of 400–405 m (coordinates UTM $x=487.700$ and $y=623.650$). It is a necropolis of cremations of the Bronze Age III dated 2.850 ± 40 BP (ref. Beta-136241)²⁰.

Chronologically, this is one of the first necropolises in the NE peninsula that introduces the cremation ritual for corpses. The site was located by a geologist in 1999. From 1999 to 2007, there have been several field campaigns and the necropolis has now been fully excavated. This report presents data from the 43 structures that housed cremation urns. These are small, simple structures of circular or ellipsoidal shape that just have enough space to house the urn. Four of these structures (E-22-25, E-40, E-77 and E-85) had two containers. In total, 47 cremation urns have been studied²⁰. In some cases, the human remains were inside the urn and also dispersed in the structure's base (E-51, E-53 and E-77).

The remains of the 47 urns arrived at the laboratory in different states. Some had to be excavated in the urns themselves (E-4, E-11, E-28, E-45, E-52); some kept only the basis of the urn to be excavated (E-26, E-49); in others, the urn content arrived within a block to be excavated in the lab (E-15, E-35, E-40g and p, E-41, E-47, E-49, E-57, E-58, E-61, E-72, E-75, E-78, E-85a). The last group of remains arrived already excavated. Due to the heterogeneity of material, the methodology had to be adapted to the characteristics of each set from the excavation.

Remains that arrived with an urn or as a block were excavated in different conditions. In the urns from the first field campaign, the material was dry excavated in pieces that were 2 cm thick to preserve the possible dis-

position of parallel disposed diaphyses, the presence of empty spaces between the remains or urn edges, the location of the artefacts from the graves, and so on. It was observed quickly that the exterior level was partially consolidated; thus, the extraction had to be made with solvent to free the remains. The archaeologists took into account the difficulty the previous campaign had in extracting materials and they did not use the consolidation method on the human remains. The excavation continued with the dry excavation of material continuing with 2 cm pieces. Because they were under a path, the remains had been compacted and some were fragmented. Thus, the sediment had to be lightly moistened to enable the fragments to rise without producing fragmenting due to excess humidity. This procedure was continued until the study's end.

Once excavated, bone material from the urns was classified according to several anatomic groups: skull, thorax, upper extremity, lower extremity and indeterminate fragments. Each one of these categories is distributed at the same time in other, as it is detailed on Tables 1, 2, 4, 6 and 8.

Once classified, all bone remains were weighed (Tables 1, 2, 4, 6 and 8). This quantification allows us to evaluate if a selection of bone in deposit in urn exists^{21,22}. Then, the number of individuals present in each urn was identified.

To establish the minimum number of individuals in each urn, the following had to be taken into account: the repetition of bone pieces, the age, and osteologic incompatibilities such as robustness, weight and pathologies. These data allow us to evaluate if there is more than one individual in the same structure.

The diagnosis of age and sex in cremated individuals is difficult because the cremation process alters and fragments the remains. The methodology used is the same as in buried remains.

Sub-adult individuals are distinguishable because their bones have not completed their growth, which is indicated by the presence of metaphyseal lines, non-merged epiphyses, and decidual dental pieces or ossification nodules. The knowledge of the order of formation of each bone and the presence and aspect of bone nodules allows us to estimate the individual's age^{23,24}. Different stages of dental eruption also allow us to reliably estimate the individual's age^{25,26}.

Adult individuals present bones that are all completely formed. The skull is the only piece that allows us to evaluate the individual's age of death^{27,28}. The cremation process can break the cranial vault at the most fragile place, namely at the sutures, which remain visible at the fragment's edge. However, when the closing process is advanced, the break does not occur at a suture and the sutures can be detected in mature individuals.

Determining an individuals' sex is also a difficult task in cremated remains. We use the methodology that Férebach and collaborators proposed²⁹. The high fragmen-

tation of the remains has blocked the application of other more precise methods described in the petrous region^{30,31}.

A morphologic study has been methodically applied to each fragment in order to document possible pathologies.

Finally, other factors, which indicate how this death ritual was carried out, have been taken into account. Some of these factors are colour, bone size and fissures. Using the criteria established by Bonucci³² and MacKinley³³, an estimation of the temperature and conditions of the cremation can be made from the colours and types of fissures. The bone-fissuring pattern after cremation indicates the intensity and method of cremation; bones size can give information about the process of the cremation. Finally, colouration indicates the temperature attained during the process.

Results and Discussion

The treatment of the data has been carried out at the necropolis' global level. This study does not include the excavation's description and bone characteristics for each structure, because they are described in previous works^{34–39}.

Methodological considerations

The »Pi de la Lliura« necropolis was located in a pathway just below the ground. The continuous traffic over the site had compressed the earth, hampering the structures' excavation and subsequent excavation of the urn contents. First, the archaeologists they attempted to dry excavate the content of the bone level. However, this kind of excavation was impractical because of the layer's hardness and the consolidating effect of the first field campaign. It was necessary to use solvents, ketone in this case, in order to free the fragments. The process was quite slow and difficult³⁴. Urns from the second and most recent campaigns had not been compressed, so a dry excavation was attempted. However, the site's hardness made this excavation impossible. Thus, archaeologists opted to moisten the layers as the excavation proceeded without reaching water saturation at the bones' block level. Bone fragments were freed more easily and without breaking^{35–38}. In each case, remains were collected from 2 cm high layers. It was not possible to document the presence of ashes coming from the corpse's cremation or coals coming from the pyre.

Urn excavation has allowed fragment identification at the time of the extraction. This has facilitated the posterior identification process, which made possible the documentation of the fragments' disposition in the urn. The excavation was totally or partially made in 22 of the 47 urns studied. In all cases, because of increased fragment diagnosis, more information has been obtained from the excavated urns than from the emptied urns. Cremated bones tend to have increased fragility, which makes them break easily during the excavation and their diagnosis more difficult.

The excavation has allowed a better approach to ascertain the dimensions of bone fragments deposited in the urn. Methodologically, bone fragment dimension is one of the criteria used to value the process of this ritual. It must be determined if size has been affected by the excavation process. In »Pi de la Lliura« it has been affirmed that the small fragments (between 1 and 2 cm in almost all urns) are not a consequence of emptying the urns contents; in a few cases – always in the biggest fragments – the remains were broken during the extraction. In some cases, the diagnosis of these pieces was made before they were removed and would have been completely impossible to carry out *a posteriori*.

Finally, it has to be considered that an urn excavation has allowed documentation of several aspects of how the remains inside the urn were produced. First, no differences have been found between the frequency of anatomic parts and their size. In most cases, there is no observable trend that would indicate piece selection. There are no sets corresponding to specific anatomic parts, nor dispositions in a bundle, such as no small air chambers indicating perishing material decomposition, which would indicate that diaphyses were deposited in handfuls. Spaces between a bone deposit and the vessel wall, which would indicate a wrapped deposit with perishable tissue, were not observed. A diaphysis bundle deposition was only observed on E-49; a certain disposition of superimposed and flat cranial fragments in E-58, and an empty space of 3 cm, which was possibly formed because of the decomposition of perishable material. In general, it appears that the remains were not deposited systematically in the urn, but mixed.

Cremation conditions

The size of bone fragments, the manner of bone fragmentation after cremation, and bone colouring, are indicators of the intensity and mode of cremation.

Cremation, which is observed in this set of structures, is always intense. All fragments have the same white coloration; in a few cases, a fragment has double coloration. The last cremation resulted in an extreme bone fragmentation; some were reduced to very small splinters, the majority between 1 and 2 cm.

There are few fragments more than 2 cm long. The small size of the remains makes it difficult to assign to a concrete skeletal piece and makes reconstruction impossible. This is especially true for remains smaller than 1 cm. Fragments that could not be assigned to a skeletal piece and were smaller than 1 cm have been grouped as splinters.

The biggest fragments have revealed that bones have a certain degree of deformation because of the temperature of cremation. The small size of the fragments has made it difficult to observe fracture lines. When these are observed at the middle of the fragment, they are transverse and parabolic; in contrast, the lines at the edges are rectilinear in some cases. These differences between the middle part and the edge of the fragment make us think that the bone had a double treatment. The corpse was

burned, producing the typical curved fracture lines of a fresh bone with organic matter. However, rectilinear fracture lines on the fragment's edge could be caused by the fragmentation of the remains that are left after the corpse's cremation; this would reduce the volume that had to be put in the urns. Finally, bone fragmentation before filling the remains in the urn would explain the absence of ashes and coals between bone fragments.

Mostly, the remains are white chalk. According to several studies carried out by Bonucci and collaborators³² and Le Goff³⁹, the temperature that causes this coloration is higher than 650–700°C.

According to several authors^{32,39–42}, the morphology and the characteristics observed in the remains of »Pi de la Lliura« would indicate a cremation temperature of 650–700°C. The cremation was made with high ventilation, which resulted in the corpse's complete combustion, since no dry bone or bone removed from the flesh was found.

Anthropologic factors

First, the minimum number of individuals deposited in each urn has been studied. The accurate analysis of

bone fragments indicates that each urn only contained one individual, with the exception of two structures. In structure number 66, an osteologic incompatibility has been found. It is a unique bone, an adult metatarsus, that does not coincide with the rest of the remains, which belong to a juvenile. In this case, it has to be considered that it is a unique bone and that its presence can be due to an infiltration of an individual burial. The only clear case with two individuals present is in structure number 78, where a perinatal child and a slender adult individual are present. We believe that this is a mother-child burial. Even today, there are Third World societies where there are poor hygiene conditions, where women's life expectancy is usually low, and where childbirth mortality is high. There is no clear evidence of this phenomenon, but the baby's age and adult's slenderness seems to indicate this. Because this new urn was not excavated by this team, it is not possible to know if individual deposits were differentiated or if the remains were mixed. In the »Can Piteu« necropolis, several cases of urns with children and adults has been documented¹⁷.

In several structures (E-51, E-53, E-77a and E-77b), the human material found was distributed between the

TABLE 1
DISTRIBUTION OF ANATOMICAL WEIGHT OF STRUCTURES WITH HUMAN REMAINS INSIDE THE URN AND ALSO IN THE GROUND

# structure	51 int	51 ext	51Total	53 int	53 ext	53 Tot	77a Int	77a ext	77aTotal	77b int	77b ext	77bTotal
Total Skull	35.82	2.7	38.52	33.67	1.74	35.41	0	0	0	6.43	2.08	8.51
Total Thorax	0.75	0	0.75	32.98	0	32.98	0	0	0	2.3	0	2.3
Clavicle	1.27		1.27	1.9		1.9						
Scapula	1.5		1.5	0.75		0.75						
Humerus	6.01		6.01	17.72		17.72	6.2	1.6	7.8	7.41		7.41
Radius	6.54		6.54	12.12		12.12				1.83		1.83
Ulna	0.64		0.64			0				3.04		3.04
Hand	1.34		1.34	8.68		8.68						
Total upper extremity	17.3	0	17.3	41.17	0	41.17	6.2	1.6	7.8	12.28	0	12.28
Coxa												
Sacrum				2		2						
Femur	8.82		8.82	17.39		17.39						
Patella												
Tibia	3.08		3.08	5.66		5.66					6.24	6.24
Fibula	2.26		2.26	4.78		4.78				4.43		4.43
Foot				3.4		3.4						
Total lower extremity	14.16	0	14.16	33.23	0	33.23	0	0	0	4.43	6.24	10.67
Mtc, Mtt, HPh, FPh	1.48	0.34	1.82							5.34	0.55	5.89
Flat bone	3.49		3.49									
Spongy bone	17.32		17.32	29.53	5.93	35.46				12.13		12.13
Epiphysis	2.19		2.19	22.58		22.58						
Diahyis indeterminate	95.09		95.09	112.76	27.94	140.7	1.7	1.9	3.6	65.04	15.21	80.25
Splinter	66.46		66.46	21.15	4.2	25.35	4.63	4.54	9.17	111.71	14.81	126.52
Total indeterminate	186.03	0.34	186.37	186.02	38.07	224.09	6.33	6.44	12.77	194.22	30.57	224.79
TOTAL	254.06	3.04	257.1	327.07	39.81	366.88	12.53	8.04	20.57	219.66	38.89	258.55

Mtc – Metacarpal, Mtt – Metatarsal, HPh – Hand phalanx, FPh — Foot phalanx.

inside and the outside of the vessel. The remains were studied, taking into account their localisation inside and outside the urn (Table 1). In all cases, osteologic incompatibilities between the material deposited directly in the structure's ground and inside the urn were not observed, giving no evidence of the presence of remains of more than one individual in the structure. Therefore, we can conclude that the remains of each structure relate to a unique individual. It is likely that bone frag-

ments fell in the structure itself when the urn was deposited in the cavity.

This varies among the different types of individuals.

- In 11 urns, the weights calculated were less than 10 g (E-22, E-34, E-35, E-36, E-40P, E-46, E-47, E-57, E-61, E-68 and E-74) (Table 2). Low weight is associated with high remain fragmentation and a low anatomic representativeness (Table 3). It was possible to anatomically identify some fragments in only two urns.

TABLE 2
DISTRIBUTION OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS <10 g

# structure	E-22	E-34	E-35	E-36	E-40p	E-46	E-47	E-57	E-61	E-68	E-74
Total Skull									0.1		
Total Thorax											
Clavicle											
Scapula											
Humerus											
Radius				2.5							
Ulna											
Hand											
Total upper extremity				2.5							
Coxa											
Sacrum											
Femur											
Patella											
Tibia										1.7	
Fibula											
Foot											
Total lower extremity										1.7	
Mtc, Mtt, HPh, FPh											
Flat bone									0.63		
Spongy bone											
Epiphysis											
Dialysis indeterminate		0.46		1.89	2.8		1.58		1.25	1.35	1.16
Splinter	5.91	0.5	2.57	4.15			2.47	3.61	2.93	1.77	
Total indeterminate	5.91	0.96	2.57	6.04	2.8	2.73	4.05	3.61	4.81	3.12	1.16
TOTAL	5.91	0.96	2.57	8.54	2.8	2.73	4.05	3.61	4.91	4.82	1.16

Mtc – Metacarpal, Mtt – Metatarsal, HPh – Hand phalanx, FPh – Foot phalanx.

TABLE 3
PERCENTAGE OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS <10 g

# structure	Faye <i>et al.</i> 1994	E-22	E-34	E-35	E-36	E-40p	E-46	E-47	E-57	E-61	E-68	E-74
Skull	20.40									2.04		
Thorax	17.00											
Upper extremity	17.60				29.27							
Lower extremity	45.00										35.27	
Total indeterminate		100.00	100.00	100.00	70.73	100.00	100.00	100.00	100.00	97.96	64.73	100.00
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

With the exception of urns E-46 and E-74, where the individuals' age had not been established, the rest of the burials corresponded to individuals from the Infan- tile I age group (0–6 years old).

- The main group is formed by sets of urns which have between 10 and 100 g of cremated remains; (E-4, E-15, E-21, E-23, E-30, E-32, E-33, E-38, E-39, E-40G, E-43, E-49, E-50, E-55, E-59, E-69, E-71, E-72, E-75, E-77a and E-85b). All of these urns have fragments from the thoracic region (Table 4). Most of the urns have frag- ments from the cranial region, and some have limb fragments (Table 5). The ages of the individuals vary and we do not observe a weight/age association.

- There is a third group represented by 6 urns (E-25, E-41, E-58, E-66, E-70 and E-85a) whose remains weigh between 100 and 200 g. In this case, there are no thoracic region remains (Table 6). In this group, the most represented regions are superior and inferior limbs (Table 7).
- Finally, in ten cases (E-11, E-12, E-26, E-28, E-45, E-51, E-52, E-53, E-77b and E-78) the remains weigh more than 200 g, which allows for a high skeleton rep- resentation (Table 8). Specifically, the urns of struc- tures E-52, E-53 and especially E-28 (410.33 g) have a greater degree of skeletal representativeness. None of these cases indicate evidence of multiple burials. The-

TABLE 4
DISTRIBUTION OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS BETWEEN 10 AND 100 g

# structure	E-4	E-15	E-21	E-23	E-30	E-32	E-33	E-38	E-39	E-40g	E-43	E-49
Total Skull	22.29	4.32	8.51	19.49	6.55	1.63	1.13	6.64	1.67	0.79		3.07
Total Thorax			2.89		0.69					0.13		
Clavicle												
Scapula												
Humerus					1.83			1.45				0.88
Radius											0.98	
Ulna												0.91
Hand												
Total upper extremity					1.83			1.45			0.98	1.79
Coxa					0.98							
Sacrum												
Femur												
Patella												
Tibia			2.62					2.22		2.35		
Fibula					1.65	3.28						
Foot												
Total lower extremity			2.62		2.63	3.28		2.22		2.35		
Mtc, Mtt, HPh, FPh					3.54							1.03
Flat bone			2.59		3.56							1.98
Spongy bone			1.35	2	5.2					2.25		0.41
Epiphysis												
Diahysis indeterminate	11.08	33.57	28.46	2.73	57.62	10.56	15.27	9.61	9.17	14.67	9.01	11.54
Splinter	15.13	25.15	13.95	8.33		27.46	22.54	11.35	6.09	19.4	17.38	27.06
Total indeterminate	26.21	58.72	43.76	13.06	69.92	38.02	37.81	20.96	15.26	36.32	26.39	42.02
TOTAL	48.5	63.04	60.37	32.55	81.62	42.93	38.94	31.27	16.93	39.59	27.37	46.88
# structure	E-50	E-55	E-59	E-69	E-71	E-72	E-75	E-77a	E-85b			
Total Skull		8.27	1.87	0.96	1.04	0.81	11.45					9.26
Total Thorax												
Clavicle												
Scapula												
Humerus										7.8		
Radius												
Ulna												
Hand												

Upper extremity indet.	3.63	4.74								1.73
Total upper extremity	3.63	4.74							7.8	1.73
Coxa										
Sacrum										
Femur	3.05	1.74	5.58				1.80			1.98
Patella				1.57						
Tibia										2.69
Fibula										1.6
Foot										
Lower extremity indet.		3.95								1.16
Total lower extremity	3.05	5.69	5.58	1.57			1.80			7.43
Mtc, Mtt, HPh, FPh		0.33		0.23						
Flat bone			2.89							
6053914 Spongy bone			1.66							
Epiphysis										
Diahyosis indeterminate	5.71	34.39	22.24	7.18	12.13	5.58	8.21	3.6		27.87
Splinter	13.62	23.91	25.41	2.27	6.74	8.03	13.04	9.17		5.48
Total indeterminate	19.33	58.63	52.2	9.68	18.87	13.61	21.25	12.77		33.35
TOTAL	26.01	77.33	59.65	12.21	19.91	16.22	32.7	20.57		51.77

refore, we conclude that single burials were the norm. The weights are far from the total weight of the cremated individual (between 970 and 2630 g, according to Herrmann, 1976, cit Le Goff, 1998), even if it is heavier in comparison to the percentage of the other urns. The most diagnosed piece is the skull, followed by the upper limb. The majority of the remains are indeterminate (between 37.46% until 97.37%) (Table 9).

Generally, there is a sub-representation of the thoracic region; cremation destroys this region fairly easily due to the high temperatures attained and the fragile nature of the ribs and vertebrae. The same is observed with hand and foot bones. In both cases, the representation of some structures, generally the ones with heavier bones, stands out. A greater amount of bone allows us more

skeleton representativeness. In the urns with less than 10 g of matter, the diagnosis of skeletal pieces is practically zero. As the weight increases, more anatomic regions, such as the skull and limbs, are represented. Possibly, people selected bones and took only one part of the individual and not all the remains. The most represented parts are generally the most frequent parts of the skeleton. If the collection increases, the variability of the diagnosable pieces will increase, too. Some spongy tissue fragments, which are very alterable in a cremation process and difficult to conserve at high temperatures, may appear.

Taking into account the individuals' diagnostic study and the death age, we can see that epiphysial and metaphysial regions are seldom conserved. Therefore, other

TABLE 5
PERCENTAGE OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS BETWEEN 10 AND 100 g

# structure	E-4	E-15	E-21	E-23	E-30	E-32	E-33	E-38	E-39	E-40g	E-43	E-49
Skull	45.96	6.85	14.10	59.88	8.02	3.80	2.90	21.23	9.86	2.00		6.55
Thorax			4.79		0.85					0.33		
Upper extremity					2.24			4.64			3.58	3.82
Lower extremity			4.34		3.22	7.64		7.10		5.94		
Total indeterminate	54.04	93.15	76.78	40.12	85.67	88.56	97.10	67.03	90.14	91.74	96.42	89.63
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
# structure	E-50	E-55	E-59	E-69	E-71	E-72	E-75	E-77a	E-85b			
Skull	8.84	10.69	16.56	7.86	5.22	4.99	35.02					17.89
Thorax			0.38									
Upper extremity		6.13	7.75							37.92		3.34
Lower extremity	12.42	7.36	4.97	12.86			11.10					14.35
Total indeterminate	78.74	75.82	70.34	79.28	94.78	83.91	64.98	62.08				64.42
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00

TABLE 6
DISTRIBUTION OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS BETWEEN 100 AND 200 g

# structure	E-25	E-41	E-58	E-66	E-70	E-85a
Total Skull	2.41	3.82	17.75	28.87	2.55	23.76
Total Thorax						
Clavicle						
Scapula						
Humerus		3	25.86		7.48	5.47
Radius		6.6		3.1		
Ulna	2.2	4.36			1.1	
Hand						
Upper extremity indet.					5.13	3.69
Total upper extremity	2.2	13.96	25.86	3.1	13.71	9.16
Coxa						
Sacrum						
Femur	17.37			1.52	2.03	26.6
Patella			1.74			
Tibia			6.51			3.33
Fibula		1.75	2.46			
Foot						
Lower extremity indet.					1.58	
Total lower extremity	17.37	1.75	10.71	1.52	3.61	29.93
Mtc, Mtt, HPh, FPh		8.2	0.46	2.46	1.65	2.78
Flat bone			5.28			
Spongy bone		5.78	9.9		0.71	0.35
Epiphysis			4.14			
Diahysis indeterminate	69.51	56.39	53.39	36.69	23.97	29.58
Splinter	29.86	64.09	45.64	30.7	75.13	5.35
Total indeterminate	99.37	134.46	118.81	69.85	101.46	38.06
TOTAL	121.35	153.99	173.13	103.34	121.33	100.91

Mtc – Metacarpal, Mtt – Metatarsal, HPh – Hand phalanx, FPh – Foot phalanx.

aspects, associated with bone morphology, have had to be evaluated for the study of the sub-adults. There have been difficulties diagnosing adults, as well, because no diagnostic regions have been found. There are a few cranial fragments where some sutures can be observed. Unlike other necropolises, the representation of dental pieces in »Pi de la Lliura« is scarce. In most cases, there are only dental root fragments, which do not yield data about

the age of the individual. Remains that were recovered are shown in Table 10. These remains provide little information because, except in E-75, they are permanent dental pieces with the root's apex completely formed. Due to the crown of the right inferior first molar and the presence of a deciduous canine fragment, the individual's age of E-75 has been determined to be about 2.5 years²⁵.

TABLE 7
PERCENTAGE OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS BETWEEN 100 AND 200 g

# structure	E-25	E-41	E-58	E-66	E-70	E-85a
Skull	1.99	2.48	10.25	27.94	2.10	23.55
Thorax						
Upper extremity	1.81	9.07	14.94	3.00	11.30	9.08
Lower extremity	14.31	1.14	6.19	1.47	2.98	29.66
Total indeterminate	81.89	87.32	68.62	67.59	83.62	37.72
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 8
DISTRIBUTION OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS >200 g

# structure	E-11	E-12	E-26	E-28	E-45	E-51	E-52	E-53	E-77b	E-78
Total Skull	4.59	11.2	102.99	53.33	37.8	38.52	83.33	35.41	8.51	18.67
Total Thorax		0.78	8.41	4.45	9.06	0.75	16.03	32.98	2.3	
Clavicle						1.27		1.9		
Scapula			2.79			1.5		0.75		
Humerus			0.45	5.57	5.33	6.01	29	17.72	7.41	13.72
Radius			10.76	7.84		6.54	1.07	12.12	1.83	10.75
Ulna			9.87	0.51	5	0.64	1.54		3.04	
Hand						1.34	0.48	8.68		
Upper extremity				2.9			21.47			2.3
Total upper extremity			23.87	16.82	10.33	17.3	53.56	41.17	12.28	26.77
Coxa										
Sacrum								2		
Femur				4.37		8.82	14.67	17.39		7.86
Patella				10.93			2.58			1.39
Tibia					10.49	3.08	28.24	5.66	6.24	
Fibula			16.11		4.1	2.26	5.32	4.78	4.43	
Foot				6.05			0.54	3.4		
Lower extremity							3.33			5.95
Total lower extremity			16.11	2 1.35	14.59	14.16	54.68	33.23	10.67	15.2
Mtc, Mtt, HPh, FPh					8.29	1.82	10.13		5.89	
Flat bone			2.56	8.16	1.36	3.49	5.38			12.11
Spongy bone	0.25	6.89	10.27	31.78	22.71	17.32	19.15	35.46	12.13	5.46
Epiphysis						2.19		22.58		
Diahyosis indeterminate	169.65	95.48	55.74	218.48	93.32	95.09	59.89	140.7	80.25	102.24
Splinter		131.8	22.1	55.96	66.63	66.46	58.7	25.35	126.52	86.17
Total indeterminate	169.9	234.17	90.67	306.22	192.31	186.37	153.25	224.09	224.79	205.98
TOTAL	230.58	246.87	242.05	410.33	264.09	257.1	360.85	366.88	258.55	266.62

Mtc – Metacarpal, Mtt – Metatarsal, HPh – Hand phalanx, FPh – Foot phalanx.

However, bone fragments have allowed identification of the ages of the remains, as is shown in Table 11. The data show that it is a population with a high mortality rate in the sub-adult stage; 60.42% (29/48) correspond to this age set. Specifically, 37.5% are children less than six years old. There could be a greater number of sub-adults because of the number of individuals in the indetermi-

nate adult category. No conclusions can be drawn about the adults' age, because no bone elements have been conserved, which would suggest the age at death. For the first time in a cremation necropolis, these data allow us to ascertain not only the number of child burials, but also the high child mortality rate.

TABLE 9
PERCENTAGE OF ANATOMICAL WEIGHT OF URNS WITH HUMAN REMAINS >200 g

# structure	E-11	E-12	E-26	E-28	E-45	E-51	E-52	E-53	E-77b	E-78
Skull	2.63	4.83	42.55	13.00	14.31	11.89	23.09	9.65	3.29	7.00
Thorax		0.32	3.47	1.08	3.43	0.12	4.44	8.99	0.89	0.00
Upper extremity			9.86	4.10	3.91	4.73	14.84	11.22	4.75	10.04
Lower extremity			6.66	5.20	5.52	6.57	15.15	9.06	4.13	5.70
Total indeterminate	97.37	94.86	37.46	76.62	72.82	76.69	42.47	61.08	86.94	77.26
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 10
DESCRIPTION OF DENTAL PIECES FROM STRUCTURES

# structure	Dental remains recovered
E-26	2-root fragments not identifiable
E-30	3-root fragments of lower molars
E-41	Crown of right lower canine
E-45	Right second premolar and left lower second molar
E-53	Canine root
E-66	Root fragment
E-75	Crown of first lower molar in formation and decidual fragment of canine
E-77B	Left lower premolar and molar root fragment

TABLE 11
DESCRIPTION OF THE SAMPLE ACCORDING TO AGE AND GENDER CATEGORY

	Indeterminate	Female	Male	Total
Perinatal	1			1
Infantile I (0–6 years)	17			17
Infantile II (7–12 years)	2			2
Youthful (13–18 years)				
Sub-adult indeterminate	9			9
Adult indeterminate	8	1	1	10
Indeterminate	9			9
Total	46	1	1	48

Sex determination has been difficult because fragments were very small. Only in two cases, an adult female (E-28) and an adult male (E-53), can an individual's sex be determined with certainty. This small sample does not allow us to draw generalizations. The small size of remains has probably reduced the pathology rate of living individuals. Evidence of pathology was only observed on the individual from E-26. This pathology was mostly represented by cranial remains. In several cranial fragments, the presence of osteoporosis could be observed. The scarceness of observable material makes it impossible to indicate a possible aetiology for this affectation. Regarding dental pathologies, conserved pieces do not give any pathologic or alimentation data. Low rates of pathology should not suggest these individuals did not suffer from illness when they were alive. There were individuals who died while young and possibly due to an illness. This illness may not have affected the bone, and may not have left evidence due to the high skeletal fragmentation and the low skeletal representativeness.

Conclusions

The »Pi de la Lliura« necropolis is a small necropolis from the first Bronze Age in Catalonia. Certain characteristics of bone fragments are common in each urn: white colouration, size of fragments, fracture type, and

general low weight. This indicates that, after the cremation, part of the burned remains were taken and reduced to smaller size fragments. The funeral practice was commonplace during the necropolis utilisation period. Basically, they are structures where a unique cinerary urn was deposited and was adjusted to the structure space. With the exception of one case, these structures were single deposits. Necropolis dimensions and the homogeneous treatment of the corpses suggest that it is a necropolis for contemporary burials that was used over a short period.

Important data to take into account as a result of this study concern the individuals' ages. Although age could be established in most cases, sex could not. This resulted in an incomplete demographic study. The buried individuals' set is mostly comprised of a sub-adult population (60.42%). This data contradicts studies of other sets where sub-adults (children and juniors) were very scarce, almost non-existent. Even though some recent studies indicate the presence of sub-adult remains in the cremation necropolis, none have documented the amount obtained from the »Pi de la Lliura«. In the »Pla de la Bruguera«, a slightly older and smaller necropolis (26 structures with cremated remains), the sub-adult frequency is 17.24%¹⁵. Currently, there are no Catalan necropolises that compare with »Pi de la Lliura«; it would be interesting to re-examine the necropolises studied in the middle of the 20th century.

There is no clear age distribution in the site due to a high sub-adult frequency in the necropolis. Data regarding a possible relation between the grave artefacts and individual's age and sex is insufficient to draw conclusions, due to the scarcity of materials deposited in the structures. Similar to other sites of the Bronze Age in Catalonia, »Pi de la Lliura« does not contain many grave artefacts. Two structures had accompanying ceramic elements, a small vessel (E-22) and a patera (E-23). As for bronze elements, E-28 contained a sapling burin's fragment and a needle; E-26 contained a shave leaf and a needle; E-53 contained a bronze fragment and E-78 another bronze needle. The small number of grave artefacts and low sex assignation make it impossible to draw an association between these variables in this case. There was no relation between age and grave artefacts seen. This data is similar to that observed in the Bronze Age phase of the »Can Piteu« site¹⁷.

In the NE peninsula, some authors suggest the possibility of a change in cremation rituals from the Bronze Age to the Iron Age^{17,18}. In the former period, remains were totally white, small and not very representative since they were subjected to a high temperature; gradually they changed and turn to beige, larger and more abundant fragments, due to a lower cremation temperature. The reason for this change may be due to a modification of the funereal pyre and of the fire conditions. Firewood quantity and fire intensity are reduced. Bronze Age remains are reduced before depositing them into the urns, but Iron Age remains are bigger and frequently include metallic grave artefacts. The »Pi de la Lliura« ne-

ropolis begins to elucidate some factors, which were unclear until recently.

Finally, the importance of the anthropologists' inclusion in the urns excavation team must be established. The anthropologists extracted more data, saved the study time, and established the best excavation techniques in order to extract the maximum information and preserve the remains.

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VATRA I KOSTI: BRONČANO DOBA III NA SJEVEROISTOKU PIRENEJSKOG POLUOTOKA

SAŽETAK

Između I. tisućljeća pr. Kr. i 5. st. pos. Kr. na Pirenejskom poluotoku nalaze se mnogobrojne nekropole s urnama. Jedan primjer je »Pi de la Lliura« (Vidreres, Girona). Unatoč brojnosti nekropola, istraživanja o njima su oskudna. »Pi de la Lliura« sastojala se od 43 strukture, koje su sadržavale ukupno 47 posuda s ljudskim ostacima. Od 43 strukture, 22 su u potpunosti ili djelomično istražene u laboratoriju. Sačuvani ulomci sugeriraju da se spaljivanje vršilo pri temperaturi od 650–700 °C. Nakon toga, dio spaljenih ostataka prebačen je u urnu. Jedna od posebnosti ove nekropole je visoka učestalost osoba mladih od 20 godina. Mortalitet osoba dječje dobi je uvijek visok u prapovijesnim nekropolama, no još je viši u nekropolama koje sadrže kremirane ostatke. »Pi de la Lliura« je vrlo mala nekropola, gdje se s tijelima postupalo na sličan način u kratkom vremenskom razdoblju