

# TORCA L'ARROYU: A NEW HOLOCENE SITE IN THE CENTRE OF ASTURIAS (NORTH OF SPAIN)

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**Abstract:** The archaeological site of Torca L'Arroyu was discovered in 2002 during the works of construction of the new net of sewer of Llanera's municipality (province of Asturias, N of Spain). The archaeological deposit is placed inside a small cave and it has provided some ceramic fragments very rolled, two polished lithic pieces, abundant bones of animals consumed by man and charcoals. The archaeological materials and the <sup>14</sup>C dates of the bones associated with the ceramics (UBAR-803 4930 ± 70 BP y UBAR-804 4240 ± 60 BP) indicate the existence of an settlement of certain duration that would correspond to the chronological frame of the regional Neolithic. Sites of this chronology are very scanty in the Cantabrian area, therefore, this new deposit will contribute to a better knowledge of the Neolithic in this zone of the Iberian Peninsula.

**Key words:** geoarchaeology, radiocarbon, taphonomy, pottery, polish stone, Neolithic, Holocene, Asturias

**Résumé:** Le gisement holocène de Torca l'Arroyu a été découvert en 2002 durant les oeuvres de réalisation du réseau d'assainissement de la municipalité de Llanera (Asturies, N de l'Espagne). Le dépôt, situé à l'intérieur d'une petite grotte, a proportionné nombreux fragments céramiques très roulés, deux pièces de pierre polie, nombreux restes osseux d'animaux consommés par l'homme et fragments charbonneux. Les matériels archéologiques et les dates <sup>14</sup>C des os associés aux céramiques (UBAR-803 4930±70 BP y UBAR-804 4240±60 BP) nous indiquent l'existence d'un lieu d'occupation de certaine durée que l'on peut attribuer au cadre chronologique du Néolithique régional. Les gisements de cette chronologie sont très peu abondants dans la corniche cantabrique, donc, ce nouveau gisement contribuera à une meilleure connaissance du Néolithique dans cette zone de la Péninsule Ibérique.

**Mots clé:** geoaarchéologie, radiocarbone, taphonomie, céramique, pierre polie, Néolithique, Holocene, Asturias

## INTRODUCTION

The site of Torca l'Arroyu is located in the centre of the province of Asturias (UTM: X=270.400, Y=4.810.797, Z=170), in the vicinity of Oviedo (village of La Ponte, parish of Cayés, Council of Llanera) (figure 2.1.A). Its discovery was fortuitous, since it appeared during the works of construction of the new net of sewer of Llanera municipality, in December of 2001. After its find, the construction company stopped the works and asked for the professional services of R.E.G to carry out the archaeological documents of the find. There were previous proceedings to obtain the excavation permit from the Culture Board of the Principado de Asturias. A scanty but interesting collection of ceramic rests stands out among the recuperated materials. There are two polished lithic pieces, a high number of bone rests that belong to macromammals and scanty gastropods.

## GEOARCHAEOLOGY: THE CAVITY AND ITS FILLING

The cavity of Torca l'Arroyu is located in the west side of the mesozoical deformed materials of the Oviedo trough in the mesotertiary basin of Asturias. They form the cover of the western extreme of the Central Area of la Cantabric Range (Barnolas y Pujalte, 2004). It is opened in the

limestones and marls of the Upper Cretaceous (Cenomanian) which is placed in agreement over the conglomerates, sands and clays of the Albian (IGME, 1973). They appear a few metres below following the slope. At this point, the Cretaceous serie is inclined towards NE with a direction close to N45°E and a dip of 19°/22° NE. They form the western flank of syncline of Llanera in the NW extreme of the synclitorium of Oviedo-Infiesto.

Geomorphologically, the area of Torca l'Arroyu belongs to the morphological division called Longitudinal Depression (Martínez, 1981), it is also called Prelitoral Trough or Intermediate Depression (Martín-Serrano, 1994), which agrees partialy with the unit of relief of the Mesozoical-Tertiary cover (Farias y Marquínez, 1995), units of relief that belongs to the coastal-mesozoical cantabric border, which is located in the NE extreme of the Meridional Hesperian Massif. In this area, the river Nora runs confined within the Cretaceous materials mentioned. It runs from E to W after running through the detritic materials of the Terciary of the Basin of Oviedo; then, the river gets into the Carboniferous limestones of the Naranco hill, more towards the W. Torca l'Arroyu is located in the slope of the right side of the Nora river, which runs among 140 and 150 m. level. The slope ends up in a small plain belonging to the rests of a applanation surface subsequent to the Paleogene, because the river links with the higher levels of the deposit of that

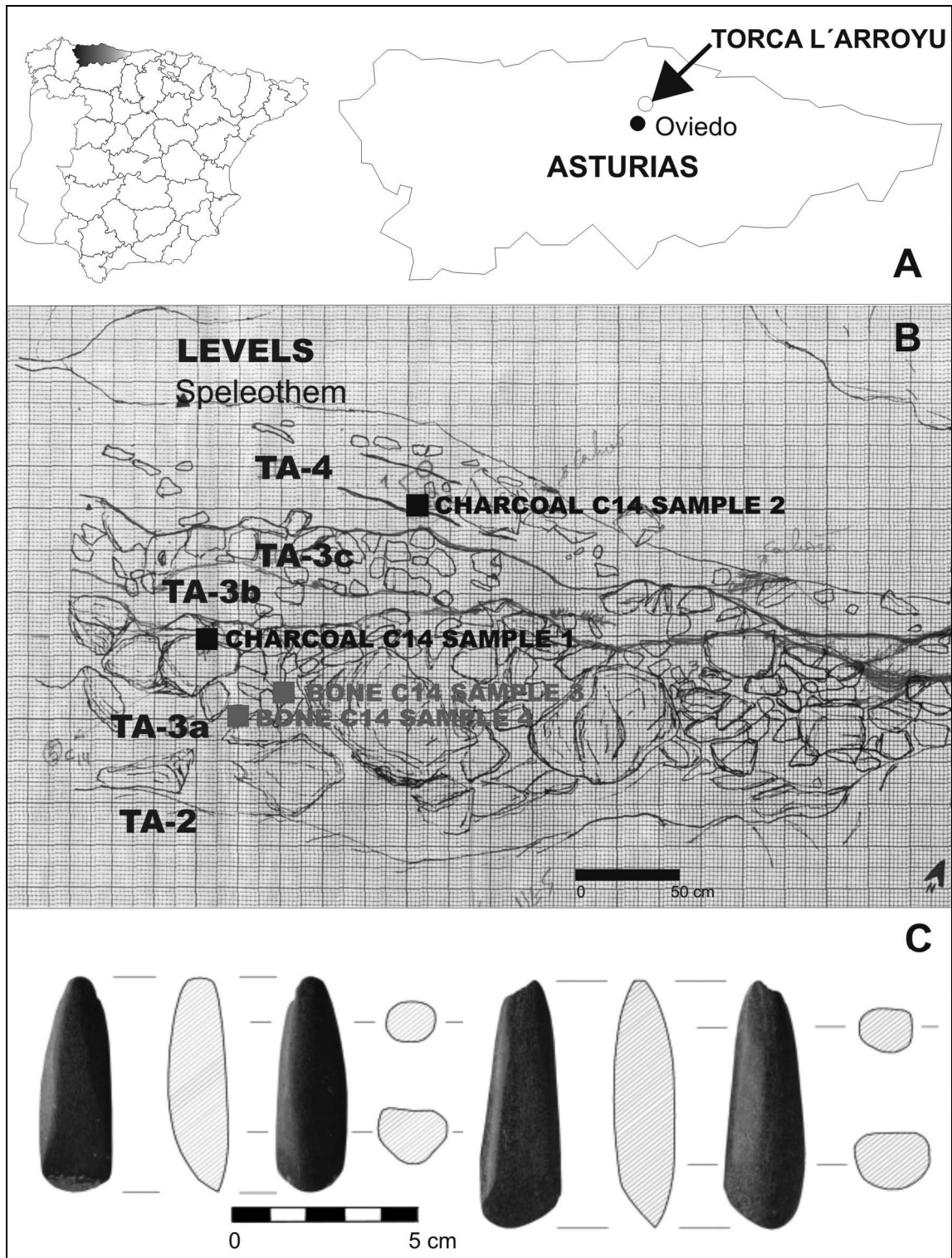


Fig. 2.1. A: Geographical location of Torca l'Arroyu. B: Stratigraphical scheme with indication of <sup>14</sup>C samples. C: Polished lithic materials of Torca l'Arroyu

chronology belonging to the Tertiary Basin of Oviedo, and, it is previous to the confinement of the Quaternary fluvial net.

The made gap cut partially a karstic cavity partially filled. It is expanded in an alternation of sandy limestones and

marls where the first ones prevail. They appear into banks of tabular geometry of metric and high power. We do not have the cenital extreme of the cave. It was wiped out by the construction works on the slope where it was discovered. The access to the outside would be probably in the missing area. The opening would be blinded and

would be a collapse sinkhole (*torca*) where the partial filling took place through a deposit formed by a cone of thick and thin detritic materials crowned by a speleotheme. The different stratigraphic sections that can be seen in the gap have allowed to obtain a complete lithostatigraphic sequence from the deposit affected by the works. The base of the sequence lays on the limestones and marls mentioned, which are karstified with an irregular pre-depositional surface where a threshold area stands out. It is situated, approximately, in the vertical of the disappeared cenital entrance. This ledge determines the geometry of the deposit; so that two sediment areas can be distinguished. In one of them, the material transport shows a NE direction, and in the other, a S direction. This one is worse controlled due to record disappearance. From wall to ceiling the sequence is composed of the following lithostratigraphic units (figure 2.1.B):

- Unit TA-1: 40 visible cm of clays and yellow sandy marls with small stones of autochthonous lime rounded by alteration (centil: 1 cm), with a high content in carbonates, with irregular geometry, they fill the karstic palaeotopography of the cavity soil. Sterile.
- Unit TA-2: 8-10 cm of dark brown clays with stones of autochthonous lime rounded by alteration (centil: 1 cm), they are very scanty and with a low content in carbonates. It contains scanty rests of mammals and gastropods together with fragments of carbonized organic matter. Its contact is net with the previous materials and its geometry is lenticular, it is getting lost toward the proximal extreme of the deposit. It presents a strong depositional inclination towards NE, it is shaped by the paleotopography of the cavity.
- Unit TA-3. It is composed of three subunits or levels from wall to ceiling:
  - Subunit TA-3a: 60cm – 1 m (in the W profile) of clast-supported conglomerate formed by blocks and pebbles of autochthonous lime (centil 1 m) It's lower contact is net and its geometry is lenticular. It is getting thin towards the proximal extreme of the deposit, it shows a marked depositional dip towards NE. Two lithic polished tools, decorated ceramic fragments and bone rests (sampled for C14) come from those deposits.
  - Subunit TA-3b: 30 cm (in N profile) of brown clays, very plastic, scanty carbonated, with lenticular geometry (maximum lateral extension: 2 m) and inclined arrangement similar to the previous level. They contain many fragments of carbonized organic matter, some bone rests and some specimens of gastropods non-troglophilus. Samples of some charcoals were taken for its radiocarbonic date.
  - Subunit TA-3c: 30-40 cm of clast-supported conglomerate with scanty matrix, more plentiful at the base. It is formed by boulders and pebbles of autochthonous lime, angular (centil: 30 cm), which include fragments of speleothemes that have come off the ceiling
- of the cavity, and limy plaquets of 30 cm of maximal dimension and 4 cm of thickness. Both, towards the proximate extreme and towards the distant one, this subunit joints the TA-3a, so that the big clayish lenticle remains in the centre. It contains rests of carbonized organic matter and bone rests.
- Unit TA-4: 50-75 cm of very dark brown clays that are arranged parallelly to the previous subunit. It has a well marked limit due to the lithological difference; however, a discontinuity in the sediment process cannot be seen. This unit shows some internal arrangement outlined by two levels of black organic matter and by the arrangement of autochthonous lime plaquets (centil: 30 cm). They are slightly overlapped parallelly to the depositional surface, which is configurated by some levels with a certain order. Both levels present a remarkable lateral continuity, so that they can be seen in the different cuts. Its depositional inclination is towards NE, the same that is outlined by the alignment of plaquets. They contain bone rests, specimens of non-troglophilus gastropods and fragments of undecorated ceramic.
- Unit TA-5: 2-10 cm of stalagmite cover that embraces rounded pebbles (centil: 20 cm) and seals the whole detritic deposit that lays below; as a result, there is an inclined crust towards the inside of the cavity with direction N-NE on the surface. It contains non-troglophilus gastropods and bone rests.

## THE RECUPERATED MATERIALS

### Polished lithic materials

The only recuperated lithic materials (unit TA-3a) are two polished lithic pieces (figure 2.1.C) of a small size made out of amphibolite (length: 69,53 mm and 62,07; mesial width: 19,79 mm and 18,94 mm; mesial thickness: 16,30 mm and 16,02 mm). They present a trapezoidal form that tends to a triangular and lengthened one; a thick profile, a rectangular rounded oval section and a curved thick edge with a very marked asymmetric profile, both pieces are shaped by a bevel (Eiroa *et al.*, 1999). The polishing of the bevel belonging to the bigger piece matches with the one of the ventral side of the piece. It does not show a marked wearing due to use. On the contrary, the bevel of the smaller one shows an oval surface produced by the wearing due to use. It presents a slight inflection with the polishing of its ventral side; besides, it can be appreciated a wearing on its edge, which is also marked by an inflection on the surface of the bevel. There is a concave wearing, lengthened in its back area, which is produced by friction with a cylindrical object. Its heels are pyramidal with a rounded vertex and do not show percussion marks; the heel of the smaller piece has two lateral notches that are perpendicular to the longitudinal axis (figure 2.1.C.1), probably, related to the handling system, while the one of the bigger piece is affected by a small fracture with a loss of lithic material (figure

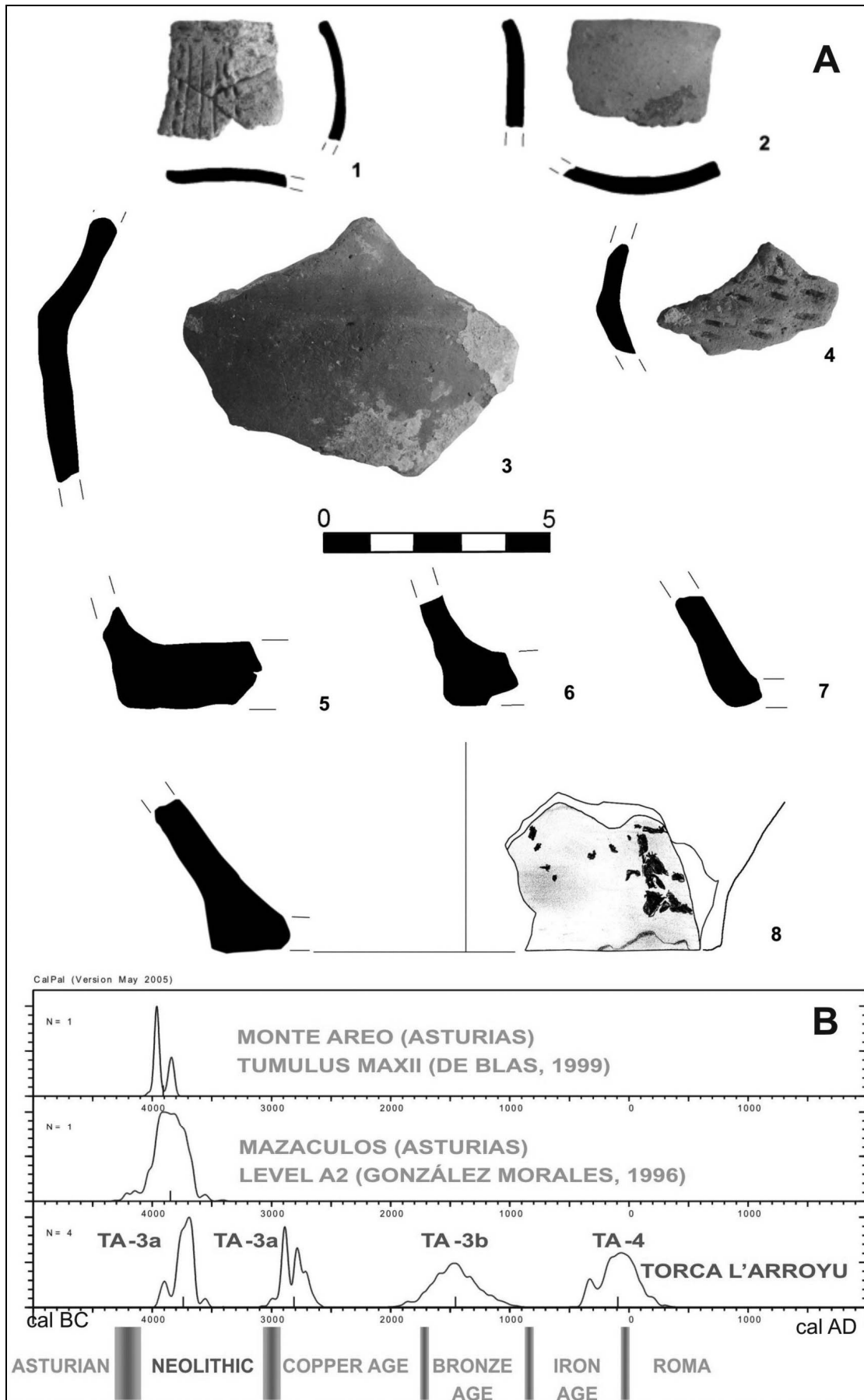


Fig. 2.2. A: Pottery of Torca l'Arroyu. B: Calibrated  $^{14}\text{C}$  dates, regional parallels and chronology

2.1.C.2). In relation to their typology, both pieces present the usual characteristics of the chisels (Eiroa *et al.*, 1999), tools used to carve the wood nicely. From our point of view, its more correct denomination would be firmer chisel, because these ones are used to carve wood while the chisels are used to work the stone and the metal. Both lack of percussion prints on the heels, so that they might have been used with handle. This would be proved by the notches that the smaller one has on the heel. Besides, this piece evidences clear signs of use because two types of wearing on its bevel can be appreciated. The bigger one does not show notches on the heel, which is partially fractured, nor clear prints of use, since the ventral and bevel surfaces seems to belong to the making process.

### Pottery

The ceramic materials of Torca L'Arroyu form a small collection that is composed of an amount of 68 fragments. All of them are handmade, 61 of them were recuperated in the unit TA-3, five fragments, in the unit TA-4, and two fragments, in the mixture of the gap. The materials of the unit TA-4 are: three fragments of wall of small size and reducing baking, and two fragments of wall of mixed baking and thin degreasing. One of them has its edges rolled, while the other shows a smoothed surface. A more attractive view is presented by the ceramics remains of the unit TA- 3. The following ones stand out among them (figure 2.2.A):

1. Three decorated fragments which form a very thin piece (figure 2.2.A.1), slightly rolled, concave in its longitudinal profile and convex in the transverse one. It is characterized by the presence of two rounded rims or borders. One of them parallel to the longitudinal axis, and other that is normal to this. This one is slightly thickened. It is a ceramic piece made, apparently, on a thin plate that was probably leaned against an irregular surface (ground), since it shows a smoothed side, the decorated one, and other one quite irregular. Maybe, it was just the wish of finishing finely the decorated side, and for that, it was smoothed when the piece was already made and the paste was still soft. Its morphology appeals: the rim forms a 90° angle, which could be a fragment of handle. The degreasing is thick (> 2mm) and mainly, limy. The baking is oxidizing, its inside is reducing. The decoration consists of two lines of discontinuous incisive strokes in the thickened side of the edge, from them, five lines go at right angles: the two first, which come from the second rim, are formed again by discontinuous incisive strokes; secondly, there are three continuous incisive lines. The composition concludes with two lines of discontinuous incisive strokes; therefore, the decorative structure of the preserved fragment is completely symmetrical. If we consider that the undecorated ceramic fragment, the one that shows some of carbonated concretion, is a handle, then, we can think that the same decorative pattern could be repeated in the missing part.
2. This is a fragment that, as it happens with the previous piece, presents two orthogonal rims with a longitudinal profile, slightly concave and transversal convex. It shows superficial carbonate concretions. It is hardly rolled (figure 2.2.A.2). It shows a main rim slightly thickened with a flat lip which turns suddenly, leaving an angle inferior to 90° in this case; and gets the same thickness than the rest of the piece. Now, the lip appears rounded. It presents a mixed baking with colouration changes, mainly among light greys and pale oranges. Both, the internal and external surfaces seem smoothed and the thickness changes reveal again slow rotations during its making. Here, the degreasing is also limy and it may include small vegetable fibres.
3. Fragment of wall of carenated ceramic. The inflection is appreciated both, in the internal and the external side of the piece (figure 2.2.A.3). It has been made with a slow rotation (handmade ceramic), where changes of thickness are very frequent in the same horizontal line. The baking is mixed. It is mainly oxidizing in the superior side of the careening and reducing in the inferior one. The paste is quite decanted and the degreasing is almost imperceptible at first sight. It presents limy concretions in the external side mainly. The edges are not rolled and it presents superficial carbonated concretions.
4. Rolled ceramic (fragment of wall) with an external inflection marked by a horizontal careen (figure 2.2.A.4). The baking and the degreasing are identical to those of the piece number 1, as well as the decoration, which is based on small strokes of burin. They form four parallel lines to the careen, and tend to horizontality together with the rests of prints which are perpendicular to these. The external side, as it happens with the piece of number 1, has a more careful finish than the internal one, which has many irregularities. It belongs to the usual name of handmade ceramic, which can be named again as ceramics made with slow rotations. All this seems to indicate that this fragment and the one of the number 1 belonged to the same piece.
5. Four bottom fragments (see description 8) (figures 2.2.A.5, 2.2.A.6, 2.2.A.7 and 2.2.A.8): The base of the pieces is flat. The thickness of the bottom is out of proportion as regards the thickness of the start of the preserved wall. They seem to be made by slow rotation. Instead of using sticks/bars of paste, it seems that a very liquid paste has been applied using the fingers, and lately, it has been smoothed with the hands or with a spatula. There are areas in the external side where the smoothing is not homogeneous; therefore, layers of clay that were previously applied can be seen. The baking is mixed: the external side of the piece tends to be oxidizing while the internal side is reducing. There are several sizes of degreasing. It presents rests of soot in the external side, so that it can be inferred an use to cook food by putting the piece

directly beside the fireplace. One of the pieces (figure 2.2.A.7) has some very remarkable changes of thickness considering the small size of the preserved fragment. Its degreasing is limy, scanty but it has a big size (fragments of 3-4 mm). These four fragments present a bad condition. Two of them stand out because of its marked rolling

The differences in the baking do not show different moments, since, in this kind of batches made in mono-chamber ovens (holes in the ground where the pots are put and covered with firewood), the baking of each pot changes a lot according to the place they are inside the oven, and also, if the pieces are in close contact to the combustion. The degreasings, mainly limy, could show that the place where the earthenware was taken is quite near the settlement. Considering the described materials and their secondary position within the same level, this small ceramic collection does not allow us to do great chronocultural appraisals. However, two ceramic groups can be distinguished in a first approach. There is a first lot of several fragments which contains the two mentioned rims and the decorated fragments, which we associate to Neolithic. The second one is a small group that includes the carenated fragment, which could belong to a more advanced period, possibly to Copper Age.

#### Faunal remains

The malacological rests are scanty and come from subunit TA-3a and subunit TA-4. This group is only composed of gastropods. A specimen of *Paella (Patella) vulgata* (Linné, 1758), recuperated in TA-3a, stands out. The rest of the group belongs to three different kinds of continental gastropods that were found in the two mentioned units.

With regards to macromammals, the zooarchaeological analysis of the group shows the following spectrum of species: *Bos taurus*, *Ovis aries* or *Capra hircus* among the domesticated ones, and *Sus scropha*, *Orientalis cuniculus*, *Cervus elaphus*, *Ursus arctos* and *Vulpes vulpes* among the wild ones. The lot of bones is composed of 203 rests; the ones of unit TA-3 stand out among them because they are the more numerous group (table 2.2). Compared to unit TA-3, unit TA-4 is no representative; it can be stood out the lack of animals of big size and the presence of rests of some kind of ovicaprid.

The bones of Torca l'Arroyu presents a very well preserved fauna. It has only turned out to be representative the fauna belonging to unit TA-3, since unit TA-4 contains few rests. The boar stands out among the documented animals; with regard to the domestic ones, the presence of the cow stands out. The presence of the ovicaprids is testimonial and little meaningful. The taphonomic and seasonal data allow to claim that the boars were hunted during summertime and the beginning of winter. In the case of the rest of the animals, the lack of seasonal data does not allow us to know when they died;

but the taphonomic information indicates, as it occurs with the boar, that the different animals of units TA-3 and TA-4 were processed by the human being, except for the fox, which lacks of cutting marks and its rests are not fragmented. Despite we can explain the represented fauna and its consequences to the human being, the existence of other alterations indicates that we face a group slanted by different processes. The presence of rolled and polished bones in unit TA-3 evidences that we are before a bone group moved by hydric transport. In the same way, the scavenger action of carnivores suggests that they acted on the bone sample slanting it. Therefore, we can think that these two agents could slant the bone sample and, at the same time, they can be also the main responsible ones of the high trampling that the bone rests show. The real importance of the fauna of Torca L'Arroyu is based on the presence of domestic fauna in a precise moment of the Asturian Neolithic and also, because of the predominance of the boar among the wild species.

#### GEOCHRONOLOGY: RADIOCARBONIC DATES

In order to obtain numeric ages for the site of Torca L'Arroyu, we sent five samples of charcoal and bone material coming from two different archaeological levels, TA-3 and TA-4 to the Laboratory of Radiocarbonic Date of the University of Barcelona, finally, they got reduced to four samples (figure 2.1.B).

Table 2.1 shows the source unit of the samples, the material, the code of laboratory, the date assignation results expressed in BP<sup>1</sup>(1) with its uncertainty belonging to once the usual deviation of the radiometric measures that we indicate ordered from minor to major age. It also shows the results of the dates calibration according to CalPal 2005 SFCP curve (Weniger *et al.*, 2005). The probability intervals are indicated, whose sum is equal to 95,4% (calibration 2 sigma) (Stuiver y Reimer 1993 ), expressed in calendaric years cal. BP and cal. BC/AD<sup>2</sup>.

#### TORCA L'ARROYU: NEOLITHIC SETTLEMENT, FIRES AND SEDIMENT PROCESSES

Considering the information exposed before, the first to be distinguished, on studying the sediment filling of Torca l'Arroyu, is that although it is a site located in a secondary position, it contains a very interesting geoarchaeologic information that we will try to decode

<sup>1</sup> BP (before present). It is used to indicate a radiocarbonic date expressed in its own chronological scale, which comes from the year 1950 dC. It is always presented through two values: the experimental value and the usual deviation belonging to the group of the radiometric measures. (Mestres, 2000a, 2000b).

<sup>2</sup> Cal BC (before Christ). It is used to indicate a date in the sun chronologic scale; it is expressed in years before Christ. It comes from the calibration of a radiocarbonic date.

Cal AD (annus Domini). It is used to indicate a calibrated date that comes from a radiocarbonic date. It is expressed in sun years after Christ.

Tab. 2.1. Torca L'Arroyu. Taxonomic profiles according to NR and MNI

Unit	TA-3		TA-4		Surface		MNI TA-3	MNI TA-4	MNI Surface
	NR	%	NR	%	NR	%	Ad/ Juv/ Inf	Ad/ Juv/ Inf	Ad/ Juv/ Inf
<b>Bos taurus</b>	<b>22</b>	<b>12.3</b>			<b>2</b>	<b>22.2</b>	<b>1/1/0</b>		<b>1/0/0</b>
Big	51	32.9			1	11.1			
<b>Deer</b>			<b>1</b>	<b>4.5</b>				<b>1/0/0</b>	
Average	2	1.3	1	4.5					
<b>Boar</b>	<b>50</b>	<b>32.3</b>					<b>1/0/2</b>	<b>1/0/0</b>	
<b>Ovicaprid indet.</b>	<b>1</b>		<b>5</b>	<b>22.7</b>				<b>1/0/0</b>	
Samall	22	14.2	11	50	4	44.4			
<b>Bear</b>	<b>1</b>	<b>0.6</b>					<b>1/0/0</b>		
<b>Fox</b>		<b>0.0</b>	<b>4</b>	<b>18.2</b>				<b>1/0/0</b>	
<b>Rabbit</b>					<b>2</b>	<b>22.2</b>			<b>1/0/0</b>
Indet.	24	6.5							
<b>Total</b>	<b>173</b>		<b>22</b>		<b>9</b>		<b>3/1/2</b>	<b>4/0/0</b>	<b>2/0/0</b>

NR: Number of remains; MNI: Minimal number of individuals; Ad.: Adult; Juv: Juvenile; Inf.: Infantile

Tab. 2.2. Torca L'Arroyu. Calibrated Radiocarbonic Dates

Unidat	Material	Code	<sup>14</sup> C dates BP	2 $\sigma$ calibrated dates cal. BP (0=AD1950)	2 $\sigma$ calibrated dates cal. BC/AD
<b>TA-4</b>	Charcoals	UBAR-746	2050 $\pm$ 120	2340 – 1740 cal. BP	390 cal. BC – 210 cal. AD
<b>TA-3b</b>	Charcoals	UBAR-745	3190 $\pm$ 150	3790 – 3030 cal. BP	1840 – 1080 cal. BC
<b>TA-3<sup>a</sup></b>	Bones indet.	UBAR-804	4240 $\pm$ 60	4940 – 4580 cal. BP	2990 – 2630 cal. BC
<b>TA-3<sup>a</sup></b>	Bones of <i>Bos taurus</i>	UBAR-803	4930 $\pm$ 70	5850 – 5530 cal. BP	3900 – 3580 cal. BC

along this work. The hypothetical geodynamic model that we lay out considers the previous existence of an open air site located in the slope where the sinkhole opens. It is in a topographic position superior to the sinkhole. In this way, the slope and the small hill where the slope ends up offer excellent conditions for the habitat, with a South orientation and with a good sight control over the near fluvial bed of the Nora river. The chronology of this occupation of surface is marked by the date UBAR-803 4930  $\pm$  70 BP (5850-5530 cal. BP), obtained from bone rests of an only specimen of *Bos taurus*. It locates the settlement in the first half of IV millenium a.c. (3900-3580 cal. BC) (figure 2.2.B). The length of this occupation would be defined by the date obtained from a sample that contains several bones, UBAR-804 4240  $\pm$  60 BP (4940- 4580 cal. BP) (figure 2.2.B), so that its result would be the mean of its different ages; it would show us an average chronology for the settlement, which would go along the first third of the III milenium B.C. (2990-2630 cal. BC). If we sum the probabilities of both dates, the period of validity for the settlement would be in the interval 5860-4610 cal. BP (3910-2660 cal. BC), whose considered duration is 1250 years. This long duration of the inhabitation of the slope settlement together with the

presence of ceramic materials that seem to belong to two different moments would be showing us the existence of two moments of inhabitation: one of them would belong to the Neolithic, associated to the date UBAR-803, which the decorated ceramics would come from, and the other one, to the Copper Age, associated to the date UBAR-804, the carenated ceramics belong to it. The first moment would be related to the Neolithic levels of some other Asturian sites such as the A2 level of the Cave of Mazaculos (González Morales, 1995) whose date is GAK-15221 5050  $\pm$  120 BP (6040-5560 cal. BC) or the tumulus MAXII of Monte Areo (de Blas, 1999) whose date is CSIC-1380 5133  $\pm$  30 BP (6000-5720 cal. BP; 4050-3770 cal. BC) (figure 2.2.B).

Inside the cavity, the sequence begins with some materials which are produced by the rock alteration of the substratum (unit TA-1). They fill in the existing paleotopography in the cavity ground and probably, were placed in a time when the cavity was without outside communication. The sequence continues when the conection of the cavity with the outside is made through a small collapse sinkhole which contains external materials.

After leaving the settlement of the slope, some of its rests and the thin geologic materials from the surface went through processes linked to a dynamic of gravity-slope with hydric influence due to rainfalls of some intensity. This produced clay layers, which are the source of unit TA-2.

Later, there was a fire in the slope and the vegetation was wiped out. As a consequence, the archaeological rests that were still there and the surface geological materials (thin and thick) went through a new sediment cycle by processes of gravity-slope with hydric influence, which are the source of the clay layers with pebbles and blocks that ended up in subunit TA-3a, whose inside contains a lot of archaeological materials (bone and ceramic rests, polished tools) and clear signs of hydric transport. The presence of big angular blocks of autochthonous lime in the base of TA-3a evidences that in those moments, there were collapses in the opening of the *torca*, which enlarged its original size. The sediment process of gravity-slope continues with the clay layer of subunit TA-3b dated in the interval 3790-3030 cal. BP (1840-1080 cal. BC), which has scanty lateral extension in the sediment cone, and with the clay layer with stones and blocks of subunit TA-3c, which superimposes on subunit TA-3a towards the distal areas of the cone. Both, TA-3b and TA-3c contain scattered and scanty archaeological rests, which evidences that the rests of the settlement of the slope surface were practically dismantled.

Later, the slope where the settlement was located went through another fire which wiped out its vegetal cover; besides, new episodes of dragging by gravity-slope processes took place and led to the sediment process of unit TA-4 dated in the interval 2340-1740 cal. BP (390 cal. BC-210 cal. AD), where two levels of well stratified ashes and charcoals can be seen in the clay sediments.

Finally, during a wet epoch with mild temperatures of some duration, the precipitation of the calcic carbonate took place. It formed the espeleotheme which sealed the deposits of the sinkhole. The precipitation continued over it, and stalagmites and stalactites were produced; in some cases they have formed small columns.

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