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Ambrona and Torralba archaeological and palaeontological sites, Soria Province

1. Discovery and early research

The Torralba and Ambrona sites (Santonja *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 18-39) are 150 kilometres north east of Madrid on the watershed between the Ebro, Duero and Tagus Rivers, in the southern part of Soria Province. This is a strategic transit zone between the highlands of the Iberian *Meseta* (plateau) and the Jalón River Valley. An oblique perspective generated by a digital terrain model shows the two sites between reliefs drained by tributaries of the Atlantic slope Duero and Tajo Rivers. To the east, the clear outline of the Jalón River canyon, which flows into the Ebro and eventually into the Mediterranean (Fig. 1).

1.1. First work by Marquis of Cerralbo (1909-1916)

The discovery of both sites began with the detection of large elephant bones in 1888 at the Torralba railway station. Between 1909 and 1913, Enrique de Aguilera y Gamboa (1845-1922), the 17th Marquis of Cerralbo, excavated over 2000 m^2 in Torralba. From 1914 to 1916, he continued his work at the Loma de los Huesos in Ambrona site, 2.5 km to the north. His results had a great impact at the time and drew visits by leading researchers. Cerralbo's conclusions, paradoxically from a creationist's ideological perspective (Santonja and Vega, 2002), conjugated the key aspects around which the site was later interpreted –organised hunting of elephant herds by a group of human settlers on the banks of a lake– and provided a glimpse of the potential importance of these sites for the study of human behaviour (Isaac, 1977: 3-4).

1.2. Research resumed by F.C. Howell (1960-1963)

In Spain after the Civil War, in 1936, Lower Palaeolithic research was abandoned almost entirely. Only occasional visits to international congresses awakened memories of Torralba and Ambrona and spurred individual initiatives such as the palynological studies by J. Menéndez Amor and F. Florschütz in 1959 and 1963, which focused on the Middle Pleistocene chronology of the sites (Santonja and Vega, 2002).

Contacts between Luis Pericot and Clark Howell at the Panafrican Prehistory Congresses led to the recommencement of the research work, nearly 50 years later of the Cerralbo's work. Howell proposed systematic full-cover, multidisciplinary excavations for Torralba and Ambrona. By the end of the decade, research into the African Pleistocene had implanted this model, but in 1960 it was a novelty in Europe.

When this work began, the Torralba site was estimated to cover approximately 3800 m² (Howell *et al.*, 1962), of which over 2000 m^2 were to be preserved, of which 1026 m^2 dug between 1961 and 1963 (González Echegaray and Freeman, 1998). Loma de los Huesos in Ambrona was estimated to cover roughly 6000 m^2, of which 1243 m^2 were excavated in 28 weeks during the 1962 and 1963 digs (Howell, 1965). Both sites were studied by the same team –K.W. Butzer, E. Aguirre, P. Biberson and L.G. Freeman– who used a similar methodology and reached common conclusions. Butzer's geological survey attributed an identical age and formation processes to both sites and defined a morphosedimentary unity, the "Torralba Formation", which integrated the strati-

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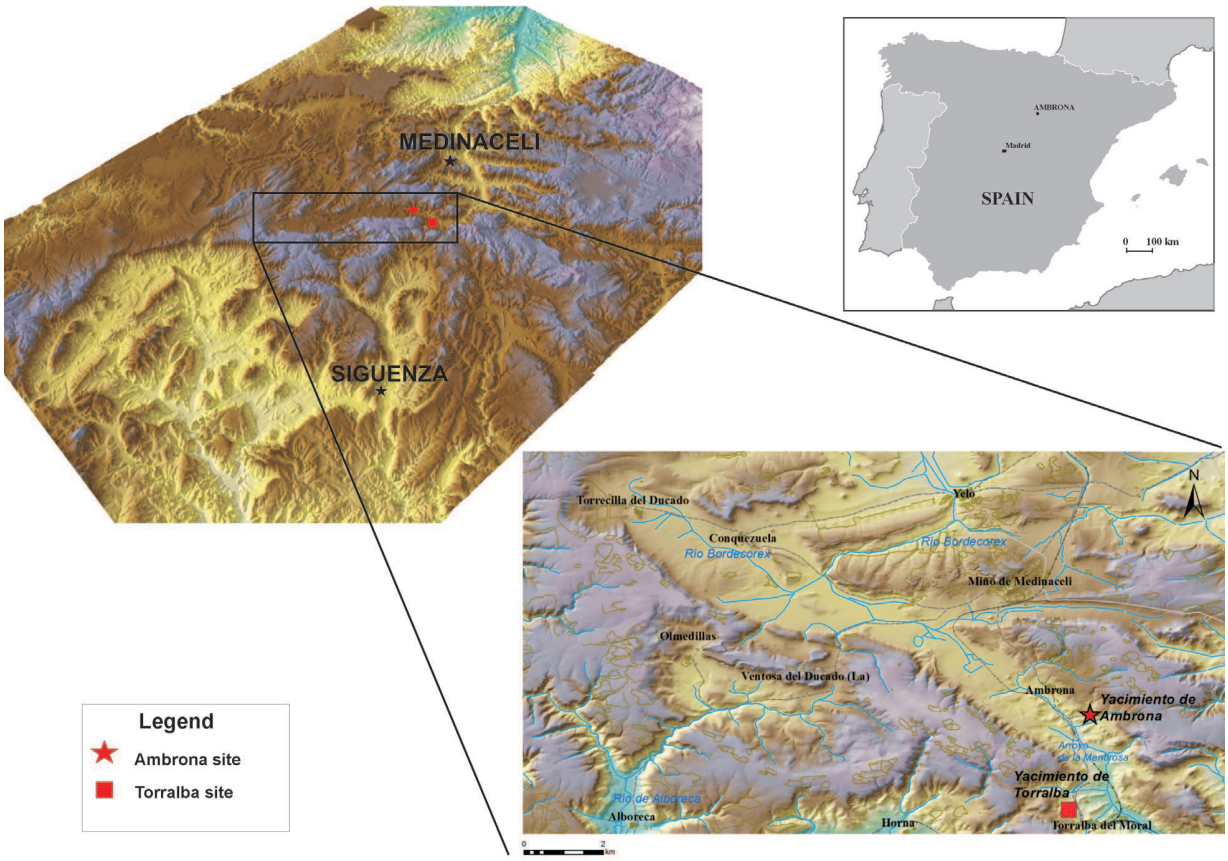

Figure 1. Geographic location of the Torralba and Ambrona sites in the south of Soria province, 150 km NE of Madrid (Spain). Both sites are in the valley of La Mentirosa arroyo Rivulet, also known as Mansegal, a tributary of the Jalón River which flows into the Ebro. The Bordecorex stream flows into the Duero River, while south of Olmedillas and Ventosa del Ducado, the river network flows into the Henares River (Tagus basin).

graphic sequences of the two sites, described at the time as twin (Butzer, 1965).

The published studies of the lithic tools, all preliminary, interpreted the industry at either sites as early (Freeman, 1975) or middle (Biberson, 1964) Acheulean. Biberson and Aguirre also noted the existence of worked bone, an issue debated subsequently and pending a systematic review (Domínguez-Rodrigo, in Santonja and Pérez-González (eds.), 2005: 282-287).

This first research stage led to an interpretation of the sites which in some general aspects matched Cerralbo's imaginative foresight. The Mansegal or La Mentirosa stream valley connected the highlands plateau of the North with the Ebro Basin, and was probably a corridor frequented by herbivores during their seasonal migration (Butzer, 1971). The presence of these herds led groups of hominins –in a display of premonitory behaviour– to burn the vegetation in order to drive them into swampy zones where weeds and mud hampered the animals' movement. In these conditions would have been easy to kill them, dismembered in nearby spaces and prepared for consumption (Howell, 1966).

1.3. The Howell-Freeman period (1980-1983)

The complete aperture of East Africa to Pleistocene research led Howell to interrupt his Spanish work in 1963. The large interdisciplinary teams which started to work at African sites proved decisive and triggered profound changes to the methods used in Palaeolithic archaeology from the 1970's onwards. In this context, the interpretations of Torralba and Ambrona were reviewed by Binford, who found no arguments in support of organized hunting, expressed doubts about the presence of fireplaces and questioned whether the areas containing bones had

remained in a primary position. Even in the absence of different data from those published by Howell and his team, Binford suggested that natural agents and trampling by elephants had caused intense modifications (Binford, 1987).

The debate was in full swing when a new phase of research at Ambrona began in 1980. With the addition of 207 m^2 dug by E. Aguirre in 1973, by the start of the 1980 season, almost 1450 m^2 had been excavated at Ambrona. During this stage, under the joint leadership of Howell and Freeman and the management of M. Almagro –responsible for channelling relations with the Spanish government and facilitating funding for the project under the Spain-US Cultural Cooperation Programme–, an additional 1267 m^2 were dug in 203 days. By 1983, 2717 m^2 of the estimated 6000 m^2 of the Ambrona site had been excavated. In addition, work continued on the hillside opposite Loma de los Huesos (Camp North). Here, although published references are quite vague (Howell and Freeman, 1982), we know that a little over 200 m^2 were dug, 55m^2 in 1963 and 162 m^2 in 1981 and 1983, according to unpublished documents held at the Numantine Museum in Soria.

The Ambrona assemblage remained attributed to Butzer's "Torralba Formation", with new aspects in the stratigraphic interpretation (Howell *et al.*, 1995), primarily the differentiation of two members, the "Lower complex" and the "Upper complex". The former included the characteristic concentrations of megafauna –particularly elephant– and Acheulean industry. An intermediate occupation was defined in the central part of the site, with fauna and sporadic industry considered close or equivalent to Camp North, where deer, aurochs and elephant were recorded along with some Acheulean handaxes. At the "Upper Complex", on the levels of alluvial and colluvial origin, a more frequent and more evolved lithic industry than the Lower complex was detected, also identified as Acheulean. Scarcely any elephant remains were detected, replaced in importance by *Equus* (Howell *et al.*, 1995).

At the end of this stage, the older interpretations of Ambrona's Lower complex were accepted with certain nuances. The faunal remains were basically regarded as residue from deliberate hunting activity and the processing and consumption of the food. The hominins had also shifted substantial portions of this prey to their base camps, whose location was imagined –in the absence of evidence– to be on high ground overlooking the area, "overlooking the valley" (Freeman, 1994).

2. Current state of research at Torralba and Ambrona

2.1. Digs from 1990 to 2000 and subsequent work

The controversy over the nature of these sites continued into the late 1980's, and the published information was still insufficient to be able to test the hypotheses proposed in the light of the previous excavations. Substantial unknowns still remained about the general sedimentary processes and also the microstratigraphy and the spatial distribution of the remains.

It was known for certain that there were still large unexcavated areas in Ambrona and probably in Torralba as well. Consequently, in 1990 –following an excavation permit granted to E. Carbonell in 1988 which was not continued and there are no known results– another project headed by M. Santonja and A. Pérez-González was begun using geoarchaeological, taphonomic, and techno-economic methods. In summary, its aims were to understand the morphodynamic and sedimentary processes in order to contextualize the megafauna assemblages and interpret the human activity in this area (Santonja, 1989).

An initial stage between 1990 and 1991 ascertained the basic features of the local geomorphological evolution and situated the sites in a geological framework at the local and regional scale (Pérez-González *et al.*, 1991).

Annual digs were conducted at Ambrona from 1993 to 2000, focused on the "Lower complex", with 688 m^2 excavated. In Torralba, work was hampered by the large volume of waste material from previous excavations dumped on the site itself, and thus only limited test pits were dug (Santonja *et al.*, in Santonja and Pérez-González (eds.), 2005: 104-123).

In 2001, a vertical electrical sondage was lowered into a sinkhole in Jurassic dolomites 200 m NE of Ambrona, where Pleistocene fauna was recorded. In 2001 and 2002, samples were removed for magnetostratigraphy as well as dating by luminescence and aminoacid racemisation (Parés *et al.*, in Santonja and Pérez-González (eds.), 2005: 190-199; Falguères *et al.*, 2006).

Finally, in 2013 the National Human Evolution Research Centre (CENIEH) began fresh digs focused initially on the middle stratigraphic member –partly equivalent to the Upper Complex of Howell (Pérez-González *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 176-199)–, in Ambrona and Torralba.

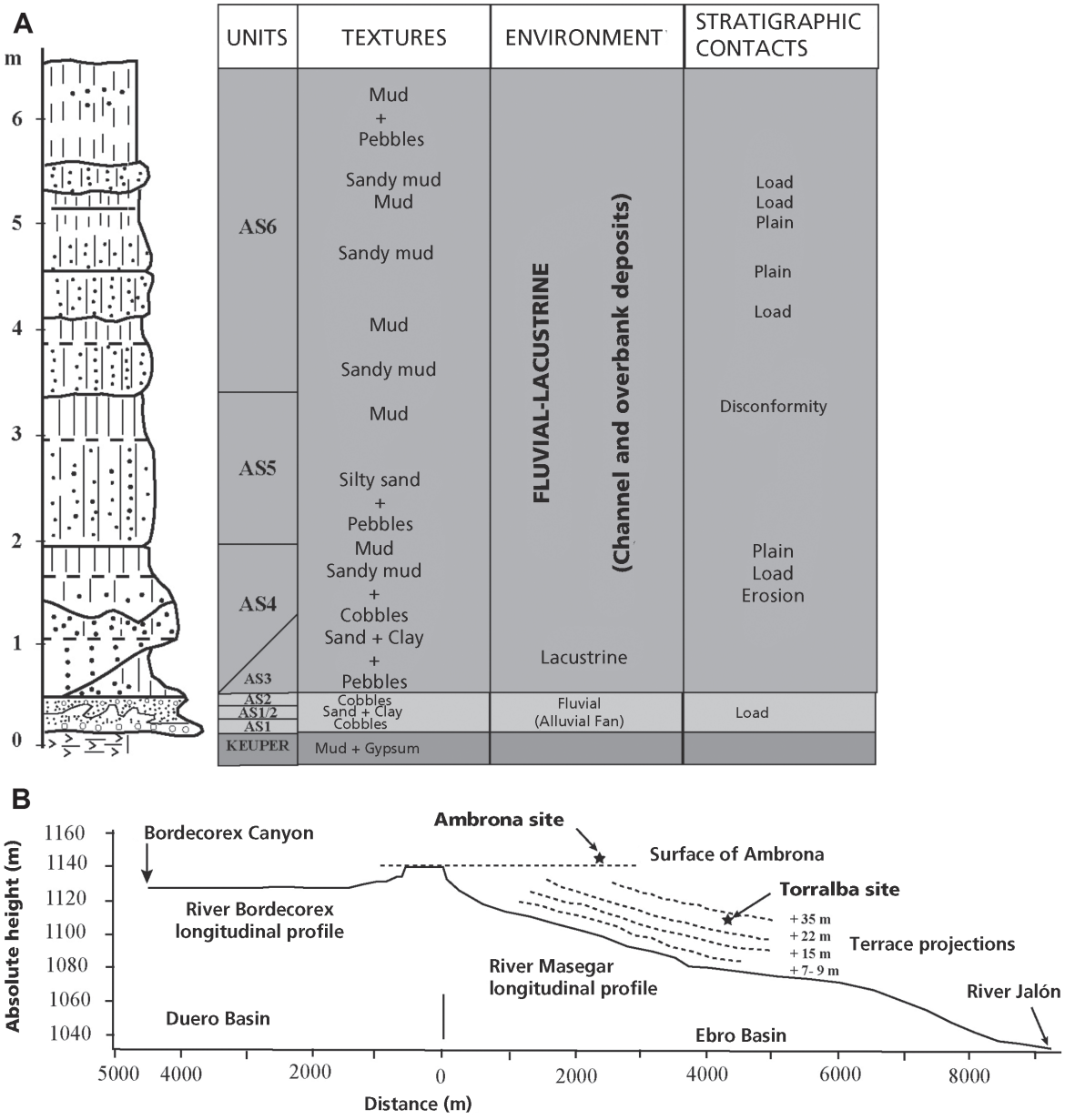

Figure 2. A: Stratigraphy of Ambrona, lower and middle members, in the central sector of Loma de los Huesos. B: Relative geomorphological position of the Torralba and Ambrona archaeological sites.

2.2. Results from Ambrona and Torralba sites between 1990 and 2000

2.2.1. Geomorphology and chronology of the sites

Ambrona is at the bottom of the karst valley or polje between Torralba, Ambrona and Conquezuela, while Torralba is in the valley of the Mansegal, built up from the bottom of the polje and set on the + 35 m terrace of the current valley (Pérez-González *et al.*, in Santonja and Pérez-González (eds.), 2005: 176-199). A cut and fill phase of the Mansegal stream, and another of the +35 m terrace development and subsequent incision on this terrace separate the two sites (Fig. 2b), categorically invalidating hypotheses which merged their stratigraphies in a single unified sequence (Butzer, 1965).

The chronological distance between Ambrona and Torralba has also been checked by numerical

dating. The middle stratigraphic unit of Ambrona has been dated at c. 350 ky by ESR/U series (Falguères *et al.*, 2006), suggesting an age of around 400 ky for the lower unit of this site. In the case of Torralba, OSL datings currently in press (N. Mercier) indicate around 200 ky, similar to the 220 ky and 240 for U series (Howell *et al.*, 1995), obtained on a +20-25 m terrace (comparable to Torralba) in the nearby Alto Henares area. This reinforces the geomorphological interpretation which refutes the contemporaneity of the sites and instead suggests a sequence of occupations in the area. The Torralba site at the bottom of the Mansegal River valley is close to MIS 7 (243-192 ky), while the lower and middle stratigraphic units of Ambrona correspond to MIS 11 (424-375 ky) and MIS 10 (374-338 ky) or 9 (337-301 ky) respectively, in positions related to the small ponds and the drainage network which developed at the bottom of the Conquezuela polje.

2.2.2. Ambrona stratigraphy

The stratigraphic units defined in Ambrona correspond to fluvial and fluvio-lacustrine environments (Pérez-González *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 176-199), each one with a different preservation potential for remains. A systematic, integrated stratigraphic interpretation has been proposed for the site, which we have called "Ambrona formation", consists of the lower, middle and upper members. Excavation campaigns from 1993 to 2000 were carried out in the lower member, that includes the following levels (Fig. 2a):

- A fluvial (AS1) and another fluvio-lacustrine level (AS4) which contains the highest density of lithic and faunal remains, albeit in a derivative position, partly brought from outside the preserved site.
- Level AS3, composed of mud built up at the bottom of a shallow pond with occasionally input via small channels. This level has the best conservation conditions for industry and fauna remains, mainly found in a primary position.
- Other minor levels in the lower stratigraphic unit are of a fluvial nature (AS1/2 and AS2). At the top of this unit is the fluvio-lacustrine level AS5. The presence of archaeo-palaeontological remains is sporadic in all these cases.

All these levels were mapped, defining the vertical and horizontal relationships of the stratigraphy across more than 400 linear metres. While AS1, AS5 and AS6 are spread across almost the entire site, other levels cover smaller areas, resulting in different stratigraphic sequences in each zone. Thus, in the Central and Western sectors there are several areas where AS1/2, AS2 and AS3 are absent and the AS4 level lies directly in contact with AS1.

The middle member of the Ambrona formation (AS6) includes fluvio-lacustrine deposits in the Central and Western Sectors and fluvial deposits in the Eastern Sector. The latter are rich in lithic industry and they also contain fauna. In some cases they occur in overbank facies, accumulated in low energy conditions which enabled the remains be found in an almost primary position. The Ambrona formation is completed by the upper member (AS7), composed of channelled and edaphized facies. It is archeologically and palaeontologically sterile.

2.2.3. Ambrona palaeontology

The results from the 1990-2000 stage almost coincide with those obtained previously, with some further details, particularly about birds and small vertebrates. The mammal association identified between 1993 and 2000 (Sesé and Soto, in: Santonja and Pérez-González 2005 (eds.): 258-281) is the following: *Crocidura* sp.; *Microtus* (Iberomys) *brecciensis*; *Arvicola* aff. *sapidus*; *Apodemus* aff. *sylvaticus*; *Oryctolagus* sp.; *Canis lupus* cf. *mosbachensis*; *Panthera* (*Leo*) cf. *fossilis*; *Palaeoloxodon antiquus*; *Stephanorhinus hemitoechus*; *Equus caballus torralbae*; *Cervus elaphus*; *Dama* cf. *dama*; *Capreolus* sp. and *Bos primigenius*. Other taxa identified previously in the lower Ambrona member must be added to this list (Howell *et al.*, 1995): *Vulpes* sp., *Crocuta crocuta* aff. *praespelaea and Megaloceros* aff. *savini*.

In the middle member, almost the only species recorded to date from the 1993-2000 excavations is *Equus caballus* and very occasional remains of *Palaeoloxodon antiquus*.

The presence of avian fauna is recorded (Sánchez Marco, in: Santonja and Pérez-González 2005 (eds.): 248-257): *Anser anser*; *Tadorna ferruginea*; *Tadorna* sp.; *Anas acuta*; *Anas strepera*; *Anas* sp.; *Mergus merganser*; Anseriformes indet.; *Fulica* cf. *atra*; *Otis tarda* and *Vanellus vanellus;* A herpetological sample (Martínez-Solano and Sanchiz,

in: Santonja and Pérez-González 2005 (eds.) : 232-239) includes: *Bufo bufo*; *Bufo calamita*; *Discoglossus* cf. *jeanneae*; *Hyla arborea*; *Pelobates cultripes*; *Pelodytes punctatus*; *Rana perezi*; *Rinechis scalaris*; *Natrix* sp.; Lacertidae and Colubridae indet. There was also some ichthyologic remains (Perea and Doadrio, in: Santonja and Pérez-González 2005 (eds.): 240-247) of C*hondrostoma arcasii*.

The macromammal series is considered characteristic of the advanced but not final Middle Pleistocene, with more modern elements than the peninsular faunas from early Middle Pleistocene sites such as Cúllar de Baza I (Granada) or Buenavista, Campo de Tiro and Polígono Industrial (Toledo), characterized by *Mammuthus trogontherii*. The micromammals show a similar chronology. The morphology and size of *Microtus* (I.) *brecciensis* teeth imply a previous age to those found in late Middle Pleistocene populations of the same species. The presence of a relatively large form of the *Arvicola* aff. *sapidus* species indicates a more modern phase than the fauna from Cúllar de Baza I, with *Arvicola mosbachensis*. The evolutionary stage of the Ambrona microfauna corresponds to the third ensemble of Middle Pleistocene associations defined by Sesé and Sevilla (1996), which include fauna such as that found in Áridos.

2.2.4. Palaeoenvironments

In addition to the study of the fauna and nanofauna –ostracods–, palynology and biomineralizations –phytoliths– have provided information about the environmental conditions when the deposits of Ambrona formation were accumulated (Baltanás *et al.*, 2005; Ruiz Zapata *et al.*, 2005; Pinilla *et al.*, 2005, in Santonja and Pérez-González (eds.), 2005: 200-231). All the conclusions indicate the existence of climatic constants which were comparable to the current conditions, albeit with certain nuances.

The macromammals from the lower member of Ambrona indicate a good representation of forest environments and open lands, with meadows and areas with abundant water in relatively warm and moist climatic conditions. Birds confirm the proximity of wetlands, flooded zones and shallow water bodies. Some species like the common goose and lapwing denote flat or gently undulating grassland. Taxa such as swamphen, coot and northern pintail require thick patches of vegetation around water bodies. The swamphen, a sedentary animal, is incompatible with very low temperatures. The herpetofauna corroborates these interpretations and indicates that the conditions were similar to today, with a more or less contrasted seasonality, less dry summers and less wet springs and winters, with slightly higher winter temperatures.

Locally, the presence of ostracods as *Leucocythere* cf. *mirabilis* in several levels indicates a lake system in oligotrophic conditions. The taphocenosis found in the ostracods is similar to current conditions in shallow ponds and lakes in southern Europe. Sometimes, *Heterocypris salina* became predominant at Level AS6 (middle member), suggesting a drier and colder period, a trend also suggested by the dominion of *Equus caballus* in replacement of *Palaeoloxodon antiquus*.

The silicophytoliths in the lower member suggest a temperate climate. The diatoms are often epiphytes, indicating a frequency of aquatic plants. Biominerals are less abundant at the top of the lower member due to the changed environmental conditions. Silicophytoliths are more abundant, but with many spicules and diatoms reduced to the *Amphora* genus, reflecting quite stressful environmental conditions for microorganisms. The reduction in the number and variety of biominerals is greater in the middle member: virtually all are silicophytoliths and almost all C3 grasses. *Hantzschia amphioxys*, a species that can survive in a wide range of saline environments, predominates amongst the diatoms. There are almost no biominerals at the top of AS6, suggesting that the lake may have dried up.

Pollen analysis describes vegetation mainly consisting of pine (*Pinus*), juniper/sabine (*Juniperus*) and grasses (Poaceas). The riparian taxa such as alder (*Alnus*), willow (*Salix*), elm (*Ulmus*) and characteristic swamp species (Cyperaceas, Ranunculaceas, *Typha*...) were present. Temperate trees such as deciduous oak (*Quercus*), birch (*Betula*), chestnut (C*astanea*), hazel (C*orylus*) and walnut (*Juglans*) were also detected. These results corroborate the predominance of a milder climate than today's conditions at the time of the lower member accumulation.

2.2.5. Human presence

The technical characteristics of the lithic industry and the sources of the raw material have fostered debate about the mode and intensity of the site's use. With regard to bone industry, recent studies (Domínguez-Rodrigo, in: Santonja and Pérez-González, 2005 (eds.): 282-287) do not support the hypothesis suggested primarily by

Aguirre and Biberson about an intense transformation of elephant bones by shaping and retouch. The possibility that the fragments corresponding to the tip of infantile elephant tusks found at both sites deriving from any kind of manufacturing has also been rejected (Villa and d'Errico, in: Santonja and Pérez-González, 2005 (eds.): 288-305), arguing that they broke off naturally in the course of the elephants' lives.

To understand the significance of the Ambrona lithic industry, we must take into account its taphonomic history (Santonja *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 306-333). AS1 and AS4, the richest levels in the lower member, are fluvial deposits with a degree of energy. The industry they contain is not in a primary position, having been dragged from its original positions in the immediate vicinity of the site. This material and the fauna found on the same levels was carried and classified by size by the watercourse. The technological imbalance in the series from AS1 and AS4 are not due to any palaeoeconomic or functional factors but rather to the natural process which formed record. On AS3, however, the industry is mainly in a primary position, albeit with some items deposited along the small streams leading to the pond. It is very low-density and essentially contains final elements of *chaînes opératoires* with little or no shaping, such as non-retouched flakes selected by size and form, and also bifacial macrotools brought from outside and left on the site.

EXCAVATED AREAS IN THE LOWER STRATIGRAPHIC MEMBER OF AMBRONA IN 1993-2000	LITHIC INDUSTRY
Level AS1: 535m^2. Only 35m^2 complete. Only the surface of the level in the rest	235 items, including 9 handaxes and 5 tools. Density in 35 m^2: 5 items/m^2, 1 handaxe/5 m^2 and 1.25 tools/m^2 (= 5 items/4 m^2)
Level AS3: 250 m^2	72 items, including 2 handaxes and 17 tools Density in 250 m^2: 1 item /3.5 m^2; 1 handaxe/ 125 m^2 and 1 tool/15 m^2
Level AS4: 379 m^2	339 items, including 1 handaxe and 56 tools. Density in 379 m^2: nearly 1 item/m^2;1 handaxe in 379 m^2 and 1 tool/7 m^2

Table 1. Excavated areas and lithic industry in the Lower Stratigraphic Member of Ambrona.

The industry at AS1 and AS3 can definitely be ascribed to the Acheulean technocomplex, as with the other levels in the lower stratigraphic member, given that in AS4, hydraulic factor is responsible for the deficit in medium and large format of lithic items, which explains the absence of bifacial tools.

The industry in AS6, previously defined as a more advanced Acheulean type than the lower levels (Howell *et al.*, 1995), is characterized by the lack of true handaxes and cleavers, the development of retouched tools on flake and the presence of Levallois debitage (Fig. 3). This level corresponds to the early Middle Palaeolithic (Santonja and Pérez-González, 2006).

2.2.6. Ambrona palaeoeconomy

The study of the sedimentation processes has enabled us to establish significant differences in relation to the meaning of the presence of remains in each stratigraphic context. A unified interpretation of the site, accepted until 1993, now seems inappropriate. The process by which the sequence was built up is a millenarian time period, but each level also comprises a major diachrony. Consequently, interpretations contextualised in short time intervals can only be applied to specific stratigraphic and spatial units. Moreover, they are obviously only meaningful for each case in point, and may differ even in areas that are part of the same level.

The low lithic density suggests that human activity did not reach great intensity in the lower stratigraphic member. Although the small amount of Acheulean evidence in the surrounding area supports this interpretation (Rodríguez de Tembleque, in: Santonja and Pérez-González, 2005 (eds.): 334-

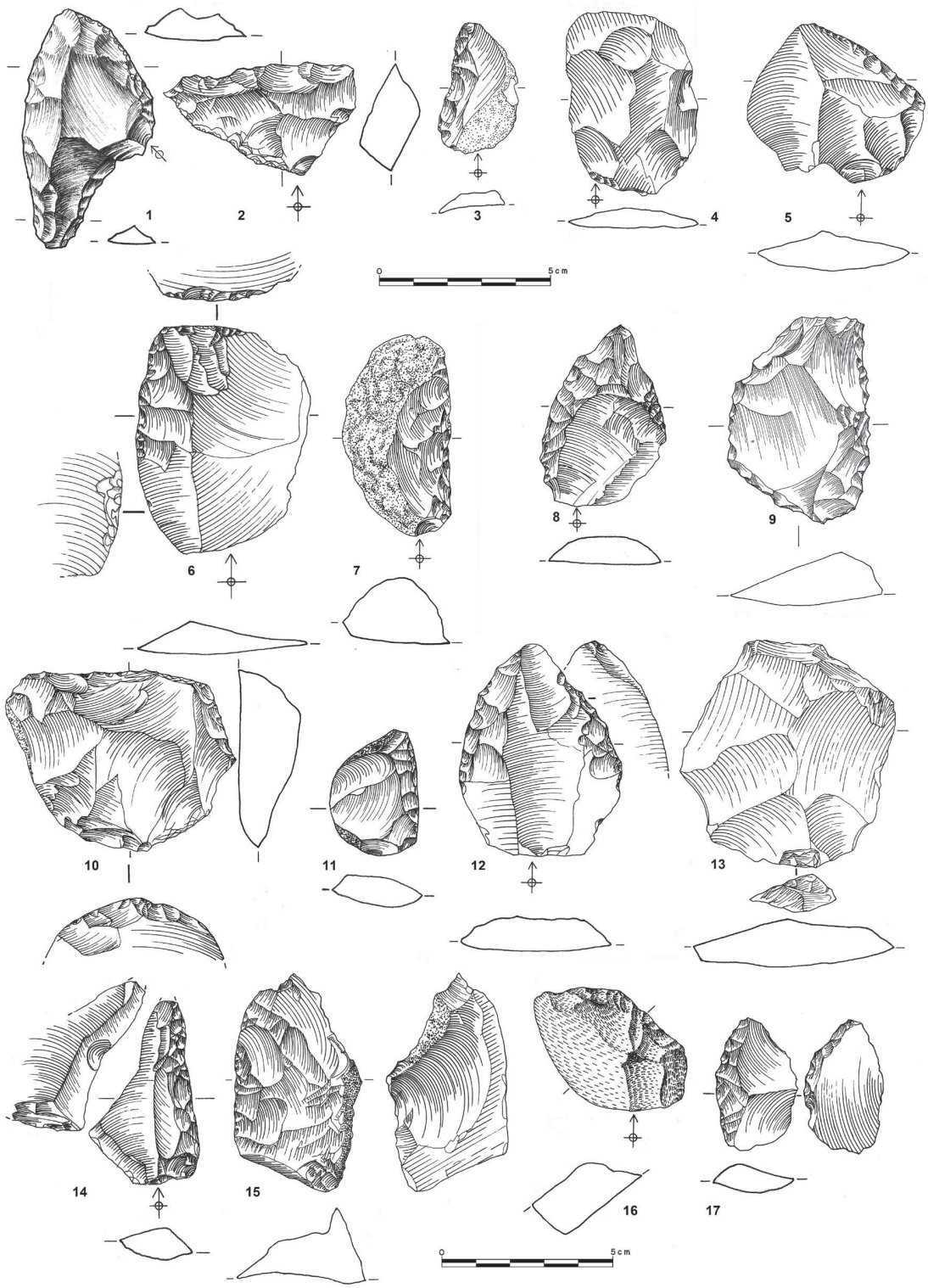

Figure 3. Lithic industry of the middle member of Ambrona site. Various sidescrapers: convergent pedunculate (1), angled-convergent (10), alternate angled-convergent (17), alternate with partial low retouch (6), doubles (8 and 12), concave (3), straight opposite a cortical back (11), sub-transversal straight (5), straights with invasive retouch (7 and 14 on *débordant* flake), straight with stepped retouch and Kombewa removal on ventral face (15) and sub-transversal convex (16). Denticulates (2 and 9). Levallois flakes (4, 12 –sidescraper– and 13). Flint, except for 8 (lidite) and 16 (quartzite).

351). Under these circumstances it must be stressed that the Ambrona area was a recurrent point of attraction for several millennia, given that lithic industry has been recorded on all levels in the lower member. The general pattern for the procurement of raw material coincides in all of them, and it must also be noted that both the flint and the quartzite used here was brought from elsewhere, in the case of the flint, from sources up to several dozen kilometres away (Freeman, 1991; Parcerisas, 2006).

The relationships between fauna –particularly elephants– and humans has not been established in all cases. The low incidence of freshly broken bones and cut marks indicates that human groups did not play a major role in the accumulation of these fauna remains. Current studies of the behaviour patterns of herds of elephants and other herbivores eloquently define the environments where remains of these animals build up in Africa: around ponds and springs, and during prolonged droughts (Haynes, 1991).

A natural scenario such as the one indicated in the previous paragraph is what we propose for Ambrona (Villa *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 352-381). The concentration alpha at Level AS3, mainly consisting of a well-circumscribed adult elephant carcass, has been studied in depth (Fig. 4). This case provides an example of an individual which died from natural causes and was buried in mud, without evidence of human intervention. The presence of lithic industry and the few recorded cut marks indicates that the Palaeolithic groups only acted in the site in a marginal way on the fauna.

2.2.7. Torralba

Work at Torralba between 1990 and 2000 has been much more limited than in Ambrona (Santonja *et al.*, in: Santonja and Pérez-González, 2005 (eds.): 104-123). Nevertheless, stratigraphic checks, numerical dating and reviews of the industry confirm that this is an Acheulean site situated chronologically toward MIS 7 (*vid.* § 2.2.1).

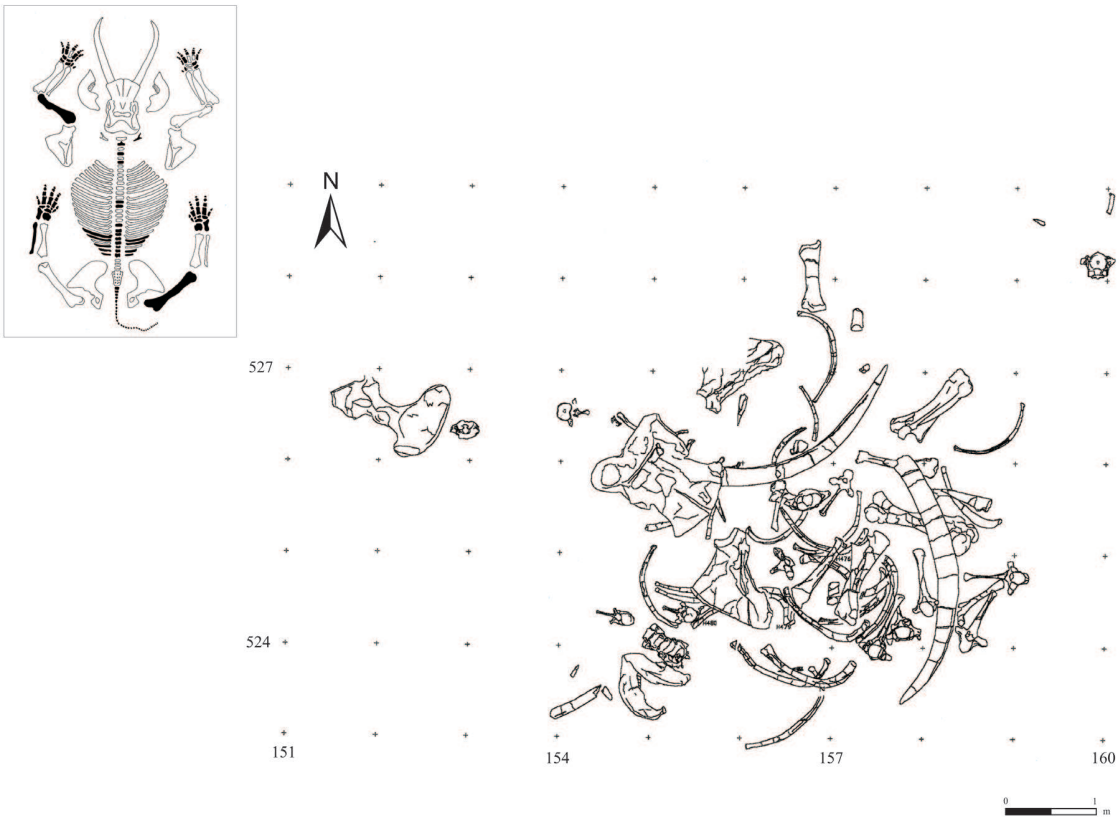

Figure 4. Remains of adult male *Palaeoloxodon antiquus* scattered across less than 60 m² on Level AS3, Central Sector. Excavation campaign of 1995. Bones not detected in the excavated assemblage marked in black (upper left).

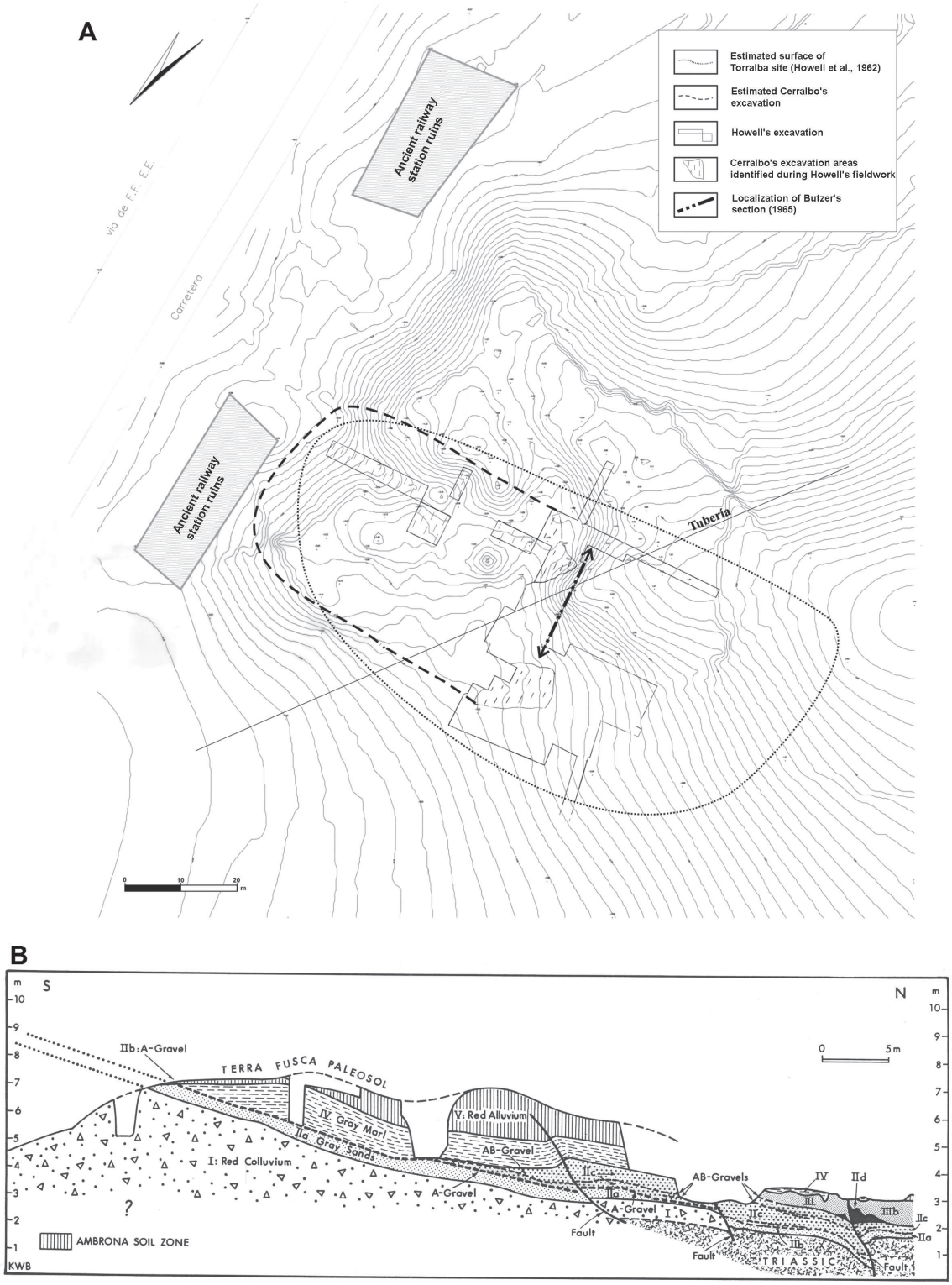

Figure 5. A: Torralba site. Zone partly dug by the Marquis of Cerralbo (1909-1913) and areas excavated by F. C. Howell (1961-1963). Equidistance of level curves: 25 cm. B: Torralba: composite stratigraphic profile (adapted from Butzer 1965).

The oldest formations on which the Torralba Pleistocene deposits lie are, as in Ambrona, red clays and gypsum from the Keuper and Triassic-Jurassic carbonate deposits. Despite the large area of the site, the only detailed stratigraphy is the N-S section in the western sector of the site (Fig. 5a), published by K.W. Butzer (1965). This is a composite profile (Fig. 5b) which starts with up to 3-4 m deep red colluvial facies lying on the Keuper. These deposits disappear to the north and the sequence continues with gray sand facies, interspersed with angular and sub-angular gravel with a carbonate composition, sized 1-3 cm along the major axis, reaching a maximum depth of 1 m in the northern half of profile. At the top there is a fairly continuous unit of grey-green marl, somewhat more sandy at the base, with a maximum depth of roughly 2 m. Above these facies, of a shallow lacustrine nature, there is a red alluvial-colluvial deposit, between 0 and 1.5 m deep. In this sector, the Pleistocene and Keuper levels are affected by reverse faults with movements of more than one metre.

The above-mentioned river sand and gravel facies contain the main concentrations of fauna and industry found during the excavations by Cerralbo and Howell. The evidence of fluvial rolling found on the fauna and industry is typical of this type of context, and implies movement or disturbance of some intensity (Sánchez-Cervera *et al.*, e. i. p.). The former interpretation of some of the Torralba stratigraphic units (Freeman and Butzer, 1966; Freeman, 1994) as occupation sites thus seems irrelevant, as they did not take into account the fact that these deposits were built up in fluvial contexts with enough energy to move the material. The same is true of the findings of the taphonomic studies of the Torralba fauna (Díez *et al.*, 1985), which assumed the unitary nature of the assemblages on each level, which is are inconsistent with the secondary position (non-autochthonous) of the remains.

The composition of the Torralba macrofauna closely resembles Ambrona, although there is a clear imbalance in the frequency of certain representative taxa such as *Equus* and *Elephas*. A parallel of any greater scope would be premature at this stage, given that only a few taxa –including *Equus* (Prat, 1977), poorly represented in the lower member of Ambrona– have been studied in depth, and the microfauna and small vertebrates –except for birds (*Tadorna ferruginea*; *Mergus serrator*; *Anatidae* indet. and *Porphyrio porphyrio*)– are still largely unknown also at Torralba.

In Torralba, the lithic industry has a density of less than 1 item per m^3 throughout the levels excavated by Cerralbo and Howell. As in Ambrona, such low frequencies suggest low-intensity human presence and interventions.

The raw material collection patterns are also similar to those observed in Ambrona. The presence of cores and flakes shows that in Torralba, quartzite and flint blocks brought from elsewhere were exploited. But the lack of cortical flakes suggests also that the material brought to the site may have been previously scabbled. Similarly, the lack of cores used to produce the flake supports for handaxes and cleavers indicates that this toolkit was already configured when it was brought to the site (Sánchez-Cervera *et al.*, i.p.).

The handaxes and cleavers on flake set lets us include Torralba in the Acheulean technocomplex. However, progressive technological items have also been observed, such as handaxes and cleavers with retouch (bifaces support of tools), making further work necessary to check for technological traditions which may be ascribed to the Middle Palaeolithic, as in the case of Ambrona. In the general context of the European Acheulean, it is important to stress the presence of true flint *hachereaux*, since there is a clear tendency to link these items closely to the availability of quartzite. In the light of the numerical chronologies now available, Torralba is one of the most recent Acheulean sites in southern Europe.

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