

The fauna of La Polledrara di Cecanibbio and Rebibbia-Casal de' Pazzi (Rome, Italy) as an indicator for site formation processes in a fluvial environment

A.P. Anzidei¹, E. Cerilli²

¹*Soprintendenza Archeologica di Roma, Roma, Italy*

annapaola.anzidei@archeorm.arti.beniculturali.it

²*Società Cooperativa ARX a r.l., Roma, Italy - eugenioicerilli@tiscalinet.it*

SUMMARY: This paper presents the preliminary results of the study of the fracture patterns and of the state of preservation of bone surfaces of the paleontological remains from the Middle Pleistocene sites of La Polledrara di Cecanibbio and Rebibbia-Casal de' Pazzi. In any case, the sampled data, although partial, are sufficiently representative for the analysis of the formation modes of the two bone assemblages, both deposited in a fluvial environment.

1. CONTEXT

The site of La Polledrara is located about 20 km NW of Rome, and it can be included within the Aurelia Formation, correlated with the OIS 9. The deposit is associated with an ancient river bed of a small water channel, incised in a compact tuffite bank, that was investigated together with parts of its edges over an area of more than 750 square meters.

The archaeological excavation started in 1985 and is still continuing. The abundant paleontological material, over 9000 specimens, mainly referable to *Elephas (Palaeoloxodon) antiquus*, *Bos primigenius*, *Cervus elaphus*, *Equus ferus* ssp., was transported by a low energy stream and deposited at the bottom of the river bed and close to the edges. Lithic industry, made from small flint pebbles and tools made from long bone shaft fragments of elephant was associated to the faunal assemblage. Later ashy tuffite sediments, containing rare bone fragments, covered the fluvial channel originating an environment characterized by stagnant water that allowed the preservation of *Elephas* and *Canis lupus* portions still in anatomical connection.

The site of Rebibbia-Casal de' Pazzi is located in the lower Aniene river valley within the suburban area of Rome. It is considered part of the sedimentary cycle of the Vitinia Formation, chronologically correlated to the OIS 7. The archaeological excavations, carried out between 1981 and 1986, covered an extension of about 1200 square meters. A portion of the ancient river bed incised in a bank of "Tufo litoide lionato" as well as the left edge have been exposed. The strata filling the river bed, composed of gravel and sands of pyroclastic origin, yielded over 2000 faunal remains mostly referable to *Elephas (Palaeoloxodon) antiquus*, *Bos primigenius*, *Cervus elaphus*, *Equus ferus*, associates with abundant lithic industry. Both lithic and faunal materials were concentrated in the levels with gravels, formed during the first phase of the river bed filling, characterized by a high energy fluvial stream. Such fluvial regimen was sufficiently strong to determine, in the flooding phases, the erosion of the older formations present in the marginal areas, also upstream of the deposit. In some of these formations there were probably some lithic and faunal materials that, as a consequence of these erosional events, were trans-

ported to the river bed. This produced a mixture of old materials with more recent specimens referable to the animal and anthropic biosphere of the territory surrounding the river.

This association of lithic and faunal materials referable to different chronological phases is the main feature differentiating the site of Rebibbia-Casal de' Pazzi from that of La Polledrara di Cecanibbio where the different phases of deposition accumulated chronologically homogeneous materials.

2. METHODS

Several parameters have been taken into account in order to investigate the features of the two bone assemblages. Such parameters are related to the natural or anthropic actions experienced by each specimen before, during and after the formation of the deposits: spatial coordinates, taxonomy and anatomy (species and age at death, skeletal element, preserved portion and segment, side), dimensions of the specimen (length, width, thickness), portion of preserved diaphysis (percentage of circumference and length), state of preservation of the specimen and of its surfaces (rolling, erosion, abrasion, abrasion striae, chipping, Behrensmeier's stage, type of fossilization and color, presence of concretions), type of fracture on proximal and distal ends (shape and angle, possible modifications and removals produced by use), presence of lateral impacts due to direct percussion and/or produced by the anvil, category where the fracture typologies of the

specimen should be placed. This research continues the formulation already applied in the preliminary studies carried out in collaboration with Paola Villa (Anzidei *et al.* 1995; Villa *et al.* 1999), following Gifford & Crader (1977).

Such parameterization of the taxonomic, anatomical and morphological attributes of the specimens allowed the definition of categories, synthesizing the events experienced by the bones from the death of the animal to their discovery during the excavation.

The analysis of the parameters relative to the state of preservation of the specimens and of the surfaces allows us to define, with a statistical meaning, duration of exposure of the bones before burial and the extent and mode of transport, as well as the spatial and temporal homogeneity of the provenience of the skeletal elements.

The aim of the analysis of fracture attributes is to define, always at a statistical level, which specimens had only natural displacement, a possible transport before the final burial, with fractures produced by sediment pressure; or which remains were fractured when the bone was still fresh, both because of natural events (e.g., impacts during fluvial transport, trampling) and human activity (fracturing for marrow extraction), but the causes cannot be always ascertained.

In few cases it was possible to recognize intentional anthropic action with the production of bone tool using the same modes of lithic technology.

Tab.1 - Categories.

0 – bones with modern damages
1 – complete bones
2 – complete bones with natural damages
3 – fragments with post-depositional fractures
4 – bones with post-depositional fractures or modifications of uncertain origin
5 – bones with fresh bone fractures without other attributes
6 – bones with evident percussion marks, cause of the fracture
7 – bones with natural or uncertain removals, larger than the chipping
8 – bones with fresh bone fractures and possible intentional removals, possibly with functional form
9 – flakes of type 8
5/7 – intermediate category
7/8 – intermediate category

3. RESULTS

The sample analyzed is still too partial to approach a global taphonomic study of the two sites; however, it allow us to make some general observations. About 40% (NISP=777) of the faunal remains of the site of Casal de' Pazzi have been analyzed and the specimens come from all the levels of the river bed filling. In the case of La Polledrara about 10% (NISP=881) of the specimens, coming from different zones of the paleosurface, have been studied. This sample, although partial, can be considered sufficiently representative for the identification of the distinctive features of the assemblage in relation to the presence of the different species and to the type of agents modifying the faunal remains.

In both sites *Elephas antiquus* and *Bos primigenius* (plus *Bos vel Bison*) are the most frequent species; the study focused only smaller specimens leaving aside, for the moment, the largest complete bones such as for example elephant vertebrae, ribs, pelvises, femurs, and tusks.

It has been possible an attribution to species or at least genus for 60.4% of the specimens analyzed at La Polledrara and for 39.9% of those from Casal de' Pazzi. A generic attribution to wider categories (large or small herbivores) was possible for 30.5% of the specimens in the first site and 51.6% in the second one. The

remaining materials, mainly flakes, often rolled (9.1% at La Polledrara and 8.5% at Casal de' Pazzi), did not allow any taxonomic attribution.

Most of the specimens analyzed are fragmented long bones; whole specimens are usually only teeth carpals, tarsals and phalanges. However, from the qualitative analysis of the whole assemblages it is possible to observe that at La Polledrara the number of complete long bones is higher than in the other site.

In the samples there are only few data relative to the age at death of the individuals. At Casal de' Pazzi 651 (83.8%) out of 777 remains do not provide indication of age, while 117 (15.0%) are referable to adults, the remaining 9 (1.2%) belong to young individuals. At La Polledrara, 720 (81.7%) out of 881 specimens, do not provide indication of age at death, 135 (15.3%) are adults, while the remaining 26 (3%) are referable to young animals.

Passing to the analysis of the alteration state of the surfaces, the percentages of rolling and erosion in the two deposits have been compared. In table 2 it is possible to observe that, while at La Polledrara rolling tend to be higher than at Casal de' Pazzi, the opposite is true for the erosion. However, it should be noted that often at Casal de' Pazzi the strong erosion does not allow to decipher the degree of rolling; in fact in this site there are evident surface alterations produced by more intense chemical attacks and by root action.

Tab.2 - Degrees of rolling and erosion (%) (following Gifford & Crader 1977).

Degrees	La Polledrara		Casal de' Pazzi	
	roll.	eros.	roll.	eros.
0	9.2	29.9	13.3	17.4
0-1	7.8	14.0	12.1	11.7
1	35.3	36.9	32.4	32.0
1-2	16.9	2.0	16.7	10.6
2-1	0.3	0.1	8.0	0.1
2	26.0	5.4	12.4	10.1
2-3	0.1		0.3	1.7
3	0.9	0.3		3.1
3-4				0.1
4				1.4
other	3.6	11.2	4.9	11.7
Total	100.0	100.0	100.0	100.0

In both sites, but with a clear prevalence at Casal de' Pazzi, it is possible to detect different degrees of rolling and/or erosion on the same specimen (intermediate categories and "other", in table 2). Such variability on the surface of the same element can be explained by its presence in a fluvial environment, where its displacement in different stages may have produced its partial burial and consequent partial exposure of the surfaces to natural agents.

As regards the type of fracture of bone remains, the analysis has been performed on the basis of the study by Villa & Mahieu (1991).

Fracture pattern has been therefore verified on distal and proximal ends of the long bones, with a distinction into two groups in relation to the main axis of the bone: curve (spiral), V shaped (pointed and negative), transverse, oblique, and stepped. The angle between the fracture and the external surface of the bone has been defined as oblique or right, with a further indication of the aspect of the surface as smooth or jagged. Furthermore also the degree of bone fragmentation has been recorded considering the length and circumference of the preserved shaft. On the basis of the sum of the parameters considered for each specimen, this has been placed into a specific category. The categories considered (a total of nine) are reported in tables 1 and 3.

4. CONCLUSION

From the analysis of the data reported in the table it is possible to make the following observations.

As regards the categories relative to complete bones, those with natural damages or those with natural and post depositional fractures (Categories 1-4), at La Polledrara complete bones or specimens with natural damages are more frequent (1, 2); while at Casal de' Pazzi those with post-depositional fractures or fractures of uncertain origin are prevalent (3, 4). As regards the categories relative to bones with fresh bone fractures, at Casal de' Pazzi those on fresh bone without other attributes are prevalent (5), but bones with percussion marks, almost absent at this site, are instead well represented at La Polledrara. However, it should be mentioned that the sample examined does not include the bone tool identified in the two sites (Anzidei & Ruffo 1985; Anzidei *et al.* 1999). As already evidenced by Villa *et al.* 1999, although it is known from the literature that hyenas are able to fracture bones of large herbivores producing morphological features of the fractures that could be confused with those produced by human activities, it should be considered that categories 8 and 9 at La Polledrara, include large sized long bone shaft fragments of elephant with butt and percussion

Tab.3 - Frequency of fracture categories.

Cat	La Polledrara di Cecanibbio						Rebibbia-Casal de' Pazzi					
	Gerb	Perb	Bov	Cerv	El	Total	Gerb	Perb	Bov	Cerv	El	Total
0	0.4	7.7	3.8	10.5	2.2	2.5	2.3	2.0	1.8	2.3	1.4	2.0
1	0.8		13.8	10.5	6.1	7.5		1.0	6.3	2.3		1.3
2	1.2		11.9	5.3	4.4	6.4			17.0	4.5	6.3	4.3
3	18.0	15.4	19.8	42.1	25.0	20.9	17.7	16.7	39.3	29.5	58.5	30.0
4	40.0	76.9	30.5	26.3	30.0	34.1	45.5	50.0	20.5	38.6	24.6	37.5
5	34.1		13.5	5.3	13.9	19.9	34.4	30.4	14.3	22.7	9.2	24.7
6	1.6		1.3		1.1	1.3						
7	2.0		0.9		5.0	2.2						
8	0.4		2.2		4.4	2.0			0.9			0.1
9	1.6				6.1	1.9						
5/7			0.6		0.6	0.4						
7/8			1.6		1.1	0.9						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Cat: category; Gerb: large herbivores; Perb: small herbivores; Bov: *Bos primigenius*, *Bos* vel *Bison*; Cerv: *Cervus elaphus*, *Dama* sp., Cervidae indet.; El: *Elephas antiquus*).

bulb. These large flakes are not eroded or rolled and they do not show evidence of carnivore gnaw marks. Furthermore, the same categories include also metapodial distal and proximal ends as well as radii of large bovids with several unidirectional removals on the external and internal faces subsequent to the primary fracture. Therefore, the presence at La Polledrara of bones with probable traces of utilization and modification, could be a reliable evidence for human presence with exploitation of animal resources. In contrast, at Casal de' Pazzi these evidences are much more rare, probably also for the disturbance produced by a fluvial current with a higher energy compared to that of La Polledrara.

5. REFERENCES

- Anzidei, A.P. & Ruffo, M. 1985. The Pleistocene deposit of Rebibbia-Casal de' Pazzi (Rome, Italy). *Papers in Italian Archaeology IV - Part I. The Human Landscape. BAR International Series* 243: 69-85. Oxford.
- Anzidei, A.P., Villa, P. & Cerilli, E. 1995. La Polledrara di Cecanibbio (Roma). Dati preliminari sull'analisi tafonomica dei reperti faunistici. *Atti del Secondo Incontro di Studi di Preistoria e Protostoria in Etruria (Farnese, VT, 21-23 maggio 1993)*.
- Anzidei, A.P., Arnoldus Huyzendveld, A., Lemorini, C. Caloi, L. & Palombo, M.R. 1999. Two Middle Pleistocene sites near Rome (Italy): la Polledrara di Cecanibbio and Rebibbia-Casal de' Pazzi. *The role of early humans in the accumulation of European Lower and Middle Paleolithic bone assemblages, Monographien des Römisch-Deutschen Zentralmuseums* 42:173-195. Mainz.
- Anzidei, A.P., Arnoldus Huyzendveld, A., Caloi, L., Lemorini, C., Mussi, M. & Palombo, M.R., in press. Nouvelles données sur le gisement Pleistocène moyen de La Polledrara di Cecanibbio (Latium, Italie). *Actes du Colloque International de Tautavel sur "Les Premiers habitants de l'Europe" (10-15 avril 2000)*.
- Bonnichsen, R. & Sorg, M.H. (eds.) 1989. *Bone Modification*. Center for the study of the first Americans, Orono, Maine.
- Behrensmeier, A.K. 1978. Taphonomic and ecologic information from bone weathering. *Paleobiology* 4: 150-162.
- Gifford, D.P. & Crader, D.C. 1977. A computer coding system for archaeological faunal remains. *American Antiquity* 42 :225-238.
- Haynes, G. 1991. *Mammoths, Mastodons & Elephants. Biology, behavior and the fossil record*. Cambridge: Cambridge University Press.
- Lyman, R. 1994. *Vertebrate taphonomy*. Cambridge: Cambridge University Press.
- Tagliacozzo, A., Cassoli, P.F., Curci, A. & Fiore, I. 1999. Analisi tafonomica dei resti ossei del livello Alfa. In Piperno, M. (ed.), *Notarchirico. Un sito del Pleistocene medio iniziale nel bacino di Venosa*: 455-534. Venosa: Osanna.
- Villa, P., Anzidei, A.P. & Cerilli, E. 1999. Bones and bone modifications at La Polledrara, a Middle Pleistocene site in Italy. *The role of early humans in the accumulation of European Lower and Middle Palaeolithic bone assemblages, Monographien des Römisch-Deutschen Zentralmuseums* 42: 197-206. Mainz.
- Villa, P & Mahieu, E. 1991. Breakage patterns in human long bones. *Journal of Human Evolution* 21: 27-38.