

# Plio-Pleistocene Proboscidea and Lower Palaeolithic bone industry of southern Latium (Italy)

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**SUMMARY:** Elephant remains were first reported from the Valle Latina, in inner southern Latium, in 1864, by O.G. Costa. Since, they have been discovered at some 20 sites, ranging in age from the Middle Villafranchian (Costa S. Giacomo, with both *Anancus arvernensis* and *Mammuthus (Archidiskodon) meridionalis*), to the Late Pleistocene (S. Anna near Veroli, with *Mammuthus primigenius*). Most of the relevant faunal record, however, is of Middle Pleistocene age, and is characterised by *Elephas antiquus*. This species was discovered, most notably, at several archaeological sites, in association with Acheulean industry, starting with Fontana Ranuccio near Anagni, which is dated to c. 450 ka bp by K/Ar. At such sites, bones of *Elephas antiquus* were sometimes knapped to produce bone tools, including bone handaxes.

## 1. PROBOSCIDEA IN THE VALLE LATINA

The quaternary deposits in the Valle Latina are rich in faunal finds. These include frequent elephant bones that have been the subject of scientific interest since the second half of the nineteenth century.

The first reported elephant fossils (Costa 1864) had been found in a cave near Cassino. Nicolucci (1883) reported elephant finds from all over the region. In 1889 Cacciamali presented his paper on the elephant fossils of Aquino and Arpino.

The earliest proboscidean remains in the region were retrieved from sandy fluvial deposits at Costa S. Giacomo (*sensu* Gliozzi *et al.* 1997). The finds are associated with the Middle Villafranchian fauna of Anagni. A lower left molar has been attributed to *Anancus arvernensis*. A further molar fragment with three plates has been identified as *Mammuthus (Archidiskodon) meridionalis*. The fauna includes *Macaca* cfr. *M. florentinus*,

*Stephanorhinus* cfr. *S. etruscus*, *Equus stenonis*, *Pseudodama* cfr. *P. lyra*, *Eucladoceros* cfr. *E. tegulensis*, *Leptobos* sp., *Gazella borbonica*, *Gazellospira torticornis*, *Canis* cfr. *C. etruscus*, *Vulpes* cfr. *V. alopecoides*, *Hyaenidae* gen. sp. indet. and *Hystrix* cfr. *H. refossa* (Cassoli & Segre Naldini 1993; Palombo *et al.* in press a).

An upper M3 belonging to a *M. (A.) meridionalis* was discovered during the Campo del Conte TAV railway line excavations on the left bank of the Sacco river (Capozza, this volume). The advanced morphology places it in the Early Galerian. Various faunal and scanty lithic remains were retrieved from the sequence. The fauna includes remains of cervidae, pachyderms and various species of bird. An upper M2 belonging to *Elephas antiquus* (Palombo *et al.*, in press b) was also recovered.

A tusk attributed to *M. (A.) meridionalis*, sinusoidal curved, was found at Fosso Meringo (Pofi). It is 2.9 m long and has an approximate circumference of 0.58 m. There were Miocene clays and sandstone blocks at the bottom of the

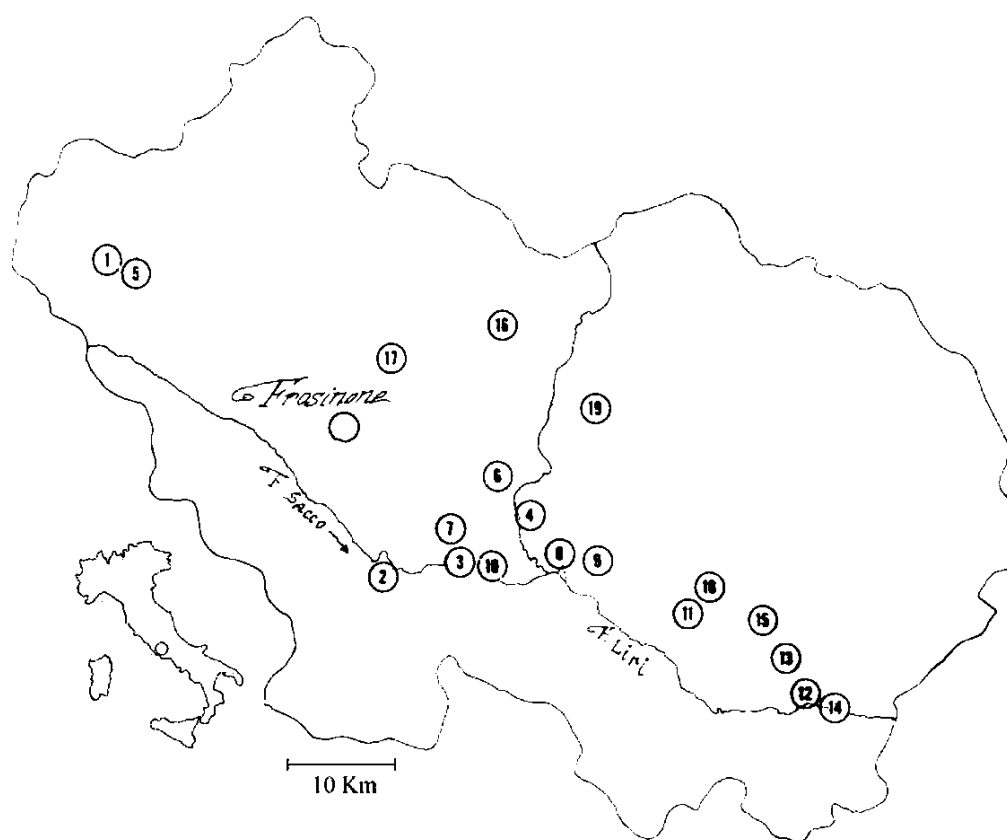


Fig.1 - Site distribution: 1, Anagni-Costa S. Giacomo; 2, Campo del Conte; 3, Pofi-Fosso Meringo; 4, Ceprano-Madonna del Carmine; 5, Anagni-Fontana Ranuccio; 6, Strangolagalli-Pietra Cantone; 7, Pofi-Cava Pompi; 8, Arce-Isoletta; 9, S. Giovanni Incarico-Lademagne; 10, Ceprano-Campogrande e Colle Avarone; 11, Pontecorvo-Cave Panzini; 12, Pignataro Interamna-Podere Tiseo; 13, 14, Pignataro Interamna-Termini e Panaccioni; 15, Piedimonte S. Germano-Ponte Castelluccio; 16, Veroli-Casamari; 17, Veroli-S. Anna; 18, Aquino; 19, Arpino.

stratigraphic sequence covered by an alternating sequence of layers of Lower Pleistocene gravels. These were sealed by layers of peat, gravels and sands with volcanic mineral inclusions. The tusk lay in sandy sediments, with the presence of altered augite. The latter could be associated with distant volcanic activity, prior to that of the Ernici district. The upper part of the sequence included flake and pebble flint artefacts. Of interest among the bone industry artefacts is a point worked from a bone flake. It has striking platform, one side has been retouched by deep notches and the platform has been whittled down with burin-like removal (Biddittu 1974).

*Elephas antiquus* finds came to light in 1899 in gravel flood deposits at Ceprano. They include the pelvis, a radius, ulna, a femur, the glenoid socket, the lower jaw with molar fragments and various other fragments of molars and tusks. They are kept in the Madonna del Carmine sanctuary. The fragment of molar that has been examined has plates with a loxodont *sinus* and a central v-shaped. The enamel varies in thickness from 2.2 and 3.3 mm (Celletti 2000).

Numerous elephant remains have been collected on the Fontana Ranuccio site (Anagni) (FU) explored by the Istituto Italiano di Paleontologia Umana (Biddittu *et al.* 1979). After K-Ar, dating the archaeological layer is 458,000 years old, bracketed by volcanic deposits dating back to 528,000 and 366,000 years ago respectively. The faunal record includes *Elephas antiquus*, *Stephanorhinus* cfr. *S. hemitoechus*, *Equus* sp., *Sus scrofa*, *Hippopotamus* ex. gr. *H. amphibius*, *Cervus elaphus eostephanoceros*, *Capreolus capreolus*, *Dama clactoniana*, Megacerini gen. spec. indet., *Bos primigenius*, *Ursus deningeri*, *Cuon* cfr. *C. alpinus* and *Panthera leo spelaea* (Cassoli & Segre Naldini 1993; Palombo *et al.* in press a). The elephant molars are elongated and tapering with a central v-shaped fold on both sides of the enamel loop. The lithic implements includes a few lava and flint bifaces as well as small-sized flake artefacts. There are several bone artefacts, mostly made on the diaphysis of elephant bones, including bone

bifaces (Biddittu & Bruni 1987). Four human teeth were found, two molars and two incisors (Ascenzi & Segre 1996).

An *E. antiquus* lower jaw and a fragment of humerus from Pietra Cantone (Strangolagalli) may also belong to Fontana Ranuccio FU. The remains came to light twenty years ago during agrarian work. The molars appear to be archaic given the enamel thickness (between 2.6 and 3.1 mm) and lamellar frequency (6) (Celletti 2000).

The Istituto Italiano di Paleontologia Umana carried out excavations at the Cava Pompei site of Pofi in 1961 and 1976. A sequence of deposits from Pofi's polygenic volcano was recorded. These lay beneath a sequence of redeposited volcanic sands with lithic industry and faunal remains as well as human bones (tibia and ulna). The faunal record includes *Macaca florentinus*, *Elephas antiquus*, *Stephanorhinus* sp., Megacerini sp. gen. indet., *Dama* cfr. *D. clactoniana* and *Cervus elaphus* (Biddittu & Segre 1978). The lithic assemblage includes both lava and flint artefacts. The former consists of choppers, denticulates and flakes. The flint artefacts are small flake implements. There are also artefacts worked from the diaphysis of big mammals including elephants. The stratigraphic position suggests an age between 350 ka and 400 ka BP.

In the second half of the nineteenth century G. Nicolucci quoted elephant finds from Isoletta (Arce). In 1999 the Soprintendenza Archeologica del Lazio excavated a sequence of fluvial and lacustrine sediments along the railway line of the new "TAV" high speed train. Two main units were recognized. The lower one yielded a few lithic scrapers and denticulates, and some bone tools. The faunal record includes *Elephas antiquus* (a skull, two jawbones and one femur), *Stephanorhinus* sp., *Equus ferus*, *Dama clactoniana*, *Megaloceros* cfr. *M. giganteus*, *Cervus elaphus* and *Castor* sp. A preliminary analysis of the pollen and macroflora suggests a temperate period with a moist climate followed by cold and arid conditions. There are various freshwater molluscs including *Unio* sp., *Pisidium* sp., *Dreissena* sp., *Pyrgula annulata* and *Theodoxus isseli*. The

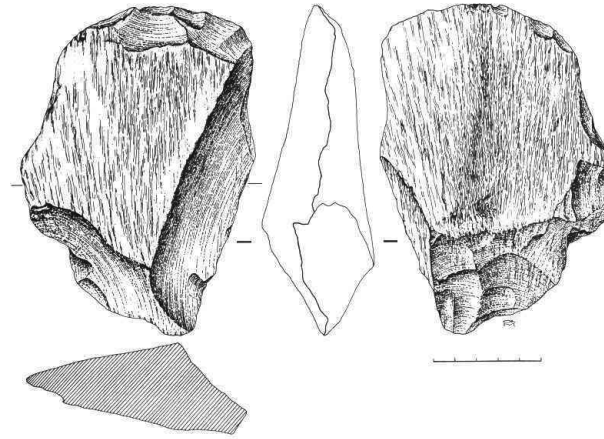


Fig.2 - S. Giovanni Incarico-Lademagne. Bone industry from the lower Acheulean level.

area was then probably partially covered by a lake, some 25 to 30 metres deep, where small reptiles, amphibians and fish lived. The fauna and flora of the lakeside ecosystem would have included hygrophyllus vegetation. The archaeological record includes flint flake artefacts and a bone scraper. Elephant molars were recovered from the sand and gravel layers and the lower silt deposits. The average enamel thickness is about 2 mm. The average laminar frequency on the upper molars is 6, whereas on the lower one it is 5.5. The aminochronological dating of an elephant molar gave an age of 385 ka bp.

The find record from the upper layers, Acheulean, includes both lithic and bone implements (bifaces, choppers, scrapers and denticulates). The faunal record includes *Stephanorhinus* sp., *Equus ferus*, *Cervus elaphus*, Megacerini gen. sp. indet., *Bos primigenius* (aminochronological dating of a molar gave an age of 174 ka) and *Canis lupus*. The *Elephas antiquus* remains included a skull, a coxal bone, a mandible with both M3 and a fragment of a mandible with a dp4. The laminae of the two M3 are consistently oval in form and lack the sinus. The laminar frequency is 5 and the average thickness of the enamel range from 1.6 to 2.4 mm. An *Elephas antiquus* foot in anatomical connection was recovered from the upper layers. A jaw fragment belonging to

*M. trogontherii* was recovered from the earliest layers. The M2 are ovoid, the lamellar frequency is 5, the enamel thickness is 2 mm (Zarattini 1999; Celletti 2000).

The Lademagne site (S. Giovanni Incarico) two km east of Isoletta, two Acheulean deposits have been explored. The faunal record of the lower deposit includes *Elephas antiquus*, *Equus* cfr. *E. ferus*, *Hippopotamus* cfr. ex gr. *H. amphibius*, *Bos primigenius*, *Dama* cfr. *D. clactoniana*, *Cervus elaphus* and *Castor* sp.. Both *Castor* sp. and *Hippopotamus* cfr. ex gr. *H. amphibius* are not found in the upper deposit. Symmetrical bifaces are included in the lithic assemblage. These are manufactured either from calcareous rock or, more rarely, from flint and quartz. Heavy-duty choppers appear to be more frequent in the lower layers. There is also lithic industry on flakes and on bone.

*Elephas antiquus* teeth (M<sup>3</sup> and M<sup>1</sup>) were found at Colle Avarone and Selvotta (Ceprano) associated to Acheulean industries. The record also includes *Stephanorhinus* sp., *Bos primigenius*, *Cervus elaphus*, *Cuon* sp, *Anser brachyrhynchus* and *Stercorarius longicaudatus*. The birds, as well as the presence of dhole, suggest a cold climate (Cassoli 1978), which might correspond to OIS 8. The lithic assemblage includes many limestone, flint and quartz

bifaces. Evidence that elephant bone was worked is given by bone flakes with percussion scars and by a rib cut transversally and splintered (Biddittu & Segre 1982).

At Cava Panzini, a quarry exposed an archaeological deposit with an Acheulean industry associated to faunal remains (*Elephas antiquus*, *Stephanorhinus* sp., *Hippopotamus* cfr. ex gr. *H. amphibius*, *Equus ferus*, *Bos primigenius*, *Cervus elaphus*, *Megaceroides* cfr. *M. verticornis* and *Anser erythrophus* - Biddittu & Cassoli 1969). There is also evidence of flaked bone industry.

Two *Elephas antiquus* skulls were discovered at Pignataro Interamna: one is in the Natural History Museum of New York (Osborn 1942), the other in the Museum of Palaeontology of the University of Naples (D'Erasmus & Moncharmont Zei 1955). They were associated to *Stephanorhinus* sp., *Hippopotamus* ex gr. *H. amphibius*, *Bos primigenius*, *Cervus elaphus*. Two flint bifaces are also recorded (De Lorenzo & D'Erasmus 1932) as well as a bone tool on an elephant long bone diaphysis (Biddittu & Palombo 2000).

From the sand and gravel deposits at Ponte Castelluccio in Piedimonte S. Germano, the following taxa are reported: *E. antiquus*, *Equus* sp., *Cervus* sp. Other finds include a limestone biface and scanty bone artefacts (Biddittu & Segre 1976).

A mandible fragment with both M<sub>2</sub> was found in 1975 at S. Anna, in the Veroli area. The molars appear to be typical of *Mammuthus primigenius*, given enamel thickness (1.3 mm) and lamellar frequency (8). There is no stratigraphic control for the deposit, but an attribution to the Late Pleistocene might be suggested after comparisons with the Předměstí sample (Celletti 2000).

## 2. FINAL REMARKS

This review confirms the occurrence of various species of Proboscidea in southern Latium all over the Plio-Pleistocene. Bone flaking was performed to produce complex tools, such as scrapers and bifaces, well before 400 ka bp. Flaked bone tools, however, are not any more

found at Late Pleistocene sites.

## 3. REFERENCES

- Ascenzi, A. & Segre, A. G. 1996. Artefacts and human teeth at the Fontana Ranuccio Middle Pleistocene site (Central Italy). *Anthropologie* 34: 39-46.
- Biddittu, I. 1974. Giacimento pleistocenico ad amigdale acheuleane nel territorio di Ceprano (FR). *Mem. Ist. It. di Paleont. Umana* 2: 61-67.
- Biddittu, I. & Bruni, L. 1987. Il rinvenimento di una amigdala in osso del Paleolitico inferiore a Fontana Ranuccio (Anagni). *Latium* 4: 3-6.
- Biddittu, I. & Cassoli, P.F. 1969. Una stazione del paleolitico inferiore a Pontecorvo in provincia di Frosinone. *Quaternaria* 10: 167-197.
- Biddittu, I. & Segre, A.G. 1976. Giacimenti preistorici e quaternario della Provincia di Frosinone, *Boll. Ist. St. e Arte del Lazio Merid.* 9: 21-44.
- Biddittu, I., Cassoli P. F., Radicati Di Brozolo F., Segre, A. G., Segre Naldini, E., Villa, I. 1979. Anagni a K-Ar dated lower and middle-Pleistocene Site, Central Italy: preliminary report. *Quaternaria* 21: 35-52.
- Biddittu, I., & Segre, A.G. 1978. Paleolitico inferiore a Cava Pompei presso Pofi, Frosinone. *Quaderni Centro Studi Arch. Etrusco-Ital.* 1: 78.
- Biddittu, I. & Segre, A.G. 1982. Utilizzazione dell'osso nel Paleolitico inferiore italiano. *Atti XXIII Riun. Sc. Ist. It. di Pr. e Prot.*: 90-105.
- Biddittu, I. & Palombo, M. R. 2000. I nuovi resti di industria e fauna di Pignataro Interamna (Lazio meridionale), *Riassunti 3° Congr. AIAZ, 2-6 novembre 2000, Siracusa*: 7.
- Cacciamali, G. B. 1889. Gli elefanti fossili di Aquino. *Boll. Soc. Geol. It.* 9: 423-424.
- Capozza, M. 2001. Microwear analysis of a *Mammuthus meridionalis* (Nesti 1825) molar from Campo del Conte (Frosinone, Southern Lazio, Italy). *This volume*.
- Cassoli, P.F. 1978. L'avifauna pre-wurmiana di

- Torre in Pietra. *Quaternaria* 20: 429- 440.
- Cassoli, P. F. & Segre Naldini, E. 1993. Le faune di Costa S. Giacomo e Fontana Ranuccio. In S. Gatti *Dives Anagnia, Archeologia nella Valle del Sacco*: 30-38. Roma: L'Erma.
- Celletti, P. 2000. Resti di proboscidi del Pleistocene medio e superiore delle valli del Sacco e del Liri (Lazio meridionale). *Tesi di laurea in Sci. Naturali, Università di Roma "La Sapienza"*. Unpublished.
- Costa, O. G. 1864. Relazione intorno agli ossami fossili di Cassino e della Melfa. *Rend. R. Acc. Sc. fis. e mat.*, giugno 1864.
- D'Erasmus, G. & Moncharmont Zei, M. 1955. Il cranio giovanile di *Elephas antiquus italicus* di Pignataro Interamna, nella valle del Liri. *Atti Acc. Sc. Fis. e nat.* 3: 1-32.
- De Lorenzo, G. & D'Erasmus, G. 1932. L'Uomo paleolitico e l'*Elephas antiquus* nell'Italia meridionale, *Atti R. Acc. Sc. fis. e mat.* 29, serie 2, n° 5.
- Gliozzi, E., Abbazzi, L., Argenti, P., Azzaroli, A., Caloi, L., Capasso Barbato, L., Di Stefano, G., Esu, D., Ficcarelli, G., Girotti, O., Kotsakis, T., Masini, F., Mazza, P., Mezzabotta, C., Palombo, M. R., Petronio, C., Rook, L., Sala, B., Sardella, R., Zanolda, E. & Torre, D. 1997. Biochronology of selected Mammals, Molluscs and Ostracods from the Middle Pliocene to the Late Pleistocene in Italy. The state of the art. *Riv. It. Paleont. Strat.* 103: 369- 388.
- Nicolucci, G. 1883. Note paleontologiche. *Mem. Soc. It. delle Sc.*, s. 3, vol 6.
- Osborn, H. 1942. *Palaeoloxodon antiquus italicus* sp. nov. final stage in the *Elephas antiquus* phylum. *American Museum Novitates*: 460.
- Palombo, M. R., Azanza B. & Alberdi M. T. in press a. Italian mammal biochronology from latest Miocene to middle Pleistocene: a multivariate approach. *Geologica Romana*.
- Palombo, M. R., Magri, D., Molinaro, A., Pisano, P. in press b. The Pleistocene sequence of Campo del Conte (Lower Sacco Valley, Southern Latium). *Geologica Romana*.
- Zarattini, A. (ed.) 1999. *Indagine geoarcheologica e paleoambientale (Isoletta, Arce)*. Tethys, unpublished report for Vianini SpA.