

Mammal fauna remains in the Middle Pleistocene volcanic deposits from Northeastern Sabatini Volcanic District area (Latium, Italy)

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SUMMARY: This paper describes mammal remains (*Elephas antiquus*, *Bos primigenius*, *Cervus elaphus*) contained in lahar deposits from the North-eastern Sabatini Volcanic District (SVD), which have been studied from a volcanological and paleontological point of view. These deposits are characterised by a very discontinuous thickness and crop out in a very small area. The stratigraphical relationship with the Tufo Rosso a Scorie Nere *Auct.* (450 ka) and with the Tufi Varicolori della Storta *Auct.* (410 ka) are based on Plinian pumice and scoria fall deposits which have been used as stratigraphic markers.

1. INTRODUCTION

The Sabatini Volcanic District (SVD) is a large volcanic field characterised by the lack of a central volcano.

Its activity, made of many small centres, spread over a wide area (about 1500 km²) and its volcanic products outcrop are found from the right bank of the Tiber valley to Rome city. Three main phases of activity have been defined in the literature: a first phase started at 600 ka in the eastern area, near the Morlupo and the Castelnuovo di Porto towns, during which prevailing pyroclastic flows and phreatomagmatic deposits were emplaced.

A second phase started in the central area of SVD, near the Sacrofano town. A new dating of the Tufo Giallo della Via Tiberina, one of the oldest known volcanic deposits in the SVD area, gave an age of 550 ka (Karner *et al.* 2001). This phase ended at 285 ka (Karner *et al.* 2001) with a caldera collapse and the eruption of a pyroclastic flow, the Tufo Giallo di Sacrofano *Auct.*

A pyroclastic flow deposit called Tufo Rosso a Scorie Nere *Auct.* (450 ka, Karner *et al.* 2001) and some pumices and scoriae plinian fall deposits are interbedded with the products of the Sacrofano volcanic centre. The origin of

these products has been located within the SVD (Alvarez *et al.* 1975), but the precise eruption locality is still uncertain.

The third phase, opened by the caldera collapse of Sacrofano, shows a progressive increase of magma-water interaction and a migration of the activity towards the Bracciano lake area. The last phreatomagmatic deposit from this last phase is 40 ka old (Karner *et al.* 2001).

Interbedded with these volcanic deposits, there have been various diatomitic deposits and paleosoils, formed during the quiescence phases of volcanic activity.

The field survey of plinian fall deposits here reported is based on the Walker's model (Walker 1973, 1981); tephrostratigraphic correlations follow the method defined by Cas & Wright (1987).

2. GEOLOGICAL SETTING

The lahar deposits, which contain the mammal remains here reported, crop out only in a small area of the northeastern SVD area. Due to the difficulty to correlated directly such lahar horizons, coeval pumice and scoria

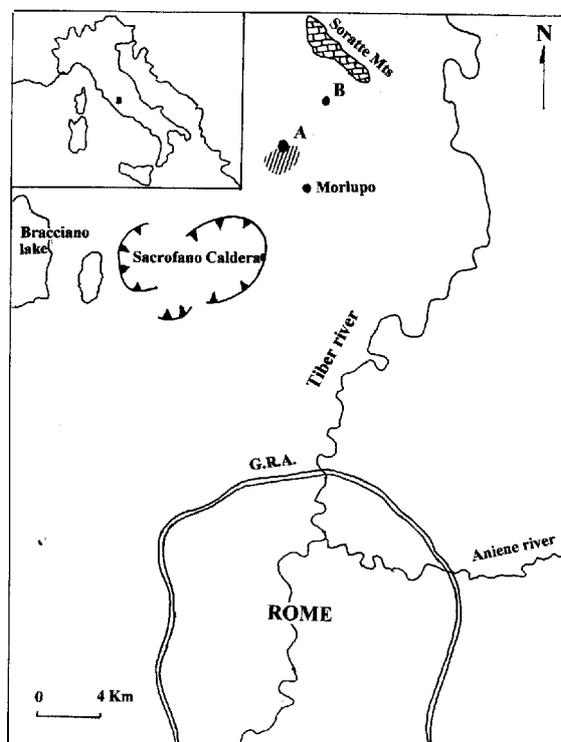


Fig.1 - Location of the Sabatini Volcanic District, North of Rome: The mammal remains area is shown in grey. The sites of stratigraphic columns reported in fig. 2 are indicated with "A" and "B".

plinian fall deposits, outcropping extensively in the SVD area, were used as stratigraphic markers. This tephrostratigraphic correlation allowed the chronology of the lahar deposits, based on the absolute K/Ar dating of two volcanic units: the Tufo Rosso a Scorie Nere Auct. (450 ka, Karner *et al.* 2001) which underlies the lahar, and the Tufi Varicolori della Storta Auct. (410 ka, Karner *et al.* 2001) which are interbedded with them.

2.1 Stratigraphy

The volcanic sequence of the Tufi Varicolori della Storta Auct., which contains the fossiliferous lahar deposits, begins at the top of the Tufo Rosso a Scorie Nere Auct. pyroclastic flow deposit (450 ka, Karner *et al.* 2001), and is made of plinian scoriae and pumice fall deposits interbedded with paleosoils, diatomite deposits, lahar deposits, epiclastic deposits,

thick idromagmatic deposits with ashy matrix and cross-laminations.

The sequence is topped by the Tufo Giallo di Sacrofano Auct (285 ka, Karner *et al.* 2001).

2.2 Lithological and sedimentological features of the fossiliferous lahar deposits

These lithoid deposits are mainly confined within paleotopographic lows, where they can reach the maximum thickness of 3 m. They are massive, very poorly sorted, with large rounded clasts (<15 cm), contain biotite and augite phenocrysts and rounded pumices in a fine-grained ashy, clayey, matrix, alternating with small continuous centimetric reverse-graded levels of well sorted pumice level.

The best preserved mammal remains are found within the fine-grained ashy matrix, probably due to their lower permeability compared to that of fall levels.

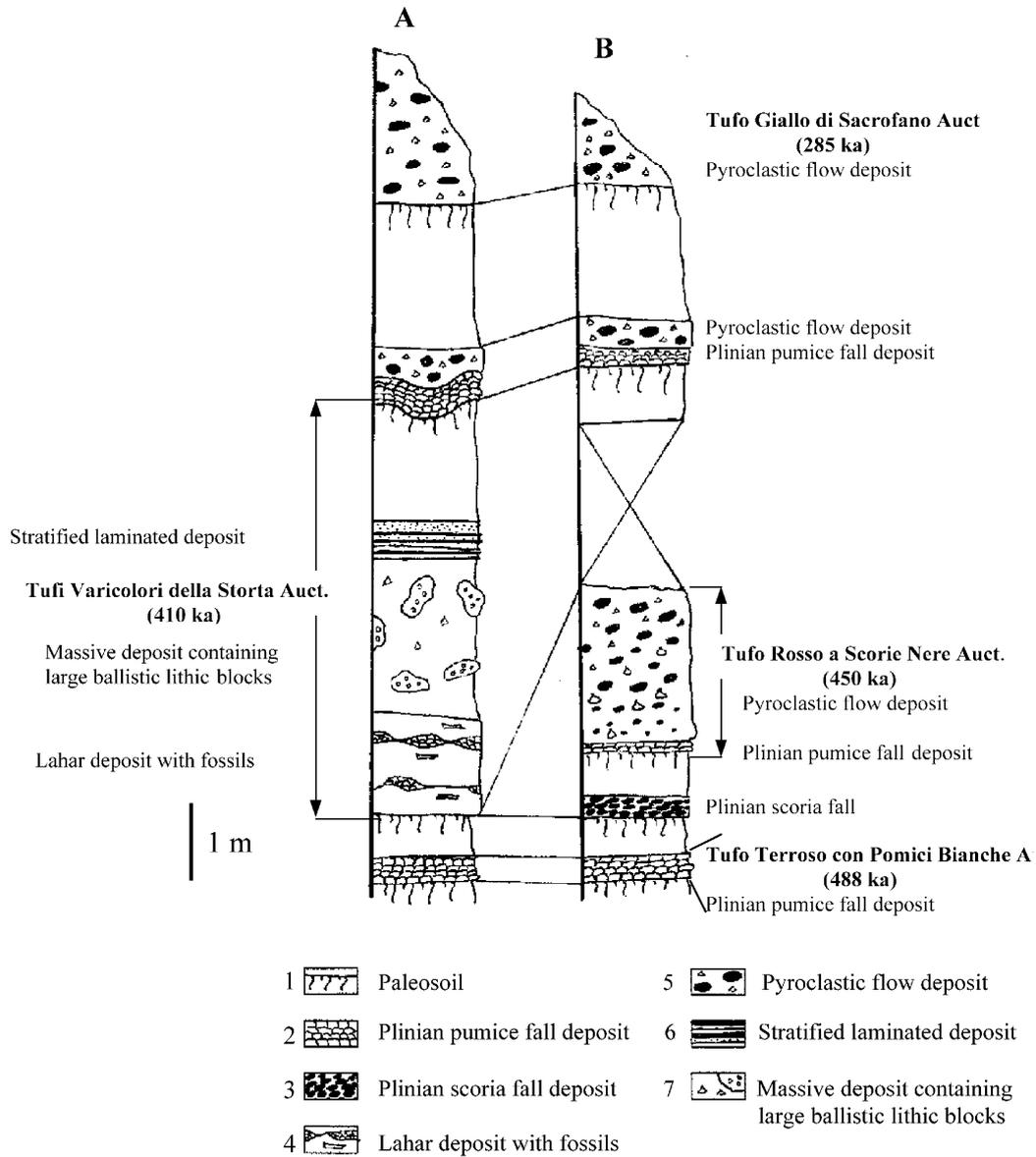


Fig.2 - Stratigraphy of the Northeastern Sabatini Volcanic District.



Fig.3 - *Elephas antiquus*: fragment of molar M³.

3. FAUNA

Three taxa were recognised:

Elephas antiquus with some tusk fragments with Schreger lines angle of 110° (average value); two fragments of M³. Two fragments probably belonging from the same tooth, possibly of the same individual, some fragments of skeleton of a young individual (fragments of parietal bone, vertebra, ribs, caput femoris, carpal and tarsal bonus). A fragment (Fig. 3) made of five lamellae, the first of these is present only in his posterior side, with a thickness compatible with the molar tooth M³.

The first two plates show clear retroflexion on both sides (cfr. Palombo 1986); the other

plates are more regular and oval shaped. The enamel is thin (2,02 mm mean value) with many folds, especially in the middle where the folds, on both the side, are very marked, especially in the last three plates where there are additional folds, strongly protruding the dental cement. In the last lamella it's clear the fusion phase with the lateral digitisation at the beginning phase. The second fragment (Fig. 4) is the back part, as the absence of pressure traces on the back wall shows and confirms the origin in M³.

Six lamellae are preserved at the first phase of wear, with digitisation separated or just united. The enamel has a thickness of 2,2 mm (average value) and shows many folds, from which protrudes the central enamel which is



Fig.4 - *Elephas antiquus*: fragment of molar M³.

both on the back and on the frontal wall.

Bos primigenius: represented by a distal epiphysis (?*Bos* sp.,? *Hippopotamus* sp.) and a fragment of a tibia proximal epiphysis.

Cervus elaphus: represented by a fragments of shed antler that does not show any subspecific diagnostic features, a fragment of vertebra, and part of femur distal epiphysis, a fragment of astragalus showing evidence of weathering.

Stephanorhinus sp. is represented by a proximal fragment of radius.

4. DISCUSSION AND CONCLUSIONS

The tephrostratigraphic correlation allowed the mammal fauna remains to be ascribed to the stratigraphic interval 450 - 410 ka.

The morphology of the molar teeth of *Elephas antiquus* is similar to the one described in the Fontana Ranuccio site (458 ka, Celletti 200, Caloi *et al.* 1998).

Their peculiar features are: the central "V" shaped fold, markedly protruding on both walls of lamina; well marked additional folds, even if the morphological and biometric data are comprised in the variability field of the later populations, like the early-Aureliano ones, (Torre in Pietra FU; Palombo, 1986; Palombo *et al.* in press). At this moment, the data collected allow to ascribe the fauna from the volcanic deposits in the north-eastern SVD area to upper Galeriano or early Aureliano.

The study of volcanic deposits from both, the volcanological and paleontological point of view, gives a powerful tool for the knowledge of the Middle-Pleistocene environment of Latium, and of the impact that the paroxysmal phases of volcanic activity had on local fauna.

5. ACKNOWLEDGEMENTS

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