

Morphological differences in *Mammuthus meridionalis* and *Palaeoloxodon antiquus* carpal bones

P. Reggiani

Paleontological Museum of Possagno, Piove di Sacco, Padova, Italy
paleostudy@libero.it

SUMMARY: *Mammuthus meridionalis* and *Palaeoloxodon antiquus* carpal bones are described. The examination of some carpals and comparisons with material found in Italy has made it possible to highlight some of the typical characteristics of these two species.

1. INTRODUCTION

Excavations carried out in 1992 and 1993 gave some fundamental answers to enquiries posed after the discovery of the Paleontological remains in the Steggio zone (Possagno, Treviso, north-east Italy). It was possible to fill a stratigraphic time gap consisting of the apparent absence of evidence of a Quaternary era in a formation geologically defined Tertiary (Paronuzzi & Tonon 1992). In the Quaternary lacustrine site at Steggio many fossil bones were recovered, among which were various carpal bones of *Mammuthus* (*Archidiskodon*) *meridionalis* (Nesti 1825).

The topic of this study is an analysis of some carpal bones of pleistocene elephants. The examinations of the remains of Steggio (Reggiani 1999) and comparisons with the abundant material found at Castel di Guido (Sala & Barb 1996), Pietrafitta (Ambrosetti *et al.* 1987), Riano (Maccagno 1962) and Grotte Santo Stefano (Palombo & Villa in press) have made it possible to highlight some morphological difference between *M. meridionalis* and *Palaeoloxodon antiquus* (Falconer & Cautley 1847). The lignite deposits of Pietrafitta (Perugia, Central Italy) contain an important association of large mammals of the Early Pleistocene (Gentili *et al.* 1996). From this fossil bed abundant rests of *M. meridionalis* have been recovered. In addition, published material which will be referred to in the text has also

been taken into consideration. Since the carpal bones are little described in the literature, we found it appropriate to introduce some characteristic for distinguishing these two species of elephants.

2. ANATOMICAL DESCRIPTION

In the distal articular surface of all the unciforms we have studied, three facets of articulation for the third, quarter and fifth metacarpal are present.

In *M. meridionalis* the unciforms ($n = 7$) are proportionally tall and narrow, while in *P. antiquus* they are low and wide ($n = 6$), as can be seen in the figure 1. This difference is highlighted in figure 2, and in fact the values of the $DT/H - DT/DAP$ relationship (Fig. 3) attributed to *P. antiquus* can be separated from those pertinent to other species.

Therefore the inclination of the proximal articular surface of the unciform is also frequently greater in *M. meridionalis* (Fig. 1). The carpal of this last species is, moreover, proportionally deeper (Fig. 2).

The unciform of the ancient elephant from Notarchirico, as described and illustrated by Cassoli *et al.* (1999), and the one of Tsoukala & Lister (1998) have a form similar to that described here. Dubrovo (1988) admits that in the forest elephant this bone is relatively wide in comparison with other species.

In the magnum of *P. antiquus* the articular

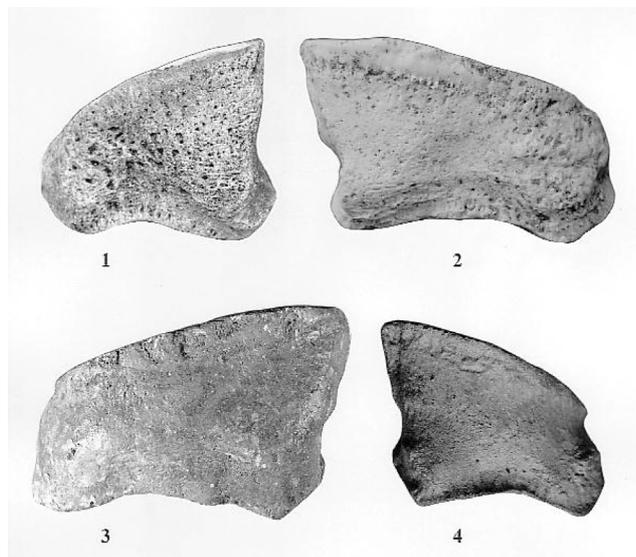


Fig.1 - Unciform viewed dorsally, 1) *M. meridionalis* n. 309 from Pietrafitta, 2) *P. antiquus* n. 11740 from Castel di Guido, 3) *P. antiquus* from Grotte Santo Stefano (Palombo & Villa, in press), 4) *M. meridionalis* n. 159/b from Steggio.

facet for the trapezoid is united, while it is divided in *M. meridionalis*. In this second species the magnum is often taller than wider. These characteristics were pointed out by Ouali & Bonifay (1998).

The trapezoids of *P. antiquus* from Cave Santo Stefano and from Riano, like those from Castel di Guido (Reggiani 1999), are proportionally long and narrow, while they are short and wide

in the *M. meridionalis*. The plantar tuberosity, on which part of the facets of articulation with the scaphoid, magnum, trapezium and second metacarpus are present, is more developed and lengthened at the back in *P. antiquus* in comparison with other species (Fig. 4).

This difference is emphasized by the value of the relationship percentage DTd (transversal diameter of the dorsal face) / DAPm (maximum

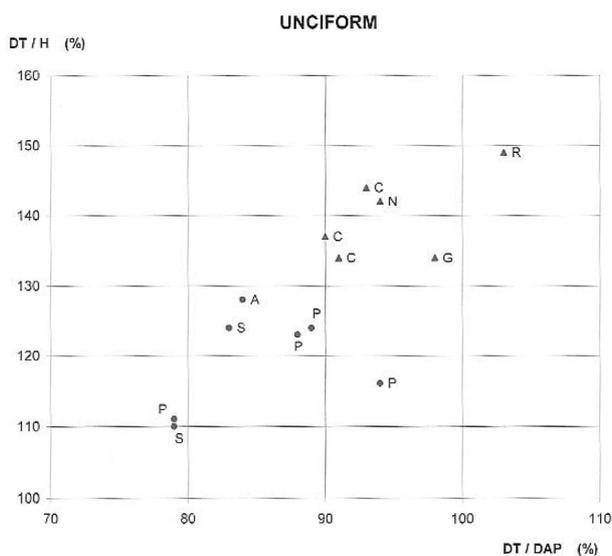


Fig.2 - The relationship between the ratio DT/DAP (transversal diameter of the dorsal face / antero - posterior diameter of the achsial face) and the ratio DT/H (transversal diameter of the dorsal face / maximum dorsal height) in *M. meridionalis* (circle) and *P. antiquus* (triangle) from Steggio (S), Pietrafitta (P), l'Aquila (A), Castel di Guido (C), Cave Santo Stefano (G), Notarchirico (N), Riano (R).

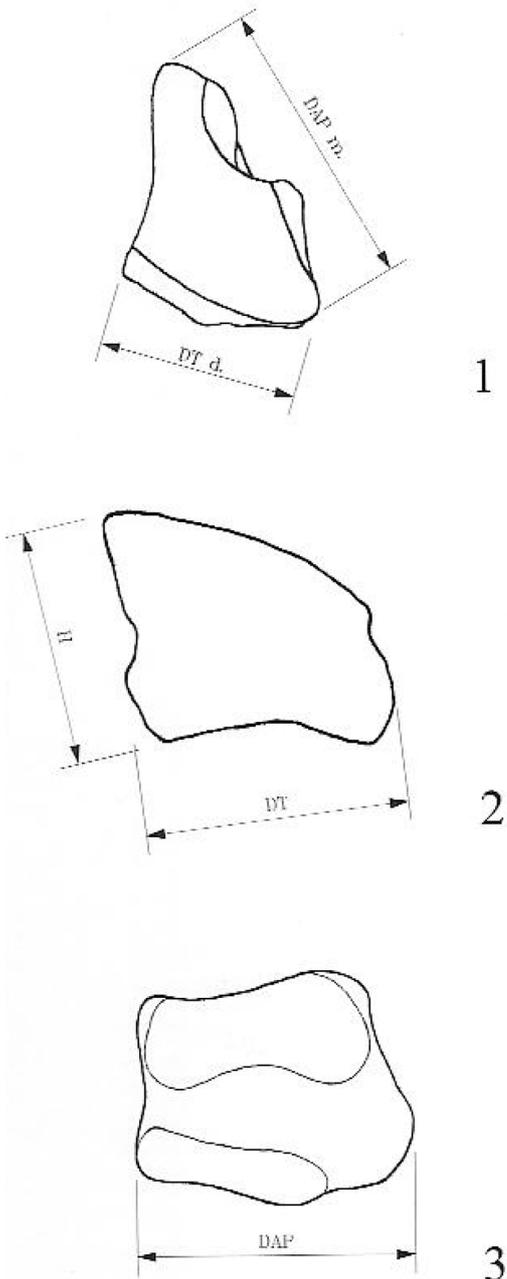


Fig.3 - Trapezoid in proximal view (1). Unciform dorsally viewed (2) and achsial viewed (3).

antero-posterior diameter) (Fig. 3). In the *P. antiquus* specimens (n = 4) this relationship varies between 56 and 64, while in the trapezoids of *M. meridionalis* (n = 4) it is 70-75. The trapezoid described and illustrated by Bonfiglio & Berdar (1986) also seems to have a form similar to that considered.

In general the bones of the first and second range of the carpus of *M. meridionalis* are narrower and taller than those of *P. antiquus*; the carpus is therefore slimmer in the former and stockier in the latter.

3. ACKNOWLEDGEMENTS

I am particularly grateful to Proff. P. Ambrosetti, M.R. Palombo and B. Sala for having allowed me to analyse the finds from Pietrafitta, Castel di Guido which are housed at the Museum of the University of Rome. I would like to thank drs. S. Gentili and R. Manni for helping me during the study of the Umbrian and Rome collections. Finally, I would like to thank prof. M. Tonon and dr. L. Picin for having contributed to the result of this work.

4. REFERENCES

- Ambrosetti, P., Faraone, A., Gregori, L. 1987. Pietrafitta: un museo di paleontologia in Umbria. *Museol. sci. IV* (1-2): 99-118.
- Bonfiglio, L. & Berdar, A. 1986. Gli elefanti del Pleistocene superiore di Archi (RC): nuove evidenze di insularità della Calabria meridionale durante il ciclo Tirreniano. *Soc. Paleont. Ital.* 25 (1): 9-34.
- Cassoli, P.F., Di Stefano, G., Tagliacozzo, A. 1999. I vertebrati dei livelli superiori (A ed ALFA) della serie stratigrafica di Notarchirico. In M. Piperno, (ed.), *Notarchirico. Un sito del Pleistocene medio-inferiore nel bacino di Venosa (Basilicata)* 1: 361-438. Venosa.
- Dubrovo, I.A. & Jakubowski, G. 1988. The carpus morphology of the forest elephant (*Palaeoloxodon*) and its significance for taxonomy. *Prace Muzeum Ziemi Warszawa* 40: 65-83.

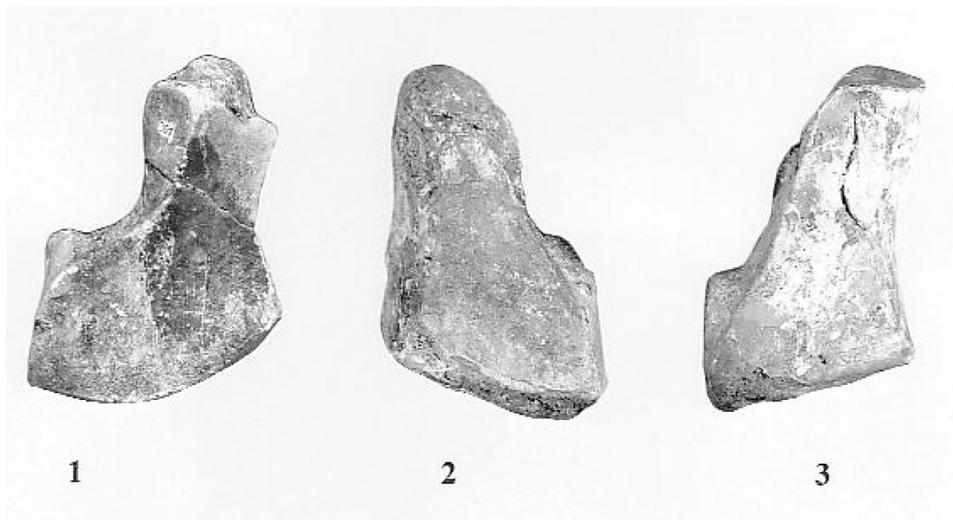


Fig.4 - Proximal view of a right trapezoid of *M. meridionalis*, n. 301 from Pietrafitta (1). Distal view of trapezoid of *P. antiquus* from Grotte Santo Stefano (2) and from Riano (3).

- Gentili, S., Abbazzi, L., Masini, F., Ambrosetti, P., Argenti, P., Torre, D. 1996. Voles from the Early Pleistocene of Pietrafitta (central Italy, Perugia). *Acta zool. cracov.* 39 (1): 185-199.
- Maccagno, A. M. 1962. Gli elefanti fossili di Riano (Roma). *Geol. Rom.* 1: 33-131.
- Ouadi, N. & Bonifay, M.F. 1998. Etudes Paléontologique et taphonomique de restes de proboscidiens. *Bull. Mus. Anthropol. Préhist. Monaco*, 39: 17-27.
- Palombo, M.R. & Villa, P. (in press). Sexual dimorphic characters of *Elephas (Palaeoloxodon) antiquus* Falconer & Cautley, 1847 from "Grotte Santo Stefano" (Viterbo, Central Italy). *Deinsea*.
- Paronuzzi, P. & Tonon, M. 1992. Il bacino lacustre villafranchiano di Steggio (Prealpi venete, Treviso): primi dati stratigrafici ed evidenze neotettoniche. *Il Quaternario* 5:251-268.
- Reggiani, P. 1999. The elephant *Archidiskodon meridionalis* (Nesti, 1825) from the Lower Pleistocene of Steggio (Possagno, Treviso, north-east Italy). *Soc. Paleont. Ital.* 38 (1): 109-119.
- Sala, B. & Barbi, G. 1996. Descrizione della fauna. In A. M. Radmilli & G. Boschian (eds.), *Gli scavi a Castel di Guido, il più antico giacimento di cacciatori del Paleolitico inferiore nell'Agro Romano. Istituto Italiano di Preistoria e Protostoria*: 55-90. Firenze.
- Tsoukala, E. & Lister, A. 1998. Remains of straight-tusked elephant, *Elephas (Palaeoloxodon) antiquus* Falc. & Caut. (1847) ESR-dated to oxygen isotope Stage 6 from Grevena (W. Macedonia, Greece). *Soc. Paleont. Ital.* 37 (1): 117-139.