

THE EARLY AND MIDDLE PLEISTOCENE SABERTOOTHED CATS IN EUROPE: TAXONOMY, BIOCHRONOLOGY AND PALEOECOLOGY.

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ABSTRACT: Sardella R. & Iurino D., *The Early and Middle Pleistocene sabertoothed cats in Europe: taxonomy, biochronology and paleoecology*. (IT ISSN 0394-3356, 2011)

Two different groups of sabertoothed cats (Machairodontinae, Felidae, Mammalia) characterized the Early Pleistocene terrestrial ecosystems in Europe: *Homotherium* and *Meganteron*. The taxonomy of these felids is matter of debate, and their importance in biochronology and paleoecology is analyzed. In Europe *Megantereon* become extinct at the end of Early Pleistocene, while *Homotherium* seems to survive until the Late Pleistocene.

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Gli ecosistemi continentali europei del Pleistocene Inferiore sono caratterizzati dalla presenza delle cosiddette "tigri dai denti a sciabola" (Machairodontinae, Felidae, Mammalia), rappresentate da due taxa che rispecchiano due diversi tipi di adattamento: *Homotherium* and *Meganteron*. La sistematica di questi felidi è molto dibattuta e sarà discussa insieme all'importanza biocronologica e paleoecologica di questi carnivori. In Europa *Megantereon* si estingue alla fine del Pleistocene Inferiore, mentre *Homotherium* diviene molto raro e sopravvive sino al Pleistocene Superiore.

Key words: biochronology, mammals, dispersal events, paleoecology, terrestrial ecosystems

Parole chiave: biocronologia, mammiferi, eventi di dispersione, paleoecologia, ecosistemi continentali

Among the top predators sabertoothed cats (Machairodontinae, Felidae) were dominant in the Early Pleistocene terrestrial ecosystems of Europe. Two genera, corresponding to two different lineages and morpho-functional adaptations, characterized the Villafranchian faunal assemblages: *Homotherium* and *Megantereon*. The taxonomy of these felids is based mainly on craniodental features and, despite an increasing number of localities provided a larger amount of fossils, including also postcranial bones, the specific attribution of such material seems to be a quite complicated matter.

Homotherium had unique craniodental as well as postcranial adaptations distinguishing it (and all the forms referable to the Homotherinii tribe) from other Machairodontinae.

Homotherium evolved from derived forms of the *Machairodus* lineage and forms referable to the Late Miocene paraphyletic species complex *Amphimachirodus* can be considered its immediate ancestors (WERDELIN L. & SARDELLA R., 2006). The timing of the *Amphimachirodus-Homotherium* transition is still unclear. The features of *Homotherium* suggest a unique ecomorphology and behaviour. It was a lion sized felid with crenulated teeth; upper canines were elongated, flat and serrated. Incisors were powerful, stronger than in any living felid. The limb proportions of *Homotherium* were very different than those of any living felid. The forelimbs were elongated, while the

hindlimbs were shorter and quite stout.

A number of different species have been proposed for the European *Homotherium* (*H. hungaricus*, *H. sainzelli*, *H. crenatidens*, *H. latidens*, *H. moravicum*) mainly based on the size and on the upper canine morphology. At present, many authors refers all the European specimens to *Homotherium latidens*,

Nonetheless, the earliest European specimens show peculiar craniodental characters (longer and narrower upper canines, stronger anterior part of the mandible, with convex labial surface) that can be considered "archaic" features. Thus, the early Villafranchian specimens should be referred to the species *Homotherium nestianus* that has been recorded at Roca Neyra (France), Pievefosciana (Garfagnana, Tuscany) and Sammezzano (Upper Valdarno, Tuscany) (SARDELLA R., 1994 and references therein).

Homotherium latidens characterized the late Villafranchian faunal assemblages and became very rare in the Middle Pleistocene; it seems to survive in Northwestern Europe until the Late Pleistocene (REUMER J. F. W. *et al.*, 2003). Finally, the presence of a preparastyle in the upper carnassial characterizes some galerian large sized *Homotherium* specimens. In the past some of these specimens were referred to *Homotherium moravicum* (Stranska Skala, Moravia; Hundsheim, Austria) (SARDELLA R., 1994), but in many following studies this species has been referred to *H. crenatidens*



Fig. 1, *Megantereon whitei* skulls from Early Pleistocene Italian localities. G1 from Pirro Nord, Apulia (up) and ARG31 from Monte Argentario, Tuscany (lower, stored at the Istituto Italiano di Paleontologia Umana, Roma). Scale bar: 1 cm.

Megantereon whitei. Crani provenienti da siti italiani del Pleistocene Inferiore. (G1) Pirro Nord, Puglia (sopra) e ARG31 dal Monte Argentario, Toscana (sotto, conservato presso l'Istituto Italiano di Paleontologia Umana, Roma). Riferimento metrico: 1 cm.

and/or *H. latidens*. Fossils sharing the “*H. moravicum* morphology” in the upper carnassials have been found also in some latest Early Pleistocene sites in northern Italy (Domegliara Selvavecchia, and other unpublished localities). It is possible that the occurrence of a separate species has been reconsidered.

The genus *Megantereon* belongs to the Smilodontini tribe and includes Plio-Pleistocene jaguar-sized, short limbed, dirk-toothed felids with a stoutly built postcranial skeleton, in which the robust distal limb bones indicate an ambushing hunting method.

The earliest occurrence of *Megantereon* in Europe is recorded in the Middle Pliocene of Les Etouaires, France (possibly 3.5 Ma, but not older than 2.5), the latest occurrence of the taxon is at Untermassfeld (Thuringia, Germany) (SARDELLA R., 1994 and references therein, HEMMER H., 2001).

Taxonomy and evolution of this felid have been discussed in several papers issued during recent decades and different interpretations have been provided. All the authors agree to refer Pliocene

European specimens to *M. cultridens*. Different interpretations are proposed for Early Pleistocene European forms. Turner considered the differences recorded into the Eurasian and African sample of *Megantereon* as due to sexual dimorphism, comparing the data to those of the living leopard. Other authors claimed a convergent evolution of the European samples of *M. cultridens* with the African *M. whitei*, due to the paleoclimate and the paleoenvironmental conditions occurring during the earliest part of the Pleistocene. They named this form *M. cultridens adroveri* (HEMMER H., 2001 and references therein). SARDELLA R. (1998) suggested the use of open taxonomy including the Early Pleistocene European specimens in *Megantereon ex gr. cultridens* (advanced form).

Recently, the attribution to *Megantereon whitei* was supported by further data and adopted by many authors (PALMQVIST P. *et al.*, 2007).

The dispersal of *M. whitei* into Europe probably occurred concurrently with other African species following the Levantine Corridor. In Europe this taxon was found in Venta Micena (Spain), Monte Argentario, Pirro Nord (Italy) and Greece (Apollonia) (SARDELLA R. *et al.*, 2008 and references therein).

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