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Chronology of the recently discovered Middle Miocene primate-bearing sites of the Vallès-Penedès Basin (Catalonia, Spain)

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After more than fifty years of study, the Vallès-Penedès Basin remains one of the most promising areas for the study of primate evolution during the Miocene in the world. Recently, many pliopithecoid and hominoid-bearing sites have been discovered in the Abocador Can Mata series (ACM) within the Masquefa-Hostalets section (l'Anoia, Catalonia, Spain). This area, which has been intensively surveyed and excavated since 2002, has yielded up to 30,000 macrovertebrate remains, and nearly 90 microvertebrate sites have been discovered. At the same time, a high-resolution magnetostratigraphic study has been carried out at the Masquefa-Hostalets section, in order to accurately date the new primate findings.

The paleomagnetic analysis has yielded a high-quality local magnetic polarity stratigraphy (LMPS). A unique and straightforward correlation with the geomagnetic polarity time scale was successfully established on the basis of, first, the characteristic reversal pattern of the LMPS and, second, the biostratigraphic constraints on the location of the Aragonian/Vallesian boundary between the historical sites of Can Mata I and Can Mata III. The Aragonian/Vallesian stage boundary, defined by the dispersal throughout Eurasia of the Late Miocene equid *Hipparion* s.l., is magnetostratigraphically well dated in the Vallès-Penedès Basin (Garcés *et al.*, 1996; Agustí *et al.*, 2001) as well as in other Spanish basins (Agustí *et al.*, 2001; Garcés *et*

al., 2003). The topmost 100 m of the composite ACM section, characterized by their normal polarity, are correlated to the characteristic long normal chron C5n, defining the beginning of the Vallesian, the base of which is 10.9 Ma. The underlying 300 m of the section belong to the Late Aragonian and have been divided into two different biozones on the basis of the presence of certain cricetid genera (Alba *et al.*, 2006). The oldest of these biozones is characterized by the presence of *Megacricetodon ibericus* and *Democricetodon larteti*, while in the following one *D. larteti* is replaced by *D. crusafonti*. (*M. ibericus* + *D. crusafonti* zone). The boundary between both biozones lies within the reversed chron C5r.3r, that ranges between 11.5 and 11.9 Ma. These local biozones are recognized in other areas of Spain and France and can be correlated to the MN7 and MN8 (sensu Mein & Ginsburg, 2002), respectively. All the classic late Aragonian primate-bearing sites of the Vallès-Penedès Basin, such as Sant Quirze and Castell de Barberà, are correlated to the *M. ibericus* + *D. crusafonti* zone. Many of the sites of the ACM series are also correlated to this biozone, although more than half of them (including Barranc de Can Vila 1, the type locality of *Pierolapithecus catalaunicus*) are placed within the *M. ibericus* + *D. larteti* zone. The earliest record of hominoids in the Vallès-Penedès area is documented at the lower part of this biozone in the ACM series at ca. 12.3 Ma.

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Modern stable isotope analogues for palaeo diet and environment studies in fossil macaques

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Macaques were widespread in Eurasia during the Pliocene and Pleistocene. Although best known from the circum-Mediterranean region, they are found as far north in Europe as Red Crag in the UK and Tegelen in the Netherlands. With the onset of the climate fluctuations of the Pleistocene, European macaques would have been subject to greater seasonality and environments that became progressively more temperate. The ability to alter dietary components according to resource availability may have been a key factor in adapting to such environmental change. Very little work has been undertaken on the palaeo-diets of macaques, in Europe or elsewhere. There is also much to be discovered about the environments of European fossil macaques.

In this work, fossil teeth of *Macaca majori*, an extinct macaque species from Capo Figari, Sardinia, were sampled for carbon and oxygen isotopes. To provide a modern comparison, samples of museum curated tissues (hair and bone) of *Macaca mulatta* (rhesus macaques) from known tropical and temperate localities were also