ON THE PRESENCE OF MEGANTEREON WHITEI AT THE SOUTH TURKWEL HOMINID SITE, NORTHERN KENYA

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INTRODUCTION

WERDELIN AND LEWIS (2000) recently described a new species of the saber-tooth genus Megantereon (Mammalia, Carnivora, Felidae) from Late Pliocene (~3.5 Ma) deposits of the Nachukui Formation south of the Turkwel River in Turkana, northern Kenya (Ward et al., 1999). The new species, Megantereon ekidoi, is said to represent the earliest occurrence of this genus in Africa. It was described from a right mandibular ramus (KNM-St 23812) with i3–m1. As discussed below, the post-canine diastema is longer than the cheek-tooth row, since there does not appear to have been a third premolar (p3), and the coronoid process is relatively well developed, showing a hook-shaped morphology (Werdelin and Lewis, 2000: Fig. 1). The fourth premolar (p4) and the lower carnassial tooth (m1) show considerable wear.

Two major reviews on the origin, evolution and dispersal of Megantereon have been published by Turner (1987) and by Martínez-Navarro and Palmqvist (1995), respectively; surprisingly, neither of these articles were cited by Werdelin and Lewis (2000).

The saber-tooth genus Megantereon shares much in common with Smilodon, and both genera form the tribe Smilodontini. The earliest presence of Megantereon is recorded at 4.5 Ma in the Bone Valley Formation (Florida), where it is represented by Megantereon cultridens. This species dispersed from North America before 3.5 Ma, to extend all over the Old World. Europe was also home to M. cultridens until the lower Pleistocene, and in China it lingered well into the middle Pleistocene (e.g., at Choukoutien Locality I).

In a comprehensive review of the systematics of Megantereon in the New and Old World, Turner (1987) considered M. cultridens to be the only valid species for this genus; however, his analysis was based on the morphology and dimensions of the lower carnassial, the tooth that shows least interpopulational variability and greatest conservatism in the evolution of the genus. The comparative study by Martínez-Navarro and Palmqvist (1995) of Megantereon remains followed a multivariate approach using both principal component and discriminant analyses of tooth measurements. The results of their study showed that M. cultridens gave rise in Africa to a new species, Megantereon whitei, characterized by a reduction in the size of both the maxillary carnassial (P4) and the mandibular premolars, particularly p3; the extreme reduction of the latter tooth is reflected in the appearance of a diastema between p3 and p4. M. whitei survived in Africa until 1.5 Ma (Turner, 1990), and is recorded at South Africa (Sterkfontein, Elandsfontein, Schurveburg, Kromdraai, Swartkrans) and East Africa (Omo, East Turkana, Koobi Fora) (Martínez-Navarro and Palmqvist, 1995). The time range of M. whitei in Africa comprises from ~3 Ma (Sterkfontein Member 2) to ~1 Ma (Swartkrans Member 3) (Martínez-Navarro and Palmqvist, 1995).

Megantereon whitei dispersed to Eurasia at the Plio-Pleistocene boundary, as recorded at Orce (Guadix-Baza Basin, Spain), Apollonia (Mygdonia Basin, Greece) and Dmanisi (East Georgia, Caucasus) (Martínez-Navarro and Palmqvist, 1995, 1996). The arrival of this machairodont in Eurasia may well have played a significant role in facilitating the dispersal out of Africa of the giant, short-faced hyena Pachycrocuta and the first representatives of the genus Homo, since Megantereon seems to have been an ambush-predator with great killing capability in relation to its nutritional requirements (Arribas and Palmqvist, 1999). Presumably it left relatively large amounts of flesh and all nutrients within bones in the carcasses of its ungulate prey; such resources could be subsequently scavenged by both hyenas and hominids (Palmqvist et al., 1996; Arribas and Palmqvist, 1998; Palmqvist and Arribas, 2001).

The goal of this article is to show that mandibular ramus KNM-St 23812, attributed by Werdelin and Lewis (2000) to M. ekidoi, is not a new species of Megantereon, and that this specimen can be confidently assigned to M. whitei.

DISCUSSION

Figure 1.1 shows the mesiodistal length of p4 and m1 in Megantereon specimens from the New and Old World (data from Turner, 1987; Martínez-Navarro and Palmqvist, 1995, 1996). The length of these teeth in the holotype of M. ekidoi (Lp4 = 14.5 mm, Lm1 = 17.1 mm; data from Werdelin and Lewis, 2000) place it very close to several specimens of M. whitei, such as TM-856 (Schurveburg, South Africa), ER-793 (East Turkana), VM-2264 (Venta Micena, Spain), and APL-12 (Apollonia, Greece). Figure 1.2 plots length against width for p4 in Megantereon; a clear-cut morphospatial discontinuity is seen between M. whitei and M. cultridens. The corresponding measurements for this tooth in the South Turkwel specimen (Wp4 = 6.3 mm; data from Werdelin and Lewis, 2000) are similar to those of African M. whitei, which show a lower Lp4/Wp4 ratio than Eurasian and North American M. cultridens.

Martínez-Navarro and Palmqvist (1995, 1996) presented linear discriminant functions between M. cultridens and M. whitei, using as variables the length and width of the fourth premolar, and the length of the lower carnassial. The function that combines the length of p4 and m1 (ϕ = 2.568 × Lp4 − 0.385 × Lm1) yields a value for the South Turkwel specimen (30.7) that clearly places it within the group formed by the African forms, very close to the bivariate mean of M. whitei populations (group centroid for M. whitei = 30.9, range of values = 26.7–36.1; group centroid for M. cultridens = 41.9, range = 37.7–48.4; limit between groups = 36.4), underlining its affinity with them. Similarly, the discriminant function for the dimensions of the fourth premolar (ϕ = 3.943 × Lp4 − 3.226 × Wp4) gives a value for South Turkwel (36.9) which is within the confidence interval around the bivariate mean of M. whitei (centroid = 33.1, range = 30.1–37.5).
and nearly incisiform in shape; 3) a single mental foramen beneath the anterior part of the postcanine diastema, approximately level with the ventral border of the main body of the ramus; 4) a shallow and long masseteric fossa, developed well anterior to the posterior end of m1, with a quite small masseteric foramen; 5) a mandibular condyle set well below the level of the cheek tooth row; 6) a postcanine diastema that angles downwards from the incisors to the cheek tooth row; and 7) a coronoid process curving backwards in a hook shape, which is particularly evident in the case of the Dmanisi mandible.

Werdelin and Lewis (2000) consider that the absence of p3 precludes the South Turkwel specimen of belonging to African M. whitei, in which this tooth is greatly reduced in size relative to Eurasian and North American M. cultridens (Martinez-Navarro and Palmqvist, 1995), although they also open the possibility that the absence of p3 could represent an individual variant in the trend for an extreme reduction of this tooth; in such a case, Werdelin and Lewis (2000) consider that the reduction of p3 would be a synapomorphy uniting M. ekidoi with M. whitei. Alternatively, the absence of p3 could be due to the loss of this tooth during the life of the animal (which reached a relatively advanced age given the considerable degree of wearing in both p4 and m1), and the subsequent obliteration of the alveolus by bony overgrowth; this situation is found in some specimens of M. whitei such as mandibular ramus VM-2264 from Venta Micena (Martinez-Navarro and Palmqvist, 1995, fig. 8), in which p3 is absent and the dental alveolus shows moderate resorption.

There has been a general trend during the last decades for over-splitting in the systematics of large carnivores, particularly in the case of Megantereon and other machairodonts, in part due to the poor and biased nature of their fossil record, their rarity in the assemblages of large mammals derived of the extremely low population densities as top predators in the paleocommunities; as a result, many new species have been described from fragmentary specimens and isolated teeth, which in some instances were heavily worn. This is so for M. euryodon, M. falconeri, M. gracile, M. hesperus, M. inexpectatus, M. megantereon, M. nihowanensis, and M. sivalensis, among others (see review in Martinez-Navarro and Palmqvist, 1995). However, the comparative analysis of metric measurements for lower and upper cheek teeth made by Martinez-Navarro and Palmqvist (1995) showed only two valid species for this genus, M. cultridens and M. whitei. The dimensions of the lower fourth premolar and lower carnassial tooth as well as the morphology of the mandibular ramus of the specimen from South Turkwel unequivocally identify it as an earlier representative of M. whitei. Thus, these results indicate that M. ekidoi, the new species proposed by Werdelin and Lewis (2000) for the South Turkwel finding, is not a valid species and must be synonymized with M. whitei; given the age of deposits at this locality (~3.5 Ma), this specimen represents the earliest occurrence of M. whitei in Africa.

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REFERENCES


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