



Original article

# Pleistocene camelids from the Syrian Desert: The diversity in El Kowm

*Camélidés Pléistocène du désert syrien :  
la diversité à El Kowm*

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## Abstract

The family Camelidae has been present in Eurasia since the latest Miocene, and several species are recognized, but their evolution is poorly known. The region of El Kowm, central Syria, includes several sites spanning the Early to Late Pleistocene and provides the only abundant fossil record of camelids in the Middle East. Our preliminary results show that several species are present over the sequence, revealing some surprising evolutionary trends.

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## Résumé

La famille des Camelidae est connue en Eurasie depuis le Miocène ; plusieurs espèces ont été identifiées, mais leur évolution est mal connue. La région d'El Kowm, au centre de la Syrie, comprend plusieurs sites couvrant la totalité du Pléistocène. Il s'agit du seul ensemble au Moyen-Orient livrant en abondance des fossiles de camélidés. Nos résultats préliminaires montrent que plusieurs espèces sont présentes sur la séquence, révélant certaines tendances évolutives surprenantes.

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## 1. Introduction

The family Camelidae (Artiodactyla, Mammalia) includes a large diversity of extinct species, but few representatives survived into recent times. These are grouped in the subfamily Camelinae and split into the Lamini and Camelini tribes (Harrison, 1985; Honey et al., 1998). Four South American species belong to the former: the guanaco (*Lama guanicoe*) and the vicuña (*Vicugna vicugna*), as well as their domestic descendants, the llama (*Lama glama*) and the alpaca (*Vicugna pacos*) (Stanley et al., 1994; Feranec, 2003; Wheeler, 2012). Modern Camelini are limited to the Old World. They include the one-humped dromedary (*Camelus dromedarius*) and the two-humped Bactrian camel (*Camelus bactrianus*) (Nowak, 1999).

Camelids originated in North America during the Uintan NALMA stage of the Middle Eocene (46.2–40.4 Ma) (Honey et al., 1998). The family was successful and developed high diversity during the Miocene, allowing the coeval existence of at least 13 genera and 20 species (Semperebon and Rivals, 2010). At the end of the Miocene, some Camelini dispersed through the Bering land bridge into the Old World (Rybczynski et al., 2013). Later, the Lamini tribe colonized South America during the Great American Biotic Interchange (Webb and Meachen, 2004). At the end of the Pleistocene, the family went extinct in North America.

Early Old World camelids are united in the widespread genus *Paracamelus*. The oldest remains are dated from the Late Turolian (MN 13, ca. 6 Ma) of China (Van der Made et al., 2002), Spain (Morales et al., 1980; Pickford et al., 1995) and Chad (Likius et al., 2003), pointing to a rapid dispersal over the arid Eurasian belt. Previous reports from Turkey have been disproved (Van der Made et al., 2002; Sen, 2010). Suggestions that camelids were already present in the Pontic region by MN 12 are questionable (Titov and Logvynenko, 2006; Sen, 2010). The Late Miocene species were remarkable for their very large size. During the Pliocene and Early Pleistocene, this genus was common in the steppe of central Eurasia, where it is recorded until 2.0 Ma (Kostopoulos and Sen, 1999; Logvynenko, 2001; Titov, 2003; Vislobokova, 2008). At the same time the first species assigned to the modern genus *Camelus* is found in India, under the name *C. sivalensis* FALCONER & CAUTLEY 1836 (Falconer and Murchison, 1868). It is very similar to advanced *Paracamelus* species, from which it most likely evolved. In the Middle and Late Pleistocene, two other species are recognized: *C. thomasi* POMEL 1983 from Algeria (Pomel, 1893; Harris et al., 2010), and *C. knoblochi* NEHRING 1901 in southern Russia and central Asia (Nehring, 1901; Titov, 2008). The most recently described species is the African *Camelus grattardi* GERAADS 2014, from Member G of the Shungura Formation (Ethiopia, 2.2 Ma) (Gentry and Gentry, 1969; Geraads, 2014). Unfortunately, none of the fossil *Camelus* species is well-known in the literature, and there is no phylogenetic scenario for the evolution of the modern species (Kostopoulos and Sen, 1999; Geraads, 2014).

Contemporary Old World camels are usually divided into two species: the domestic, one-humped dromedary (*Camelus dromedarius* L. 1758) and the two-humped Bactrian camel, mainly known as a domestic animal (*C. bactrianus* L. 1758) but also existing as a wild form (*Camelus ferus* PRZEWALSKI 1883) (Nowak, 1999; Hare, 2008). However, taxonomic controversy has surrounded the recent Camelini, as they have often been lumped in a single

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