

## Hominid-carnivore interaction: An important factor in human dispersal to Western Europe?

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During the Middle Pleistocene a new species of *Homo* and a new culture appeared in Europe. These appearances might be related to faunal change. The few localities with human remains that belong or may belong to *Homo antecessor* have estimated ages from 1.2/1.3 till 0.8/0.9 Ma. Localities in this time range with lithic industry have Oldowan or Mode1. The first localities with fossils attributed to *Homo heidelbergensis* have ages of about 0.5 Ma. The earliest records of the Acheulean or Mode 2 in Europe are claimed to be about 0.8 Ma old, but are under discussion. After 0.55 Ma the Acheulean record is abundant and continuous, but between those dates the record of lithic industry is poor. It is tempting to believe that *Homo heidelbergensis* brought the more advanced Acheulean culture to Europe. The use of hunting spears and fire may have been part of this culture. Well designed spears, such as those from Schöningen, suggest that these humans were efficient hunters. Their arrival might either have had negative effects on prey species or on competing carnivores, or, alternatively, it may have been the result of conditions with high prey abundance or low predator pressure. We cannot study changes in biomass per surface, but we can study the temporal distributions of species. Faunal change did occur during the Middle Pleistocene, with ungulate and carnivore species appearing and disappearing at different moments, often with the effect of one species replacing the other. In order to test these hypotheses, we studied the variation in ungulate and carnivore species richness in Western Europe. The study area comprises approximately the area west of the eastern frontiers of Germany and Italy. The Lower Pleistocene record older than about 1-1.2 Ma is poor in most of the area and the ages of the localities are often disputed, while even the Middle Pleistocene mammal record is poor in the north of Germany and the Netherlands and still further to the north. We counted species numbers per oxygen isotope stage mainly based on Carbonell et al. (2005, Fig. 4.2, pp. 411-

413), with the main modification that the important locality Mosbach II is correlated to stage 13 instead of 15. Species are assumed to be present from the first till the last record, unless their presence in Europe is widely assumed to have been interrupted (as is the case with *Bubalus* and *Stephanorhinus kirchbergensis*). For the carnivores we omitted small mustelids, otters, *Felix* and foxes. We scored total number of taxa and “glacial” and “interglacial” taxa. On the one hand, total and “glacial” species richness tends to fluctuate because the “glacial” species are not recorded from interglacials, while they might have been present in the north of western Europe. On the other hand, “interglacial species” are recorded from their refugia in southern Europe and thus do not fluctuate in numbers. Because we have no record of the north of Western Europe and because the human fossil record is mainly from the south or from localities of interglacial ages, we centred on the species richness minus the “glacial” taxa. Carnivore species richness tends to be relatively constant, but there is a high richness from stage 15/16 till 12/13. Acheulean industry and *Homo heidelbergensis* may have arrived during stage 14 or 15, or alternatively around 800 ka. At none of these moments a negative effect on carnivore species richness is noted, nor may a drop in carnivore species richness have caused human dispersal. Ungulate species richness had a low peak in stage 17 and subsequently rose to a high peak in stage 13. It seems thus that high ungulate species richness was not a decisive factor in human dispersal, nor does it seem that human dispersal had a negative effect on the number of prey species.

Keywords: Carnivore, *Homo*, evolution, Acheulean industry

# HOMINID-CARNIVORE INTERACTIONS DURING THE PLEISTOCENE

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