

A Tale of Ice and Campfires: Changes in the carnivoran guild of Britain during the Quaternary period influenced by hominids and climate change

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The order Carnivora is a diverse group of mammals that occupy a wide range of environments and ecological niches. This study looks at how the British carnivoran guild was affected during the Quaternary period when Britain underwent cycling glaciation events and colonisation by several hominid species. In addition to a gradual reduction in species number towards the present day, we find that the Beestonian glaciation (0.68-0.62 Ma) and the arrival of the early human *Homo heidelbergensis* during the following interglacial period (approx. 0.6 Ma) coincide with significant rapid changes in body size composition of the guild. Six small carnivorous species disappear during the Beestonian glacial period, whereas after the arrival of *Homo heidelbergensis* three large hypercarnivores (*Xenocyon lycaonoides*, *Panthera gombaszoegensis* and *Pachycrocuta brevirostris*) disappear from the British record. Competition from related species and *H. heidelbergensis*, together with the reduction of prey caused by the disappearance of many large herbivore species during the Beestonian glaciation, are the likely drivers of this observed change in carnivoran guild composition. *H. heidelbergensis* is associated with substantial evidence of tool usage and possibly the use of fire. Interestingly, we see no change in carnivoran guild structure after the arrival of *Homo neanderthalensis* (approx. 0.4 Ma), known to have competed against carnivores elsewhere, but *H. heidelbergensis* disappears from the British record soon afterwards. Overall, the functional richness of the British carnivoran community declines towards the present, corresponding with the decline observed in the contemporaneous African carnivoran guild attributed to both changes in climate and competition with early *Homo* species. The phylogenetic diversity of the British carnivoran guild also declines towards the present, and this corresponds with the decline observed in Eurasia during the same time period. However, the changes in Britain are more abrupt, reflecting its vulnerability as a peninsular/island ecosystem.