REPORT from the conference (Summary/Discussion)

The role of large herbivores in north-west European vegetation

Copenhagen, 5 – 6 May 2001

Photo: Hans Kampf

The history of large harbivores in northwest Europe: Models for today?
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The history of large herbivores in northwest Europe: models for today?

The history of the mammal fauna of Europe over the past 500,000 years is one of dramatic changes. The major cycles are between glacial and intergacial cycles on a roughly 100,000 year cyclicity. Interglacials saw a rich mammal fauna including elephants, rhinoceroses, hippopotami, up to six species of deer and two large bovids (see Table), plus big cats and hyaenas, as well as more familiar small mammals and carnivores. There was a general decline in species richness through the interglacials in the interval 500-100,000 years ago, but even the Last Interglacial (c. 120,000 years ago) saw an extensive megafauna, much of it now extinct, so cannot provide a meaningful model for today's 'natural' ecosystem in Europe. The interglacials also differed one from the other, e.g. the penultimate interglacial, c. 200,000 years ago, had a markedly savannah-like aspect, at least as reflected in its mammal fauna, while the Last Interglacial seems to have had a higher proportion of forest habitat. It is likely that a mixture of open and closed habitats was favourable to the high mammalian diversity, and according to some scholars was partly maintained by the activities of herbivores themselves.

Countries at the latitude of Britain, The Netherlands and Denmark showed the most extreme turnover in mammal faunas between glacial and interglacial stages, because their latitude makes them very sensitive to movements in the polar front. The mammal fauna of the Last Cold Stage (c. 100,000 - 10,000 years ago) included species now extinct (e.g. mammoth), those today typical of tundra (e.g. reindeer), and those of steppic grasslands (e.g. ground squirrels).

The Last Cold Stage also saw a major extinction event of large mammals across the globe. In Europe, these can be divided into two waves. Interglacial megafauna, such as the straight-tusked elephant and interglacial rhinoceros, retreated into southern Europe where they became extinct before or during the Last Glacial Maximum (maximum extent of the ice sheets, c. 20,000 years ago). Extant species such as hippopotamus also became regionally extinct from a European point of view. In the second wave, between about 12-10,000 years ago, cold-adapted megafauna such as mammoth and woolly rhinoceros became globally extinct. Explanations for this event are divided between those which favour human hunting ('overkill'), and those which point to the major change in vegetational structure (specifically, loss of the mosaic 'mammoth steppe' environment), ultimately driven by climate change. Combined vegetational and hunting hypotheses are also possible.

By the early Holocene, 9,000 years ago, the forests of NW Europe had been recolonised not only by species still surviving in our countries, such as red and roe deer, but also elk, aurochs, bear, wolf, lynx, beaver and others. However, this fauna was seriously impoverished compared to previous interglacials, specifically in large herbivores and carnivores (see Table). The 12 or so species of herbivorous large mammals of the previous interglacials had become reduced to only five, and it is unlikely that they exerted as high a grazing pressure.

Moreover, the 10,000 years of the Holocene have seen their own natural climatic and vegetational changes, so how much can even the early Holocene fauna be considered a correct model for today, if we could recreate today's natural habitats? Some species left the region long ago, due to natural Holocene changes, such as horse and pond tortoise; others are now extinct, such as aurochs, unless one follows the path of 'recreating' them genetically.

Most of the other species, however, disappeared after the Neolithic agricultural revolution or even in very recent centuries, as a result of habitat clearance and hunting. In theory, these species still 'belong' in our region. Models for their persistence in a reasonably aboriginal ecosystem exist to the east, in Poland and Russia. However, crucial to the survival of these communities is the fact that they are embedded in very large areas of habitat (particularly, the Russia taiga), so the mammals form a semi-natural metapopulation which can survive as a whole even if local areas are squeezed for various reasons. Could isolated patches of this marvellous ecosystem survive in small countries such as Britain, The Netherlands or Denmark, with their high-density agriculture and urbanisation? 'Artificial' nature may be the best we can achieve, but it is far better than nothing at all. In this case, a mosaic vegetational environment such as wood-pasture, with the habitat variety which promoted high mammalian diversity at times in the Pleistocene, may be a more suitable model than closed forest, which can support relatively fewer types of large mammalian herbivores.

Ungulate faunas from British Interglacials

STAGE	17	15	13	11	9	7	5e	1
Cervidae								
Megaloceros verticornis	X	X	X					
M. savini	X	X						
M. dawkinsi		X	X					
M. giganteus				X	X	X	X	
Alces latifrons	X		X					
A. alces								X
Cervus elaphus	X	X	X	X	X	X	X	X
Dama dama	X	X	X	X	X		X	
Capreolus capreolus	X		X	X	X	X	X	X
Bovidae								
Bison schoetensacki	X	X						
B. priscus			X			X	X	
Bos primigenius				X	X	X	X	X
Suina								
Hippopotamus amphibius		X	X				X	
Sus scrofa	X	X		X	X	X	X	X
Rhinocerotidae								
Stephanorhinus hundsheimensis	X	X	X					

S. kirchbergensis				**X**	**X**	**X**		
S. hemitoechus				**X**	**X**	**X**	**X**	
Equidae								
Equus ferus	**X**	**X**	**X**	**X**	**X**	**X**		
E.altidens/hydruntinus	**X**	**X**		**X**				
Proboscidea								
Palaeoloxodon antiquus		**X**	**(X)**	**X**	**X**	**X**	**X**	
Mammuthus trogontherii	**X**	**X**	**(X)**					
M. primigenius						**X**		
TOTAL	**12**	**13**	**12**	**11**	**10**	**11**	**10**	**5**