

## From the Miocene to the Pleistocene – new insights into cervid phylogeny

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Numerous cervid taxa are described from the Miocene, Pliocene, and Pleistocene of Eurasia, but only a few species are represented by complete skeletons or rich postcranial material. Consequently, the phylogenetic relationships between fossil cervid genera and species are poorly understood and are usually based on antler and tooth characteristics. Unlike those of antlers and teeth, postcranial characteristics are particular suitable for manual, as well as computer-aided, phylogenetic reconstruction (PFEIFFER 1999, 2002, in press).

BÖHME (1963) described a new cervid from Kaltensundheim, based on material from a juvenile skeleton. A taxonomic identification was difficult. However, in the 1970s, H.-D. KAHLKE excavated new skeletal material, representing several adult individuals, and including a left antler. This provided sufficient material for a phylogenetic analysis, which indicated that it belonged to a large cervid in the size range of red deer.

The cladistic analysis presented here attempts to define the systematic positions of the following fossil and recent cervid taxa, based on 125 skeletal characters of the postcranial bones, teeth and antlers:

- Miocene *Euprox* and *Heteroprox* from Steinheim (Germany).
- Pliocene *Croizetoceros ramosus* from St. Vallier (France).

- Pliocene *Cervoceros novorossiae* from the Shansi Basin (China), Zdansky collection.
- The new Pliocene cervid from Kaltensundheim (Germany).
- The European Lower Pleistocene *Eucladoceros tegulensis*, *E. dicranios* and *E. giulii*.
- The European Plio-Pleistocene *Dama* lineage (including the recent *Dama dama*).
- The Chinese Lower Pleistocene *Cervus* lineage (including the recent red deer, *Cervus elaphus*, and the sika deer, *Cervus nippon*).
- The European Middle and Upper Pleistocene giant deer, *Megaloceros verticornis* and *M. giganteus*.
- The European Pleistocene and Holocene telemetacarpal Alcini, *Alces gallicus*, *A. latifrons* and *A. alces*.

Results: The Miocene taxa *Euprox* and *Heteroprox*, which have virtually complete side metapodials, form the basal clade within the studied cervid group. In this phylogenetic reconstruction, the new cervid from Kaltensundheim has to be placed at the base of the Pleistocene plesiometacarpal genera, *Eucladoceros*, *Megaloceros* and *Cervus*, and has to be assigned to a new genus. The monophyly of the genera *Dama*, *Cervus*, *Megaloceros*, *Eucladoceros* and *Alces* is supported by high bootstrap values.

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