

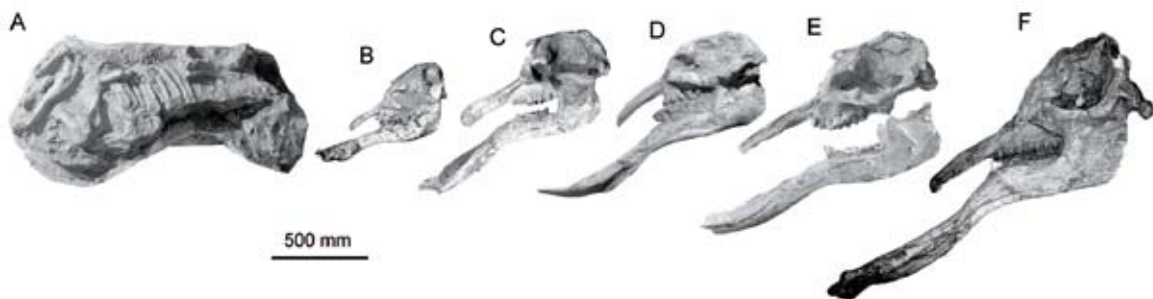
Elephantiformes without Ivories – A Weird Combination of Deinotherium and Platybelodon

In the main Proboscidean taxon of Elephantiformes, a huge pair of developed top incisors (ivories) has become a distinctive feature. The structure is usually made as a tool for individual foraging and a weapon for males to compete for mating. The Proboscidean taxon without ivories usually and only exists in the primitive taxon that were differentiated before Oligocene, for instance, *Deinotherium* merely developed a pair of hooked lower incisors with its top incisors totally missing. In the early evolving period of Elephantiformes, a group termed as Amebelodontidae appeared, whose lower jaw and lower incisor are elongated and widened specially to form a shovel-shaped structure. Researchers are always interested in the weird evolution direction; and hence many hypotheses and studies have emerged on the functional and morphologic significances of shovel-shaped lower jaws in Amebelodontidae.

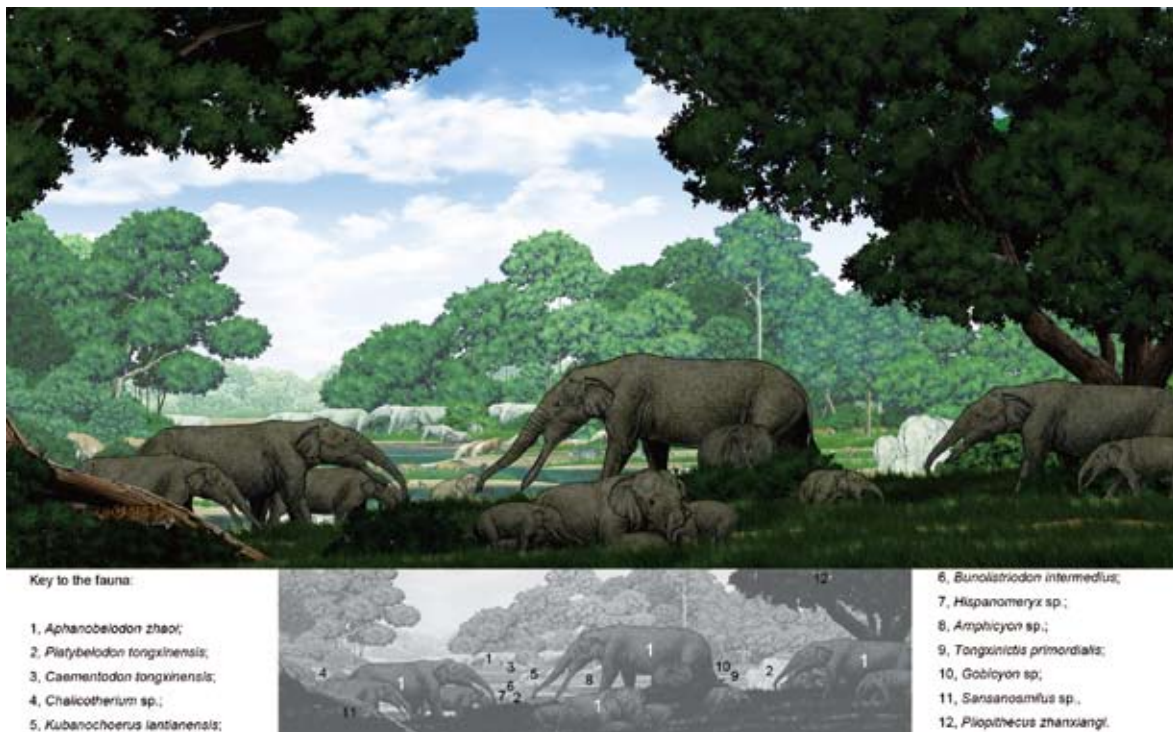
Recently, researchers, including WANG Shiqi, DENG Tao and YE Jie from the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), together with collaborators in Hezheng Palaeozoological Museum, Gansu, China found the well-conserved delicate Amebelodontidae fossil group in Middle Miocene in Dingjiaergou, Tongxin, Ningxia and report online their

discovery in the *Journal of Systematic Palaeontology*. The fossil group represents 11 quite intact individuals of different sexes and ages, with shovel-shaped lower jaws and lower incisors ascribing themselves undoubtedly to the Amebelodontidae. The new group is named as *Aphanobelodon zhaoi* gen. et sp. nov. The genus name, “*Aphanobelodon*” indicates its main feature of ivory missing, which, irrespective of the sex and age period, was firstly found in the Elephantiformes; and its species name is contributed to Mr. ZHAO Rong, discoverer of the fossil group.

The discovery of the *Aphanobelodon zhaoi* revealed an episode of diversified morphological and ecological differentiation of Elephantiformes during its early evolution. The studies and verification of branching system showed that *Aphanobelodon zhaoi* existed as the sister group of *Platybelodon* in the systematic evolution. However, the internal structure of its lower incisor is very different from the *Platybelodon*, though similar to the other *Protanancus* in the Amebelodontidae. Therefore, the same structure of lower incisors does not make a distinguishing criterion for inner members of Amebelodontidae, but a parallel evolution under the selection pressure. Studies by microwear



Selected individuals of the fossil accumulation of *Aphanobelodon zhaoi* gen. et sp. nov. showing the age-sex structure.



Habitat reconstruction of *Aphanobelodon zhaoi* gen. et sp. nov. of the Dingjiaergou Fauna during the early Middle Miocene, by CHEN Yu.

and mechanics analyses maintained that the group represented by *Aphanobelodon zhaoi* and *Platybelodon* in Amebelodontidae were specialized into a group that fed on the tender leaves and its wide-shovel-shaped lower jaw was mainly used to cut the tender shoots and leaves; and the other group represented by *Protanancus* had a broad spectrum of food, had a narrow-shovel-shaped lower jaw used to dig the shallow-layer underground plants whilst its ivories played an important role in foraging. The inner systematic differentiation of Amebelodontidae represents the ecological

differentiation as well.

The top incisor missing in the male *Aphanobelodon zhaoi* suggests that the fights between males might not have been fierce. Therefore, the social structure of *Aphanobelodon zhaoi* is supposed to be different from other elephants. Perhaps, the males and females in *Aphanobelodon zhaoi* composed a stable breeding colony and co-nursed the minor offspring. This is vastly different from the matriarchal society existing in existent elephants, which features a large-scale colony of females nurturing the offspring.