

“Herbivore teeth from Pniel 6, South Africa. Environmental reconstruction via species classification and stable isotope analysis”

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Abstract

The archaeological site Pniel 6 in South Africa dates to the transition period between the *Earlier Stone Age* (ESA) and *Middle Stone Age* (MSA). Pniel 6 is located close to Kimberley in the Northern Cape in South Africa, next to the Vaal River. *Homo sapiens*, our own species, appeared during this transition period for the first time. The material culture of this time, called Fauresmith, was detected at the site by findings of stone tools. It is remarkable that the stone tools were found in the same layers as animal teeth and bones. In this Master Thesis, herbivore teeth were used as a basis for an environmental reconstruction of this place during the time of the *Florisian Land Mammal Age* (FLMA). Based on this environmental reconstruction, the living environment of the humans at Pniel 6 can be reconstructed. For the environmental reconstruction, the animal remains were classified by species by using the Florisbad Comparative Collection which includes both extinct and recent animal species. Moreover, a complete archaeological and taphonomic analysis was performed. In total, 43 teeth were sampled for stable carbon and oxygen isotope analysis; the measurements were performed at Kiel University. Additional data of already measured teeth sampled by Michaela Ecker were included. The diagenesis of the samples was investigated by using *Fourier-transform infrared spectroscopy* (FTIR) and isotopic double measurements.

Herbivores dominated the species spectrum, especially Alcelaphinae and Equidae. According to the stable isotope results, the diet of most species consisted of C₃- and C₄-plants. While the C₄-plants must have been grasses, the C₃-part of the diet could have consisted of grasses, herbs, or leaves from trees and shrubs which cannot be reconstructed by carbon stable isotope analysis. However, most of the modern representatives of the species are grazers today, which makes it plausible that the C₃-part of the diet consisted of grasses also in former times. Water dependant species like *Hippopotamus amphibius* (hippo) and *Kobus leche* (lechwe) prove the existence of large water bodies in the region. The Vaal River could have been one of them, as well as different lakes which today exist as dried pans in the region.

The fauna at Pniel 6 consists of typical FLMA species. Extinct species like *Megalotragus priscus* (extinct giant Alcelaphine) and *Antidorcas bondi* (Bond's springbok) were part of a

unique grazing succession. Their extinction and the emigration of species which led to a shift in the species composition, prove the environmental changes in the interior of South Africa since the Pleistocene.

In summary, it can be stated that the landscape during the inhibition of Pniel 6 was dominated by extensive C₄-grasslands with a significant part of C₃-plants and large water bodies. Most of the C₃-plants are assumed to be grasses, but also trees, shrubs and herbs existed. Moreover, the climate was wetter and colder. This is an evident contrast to the modern Savanna-biome existing at Pniel 6 today.