
On the paleoecology of *Paranthropus robustus* (Mammalia, Hominidae) from South Africa and the potential impact of climatic changes on its extinction

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Résumé

Paranthropus robustus is a hominid with robust morphology, known so far only in South African Pleistocene karstic sites located within the Limpopo river catchment. We here review multiple lines of evidence to characterize the paleoecology of *P. robustus* (functional morphology, enamel microstructure, biogeochemistry, dental microwear) and compare its paleoecology to global data from other contemporaneous mammals. We then consider paleoenvironmental changes in terrestrial habitats within the context of climatic changes during the past 2.14 million years, reconstructed from multi-proxy analyses of marine sediments from a core drilled offshore of the Limpopo river mouth. Craniomandibular and dental morphology suggests traits that resulted from adaptations to heavy bite forces and/or prolonged chewing. Stable carbon isotopes of enamel indicate that *P. robustus* consumed mainly C3 resources (mostly woody or grassy plants in water-rich environments). Dental microwear and decussated enamel indicate a diet comprising at least some hard objects. When considering the whole fauna, *P. robustus* falls among mammals that feed mostly on C3 resources while most contemporaneous herbivorous mammals consume larger amounts of C4 resources (mostly grass found in drier areas). *Paranthropus robustus* was clearly able to forage for a large variety of food items in both open and close habitats, but always with abundant water and water-dependent C3 resources close by. Paleoclimatic analyses indicate a long-term aridification together with marked precessional variability in the Limpopo catchment between ca. 1 Ma and ca. 0.6 Ma. The youngest occurrence of *P. robustus* from South Africa (Swartkrans Member 3, between ca. 1.04 Ma and ca. 0.62 Ma) most likely postdates the onset of the aridification trend. It therefore appears plausible that the documented aridification trend with the extreme precessional variability in hydroclimate had a strong effect on availability of water-dependent, C3 dietary resources preferred by *P. robustus*, therefore possibly playing a role in its extinction.

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