

Comparison of molar metric variation and dental microwear among three species of Parapapio from the Pliocene cave site of Sterkfontein Member 4, South Africa

William Anderson and Laura Aday

Sterkfontein Member 4, a 2.4 million year old karstic cave in South Africa, has yielded three species of *Parapapio*, including *Pp. broomi*, *Pp. jonesi* and *Pp. whitei*. Prior analyses of dental metric variation have indicated that *Pp. whitei* exhibits the largest molars, followed by *Pp. broomi*, with *Pp. jonesi* having the smallest. However, craniofacial morphometrics and isotopic values have shown a lack of clustering of individuals with respect to taxon, whereas dental microwear analyses have suggested that all *Parapapio* from Sterkfontein exhibit evidence of hard-object consumption, particularly *Pp. broomi*.

Using a trifocal microscope camera coupled with precise measuring software, measurements were taken of the molar dimensions of a sample of *Parapapio* ($n = 67$) dental casts, including *Pp. broomi* ($n = 20$), *Pp. jonesi* ($n = 23$) and *Pp. whitei* ($n = 24$) to corroborate or contradict previous species clusters. Examination was also performed on a subset of these dental casts using low-magnification stereomicroscopy, including *Pp. broomi* ($n = 4$), *Pp. jonesi* ($n = 6$) and *Pp. whitei* ($n = 6$) to detect species differences in use-wear scars. A bivariate relationship between mesiodistal and buccolingual dimensions of the first molar with ellipses of 95% confidence around group centroids suggests that *Pp. whitei* is largely distinct from *Pp. jonesi*, but that *Pp. broomi* partially overlaps both of these taxa. Analysis of variance by Tukey's post-hoc test of significance indicates that *Pp. whitei* is significantly larger than both *Pp. jonesi* and *Pp. broomi* in molar dimensions. An analysis of variance for dental microwear features suggests that *Pp. broomi* has significantly more coarse scratches compared to both *Pp. jonesi* and *Pp. whitei*, whereas *Pp. jonesi* has a significantly greater number of hypercoarse scratches than *Pp. whitei*. A discriminant function analysis of four dental microwear features largely separates *Pp. broomi* and *Pp. whitei*. These results indicate that *Pp. whitei* is the most distinct taxon of the three and that the smaller *Parapapio* taxa may have specialized preferentially on hard-object feeding or extractive foraging.