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# Skull morphometrics of the Late Cretaceous side-necked turtle *Bauruemys elegans* (Pleurodira, Podocnemididae) from Presidente Prudente Formation, São Paulo, Brazil

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**Background.** Previous quantitative studies about *Bauruemys elegans* (Suárez, 1969) shell variation, as well as the taphonomy interpretation of its type locality, have suggested that all specimens collected in this locality may have belonged to the same population. We rely on this hypothesis in a morphometric study of the skull. Also, we tried to assess the eating preference habits differentiation that might be explained as due to ontogenetic changes.

**Methods.** We took 29 linear measurements from 21 skulls of *B. elegans*. First, a Principal Components Analysis (PCA) was performed using 27 measurements (excluding total length and width characters) in order to plot the overall individual dispersion in PCs to visualize patterns of scattering based on the form variance. Secondly, PCA was carried out using ratios of length and width of each original measurement to assess shape variation among individuals. Finally, original measurements were log-transformed to describe allometries along the ontogenetic development.

**Results.** The first three PCs of the first analysis comprising 70.2% of the variance. PC1 was related to size variation and all others related to shape variation. MCZ4123 and MN7071-V have been plotted outside the 95% ellipse in PC1xPC2 axes. The first three PCs of the second analysis comprising 64% of the variance. When considering PC1xPC2 and PC2xPC3, all specimens have been plotted inside the 95% ellipse, which is in contrast to PC1xPC3 in which two individuals (MCT1753-R and MN6750-V) are outliers. In the third analysis, five measurements were positively allometric, 18 were negatively allometric and four represent truly negatively allometry. All bones of the posterior and the lateral emarginations, as well as the squamosal, lengthen due to size increasing, different from the jugal and the quadratojugal which decrease in width.

**Discussion.** Some specimens show small differences in form (MCZ4123 and MN7071-V) and shape (MCT1753-R and MN6750-V). Form differences were already detected in a shell

morphometry study, but interpreted as due to ontogeny, which might be the case of the present data. Moreover, all outlier specimens are crushed and/or distorted, thus the form/shape differences might be partially due to taphonomy. The allometric lengthen of parietal, quadrate, squamosal, maxilla, associated with the narrowing of jugal and quadratojugal may be related to changes in feeding habit between different stages of development. This change in shape might represent a progressive skull stretching and enlargement of posterior and lateral emargination during ontogeny, and consequently, the increment of the feeding-apparatus musculature. Smaller individuals may have fed of softer diet whereas bigger ones probably have had a harder diet, as seen in some living species of *Podocnemis*. We conclude that the skull variation is higher than expected and might be related to differences in feeding habits along the ontogeny of *B. elegans*.

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