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Presented at SICB 2002

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Inertial feeding in reptiles: the role of skull mass reduction.

Inertial feeding is a stereotypic form of prey transport which is utilized in order to transport procured food items from the jaw tips into and through the oral cavity. It has been contrasted with lingual transport as a means for moving food caudally into the pharynx. Once the food item is grasped in the jaws, the head and neck are rapidly rotated backwards and the jaws are simultaneously opened, releasing the prey. Finally, the head reverses direction and the jaws are closed around the prey. Inertial transport is seen in varying degrees among reptiles, with varanid lizards and crocodilians using it as their primary intraoral transport mechanism and among various teiid lizards which combine inertial and lingual transport. Although the distribution of feeding repertoires among reptiles has been documented, the morphological adaptations related to different intraoral transport strategies are less well known. This study tests the hypothesis that inertially feeding reptiles have reduced cranial mass relative to postcranial mass to reduce the inertia of the skull during prey transport movements. Cranial and postcranial masses were recorded from skeletonized lizard and crocodilian specimens in order to determine whether inertially feeding species show a reduction in skull mass relative to body mass. Additionally, skull mass was compared to known body masses as well as body masses derived from published regression formulas based on axial skeleton measurements. Analyses of covariance indicate that regressions of skull mass on post-cranial skeletal mass are significantly different in inertially feeding and non-inertially feeding reptiles. Additionally, it may be possible to distinguish lizards with a high degree of inertial transport from those exhibiting a lesser degree of inertial transport in their feeding repertoires.