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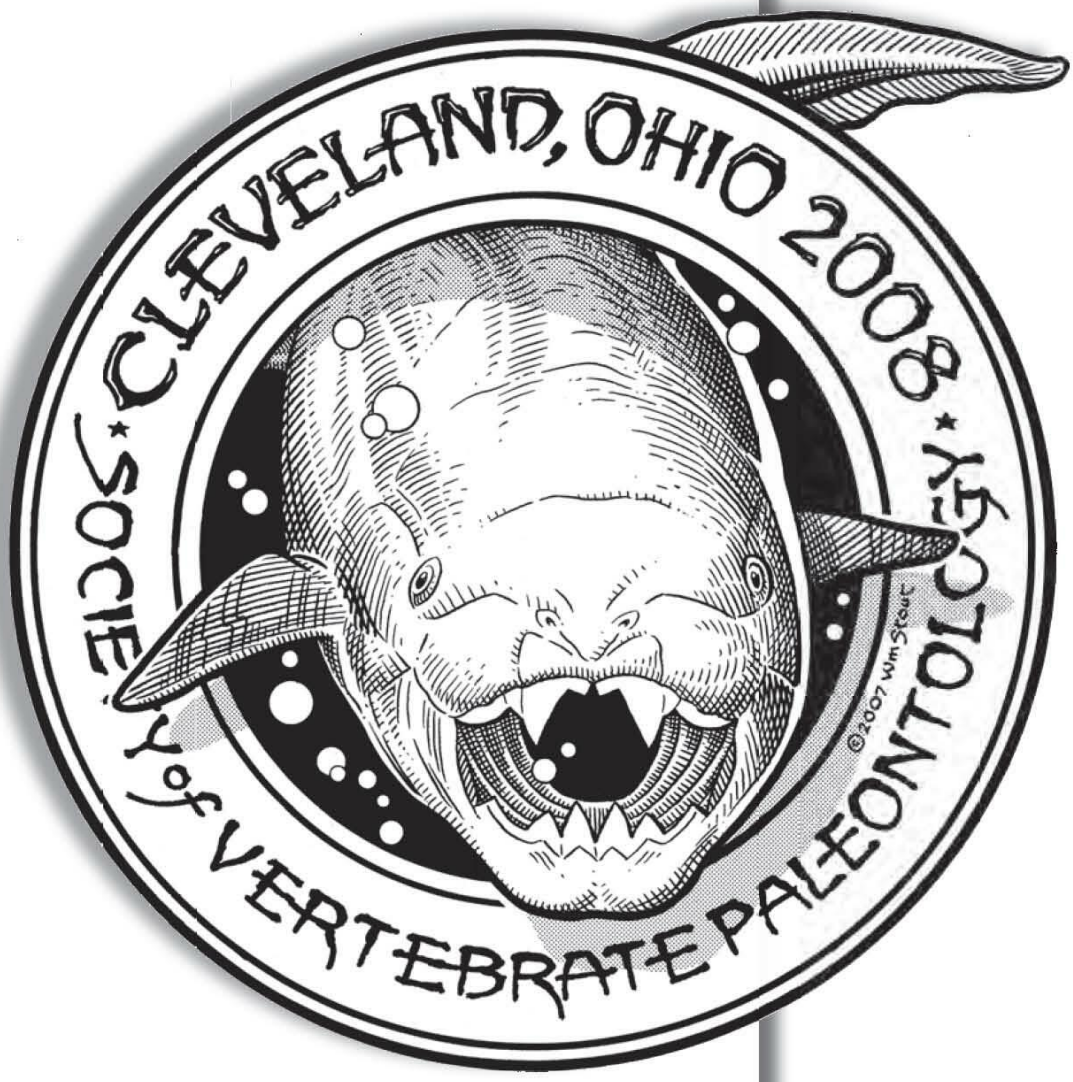
**Program and Abstracts**




# 68th Annual Meeting
## Society of Vertebrate Paleontology

Cleveland Museum of Natural History
Case Western Reserve University
*Renaissance Cleveland Hotel*
Cleveland, Ohio USA
**October 15-18, 2008**

New Directions in the Study of Fossil Endocasts: a Symposium in Honor of Harry J. Jerison, Thursday 10:45

**CAN HEARING AND VOCALIZATION CAPACITIES BE ESTIMATED FROM COCHLEAR DUCT ENDOCASTS?**

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Braincase structures that housed the auditory and vestibular apparatus are frequently preserved in fossil material, but rarely described. Some authors have attempted to infer hearing and vocalization capabilities by comparing cochlear duct dimensions in extinct taxa (e.g., hadrosaurid dinosaurs) with those of living species. However, in living reptiles the internal space of the endosseal cochlear duct (ECD) is occupied by soft tissues (e.g., perilymph) other than the hearing organ, the basilar papilla. The dimensions of the ECD thus may not reflect accurately the dimensions of the basilar papilla itself, bringing into question some inferences about hearing and vocalization drawn from the structure. The relationship between the bony anatomy of the inner ear and hearing (e.g., range of best hearing) has never been rigorously tested in either extant or fossil taxa. Here, we use high resolution micro-XRCT analysis to investigate whether simple ECD measurements can be fit to models of vocalization, sociality and environmental preference in living reptiles and birds. Fifty-seven extant taxa representing Chelonia, Crocodyliformes, Sphenodontia, Squamata, and eight avian orders were selected on the basis of whether they vocalize and on vocalization complexity. After scanning, virtual endocasts of the ECD were digitally segmented, and measurements of length, rostrocaudal and mediolateral width, and volume were taken and scaled to basicranial length. These data were subjected to multiple regression analysis along with measures of vocal complexity and pitch, hearing mean sensitivity and range, sociality and habitat. Hearing range and mean sensitivity were found to strongly positively correlate with ECD length. ECD length also positively correlated with vocal complexity, higher pitch vocalizations, pair bonding and large aggregations (>20 individuals). Volume was strongly correlated with low pitch vocalizations and aquatic habitats. Our results suggest that ECD length can be used to predict mean hearing frequency/range in fossil taxa, and that this measure may also predict vocal complexity and large group socialization given sufficient data to form a comprehensive model.