

Eric G. Ekdale

Ph.D., University of Texas at Austin, Austin, TX (2009)

M.S., San Diego State University, San Diego, CA (2002)

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Research Interests: Comparative anatomy, evolutionary biology, vertebrate paleobiology, mammal systematics, morphological variation, computed tomography (CT)

Research Interests:

I am interested in morphological variation and the role that interspecific and intraspecific variation plays in the evolution of placental and marsupial mammals. I utilize high resolution X-ray computed tomography (CT) in most of my research, which has allowed me to observe the internal structures of both recent and fossil mammal skulls in a non-destructive manner that would otherwise be impossible without destroying the specimens. This technology has led me through several research projects investigating variation within the middle and inner ear regions of a broad array of mammal taxa, including a growth series of the gray short-tailed opossum (*Monodelphis domestica*), a population of extinct elephantimorph proboscideans (mammoth and mastodons) from a cave in central Texas, a collection of early eutherian mammals from the Cretaceous Period of Asia, and a high-level anatomical comparison of the inner ear cavities across Placentalia as a whole.

My current research involves the evolution of sensory systems in secondarily aquatic vertebrates, primarily the inner ear of mysticetes (baleen whales). Baleen whales are of particular interest, because they vocalize in and likely are sensitive to low frequency and infrasonic sound waves, in contrast to the odontocetes (toothed whales), which use echolocation and high frequency sounds for navigation and prey detection. Although it is clear that echolocation was not the ancestral condition for cetaceans, the appearance of the sensitivity to low frequency sounds along the 50 million years of cetacean evolution is unknown. Comparative morphology of the inner ear structures through CT imaging of extinct and extant mysticetes, as well as related terrestrial taxa, helps to answer this and other interesting evolutionary questions.

In addition to the comparative anatomy and physiology of the mammalian ear region, I have a strong interest in biological databases and interfaces for open access and preservation of legacy data, including CT imagery. As a doctoral student at the University of Texas at Austin, I was active in expanding and contributing to the digital morphology collection at "DigitalMorphology" (<http://www.digimorph.org>), and I continue to contribute CT data to that repository. As a postdoctoral research fellow at the San Diego Natural History Museum, and subsequently in my current adjunct position at SDSU, I was involved in a major study of the evolutionary relationships of extinct and extant mysticetes utilizing the MorphoBank web portal (<http://www.morphobank.org>). Phylogenetic character data supplemented with high resolution imagery is uploaded to MorphoBank and made available to scientists all over the world for scientific research, to students for use in classroom activities, and to the public for general education.

Representative Publications:

- Ekdale, E. G.**, A. Berta, and T. A. Deméré. 2011. The comparative osteology of the petrotympanic complex in extant mysticetes (Mammalia: Cetacea). PLoS ONE 6(6):e21311. doi:[10.1371/journal.pone.0021311](https://doi.org/10.1371/journal.pone.0021311).
- Ekdale, E. G.** and T. Rowe. 2011. The bony labyrinth of zhelestids (Mammalia: Eutheria) and other Mesozoic mammals. Journal of Vertebrate Paleontology 31(3): 658-675.
- Ekdale, E. G.** 2011. Morphology and variation in the ear region of Pleistocene Elephantimorpha (Mammalia, Proboscidea) from Central Texas. Journal of Morphology 272:452-464.
- Ekdale, E. G.** 2011. Book Review: How vertebrates left the water (M. Laurin). Systematic Biology 60(6):893-895.
- Ekdale, E. G.** 2010. Ontogenetic variation in the bony labyrinth of *Monodelphis domestica* (Mammalia: Marsupialia) following ossification of the inner ear cavities. The Anatomical Record 293: 1896-1912.
- Averianov, A.O., J. D. Archibald, and **E. G. Ekdale**. 2010. New material of the Late Cretaceous deltatheroidan mammal *Sulestes* from Uzbekistan and phylogenetic reassessment of the metatherian-eutherian dichotomy. Journal of Systematic Paleontology 8:301-330.
- Bever, G. S., T. Rowe, **E. G. Ekdale**, T. E. Macrini, M. W. Colbert, and A. M. Balanoff. 2005. Comment to "Independent Origins of Middle Ear bones in Monotremes and Therians". Science 309:1492a.
- Ekdale, E. G.**, J. D. Archibald, and A. O. Averianov. 2004. Petrosal bones of the placental mammals "Zhelestidae" and *Kulbeckia kulbecke* ("Zalambdalestidae"), Late Cretaceous of Uzbekistan. Acta Palaeontologica Polonica 49:161-176.
- Archibald, J. D., A. O. Averianov, and **E. G. Ekdale**. 2001. Late Cretaceous relatives of rabbits, rodents, and other extant eutherian mammals. Nature 414:62-65.