

Biology Seminar

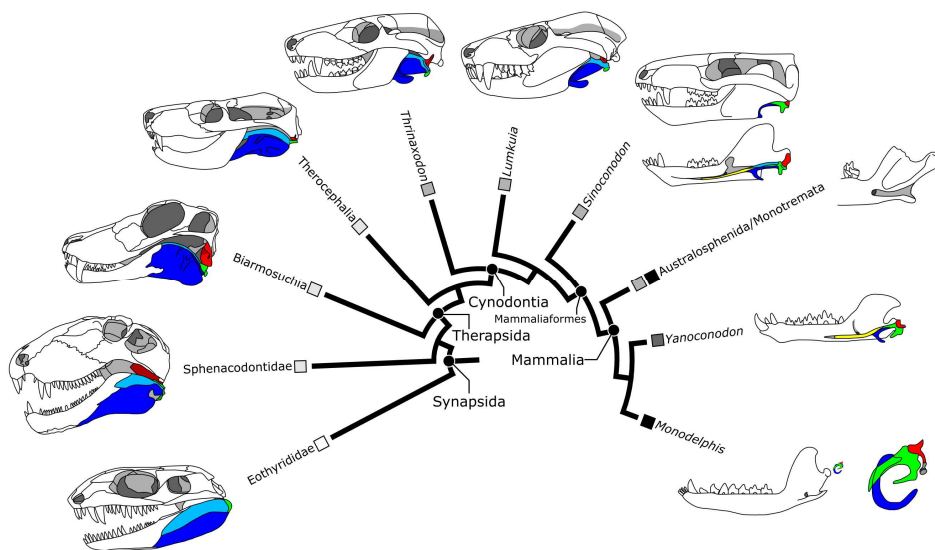
Speaker: Kenneth Angielczyk, Ph.D.

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Changing Perspectives on the Synapsid Evolutionary Radiation and the Evolution of Mammals

Monday Dec. 2, 2024 | 12:00 PM PST | HCK 132



The emergence of the mammals from morphologically disparate synapsid ancestors is one of the great macroevolutionary transitions preserved in the fossil record. The quality of the synapsid record allowed the basic steps of the transition to be recognized early. Yet, the lack of tools like modern phylogenetic comparative methods and the difficulty of preparing a diverse sample of specimens

resulted in simple transitional sequences based on small numbers of exemplar taxa representing broad evolutionary grades.

This narrative of a linear trend towards ever more mammal-like phenotypes persisted for much of the 20th century. The past three decades have witnessed a renaissance in synapsid research, including extensive taxonomic revisions, the development of far more inclusive phylogenies, descriptions of novel morphology facilitated by CT-scanning, and rigorous tests of evolutionary hypotheses using modern analytical approaches. I propose a new conceptual model for synapsid evolution: a series of temporally-successive evolutionary radiations that each explored significant volumes of ecomorphological space. Within each radiation, subclades often display divergent morphological trends and optimization for disparate functional regimes. Although some mammal-like traits evolved in each radiation, the ancestral mammalian bauplan emerged relatively late, among Late Triassic cynodonts. Extinction played a significant role in structuring the pattern of successive radiations. Breaks between the radiations often correspond with mass extinctions, and the ancestors of subsequent radiations typically evolve before extinctions, but do not diversify until the removal of incumbents during these biotic crises. A conceptual model that acknowledges the diversity of each synapsid radiation is key to framing new evolutionary hypotheses, and for communicating the scope of synapsid evolution to the public.

Seminar Speaker Host: Brenlee Shipps