© privat

Brandon Kilbourne, Ph.D.

Evolutionary Biology

Friedrich-Schiller-Universität Jena

Born in 1983 in Houma, Louisiana
Studied Evolutionary Biology at the University of Chicago and Biological Engineering at Louisiana State University

FELLOWSHIP
College for Life Sciences

PROJECT

Locomoting into New Niches: Evolution and Adaptations in the Mammalian Locomotor System

The longevity of species lineages inherently depends upon adapting to changing environments and ecosystems, making adaptations a cornerstone for understanding biodiversity past and present. Yet how are adaptations achieved? My research aims to understand this by combining functional anatomy and applied systematics to study mammal locomotion - two fields not unrelated but at the same time seldom integrated in a comprehensive manner. Functional anatomy concentrates on how anatomical traits underpin biomechanical function, whereas applied systematics uncovers how biological traits have diversified individually and alongside each other, combining phylogenetic relationships among species with models of evolutionary processes. Mammalian locomotor anatomy presents an ideal system in which to study the evolution of functional traits, as locomotion is a vital aspect of mammalian biology. As a Fellow, I will investigate whether anatomical diversity in limb size and shape in terrestrial mammals is associated with functional specializations of limbs for climbing, digging, swimming, and running. I will use phylogenetic comparative methods - statistical methods incorporating phylogenetic data - to model whether differing functions constitute actual selective pressures acting on body size, limb mass, and limb length across eight major mammalian lineages. I also will start examining anatomical diversity within the limb skeleton of the Mustelidae (e.g., badgers, weasels, otters, and their kin), an ecologically and functionally diverse group of mammals with a recent origin in geologic time. Working with colleagues at the Museum für Naturkunde Berlin, we will begin building a dataset on bone external geometry and cross-sectional properties to determine whether anatomical diversity in the mustlelid limb skeleton is a consequence of conserved vs. shifting ecological niches. By examining suites of anatomical traits, I hope to elucidate how combinations of traits act to form adaptations.

Recommended Reading

Kilbourne, B. M. and L. C. Hoffman (2013). "Scale effects between body size and limb design in quadrupedal mammals." PLoS ONE 8: e78392. doi: 10.1371/journal.pone.0078392
Kilbourne, B. M. (2013). "On birds: scale effects in the neognath hindlimb and differences in the gross morphology of wings and hindlimbs." Biological Journal of the Linnean Society 110: 14-31.
Kilbourne, B. M. and P. J. Makovicky (2012). "Postnatal long bone growth in terrestrial placental mammals: allometry, life history, and organismal traits." Journal of Morphology 273: 1111-1126.

LATEST PUBLICATIONS FROM THE FELLOWS' LIBRARY

Kilbourne, Brandon (2016)

Manipulated changes in limb mass and rotational inertia in trotting dogs (Canis lupus familiaris) and their effect on limb kinematics

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1041232004

Kilbourne, Brandon (2015)

Energetic benefits and adaptations in mammalian limbs: Scale effects and selective pressures

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1041230753

Kilbourne, Brandon (2015)

Mixed gaits in small avian terrestrial locomotion

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1041212216

Kilbourne, Brandon (2013)

Scale effects between body size and limb design in quadrupedal mammals

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=789446340

Kilbourne, Brandon (2013)

On birds: scale effects in the neognath hindlimb and differences in the gross morphology of wings and hindlimbs

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=789446049

Kilbourne, Brandon (2012)

Postnatal long bone growth in terrestrial placental mammals : allometry, life history, and organismal traits

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=789446170