QUANTITATIVE AND SYSTEMS BIOLOGY COLLOQUIUM:

THE ROLE OF BIOTIC INTERACTIONS IN THE EVOLUTION OF CENOZOIC (66 MA TO PRESENT) MAMMAL COMMUNITIES

Danielle Fraser

Canadian Museum of Nature

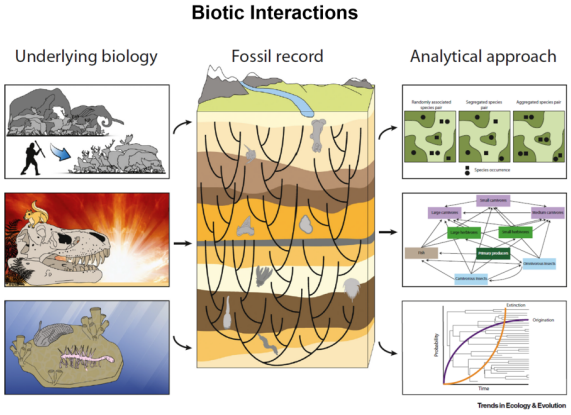
Date:
4/12/2024

Time:
12:30 – 1:45 PM

Location:
GRAN 135

About The Speaker:

I am Head of Palaeobiology and Research Scientist at the Canadian Museum of Nature, Adjunct Research Professor in Biology and Earth Sciences at Carleton University, and Associate at the Smithsonian National Museum of Natural History. I am a palaeoecologist and evolutionary biologist interested in how and why mammal communities form with the goal of understanding the emergence of modern mammal communities and how they might change under ongoing global change. I use a wide array of analytical tools including, but not limited to, computational biology, phylogenetics, field work, and stable isotopes. My research program is multidisciplinary and integrates the study of both extant and extinct mammals.



Abstract:

Biotic interactions occur when organisms living in the same communities directly or indirectly influence one another (e.g., predation, resource competition). They occur within or among species, can be positive, negative, or neutral and play important roles in community assembly over large spatiotemporal scales. The outcomes of biotic interactions include, for example, competitive exclusion, limiting similarity, and apparent limits to the accumulation of biodiversity, among others. Limits to biodiversity result from the accumulation of species during diversification, the saturation of niche space, and, thus, enhanced competition for resources and space. Potential outcomes include slowed rates of origination and increased rates of extinction, particularly among species with high niche similarity as well as changes in community assembly (e.g., changes in niche breadth, changes in geographic range size). However, the degree to which competitive interactions have shaped biodiversity patterns over long time scales remains a subject of contention. Thus, I will address biodiversity limits using two case studies, the first, the extinction of the “creodonts” (i.e., oxyaenids and hyaenodontids) and, the second, mammal diversity through the Paleocene-Eocene Thermal Maximum (PETM) in North America using trait and phylogenetic-based as well as macroecological approaches. I will demonstrate that enhanced extinction risk among the oxyaenids likely related to factors unrelated to competition with carnivoramorphans and that competitive interactions do not appear to have driven PETM mammal community assembly, likely reflecting unsaturated niche space. Studying the outcomes of biotic interactions in deep time will illuminate their relative role in shaping long-term trends in biodiversity relative to more thoroughly studied drivers of community assembly such as climate.

For more information, contact: Sora Kim
skim380@ucmerced.edu