Daniella Assing

Geosci 541

02/08/2016

Niche Conservatism above the Species Level

Author: Hadly et al. (2009)

Summary: This article aims to investigate niche conservatism in North American mammals in the Pleistocene and Holocene, determine whether it occurs above the species level, and to also determine the factors that contribute to it. The authors define “niche conservatism” as “traits that enable species to persist in ecological environments” and which are “often maintained over time” and provide evidence that controls on niche conservatism are different for higher taxonomic levels. They also differentiate between “environment-based” variables (for example thermal constraints) as opposed to “trait-based” (for example dispersal). Mammals were chosen because there is a general consensus that most genera are monophyletic and reflect a real evolutionary grouping. This study particularly focuses on “whether the relative and absolute sizes of geographic ranges of members of the North American fauna have remained similar” despite major climatic changes. The authors predict that, because mammals are so old and have lived through many glacials and interglacials in recent geologic history, the intrinsic traits that define range sizes evolved before the glacial cycles. Large range sizes on the other hand would reflect more environment-based controls.

Their results show that ecological traits are conserved above the species level (at the family level) and that geographic ranges remain constant even when species are deleted. They suggest that differences in geographic range is due more to competition between species rather than a result of environmental changes. This study also realises that intrinsic traits are important at the level of genera in defining and maintaining higher-level niches and the authors state that this is perhaps why higher-level ranges change very little in response to major past climate changes.

What I liked: I really liked the definitions provided by this paper because they are so clear and concise. I’ll list a few for future reference.

1. Distribution of a species - environmental space in which the species has a positive intrinsic growth rate.
2. “Conserved” niches - species retain inherited traits valuable for survival in the habitats in which they are presently found.
3. Realized niche - a suite of environments that a species now occupies.
4. Fundamental niche - all the environments that a species could potentially occupy.

I also really liked that this paper drew a direct parallel to the current environment that animals today live in when it says that “the trajectory of future change is toward conditions that species have not experienced in their existence.” The ranges have remained constant for thousands of years and it is only now that this dynamic is changing. No one denies today that people are changing the environment very drastically, but I also know of many people who would say that the past glacial and interglacial cycles changed the earth far more drastically than humans could and then use this as a way to downplay climate or environmental change due to anthropogenic effects. This paper proves otherwise, that although there were severe changes in climate from glacials to interglacials, the geographic ranges of mammals over the past 130, 000 remained constant enough that intrinsic traits determined the species rather than the environment. They suggest that it may be better to model populations at the genus level, and this may prove more effective or more accurate than previous modeling.

What I disliked: I have only one critique of this paper and that is that I wished that the authors had included a little more information or comparison to modern conservation efforts. I understand that space is limited in published papers but I think that a little more attention or background information on what has been happening in the past 10, 000 to 15, 000 years would have made for a more impactful paper.