Changes in North American mammal niche preferences from the late Pleistocene to the present

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northern continental regions where protistologists have so far failed to find it, but its potential distribution has not yet been rigorously assessed. We compiled an extensive database of ca. 300 known records of A. vas. Based on the geographical coordinates, we built a bioclimatic niche-based distribution model and determined its potential distribution according to current climate, IPCC warming scenarios and last glacial maximum (LGM) climatic conditions. The modelled potential distribution of A. vas clearly shows that this taxon could potentially occur across the Holarctic; its absence can thus be interpreted as evidence for limited dispersal. Furthermore, LGM distribution identified refugia, where allopatric speciation may have occurred. To our knowledge, this is the first climatic niche-based distribution modelling study of a microbial taxon. Due to the presence of a morphologically distinct shell, testate amoebae are useful models for microbial terrestrial biogeography. The modelling results are valuable to develop hypotheses on phylogeographical patterns to be tested using molecular methods.

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Changes in North American mammal niche preferences from the late Pleistocene to the present
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Human population has exponentially grown since the last glaciation, especially across temperate areas with easy access to water sources, excluding mammal species from their former habitats. Thus, we anticipate a change in environmental niche preferences for temperature and precipitation as increased human population forces mammal species into more extreme climates within their environmental tolerances. For our study, we collected species occurrences from 20,000 ybp to the present for 59 North American mammal species. We inferred temperature and precipitation for each location using paleoclimate simulations (CCSM3). Overall, we found that mammals now live in areas that are warmer and dryer on average, as mean annual temperatures rise and precipitation decreases. Their niches have significantly changed in the last 20,000 years for most climate variables except for maximum average monthly temperature and minimum average monthly precipitation, which still maintain a hard limit on geographic boundaries. Our results suggest that although they avoid some climate extremes, including hot temperatures and dry climates, most mammals in our dataset adapt to new climate conditions instead of moving to new geographic areas. This could be related to a high niche plasticity for climate or to geographic and anthropogenic dispersal limitations that prevent animals from migrating to new localities as human population increases and climate changes. Geographic models that integrate fossil and modern niche preferences and dispersal limitations will help elucidate the reasons behind the observed patterns. Moreover, understanding these patterns will help us formulate better conservation plans for the species we wish to protect.