

A Continental-scale Perspective on the Peopling of the Americas: Modeling Geographic Distributions and Ecological Niches of Pleistocene Populations

J. Christopher Gillam, David G. Anderson, and A. Townsend Peterson

A recent innovation in predictive modeling, eco-cultural niche modeling (ECNM), is now being applied to explore population distributions and ecologi-

J. Christopher Gillam, Savannah River Archaeological Research Program, SC Institute of Archaeology and Anthropology, University of South Carolina, 1321 Pendleton St., Columbia, SC 29208; e-mail: gillam@sc.edu

David G. Anderson, Department of Anthropology, 250 South Stadium Hall, University of Tennessee, Knoxville, TN 37996; e-mail: dander19@utk.edu

A. Townsend Peterson, Natural History Museum & Biodiversity Research Center and Department of Ecology & Evolutionary Biology, University of Kansas, Lawrence, KS 66045; e-mail: town@ku.edu

cal niches of early hunter-gatherers (Anderson et al. 2005; Banks et al. 2006; Gillam and Tabarev 2006). This approach, originally developed for predictive modeling of plant and animal species distributions, has had great success in application to biological sciences (Soberón and Peterson 2004). In focusing on estimating ecological niches of species, this approach reconstructs key aspects of their distributional biology and ecology, and thus shows excellent predictivity in understanding their geographic distributions.

Preliminary analyses across East Asia and Siberia, Europe, and North America have been developed to explore the potential of ECNM for understanding Middle and Upper Paleolithic human population distributions in the Old World and those of Paleoindians in North America (Anderson et al. 2005; Banks et al. 2006; Gillam and Tabarev 2006). Initial analyses of over 1,500 Paleoindian fluted-point locations from the Paleoindian Database of the Americas (PIDBA; Anderson et al. 2006) illustrate the likely distributions of early populations in North America (Figure 1A). Projection of the North American Paleoindian niche model to East Asia and Siberia shows the possible parallel climatic and environmental locations for the cultural origins of the Paleoindians (Figure 1B). The darkest gray shading in the figures indicates areas of highest modeled probability for presence of human populations.

Although these analyses are exploratory at this stage, the patterns support the hypothesis that the earliest cultures of North America came from the southern latitudes of the Far East, rather than from the more northern latitudes of inland Siberia (Birdsell 1951). Eastern China, the Korean Peninsula, the Maritime region of the Russian Far East, Sakhalin Island, and the Japanese Archipelago look particularly promising as parallel climatic and environmental source regions and warrant further investigation; these regions are also logical choices for development of coastal adaptations and subsequent coastal migration into North America. Our results may also support the hypothesis that microblade occurrences in Alaska and Canada, which commonly post-date Clovis occurrences in the lower 48 states of the U.S. (Dumond 2001), could reflect a second migration from Siberia soon after the hypothesized coastal migration from the southern latitudes of the Far East (Birdsell 1951), perhaps as little as 1000–2000 calendar years later.

To clarify, the models presented here are based not upon comparisons of lithic technology, but rather on exploited ecological niches as manifested by geographic occurrences. The “Clovis”-based North American model projected onto Asia does not suggest where antecedents of Clovis technology are, but rather where antecedent human populations might have lived (i.e., under similar environmental conditions) prior to migration to the Americas (Birdsell 1951). We consider it unlikely that we can trace the origins of the first Americans through lithic technology, as many scholars have attempted, both over the decades and recently (Bradley and Stanford 2004; Brantingham et al. 2004; Collins 2005; Goebel 2004), but rather we need to focus on where parallel sets of conditions are manifested in coastal environments during the Pleistocene (Erlandson 2002). East Asia and the Japanese Archipelago, in particular, are the most likely cultural hearths when one also considers the

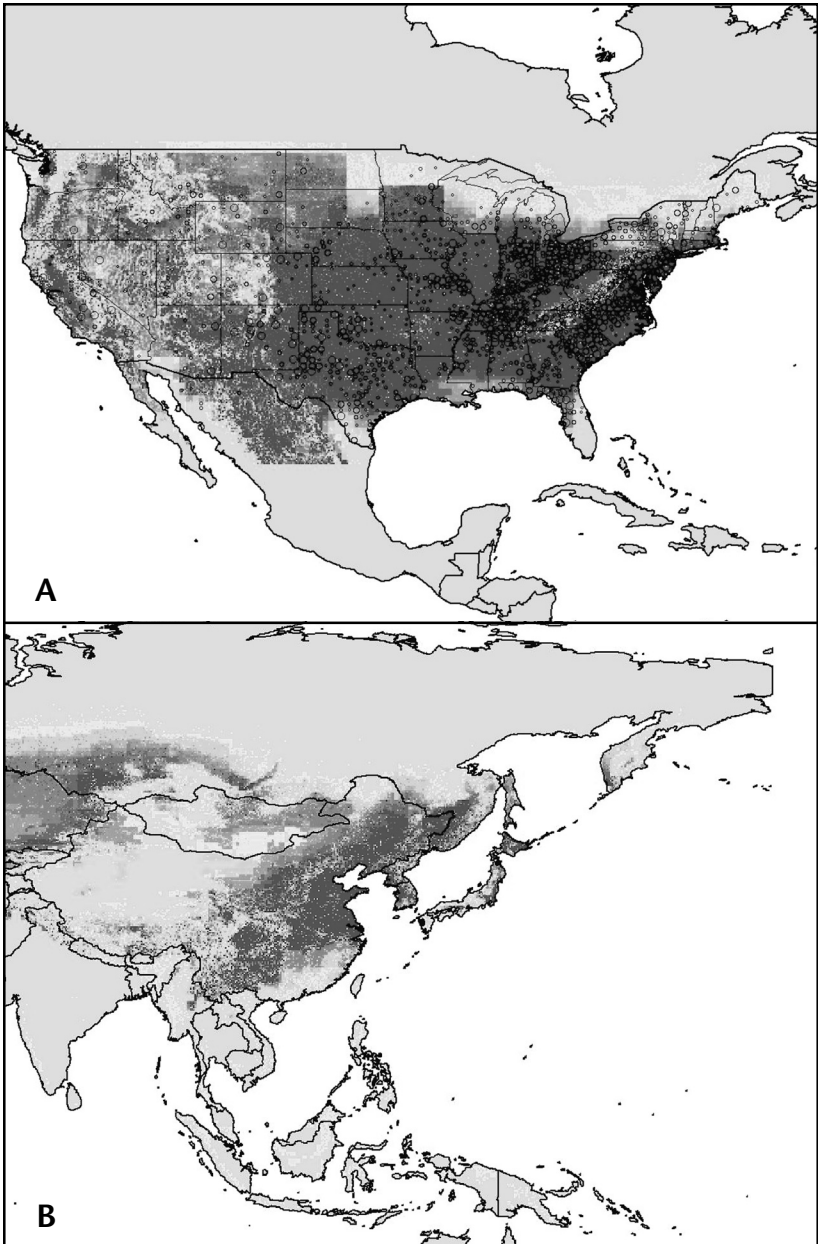


Figure 1. A, an ECNM-based predictive model highlights probable Paleindian population distributions and exploited ecological niches in North America; B, the projection of the North American Paleindian niche model onto contemporary conditions across Asia illustrates the possible ancestral population distributions of the “Clovis” Paleindians.

flexibility that a fishing-hunting-gathering adaptation offers to a rapidly growing and migrating population in the northern Pacific setting. This is precisely what the archaeology of East Asia and the Russian Far East suggests is occurring, with increasingly sedentary populations, such as Incipient Jomon beginning around 16,000 CALYBP (Taniguchi 2006), pressuring more mobile coastal groups to shift their ranges northward during the terminal Pleistocene (Gillam and Tabarev 2006; Ikawa-Smith 2004; Kobayashi 2004). Our models are already in the process of being refined with finer-resolution paleoclimate data to define further the likely population distributions and ecological niches exploited by these early hunter-gatherers.

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