

## REVIEW SUMMARY

## ANTHROPOLOGY

# Late Pleistocene exploration and settlement of the Americas by modern humans

Michael R. Waters

**BACKGROUND:** North and South America were the last continents populated by modern humans. The timing of their arrival, the routes they took, their homeland of origin, and how they explored and settled diverse environments filled with now-extinct animals have been debated for over a century. Addressing these questions is key to understanding the development of later prehistoric and contemporary Indigenous cultures.

**ADVANCES:** The study of the first Americans made slow but steady progress during the 20th century. The first half of the century brought the realization that people had entered the Americas at the end of the Pleistocene. The second half of the century brought the ability to

radiocarbon date early sites and the belief that the ~13,000-year-old Clovis lanceolate fluted projectile points associated with mammoth remains represented the first people to enter the continent. This view began to change with the discovery of artifacts dating ~14.2 thousand years (ka) ago at the Monte Verde site in southern Chile. This discovery signaled that people must have been in the Americas before Clovis and that early sites should be present in other parts of the Americas. Initially, many sites proposed to predate Clovis did not stand up to scrutiny, having issues with geological context, dating, or even the archaeological evidence itself. However, the last 30 years have seen an increasing number of sites providing evidence of early occupation that cannot be dismissed. These

sites show that people were present and successfully occupying different areas of North and South America between ~15.5 and ~14 ka ago, thereby leading the way to a new understanding of the first Americans.

In the last 15 years, genetic information from contemporary Indigenous Americans and the remains of ancient individuals from Asia and the Americas has transformed our understand-

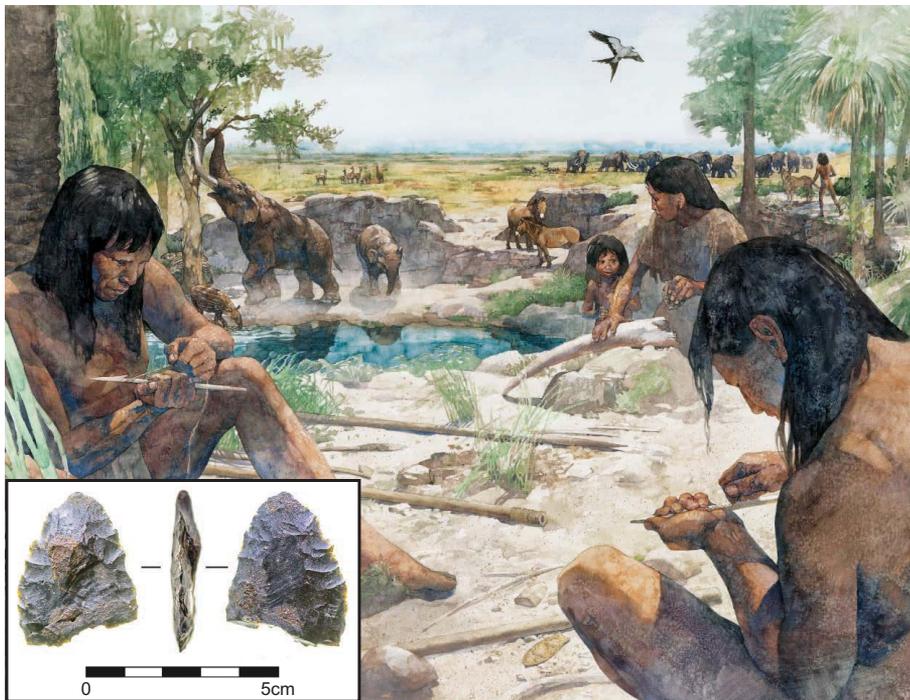
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ing of the ancestry of the first Americans. Genetic studies first concentrated on the analysis of mitochondrial DNA, but in the last decade, technological breakthroughs have permitted the reconstruction of prehistoric genomes. These genomic studies have conclusively shown that the first Americans were the result of ancestral east Asian and northern Eurasian admixture. This founder population made its way to eastern Beringia and after additional population splits traveled south of the continental ice sheets covering Canada sometime between ~17.5 and ~14.6 ka ago. These genetic results agree with the emerging late Pleistocene archaeological record.

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**OUTLOOK:** The key to learning more about the first Americans is investigating archaeological sites with solid geological contexts that are accurately dated. Only rigorously investigated sites using the best practices of archaeology, geoarchaeology, and geochronology will provide the primary and pivotal data to interpret the past. Analysis of biomolecules, including DNA, proteins, and lipids from these sites, will enhance environmental reconstructions and archaeological interpretations. This will require time and patience because building archaeological knowledge is a slow process. Genetics is a powerful new tool that has already broadly deciphered the origins and population history of the first Americans. Although the general outline of the ancestry of the Indigenous American genome will likely remain unchanged moving forward, recent genetic studies show even greater genetic complexity during the peopling process, especially once people were south of the ice sheets, and this story will surely change dramatically and quickly with the generation of additional genomes. The ancestral history of the earliest peoples in the Americas will be realized as genetic knowledge from living populations and ancient individuals is combined with archaeological, geological, ethnographic, and oral records. This will require scientists and Indigenous peoples working as partners to uncover the past. ■



**Page-Ladson site, Florida, ~14,550 years ago.** Page-Ladson is the oldest radiocarbon-dated site in North America with artifacts of the first Americans, including a bifacial knife (inset), found among the bones of extinct animals.

Email: [mwaters@tamu.edu](mailto:mwaters@tamu.edu)  
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