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Human Migration Brought Maize to Maya Region, Study Finds

A new analysis of the DNA of the remains of ancient people in the jungles of Belize reveals that farming technology arrived from the south.

By Sabrina Imbler
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The tropics are a paradise for everyone but a skeleton. Humidity keeps rainforests green but does little to preserve bodies, leading to a dearth of ancient skeletal remains in Neotropical regions such as Central America.

But deep in the jungles of Belize, under the dry refuge of two rock shelters, the skeletons of people who died as many as 9,600 years ago have been exceptionally well preserved. Their bones offer a rare glimpse into the region's ancient genetic history, which is largely unknown.

A group of scientists has now extracted these ancient people's DNA, offering new insight into the genetic history of people in the Maya region. The paper was published on Tuesday in the journal Nature Communications. The researchers identified a previously unknown mass migration from the south more than 5,600 years ago that preceded the advent of intensive maize farming in the region. This migration of people, who are most closely related to present-day speakers of the Chibchan languages, contributed more than 50 percent of the ancestry of Mayan-speaking peoples today.

Lisa Lucero, an anthropologist at the University of Illinois at Urbana-Champaign who specializes in the ancestral Maya and was not involved with the research, said the new results "have the potential to revise and rewrite the early history of the First Americans."

Xavier Roca-Rada, a doctoral student at the University of Adelaide, said the results "fill a gap between the oldest previously studied individuals from the Maya region and the time before the settling of Mesoamerica."

The new paper emerged from ongoing excavations led by the authors Keith Prufer, an environmental archaeologist at the University of New Mexico, and Douglas Kennett, an archaeologist at the University of California, Santa Barbara. The researchers have been excavating two rock shelters in the Bladen Nature Reserve, a remote and protected area of Belize that kept the sites, which were used as cemeteries, undisturbed for thousands of years. "People just kept going back to them over and over and over again and burying the dead," Dr. Prufer said.

The shelters were also occupied by the living, who made tools and cooked, evidenced by the buried bones of armadillos, deer and a type of rodent called a paca, Dr. Prufer said. The very bottom of the excavated pit held a piece of a giant sloth, which may have even predated human occupation of the shelter, he said.

The excavations also revealed a secret, formerly slimy layer of protection underground. Around 5,000 to 6,000 years ago, before the classic period of the Maya, people harvested tiny Pachychilus snails for food. "They would boil them and lop off the end of the shell and eat the flesh out of them," Dr. Prufer said. Whoever inhabited these shelters feasted on these snails, and their discarded shells shielded bodies buried below. "This layer of snails actually protected the lower burials from the Maya digging through them," he said.

Dr. Kennett and Dr. Prufer study these early burials to understand how the region transitioned from hunting and gathering to the development of intensive agriculture of maize, chili peppers and manioc (also called cassava). In a 2020 paper, they described evidence of maize consumption in the bones of individuals who lived 4,000 to 4,700 years ago.

A cliff face covering a rock shelter in the rainforest of the Bladen Nature Reserve in Belize. Keith Prufer

David Reich, a geneticist at Harvard Medical School, led the extraction of ancient DNA from 20 individuals buried in the shelters over the course of 6,000 years. The analysis revealed several human migrations into the Maya region, in what is now southeastern Mexico and northern Central America.

They found three distinct groups: one living 7,300 to 9,600 years ago, another living between 3,700 and 5,600 years ago and a third group of modern Maya people. The first group appears genetically linked to a southward migration through the Americas during the Pleistocene. But the second group was related genetically to the ancestors of Chibchan speakers living farther south.

The authors hypothesize that this population turnover came from a mass migration from the south. “That was the spectacular result,” Dr. Kennett said.

The finding overturns an old assumption that farming technology spread through the Americas by the diffusion of crops and practices — the spread of knowledge as opposed to the spread of people, Dr. Reich said. The new results suggest this migration was critical to spreading farming, such as a scenario in which Chibchan speakers migrated northward with varieties of maize, which they then cultivated and spread in local populations, the authors write.

“People were actually moving into the region from the south, carrying these domesticated plants and also the systems of knowledge about how to grow them,” Dr. Kennett said.

David Mora-Marín, a linguistic anthropologist at the University of North Carolina at Chapel Hill and an author on the paper, conducted an analysis of early Chibchan and Mayan languages. He found that a term for maize had diffused from the Chibchan language into Mayan languages, further supporting the idea of a Chibchan origin of maize.

The field of ancient DNA has been criticized for a lack of ethics or appropriate engagement with communities that may be descended from the ancient humans being studied.

Dr. Kennett and Dr. Prufer conducted their archaeological research with the Ya'axché Conservation Trust, a Belizean nongovernmental organization that is largely staffed by descendants of Maya communities. The researchers consulted with these communities, presented results from studies and translated summaries of findings into the Mopan and Q'eqchi' languages at the locals' request. In the discussions, the communities expressed a desire to learn more about the diets and precolonial family units of the ancient people living in the cave. Because of these conversations, the authors placed a greater emphasis on these topics in the paper, Dr. Kennett said.

Krystal Tsosie, a genetics researcher at Vanderbilt University, said she wanted to see a more detailed description of how the community's feedback influenced the paper. Dr. Tsosie added, "The process of proper engagement also means properly and transparently crediting the community members for informing and enriching the research."

Ripan Malhi, a genetic anthropologist at the University of Illinois at Urbana-Champaign, noted that the authors uploaded the ancient DNA data to a public database "with no safeguards or limitations on use indicated." Ancient DNA can offer a shortcut to the DNA of modern communities without their consent. "This may have implications for the present-day Maya in the region," he said.

Dr. Lucero and Mr. Roca-Rada said that more data was needed to prove the researchers' hypothesis that a southern migration had brought maize to the Maya region. To Dr. Lucero, the question is whether researchers should acquire that data. "Should we dig up ancestors?" she asked. "Would we want someone to dig up ours to answer interesting yet nonvital research questions?"

Dr. Kennett and Dr. Prufer last visited Belize in January 2020 to present the preliminary results from the new paper to Maya communities. The pandemic has since prohibited the researchers' return, but Dr. Prufer said they hoped to go back this summer to continue excavating and "keep our promise to return each year that we work and update everybody."

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