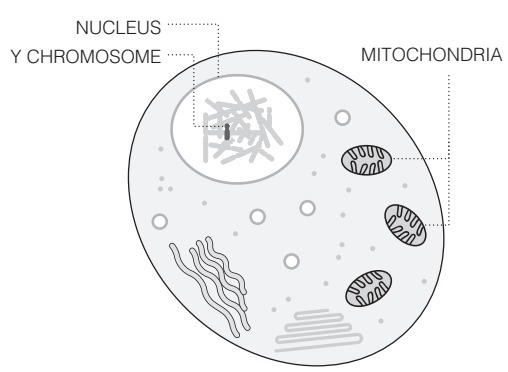


## Tracing Human History With Genetics

The Genographic Project seeks to clarify human history by testing genes from different groups for common ancestors. Here is how it works.

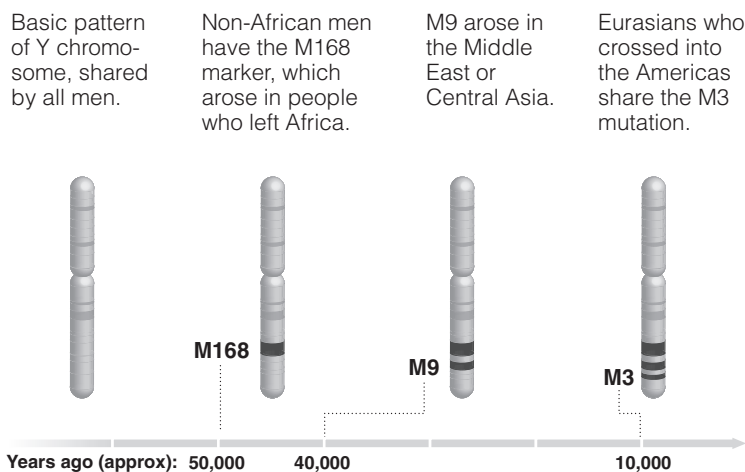
Some bits of genetic material are not subject to shuffling when parents' DNA mixes. Examples are the Y chromosome and the DNA in mitochondria, tiny structures that provide energy to the cell.



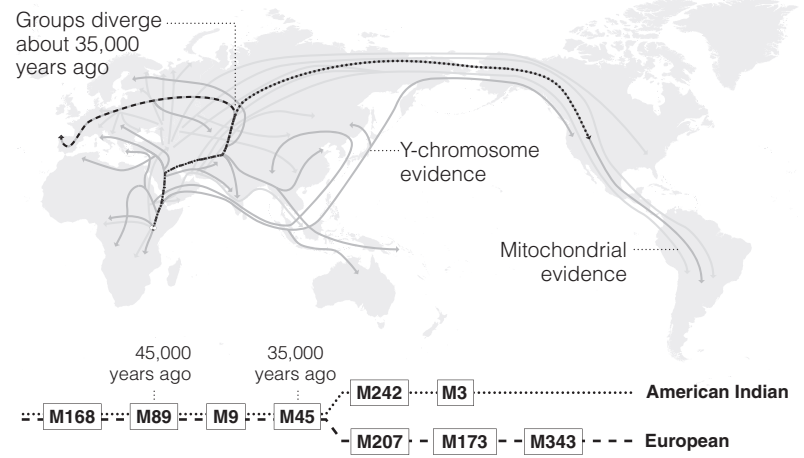
Since only males have a **Y chromosome**, mutations on this gene give information about the history of the paternal lineage.

All **mitochondrial DNA** comes from the mother. Thus, mutations in the mitochondrial DNA track changes through the maternal lineage.

Specific mutations serve as markers that tie people to a common ancestor. As they build up, they tell the history of a particular group.



As an example, two men who might live in the United States — an American Indian and a descendent of Europeans — shared an ancestor in Asia about 35,000 years ago, markers on their Y chromosomes show.



Source: National Geographic; The Genographic Project

# Scientists Trying to Trace Indigenous DNA Hit a Snag: The Tribes Don't Trust Them

Continued From Page 1

came from, and indigenous people have more of an interest in their ancestry because it is so important to them."

But indigenous leaders point to centuries of broken promises to explain why they believe their fears are not far-fetched. Scientific evidence that American Indians or other aboriginal groups came from elsewhere, they say, could undermine their moral basis for sovereignty and chip away at their collective legal claims.

"It's a benefit to science, probably," said Dr. Mic LaRoque, the Alaska board's other co-chairman and a member of the Turtle Mountain Chippewa Tribe of North Dakota. "But I'm not convinced it's a benefit to the tribes."

The pursuit of indigenous DNA is driven by a desire to shed light on questions for which the archeological evidence is scant. How did descendants of the hunter-gatherers who first left humanity's birthplace in east Africa some 65,000 years ago come to inhabit every corner of the Earth? What routes did they take? Who got where, and when?

As early humans split off in different directions, distinct mutations accumulated in the DNA of each population. Like bread crumbs, these genetic markers, passed on intact for millennia, can reveal the trail of the original pioneers. All non-Africans share a mutation that arose in the ancestors of the first people to leave the continent, for instance. But the

descendants of those who headed north and lingered in the Middle East carry a different marker from those who went southeast toward Asia.

Most of the world's six billion people, however, are too far removed from wherever their ancestors originally put down roots to be useful to population geneticists. The Genographic Project is focusing on DNA from people still living in their ancestral homelands because they provide the crucial geographic link between genetic markers found today and routes traveled long ago.

In its first 18 months, the project's scientists have had considerable success, persuading more than 18,000 people in off-the-grid places like the east African island of Pemba and the Tibesti Mountains of Chad to donate their DNA. When the North American team arrived in southwestern Alaska, they found volunteers offering cheek swabs and family histories for all sorts of reasons.

The council members of the Native Village of Georgetown, for instance, thought the project could bolster a sense of cultural pride.

Glenn Fredericks, president of the Georgetown tribe, was eager for proof of an ancient unity between his people and American Indians elsewhere that might create greater political power. "They practice the same stuff, the lower-48 natives, as we do," Mr. Fredericks said. "Did we exchange people? It would be good to know."

Others said the test would finally force an acknowledgment that they were here first, undermining those who see the government as having "given" them their land. Still others were interested in the mechanics of migration: "Were the lands all combined? Did they get here by boat?" For many nonindigenous Americans who feel disconnected from their roots, the project has also struck a chord: nearly 150,000 have scraped cells from their cheek and sent them to the society with \$100 to learn what scientists know so far about how and where their individual forebears lived beyond the mists of prehistory.

By giving the broader public a way to participate, though it is likely to generate little scientific payoff, the project has created an unusual set of stakeholders with a personal interest in its success. More details, the project explains in the ancestral sketches it gives individuals, will come only with more indigenous DNA.

"I think you have to be sensitive to these cultures," said Jesse R. Sweeney, 32, a bankruptcy lawyer in Detroit who hopes the millennia-size



Glenn Fredericks, a tribal leader in Georgetown village, Alaska, swabbing his cheek to give a DNA sample.

gaps in his own ancestors' story will eventually be filled in. "But hopefully they will change their mind and contribute to the research."

Mr. Sweeney's DNA places his maternal ancestors in the Middle East about 50,000 years ago. After that, they may have gone north. Or maybe south: "This is where the genetic clues get murky and your DNA trail goes cold," read the conclusion to his test results on the project's Web site. "By working together with indigenous peoples around the globe, we are learning more about these ancient migrations."

The first large effort to collect indigenous DNA since federal financing was withdrawn from a similar proposal amid indigenous opposition in the mid-1990s, the Genographic Project has drawn quiet applause from many geneticists for resurrecting scientific ambitions that have grown more pressing. As indigenous groups intermarry and disperse at an ever-accelerating pace, many scientists believe the chance to capture human history is fast disappearing.

"Everyone else had given up," said Mark Stoneking, a professor at the Max Planck Institute for Evolutionary Anthropology. "If they get even a fraction of what they are trying for, it will be very useful."

Unlike the earlier Human Genome

Diversity Project, condemned by some groups as "biocolonialism" because scientists may have profited from genetic data that could have been used to develop drugs, the Genographic Project promises to patent nothing and to avoid collecting medical information. The project has designated half the proceeds from the sale of kits to the public for programs designed to preserve traditional cultures and language.

In May, project officials held a stormy meeting in New York with the indigenous rights group Cultural Survival while protestors carried signs reading "National Geographic Sucks Indigenous Blood." Shortly after, the United Nations Permanent Forum on Indigenous Issues recommended suspending the project.

On the ground, every region has its challenges. To make scientific progress, the project's geneticists are finding they must first navigate an unfamiliar tangle of political, religious and personal misgivings. Pierre Zalloua, the project director in the Middle East, faces suspicion that he is an emissary of an opposing camp trying to prove their lineages are not important. Himla Soodiyall, the project's South African director, finds herself trying to explain to people who worship their ancestors what more her research could

add. In Australia, some aboriginal groups have refused to cooperate.

But among the 10 geneticists the society has given the task of collecting 10,000 samples each by the spring of 2010, Theodore G. Schurr, the project's North American director, is in last place. Fewer than 100 vials of DNA occupy a small plastic box in his laboratory's large freezer at the University of Pennsylvania, where he is an assistant professor of

## Science may prove a threat to indigenous beliefs about creation.

anthropology. And at the request of the Alaska review board, he has sent back the 50 or so samples that he collected in Alaska to be stored in a specimen bank under its care until he can satisfy their concerns.

American Indians, Dr. Schurr says, hold the answer to one of the more notable gaps in the prehistoric migration map. Although most scientists accept that the first Americans came across the Bering Strait land bridge that connected Siberia and

Alaska some 20,000 years ago, there is no proof of precisely where those travelers came from, and the route they took south once they arrived.

Comparing the DNA of large numbers of American Indians might reveal whether their ancestors were from a single founding population, and when they reached the Americas. And knowing the routes and timing of migrations within the Americas would provide a foundation for studying how people came to be so different so quickly.

But almost every federally recognized tribe in North America has declined or ignored Dr. Schurr's invitation to take part. "What the scientists are trying to prove is that we're the same as the Pilgrims except we came over several thousand years before," said Maurice Foxx, chairman of the Massachusetts Commission on Indian Affairs and a member of the Mashpee Wampanoag. "Why should we give them that openly?"

Some American Indians trace their suspicions to the experience of the Havasupai Tribe, whose members gave DNA for a diabetes study that University of Arizona researchers later used to link the tribe's ancestors to Asia. To tribe members raised to believe the Grand Canyon is humanity's birthplace, the suggestion that their own DNA says otherwise was deeply disturbing.

When Dr. Schurr was finally invited to a handful of villages in Alaska, he eagerly accepted. But by the time he reached South Naknek, a tiny native village on the Alaska Peninsula, to report his analysis of the DNA he had taken on an earlier mission, the Alaska review board had complained to his university supervisors.

The consent form all volunteers must sign, the Alaska board said, should contain greater detail about the risks, including the fact that the DNA would be stored in a database linked to tribal information.

Dr. Schurr's latest attempt at a revised form is to be reviewed this month by the board in Alaska and the by University of Pennsylvania board supervising the project.

In the meantime, his early results have surprised some of the Alaskans who gave him their DNA. In South Naknek, Lorianne Rawson, 42, found out her DNA contradicted what she had always believed. She was not descended from the Aleuts, her test results suggested, but from their one-time enemies, the Yup'ik Eskimos.

The link to the Yup'iks, Ms. Rawson said, only made her more curious. "We want them to do more research," she added, offering Dr. Schurr more relatives to be tested. But she will have to wait.



A review board stopped DNA research in South Naknek, Alaska.

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the Swanlund Professor of English, for winning this year's

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