Paleogenetics, Pt. 14
Americas

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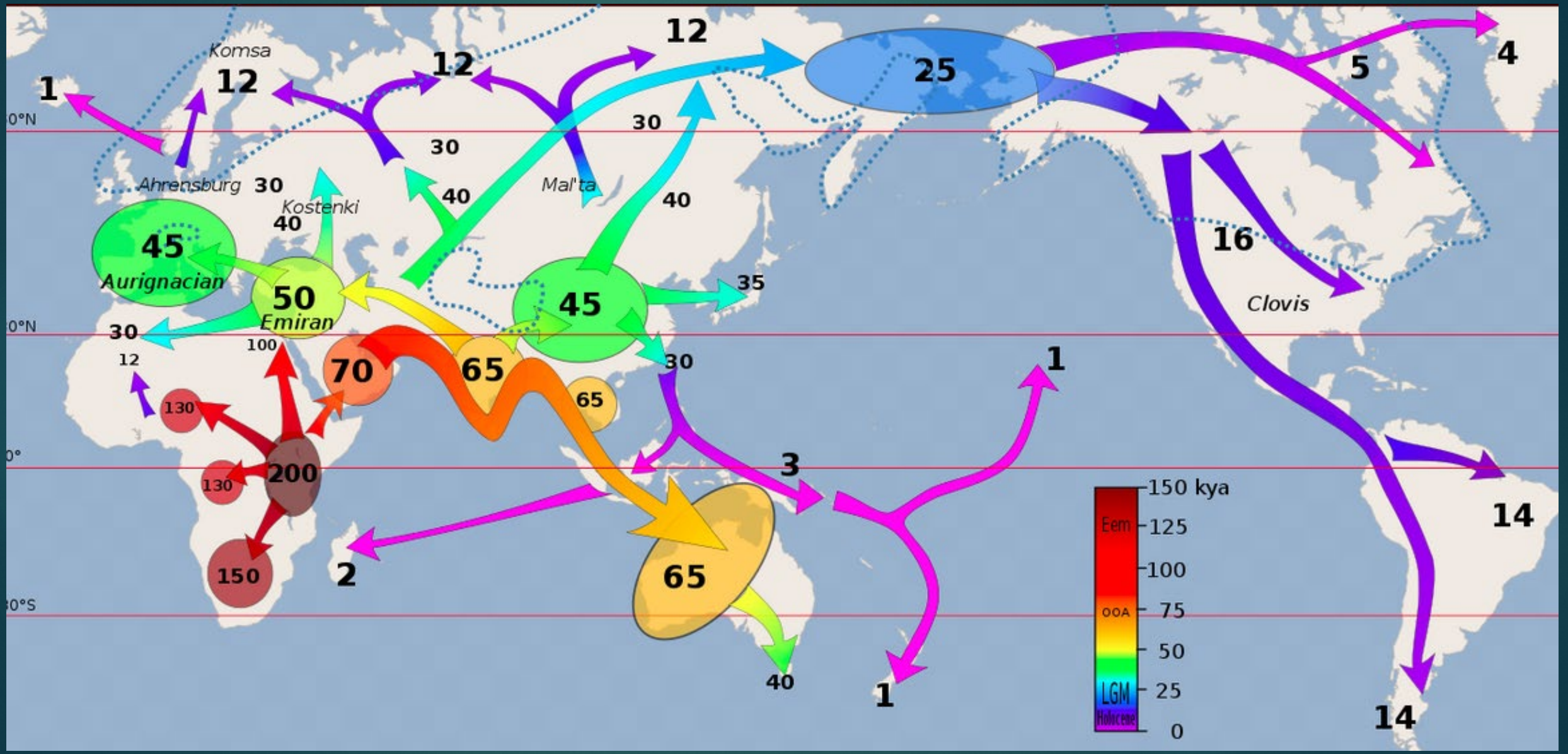
In Search of Native North Americans

Native American Ancestry

- Please note:
- The following discussion is about aDNA and genetics of Native Americans ancestry
- Indigenous Native American identity is not necessarily about scientific genetics, but rather about political citizenship, culture, kinship, and daily, lived experience as part of an Indigenous community.

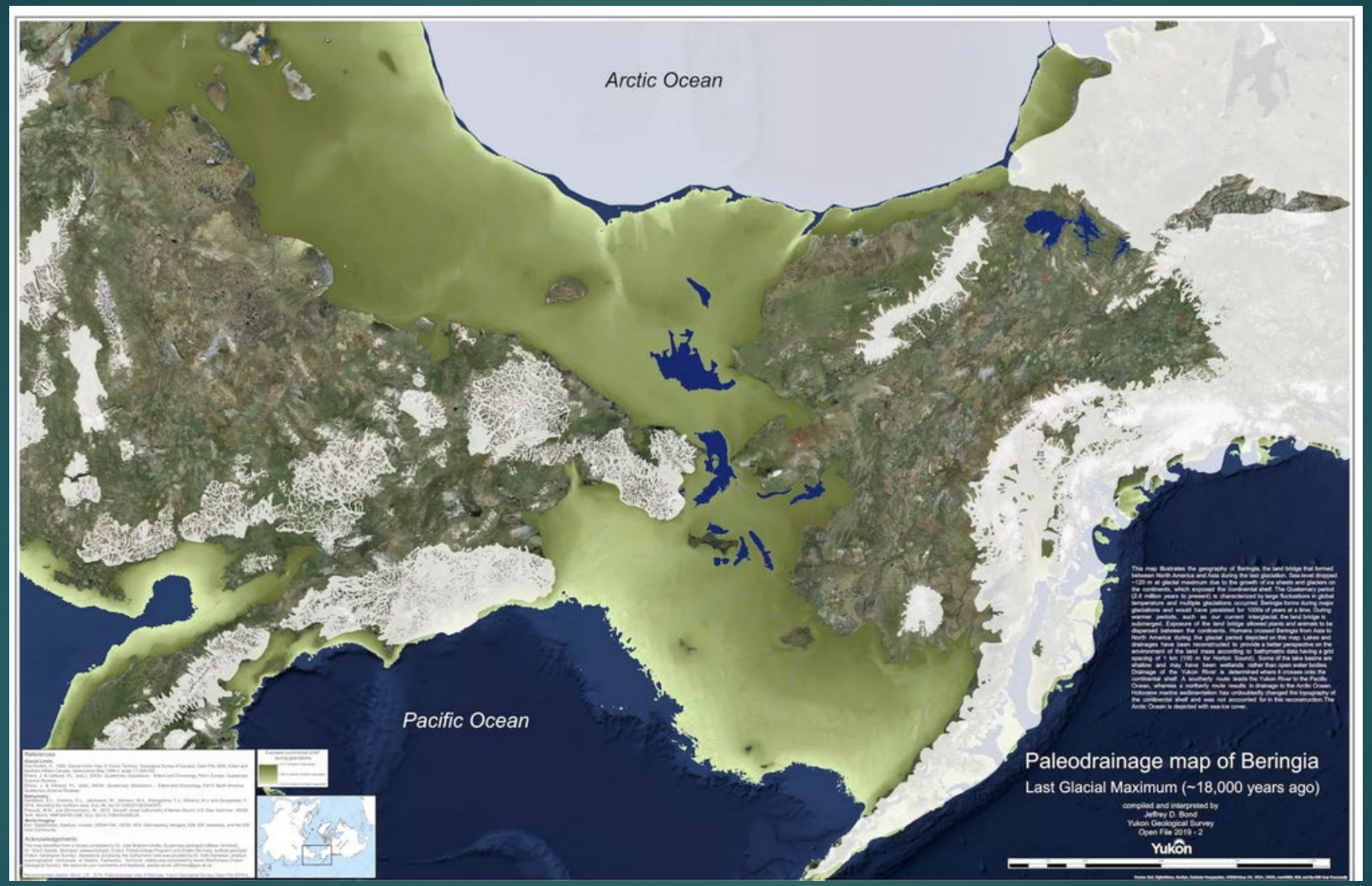
Standard model of Out of Africa migrations



Bering Land Bridge/Bergenia

Historical theory: a small human population of at most a few thousand arrived in Beringia from eastern Siberia during the Last Glacial Maximum before expanding into the settlement of the Americas sometime after 16,500 years age. This would have occurred as the American glaciers blocking the way southward melted, but before the bridge was covered by the sea about 11,000 years ago.

Bering Land Bridge formed much later than originally thought



Tim Stephens, 2022

Bering Land Bridge: formed 35,700 ya

- Researchers reconstructed the sea level history of the Bering Land Bridge from 46,000 years ago and found that it didn't emerge until around 35,700 years ago, which is less than 10,000 years before the last ice age (Last Glacial Maximum (LGM));
- Land bridge consisted of steppe/tundra; supported herds of horses, mammoths, and other Pleistocene fauna
- Some studies suggest people may have lived in Beringia throughout the height of the ice age.
- The growth of the ice sheets, which led to a subsequent drop in sea levels, occurred later in the glacial cycle, with the Bering Strait being open and flooded from at least 46,000 to 35,700 years ago
- As Earth warmed and its ice sheets began melting, the bridge became inundated around 11,000 to 13,000 years ago as it disappeared under the Bering Strait

Origin. A Genetic History of the Americas
- Jennifer Raff, 2022

- Accepted historical theory: the first humans in America were the Clovis people with their distinctive spearheads around 13 Ka, having crossed the Bering Land Bridge (Beringia) after the last Ice Age.

- Now multiple pre-Clovis sites identified:
  - Meadowcroft site, Pa – 16 Ka,
  - Cactus Hill (VA) 16.9-15 Ka,
  - Paisley Caves (OR) 14 Ka,
  - Buttermilk Creek (TX) 15 Ka. - pre-Clovis tools,
  - Page-Ladson (FL) 14.5 Ka,
  - Huaca Prieta (Peru) 14-5-13.5 Ka,
  - Monte Verde, Chile - 14 Ka.

- Conservative estimate for first people in America – 15-14 Ka, more likely 17-16 Ka

Origin. A Genetic History of the Americas - Jennifer Raff, 2022

- Coast highway: coast open by 16 Ka; ice free interior corridor, not until 12.5 Ka. Rapid movement south – by boat – leaping over regions. Cordilleran ice sheet melted back from coast 17 Ka, could have allowed coastal migration. "Kelp Highway" Alaska to Tierra del Fuego – evidence of eating kelp 14 Ka at Monte Verde. Migration along west coast could have happened as early as 30-25 Ka.

- Home to future Americans in Beringia - Ancient North Siberians interbreed with East Asians – 25 Ka.

- Two origin groups: 63% of First Peoples = East Asian; 37% Ancient North Siberians.

- Southern central Beringia now under 164 feet water, was coast 50-11 Ka.

Origin

- Stone tool industries of Beringia –
  - Dyuktai (Swan Point),
  - Denali – 12-6 Ka,
  - Nenema – 13.6-12.7 Ka,
  - Mesa – 13 Ka.
- Migration back into north Asia after LGM – 18-15 Ka – Dyuktai tools

Origin

- Split into three lineages–
  - Ancestral Native Americans (First Peoples) (ANA)
  - Ancient Beringians (stayed there)
  - ghost Population Y

- Further split of Ancestral Native Americans –
  - major branch – Southern Native Americans (SNA) – US and central and S. America.
  - Other branch – Northern Native Americans (NNA) – include Algonquians and others.
  - Split (15.7 Ka) occurred south of ice sheets (Ancient Beringians equally related to both groups).

- Population in central and south America diverged from N. America – 15-13 Ka. Dogs show similar splits.

Origin

- 12.6 Ka – S. central Montana – Anzick-1 (2 yo) and Anzick-2 (8 yo) – oldest known person aDNA in America – from Southern Native Americans (SNA)

- Population Y (for Ypikuera) (Tupi speaking population) – Amazonians share alleles with Australians, New Guineans, Onge from Andaman Island. DNA signal in S. American west coast as early as 10.4 Ka, long before Europeans there 1492. Also in Tianyuan Cave, China (40 Ka). Probably ancient population in Asia gave rise to alleles in First Peoples, etc. – shows spotty genetic drift.

- Could Pop Y be at White Sands Locality 2 site – 23-21 Ka – footprints? Reich's other theory for Popul Y was population preceded First people – 17-16 Ka.

Origin

- High incidence of Type 2 diabetes (T2D) in Native Americans due to alleles – SLC16A11 and SLC16A13 from Neandertals – probably was beneficial to early Native Americans eating meat at high elevations.

- Denisovan genes TBX15 and WARS2 gave Native Americans physical traits, fat distribution, hair pigment – adaption to living above Arctic Circle.

Oldest evidence

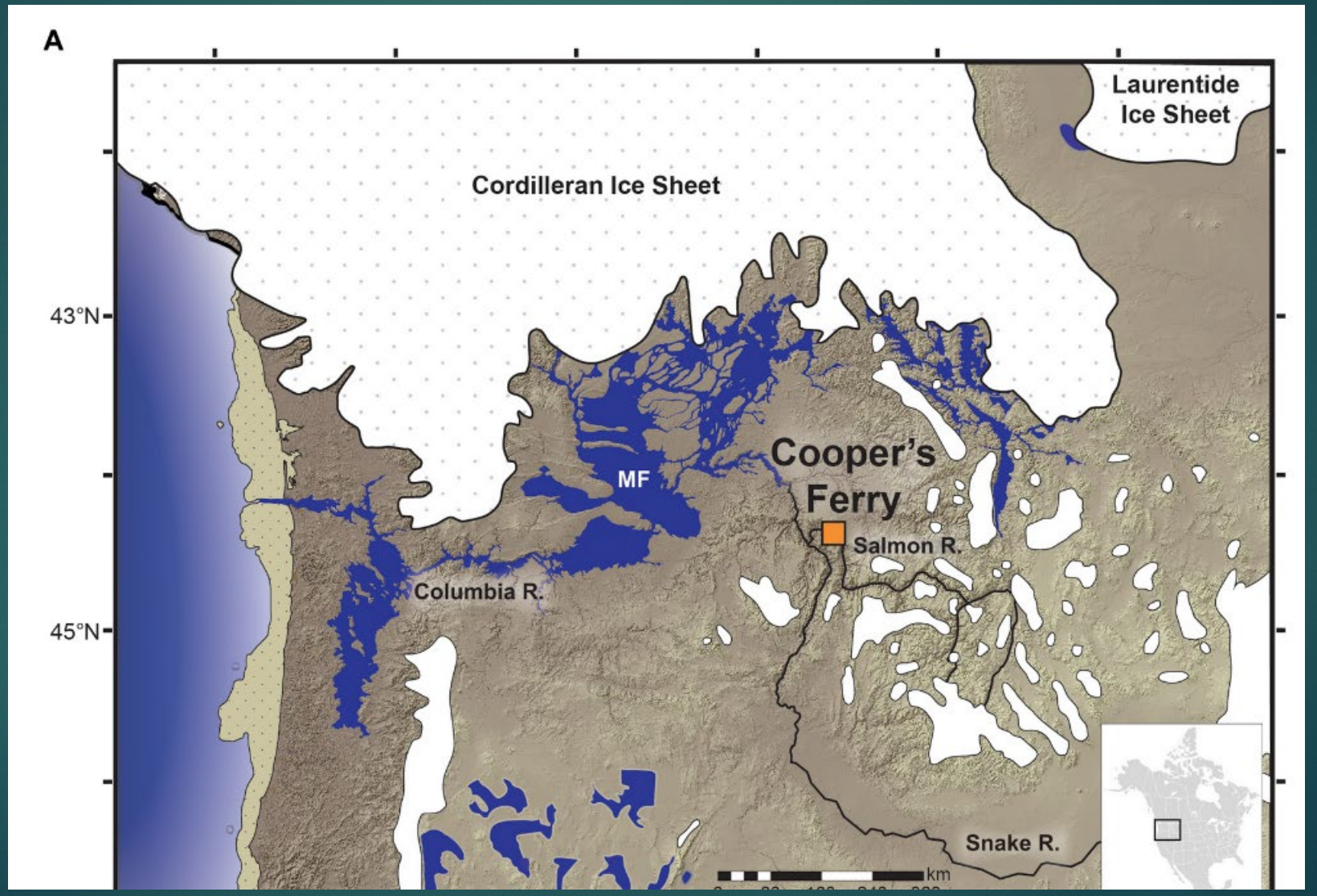
- At present, the oldest human aDNA in the Americas is from the Anzick child burial site that includes diagnostic Clovis artifacts and dates to 12,905 – 12,695 ya; aDNA places this individual on the stem of the Native American clade; it preserves no Population Y ancestry.
- The absence of a Population Y signal in North America may be an artifact of the lack of human bones and aDNA older than 13,000 cal BP, and under-sampling of living populations.
- Until much older human aDNA is recovered, uncertainty will attend the association of Population Y with any of the older archeological sites.
- It is technically possible that the older American sites represent entirely separate, unrecognized pre-LGM lineage(s) that became extinct without leaving a discernable genetic trace in younger populations (Raff, 2022).

2022 study: Cooper's Ferry site, Area B, Idaho, **~15,785 ya**

Diminutive; probably tied to darts rather than arrows or spears.

Loren G. Davis, et al. 2020

Cooper's Ferry, ID



Dating of a large tool assemblage at the Cooper's Ferry site (Idaho, USA) to ~15,785 B.P. extends the age of stemmed points in the Americas

- Lethally sharp projectile points found along the banks of a river in southwestern Idaho, dated to nearly 16,000 years ago, could represent the oldest evidence of the first tool technology brought to the Americas.
- Apparently deposited into a series of shallow pits by an ancient group of hunter-gatherers, the points are examples of "stemmed point technology..
- Hypothesis: blueprint for making them may have come from East Asia.
- Sixteen thousand years ago, the river sat in an ice-free corridor inside a glacial amphitheater left by the tail end of an ice age. At the time, an overland route into the North American continent from the Bering Strait would have been blocked by massive ice sheets.

L. David, et al., 2022

Take a left at Columbia River

- But some researchers have proposed that the earliest migrants from Siberia could have boated along the ice-covered Bering Strait's shores and down the Pacific coast.
- If you're coming south along the Pacific coastline entering North America … the first major left-hand turn south of the ice is the Columbia River, and if you head upstream, you get to Cooper's Ferry,
- Davis began working at the site in 1997 and never left. In 2019, he and colleagues published a paper in *Science* that included radiocarbon dates obtained from bits of bone and charcoal excavated in collaboration with the Nez Perce Tribe. The oldest dates put the village somewhere between 16,560 and 15,280 years old, making it one of the earliest known human-occupied sites on the continent.

Not Clovis points

- Digging below the surface, they found three cylindrical pits that had been hollowed from the earth. Inside were hundreds of bits of animal bone—as well as 13 carefully worked stone projectile ends known as stemmed points, after the protruding stems used to haft them onto the tips of spears.
- A radiocarbon dating lab dated several of the animal bones to between about 16,000 and 15,600 years ago, firming up the dates for the overall site reported in the earlier study.
- Not Clovis points

Oldest points in America?

- According to carbon-14 dating, the 13 complete and broken projectile points, which are razor sharp and range in size from half an inch to two inches, date to a time around 15,700 years ago.

- In total, they located and mapped more than 65,000 artifacts

- That is 2,300 years older than the points previously discovered at the same Cooper's Ferry location, and roughly 3,000 years older than the Clovis fluted points discovered across North America.

Cooper's Ferry: Asian tech?

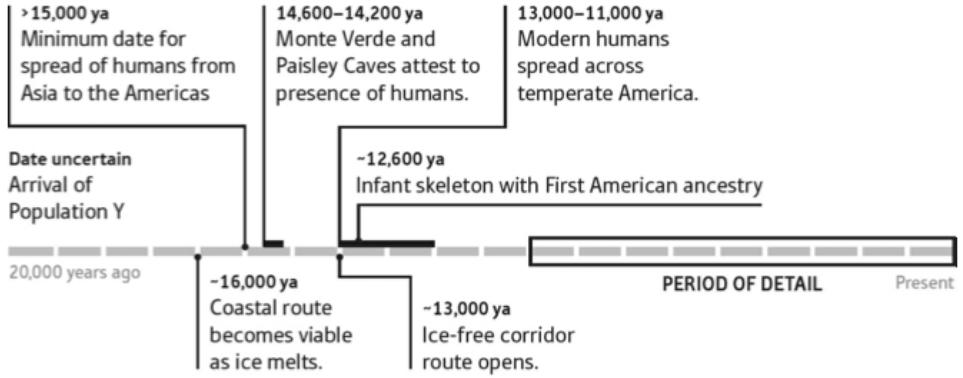
- The points at Cooper's Ferry most closely resemble projectile points made by people who lived near modern-day Hokkaido, Japan, some 20,000 years ago.
- Genetic studies show these people were not ancestors of modern Native Americans, but Davis believes their technological tradition may have been passed on to other Asian groups that did ultimately migrate through northeastern Siberia and into the Americas.

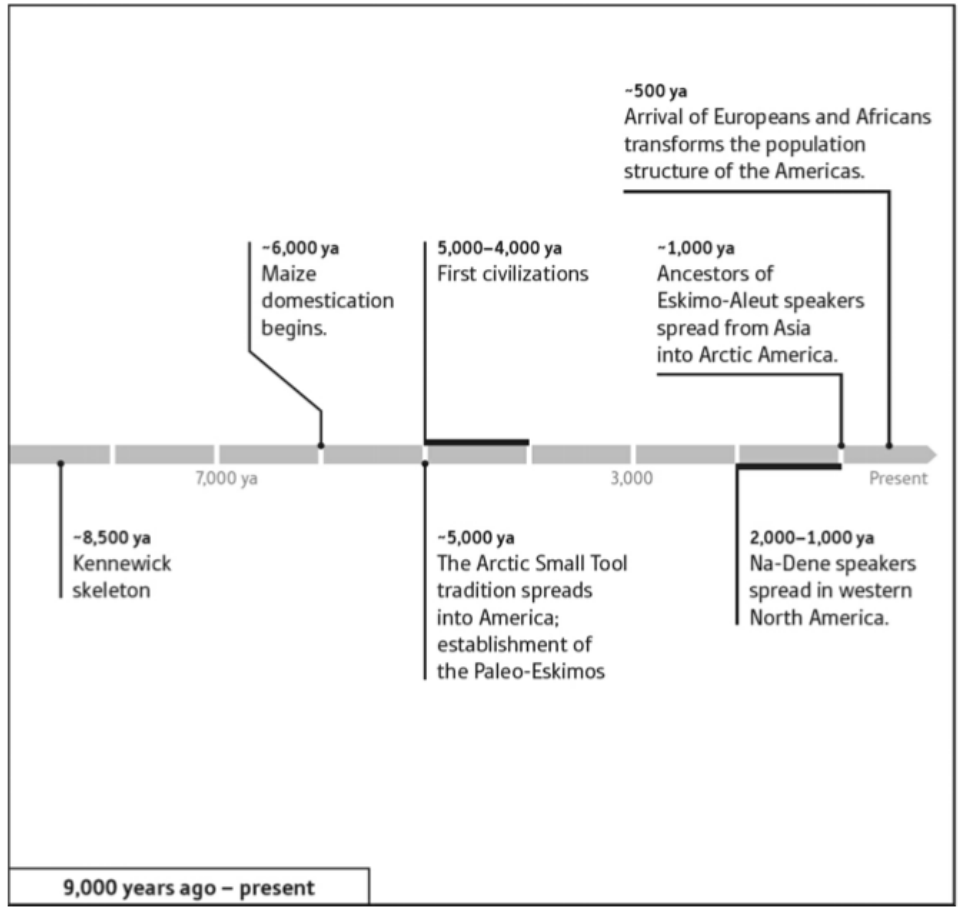
Critique

- Critical examination of the data and analysis presented gives rise to a degree of caution.
- Dating is via statistical modeling. There is no quantifiable information, and the stratigraphically lower OxA-38106 in fact yielded a much more recent age, raising possible issues of bioturbation.
- Critical review suggests that more and better evidence is required to be confident of human presence at Cooper's Ferry before ~15,000 years ago

Sturt W. Manning, 2020

Migrations to the Americas





Migrations to the Americas: 20.000 ya to Present

- 23-19 ka: Last Global Maximum
- -16,000 ya Coastal route becomes viable as ice melts.
- Date uncertain, Arrival of Population Y
- >15.000 ya Minimum date for spread of humans from Asia to the Americas
- 14,600-14,200 ya Monte Verde and Paisley Caves attest to presence of humans.
- 13,000-11,000 ya Modern humans spread across temperate America.
- -13,000 ya Ice-free corridor route opens.
- -12,600 ya Anzick Infant skeleton with First American Clovis ancestry (2014)

Migrations to the Americas; 9000 ya to Present

- -8.500 ya Kennewick Skeleton
- -6.000 ya Maize domestication begins.
- 5,000-4,000 ya First civilizations
- -5,000 ya The Arctic Small Tool tradition spreads into America; establishment of the Paleo-Inuits
- 2,000-1,000 ya Na-Dene speakers spread in western North America.
- -1.000 ya Ancestors of Inuit-Aleut speakers spread from Asia into Arctic America
- -500 ya Arrival of Europeans and Africans transforms the population structure of the Americas.

Arctic Indigenous Peoples: Note about correct names

- Term
- Inuit
- The uit. They deve eastward acro ntury.

Who We Are and How We Got Here

- Chapter 7, "In Search of Native American Ancestors," shows how the analysis of modern and ancient DNA has demonstrated that Native American populations prior to the arrival of Europeans derive ancestry from multiple major pulses of migration from Asia.

- The settlement of the Americas occurred at least 15,000 years ago through Beringia, a land bridge between Asia and America that existed during the ice ages,

Origins Stories and humility

- Indigenous American origins stories have been documented by anthropologists working to understand these cultures, and, like origins stories the world over, it is viewed by scholars as fictional, of interest because of what it reveals about a society.

- But scientists too have origins stories. They like to think these are superior because they are tested by the scientific method against a range of evidence.

- But some humility is in order.

Reich: First Americans

- In 2012, Reich led a study that claimed that all Native Americans from Mesoamerica southward derived all of their ancestry from a single population, one that moved south of the ice sheets sometime after fifteen thousand years ago.

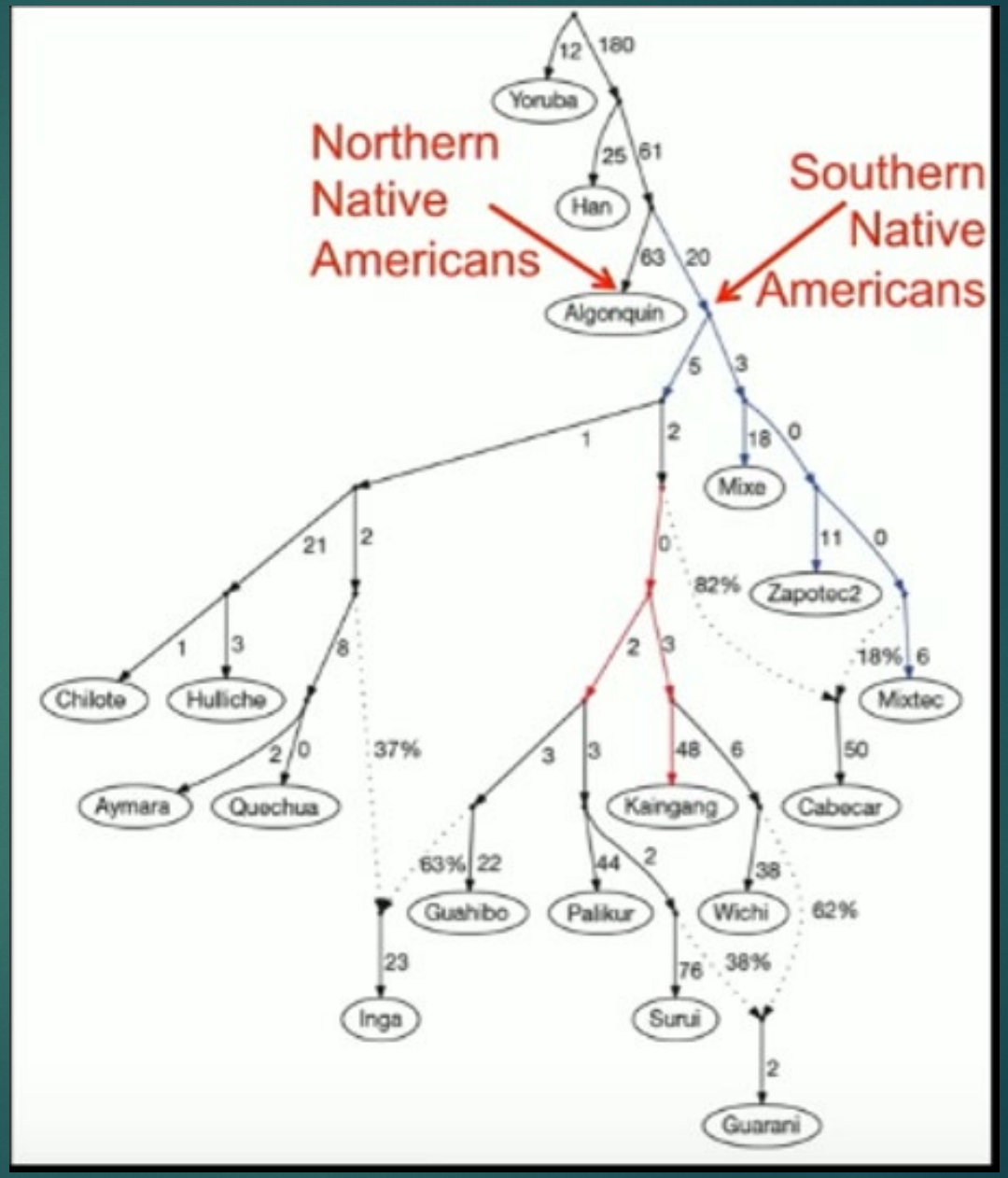
- He was so confident of this theory, which fit with the consensus derived from archaeology, that he used the term "First American" to signal that the lineage we had highlighted was a founding lineage.

- Three years later, he found out he was wrong. Some Amazonian groups harbor some ancestry from a different founding population.

Lesson in humility: deep history of South America

View from 2012:
Claimed a single source population for Central and South Americas

Reich et al. *Nature* 2012
Reconstructing Native American population history



2012: Reconstructing Native American population history
D. Reich, et al.

- The peopling of the Americas: One contentious issue is whether the settlement occurred by means of a single migration or multiple streams of migration from Siberia.
- Assembled data from 52 Native American and 17 Siberian groups genotyped at 364,470 single nucleotide polymorphisms.
- Show that Native Americans descend from at least three streams of Asian gene flow. Most descend entirely from a single ancestral population that Reich called ‘First American’.
- However, speakers of Inuit–Aleut languages from the Arctic inherit almost 50% of their ancestry from a second stream of Asian gene flow, and the Na-Dene-speaking Chipewyan from Canada inherit roughly 10% of their ancestry from a third stream.

Reich, 2012

- Show that the initial peopling followed a southward expansion facilitated by the coast, with sequential population splits and little gene flow after divergence, especially in South America.

- A major exception is in Chibchan speakers on both sides of the Panama isthmus, who have ancestry from both North and South America

- The reason for humans' late arrival to America lies in the geographical barriers that separate the continent from Eurasia: vast stretches of cold, harsh, and unproductive landscapes in Siberia, and oceans to the east and west.

A difficult passage

- It took until the last ice age for Siberia's northeastern corner to be visited by people with the skills and technology needed to survive there at a time when sea levels were low enough for a land bridge to emerge in what is now the Bering Strait region, enabling them to walk across to Alaska.

- Once there, the migrants were able to survive, but they still could not have traveled south, at least by land, as they were blocked by a wall of glacial ice formed by the joining together of kilometer-thick ice sheets that buried Canada.

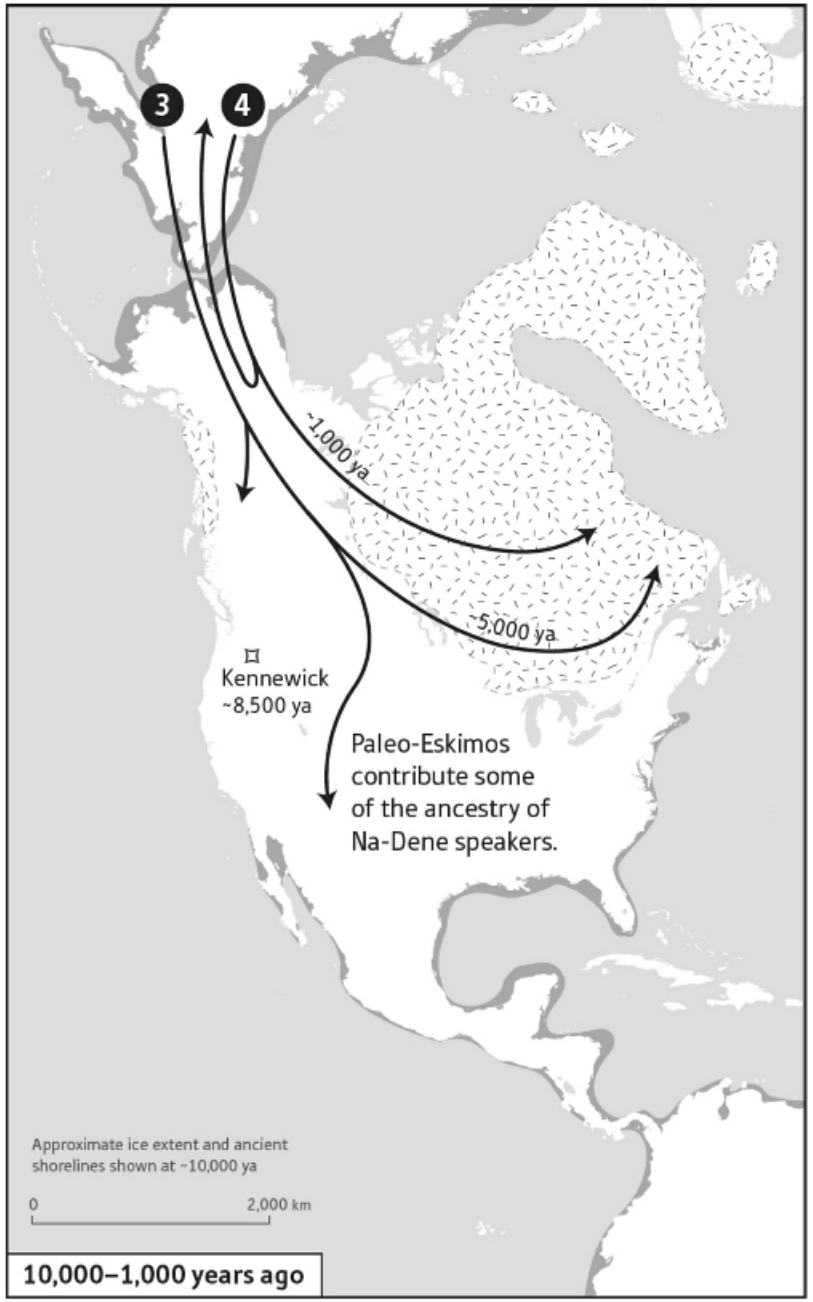
Figure 19

Genetic Evidence of at Least Four Prehistoric Migrations to America

There were at least two migrations that left a human legacy as far as South America (left) and at least two whose impact was limited to northern North America (right).

1
Split from closest Eurasians
~23,000 ya

2
Source of Population Y
Timing of entry unknown



3
Migration out of Asia forms the Paleo-Eskimo lineage.
~5,000 ya

4
A final wave from Asia contributes to the Neo-Eskimos and displaces the Paleo-Eskimos.
~1,000 ya

The crossing

- How were the Americas first peopled? Until two decades ago, *the prevailing hypothesis was that the gates of the American Eden only opened after ~13,000 years ago.*
- The migrants who passed through emerged into North America's Great Plains. Before them was a land filled with massive game that had never before met human hunters. Within a thousand years, the humans had reached Tierra del Fuego at the foot of South America.
- The notion that humans first reached an empty America from Asia—an idea that today is still the overwhelming consensus among scholars—dates back to the Jesuit naturalist José de Acosta in 1590, who conjectured that the New World was joined to the Old in the then-unmapped Arctic.

Historical theory: Clovis culture as First People

- Scientific evidence for humans in temperate America at the tail end of the last ice age came in the 1920s and 1930s, when archaeologists working at the sites of Folsom and Clovis, New Mexico, discovered artifacts and stone tools—including spear tips mixed in among the bones of extinct mammoths—that were effectively smoking guns proving a human presence.
- Clovis-style spear tips have since been found over hundreds of sites across North America, sometimes embedded in bison and mammoth skeletons.
- The available evidence suggests that the Clovis culture appeared in the archaeological record around the time of the geologically attested opening of the ice-free corridor, so everything seemed to fit.
- It seemed natural to think that people practicing the Clovis culture were the first humans south of the ice sheets, and were also the ancestors of all of today's Native Americans.

Clovis First

- This "Clovis First" model: that makers of the Clovis culture emerged from the ice-free corridor and proceeded to people an empty continent, became the standard model of American prehistory.
- It fostered skepticism among archaeologists regarding claims of pre-Clovis sites. It influenced linguists who claimed to find a common origin for a large number of diverse Native American languages.
- The mitochondrial DNA data available at the time was also consistent with the great majority of the ancestry of present-day Native Americans deriving from a radiation from a single source, although with such data alone it was not possible to determine whether that radiation occurred at the time of Clovis or before.

1997: Monte Verde, Chile = 14 Ka

- A major blow to the idea that Clovis groups were the first Americans came in 1997.
- That year marked the publication of the results of excavations at the site of Monte Verde in Chile, which contains butchered mastodon bones, wooden remains of structures, knotted string, ancient hearths, and non Clovis stone tools
- The radiocarbon dates of Monte Verde indicated that some of the artifacts there dated to around 14,000 years ago, definitively before the ice-free corridor had opened thousands of kilometers to the north.
-

A pre-ice-free corridor and a pre-Clovis human presence in the Americas

- A group of skeptical archaeologists who had previously shot down many pre-Clovis claims visited the site that same year, and though they arrived doubting that the site could be that old, they left convinced.
- Their acceptance of Monte Verde was followed by the acceptance of finds elsewhere that also pointed to a pre-ice-free corridor and a pre-Clovis human presence in the Americas
- Another strong case for a pre-ice-free corridor occupation has been made at the Paisley Caves in Oregon in the northwestern United States, where ancient feces in undisturbed soil layers have also been dated to around 14,000 years ago, and have yielded human mitochondrial DNA sequences.

Other sites

- How could humans have gotten south of the ice sheets before the ice-free corridor was open? During the peak of the ice age, glaciers projected right into the sea, creating a barrier more than a thousand kilometers in length along the western seaboard of Canada.
- But in the 1990s, geologists and archaeologists, reconstructing the timing of the ice retreat, realized that portions of the coast were ice-free after 16,000 years ago. There are no known archaeological sites along the coast from this period, as sea levels have risen more than a hundred meters since the ice age, submerging any archaeological sites that might have once hugged the shoreline. The absence of archaeological evidence for human occupation along the coast in this period is not evidence that there was no such occupation in the past.

Coastal route

- If the coastal route hypothesis is right, humans could have walked at that time or later (but still in time to reach Monte Verde) along ice-free stretches of the coastline, possibly bypassing ice-covered sections with boats or rafts, and arriving south of the ice millennia before the interior ice-free corridor opened.
- Ancient DNA studies have also now made it clear just how wrong the Clovis First idea is—how it misses a whole deep branch of Native American population history.
- In 2014, Eske Willerslev published whole-genome data from the remains of the Anzick infant excavated in Montana whose archaeological context assigned him to the Clovis culture and whose radiocarbon age was a bit after thirteen thousand years ago.

A lineage split

- Their analysis showed that this infant was definitely from the same ancestral population as many Native Americans, but his genetic data also showed that by the time he lived, a deep split among Native American populations had already developed.
- The remains from the Clovis infant were on one side of that split, the Southern Native American branch: the side that contributed the lion's share of ancestry to all Native American populations in Mesoamerica and South America today.
- The other side of the split includes the Northern Native American peoples who today live in eastern and central Canada. The only way this could have happened is if there had been a population that lived before Clovis and that gave rise to major Native American lineages.

Mistrust of Western Science

- Tthe last five hundred years have witnessed repeated cases in which people of European ancestry have exploited the indigenous peoples of the Americas using the toolkit of Western science. This has engendered distrust between some Native American groups and the scholarly community—a distrust that makes carrying out genetic studies challenging.
- After the arrival of Europeans in the Americas in 1492, Native American populations and cultures collapsed under the pressure of European diseases, military campaigns, and an economic and political regime set on exploiting the riches of the continent and converting its inhabitants to Christianity. History is written by the victors.
- Tribal councils have sometimes been hostile to scientists. A common concern is that genetic studies of Native American history are yet another example of Europeans trying to “enlighten” them.

Karitiana of Amazonia

- One of the first strong responses to genetic studies of Native Americans came from the Karitiana of Amazonia.
- In 1996, physicians collected blood from the Karitiana, promising participants improved access to health care, which never came.
- Distressed by this experience, the Karitiana were at the forefront of objections to the inclusion of their samples in an international study of human genetic diversity—the Human Genome Diversity Project—and were instrumental in preventing that entire project from being funded.

Karitiana of Amazonia

- Ironically, DNA samples from the Karitiana have been used more than those of any other single Native American population in subsequent studies that have analyzed how Native Americans are related to other groups.
- The Karitiana DNA samples that have been widely studied are not from the disputed set from 1996.
- Instead, they are from a collection carried out in 1987 in which participants were informed about the goals of the study and told that their involvement was voluntary.
- However, the Karitiana people's later experience of exploitation has put a cloud over DNA studies in this population.

DNA vs Indian Origin Myths

- Another strong response to genetic research on Native Americans came from the Havasupai, who live in the canyonlands of the U.S. Southwest.
- 1990s: Arizona State University & Havasupai People
- Gave blood samples to understand high rates of diabetes
- ASU also used DNA to study interbreeding and test theory that 1st Americans came from Siberia
- Offended Havasupai who believe they originated in Grand Canyon
- 2010 ASU paid $700 K to tribe & apologized for misuse of DNA
- Fear that if Siberian, will be relegated to another immigration group among many

The Havasupai

- Blood from the Havasupai was sampled in 1989 by researchers at Arizona State University who were trying to understand the tribe's high risk for type 2 diabetes.
- The participants gave written consent to participate in a "study [of] the causes of behavioral/medical disorders," and the language of the consent forms gave the researchers latitude to take a very broad view of what the consent meant.
- The researchers then shared the samples with many other scientists who used them to study topics ranging from schizophrenia to the Havasupai's prehistory.

Havasupai

- Representatives of the Havasupai argued that the samples were being used for a purpose different from the one to which its members understood they had agreed—that is, even if the fine print of the forms said one thing, it was clear to them when the samples were collected that the study was supposed to focus on diabetes.
- This dispute led to a lawsuit, the return of the samples, and an agreement by the university to pay $ 700,000 in compensation.

The Navajo: Origin story, not genetics

- The hostility to genetic research has even entered into tribal law.
- In 2002, the Navajo—who along with many other Native American tribes are by treaty partly politically independent of the United States—passed a Moratorium on Genetic Research, forbidding participation of Navajo tribal members in genetic studies, whether of disease risk factors or population history.
- The document reads: “Human genome testing is strictly prohibited by the Tribe. Navajos were created by Changing Woman; therefore they know where they came from.”

Reich research

- Reich became aware of the Navajo moratorium in 2012, whine study was in the final stages of preparing a manuscript on genetic variation among diverse Native Americans.
- After receiving favorable reviews of their manuscript, he asked each researcher who contributed samples to double-check whether the informed consent associated with the samples was consistent with studies of population history and to confirm that they themselves stood behind the inclusion of their samples in our study.
- This led to withdrawal of three populations from the study, including the Navajo. All three populations were from the United States, reflecting the anxiety that has seized U.S. genetic researchers about genetic studies of Native Americans. Many researches have stopped Native American genetic research.

Reich defense of genetic research

- Reich claims he is not aware of any cases in which research in molecular biology including genetics has caused major harm to historically persecuted groups.
- Of course, there have been well-documented cases of the use of biological material in ways that may not have been appreciated by the people from whom it was taken, not just in Native Americans.
- For example, the cervical cancer tumor cells of Henrietta Lacks.

Reich's defense of research

- Reich believes that modern DNA studies are a force for good, contributing to the understanding and treatment of disease in these populations, and breaking down fixed ideas of race that have been used to justify discrimination.
- Reich: " I wonder if the distrust that has emerged among some Native Americans might be, in the balance, doing Native Americans substantial harm. I wonder whether as a geneticist I have a responsibility to do more than just respect the wishes of those who do not wish to participate in genetic research, but instead should make a respectful but strong case for the value of such research."

Community consultation

- There is a movement among some Native American ethicists and community leaders to argue that any research that has as its subject a tribe should only be considered acceptable if there is community consultation, not just informed individual consent.
- These concerns prompted some international studies of human genetic variation to carry out community consultation in addition to individual informed consent before including samples.
- The very few researchers studying Native American genetic diversity almost all now consult with tribal authorities.

Dispute over bones

- Ancient DNA studies of population history are mostly not as fraught as studies of present-day people.

- However, in 1990, the U.S. Congress passed the Native American Graves Protection and Repatriation Act (NAGPRA), which requires institutions that receive U.S. funding to contact Native American tribes and offer to return cultural artifacts, including bones that are from groups to which Native Americans can prove a biological or cultural connection.

- This has meant that Native American remains are being returned to Native American tribes and the opportunity to carry out ancient DNA analysis on many of the samples is disappearing.

NAGPRA

- NAGPRA has had its greatest impact on archaeological remains dating to within the last thousand years, for which a relatively strong case can be made for cultural connections with living Native American tribes.

- The case for cultural connection is harder to make for very old remains, such as the approximately eighty-five-hundred-year-old Kennewick Man found on U.S. lands in Washington State in 1996.

Kennewick Man ~8,500 BP

Figure 13.8 Human Evolutionary Genetics, 2nd ed. (© Garland Science 2014)

Rasmussen et al., 2015

2015: 8500-year-old Kennewick man

- To scientists, he is “Kennewick Man.” To Native Americans, he is the “Ancient One.” More than a decade ago, Native Americans lost their claim for custody of this 8500-year-old skeleton found in 1996 in Washington state, when a federal appeals court ruled there was no evidence he was related to any modern tribe.
- Some of the earliest known skeletons—with long skulls and prominent foreheads—do not resemble today's Native Americans, who tend to have rounder skulls and flatter faces
- Earlier studies of the skull suggested that it was long and high in shape, most resembling that of Polynesians or the Ainu people of Japan rather than the broader, rounder skulls of today’s Native Americans.

Kennewick Man

- Has been suggested that DNA methods can be used to facilitate the accurate identification of the geographic origin of ancient human remains.
- This approach was successful in the case of Kennewick Man. This ancient male human skeleton was discovered in Washington State (USA) in 1996 and was radiocarbon dated to 8,358 years BP.
- Based on a number of craniometric studies it was suggested that Kennewick Man was not a Native American.
- Kennewick Man's skeleton was initially slated for return to five Native American tribes that claimed him as an ancestor, but was made available for scientific study instead after courts found that there was no good scientific evidence that he was Native American under the rules of NAGPRA.

Kennewick Man, 8000 Ka

- To win their case, the scientists who challenged the tribal claims pointed to analyses of skeletal morphology that suggested that his skeleton was closer to Pacific Rim Asian and Pacific islander populations than to present-day Native Americans.
- In order to resolve Kennewick Man's ancestry and affiliations, Rasmussen et al. (2015) sequenced his genome. Comparison of this genome to worldwide genomic data showed that Kennewick Man was more closely related to modern Native Americans than to any other population worldwide. Concluded that Kennewick Man showed continuity with Native North Americans over at least the last eight millennia.
- He is closely related to at least one of the five tribes (Colville tribe) that originally fought to rebury him on spiritual grounds
- Not related to Anzick child (or central & south Americans)

Was Kennewick Man related to local Native Americans

- While the ancient DNA study produced clear proof of the Native American ancestry of Kennewick Man, it was not so clear whether he bears a particularly strong relationship to the Washington State Native American populations that made claims on his remains.
- The paper reporting the Kennewick Man genome sampled DNA from the Colville tribe, one of the five tribes staking a claim of relationship to him, and argued that the data were consistent with a direct link.
- However, the Colville was the only tribe from the lower forty-eight states of the United States that the scientists analyzed, and a close look at the details of the paper provides no compelling case that Kennewick Man is more closely related to the Colville tribe than he is to Native Americans as far away as South America. The Colville data are also not available to the scientific community for independent analysis.

Unsubstantiated claims of direct ancestral links

- These are just two examples of how the ancient DNA literature is beginning to fill up with unsubstantiated claims of direct ancestral links between ancient skeletons and groups living today, a problem that is not limited to the Americas. Scientists working with indigenous people have an incentive to make such claims

- The relationship between tribes and scientists need not be antagonistic: "Tribes do not like having a scientific world view politically shoved down their throat.. .but there is interest in the science."

Native American Population sizes before 1492

- There is also a second great area of unrealized common cause between Native Americans and geneticists—the potential to use ancient DNA to measure the sizes of populations that existed prior to 1492 by looking at variation within the genome of ancient samples.
- This is a critical issue for Native Americans, as there is evidence for about a tenfold collapse in population size in the Americas following the arrival of Europeans and the waves of epidemic disease that Europeans brought, leading to the dissolution of previously established complex societies.
- The relatively small population sizes that European colonialists encountered when they arrived in the Americas were used to provide moral justification for the annexation of Native American lands.

Reich, 2012: The Genetic Evidence of the First Americans

- The first genome-scale study of Native American population history came in 2012, when Reich's lab published data on fifty-two diverse populations. A major limitation of the study was that we had no samples at all from the lower forty-eight states of the United States because of anxieties about genetic research on Native Americans. Nevertheless, the study sampled Native American diversity in much of the rest of the hemisphere.
- For forty-seven of the fifty-two populations, they could not detect differences in their relatedness to Asians. This suggested that the vast majority of Native Americans today, including all those from Mexico southward as well as populations from eastern Canada, descend from a single common lineage.
- Thus the extraordinary physical differences among Native American groups today are due to evolution since splitting from a common ancestral population, not to immigration from different sources in Eurasia.

“First Americans”

- Reich called this common ancestral population the “First Americans.”
- They hypothesized that the “First American” lineage that had been characterized represented the descendants of the first people to spread south of the ice sheets, whether via an ice-free corridor or along a coastal route.
- But whatever happened, they argued that this was a pioneer population of limited size that moved into a human vacuum, expanding dramatically wherever it arrived.

One Population

- The great majority of Native Americans, from populations in northern North America down to southern South America, can be broadly described as branches of one tree, forming a sharp contrast to patterns of population relationships in Eurasia.

- Most populations branched cleanly off the central trunk with little subsequent mixture. The splits proceeded roughly in a north-to-south direction, consistent with the idea that as populations traveled south, groups peeled off and settled, remaining in approximately the same place ever since.

The Genomic Rehabilitation of Joseph Greenberg

- The genetic discovery of the spread of the First Americans also helps to resolve a linguistic controversy.
- The extraordinary diversity of Native American languages had been noted as early as the seventeenth century, with some European missionaries attributing it to the devil's efforts to resist the conversion of Native populations by making the language that missionaries needed to learn to proselytize to one population useless for proselytizing to the next.
- Linguists can be divided into "splitters," who emphasize differences among languages, and "lumpers," who emphasize their common roots.

Linguistic fight

- One of the most extreme splitters was Lyle Campbell, who divided about one thousand Native American languages into about two hundred families (groups of related languages), sometimes even localized to particular river valleys.
- One of the most extreme lumpers was Joseph Greenberg, who argued that he could group all Native American languages into just three families, the deep connections of which he could trace. He argued that these three families reflected three great waves of migration from Asia.
- Campbell and Greenberg clashed famously in their interpretation of Native American language relationships, with Campbell finding Greenberg's tripartite classification so objectionable that he wrote in 1986 that Greenberg's classification "should be shouted down."

Three linguistic families

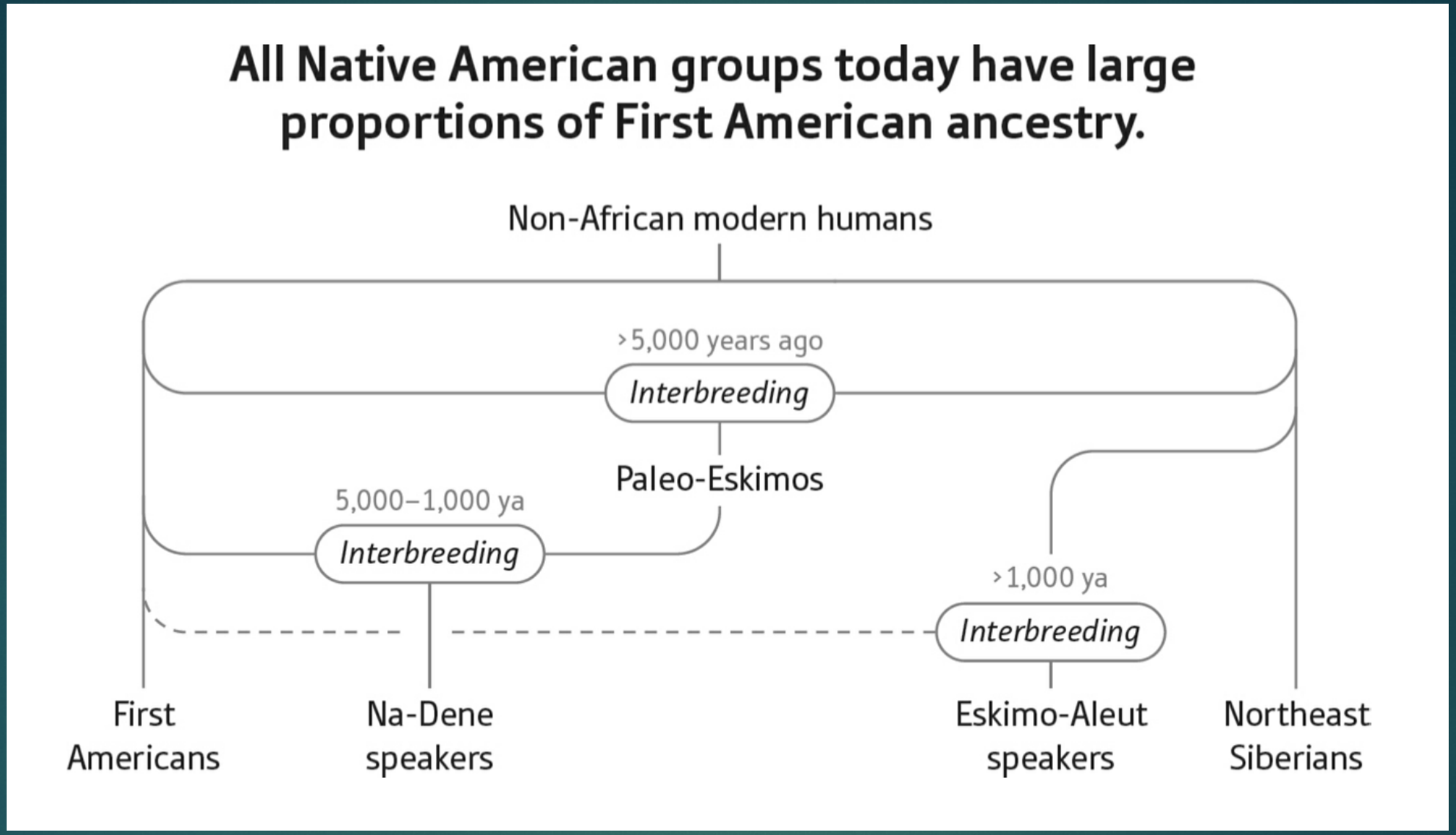
- In fact, two of the language families are indisputable:
  - Inuit-Aleut languages spoken by many of the indigenous peoples of Siberia, Alaska, northern Canada, and Greenland, and
  - Na-Dene languages spoken by a subset of the Native American tribes living on the Pacific coast of northern North America, in the interior of northern Canada, and in the southwestern United States.
- But it was Greenberg's third family, "Amerind," which he claimed includes about 90 percent of the languages of Native Americans, that so many linguists found objectionable.

3 Groups

- The method that Greenberg used to propose Amerind was to study several hundred words across different Native American languages and to score them according to the extent to which they were shared. By finding high rates of sharing, he claimed evidence for common origin.
- As he saw it, proto-Amerind was spoken by the first Americans south of the ice sheets.
- Because he found that every non-Na-Dene and non-Inuit-Aleut language throughout the Americas could be classified as Amerind using this approach, he concluded that the language data supported a theory of three great waves of Native American dispersal from Asia. If there had been another wave, it would have left another distinct set of languages.

Greenberg was right

- The critique of Greenberg's ideas that followed was withering.
- But Greenberg got something right. His category of Amerind corresponds almost exactly to the First American category found by genetics. The clusters of populations that he predicted to be most closely related based on language were in fact verified by the genetic patterns in populations for which data are available. And the present-day balkanization of Native American languages also reflects a history in which the great majority of populations descend from a single migratory spread.
- So both the genetic and linguistic evidence support a scenario in which many of the present-day Native American populations are direct descendants of populations that plausibly lived in the same region shortly after the first peopling of the continent.
- This suggests that after the initial dispersal, population replacement was more infrequent in the Americas than it was in Africa and Eurasia.



This simplified tree relates the three groupings of Native American populations hypothesized by Joseph Greenberg based on linguistic data. The groupings correspond to three distinct entries into the Americas, but Greenberg did not know about the high proportions of First American ancestry in all groups: about 90 percent in Na-Dene speakers and about 60 percent in Inuit-Aleut speakers.

Greenberg was partially wrong

- While Greenberg got the broad picture, he missed something important.
- Although Inuit-Aleut and Na-Dene speakers are genetically distinguishable from other Native Americans because they carry ancestry from distinct streams of migration from Asia, both have large amounts of First American ancestry: around a 60 percent mixture proportion in the case of the Inuit-Aleut speakers we studied, and around a 90 percent proportion in the case of some Na-Dene speakers.
- So while Greenberg's three predicted language groups correlate well with three ancient populations, First Americans have made a dominant demographic contribution to all present-day indigenous peoples in the Americas.

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