

NEWS

HUMANS & SOCIETY

One Africa exodus populated globe

DNA data point to migration less than 75,000 years ago

BY TINA HESMAN SAEY

One wave of ancient human migrants out of Africa gave rise to all non-Africans alive today, three new genetic studies conclude.

Those human explorers left Africa 50,000 to 75,000 years ago, mixed with Neanderthals and spread across the world, researchers report online September 21

in *Nature*. The studies, using data from genetically diverse and previously unrepresented populations, offer details of deep human history and add fuel to longstanding debates.

All non-Africans stem from one major founding population, the studies agree. But earlier migrations are recorded in some present-day people's DNA, in some present-day people's DNA, one study finds. A fourth study (also in *Nature*), focusing on ancient climate, also makes the case for an earlier exodus.

Scientists have long debated when modern humans first trekked out of Africa and how many waves of migration there were. Archaeological evidence suggests modern humans were in Asia by at least 80,000 years ago. Human DNA in a Neanderthal woman from Siberia suggests humans interbred with Neanderthals outside Africa as long as 110,000 years ago (*SN*: 3/19/16, p. 6). But those people died out and didn't contribute much, if any, DNA to later generations, says evolutionary geneticist Swapan Mallick of Harvard Medical School, coauthor of a paper that traced the genetic history of 300 people from 142 populations around the world.

Ancestors of today's non-Africans probably left Africa about 50,000 years ago, Mallick and colleagues calculate. Another study describes remnants of a much earlier exodus from Africa in



Earth wobbles on its axis, causing major climate shifts. Some of those shifts turned the Arabian Peninsula into lush grassland that ancient humans could have traversed as they migrated out of Africa. Researchers simulated climate conditions over the last 125,000 years and predicted how those changes would have allowed humans to spread around the globe (increasing intensity of red shows greater predicted population density on this topographic map).

the genomes of present-day Papuans. Biological anthropologist Luca Pagani of the Estonian Biocentre in Tartu and colleagues report that at least 2 percent of the Papuan genome can be traced to small bands of humans who left Africa 120,000 years ago. "This expansion was successful in leaving descendants today," Pagani says. But a massive wave of migrants who left Africa after about 75,000 years ago probably overwhelmed that small trickle, swamping out their genetic signature, the team's data show.

A third study, focusing on the genetic history of aboriginal Australians and Papuans from the New Guinea highlands, didn't find traces of a 120,000-year-old migration, but didn't rule it out either, says study coauthor Eske Willerslev, an evolutionary geneticist at the University of Copenhagen.

Previous studies have suggested that ancestors of Australians and Papuans came from an early wave of migration. "Australians and Papuans are descendants of some of the earliest modern human explorers," Willerslev says. His group's evidence suggests a single wave of migrants left Africa about 72,000 years ago and settled initially in the Middle East. Ancestors of Europeans and Asians stayed put for thousands of years before splitting into different groups. But

Australian and Papuan ancestors kept going. "These guys were heading off on this marvelous journey across Asia," ending up in Australia and Papua New Guinea about 50,000 years ago, Willerslev says. Mallick and colleagues also found evidence of a main wave of migration into the Middle East that split into two groups after breeding with Neanderthals. Those groups took different routes. One ended up in Europe, the other populated Asia. Instead of Australians and Papuans sprinting ahead independently of everyone else, they moved with the ancestors of East Asians and continued to the islands only later, the researchers say.

Pagani and colleagues' analysis method picks out older chunks of DNA, says evolutionary geneticist Mattias Jakobsson of Uppsala University in Sweden. That method revealed evidence of the older migration that the other studies couldn't. But genetic dating methods are imperfect; they can differ because of inaccurate mutation rates, skewed sampling, biased analyses or other reasons.

Even though Pagani's study results seem to disagree with the other two, "it's a superficial disagreement," says evolutionary geneticist Joshua Akey of the University of Washington in Seattle. "One group is saying 98 percent" of DNA came from the main wave of migration, "while the

other groups say it's 100 percent.... The main conclusion is that the vast majority of ancestry in non-Africans can be traced to a single out-of-Africa dispersal."

A study of ancient climates suggests the departure window geneticists propose was the worst time to leave Africa. "Every 20,000 years or so, Earth's axis wobbles caused massive shifts in climate and vegetation," says Axel Timmermann, a climate scientist at the University of Hawaii at Manoa. Those fluctuations opened green corridors across northern Africa and the Arabian Peninsula, then turned those areas to deserts.

Computer simulations of climate and sea level over the last 125,000 years by Timmermann and Hawaii colleague Tobias Friedrich show when and where humans might have easily moved. A mass human migration out of Africa 60,000 to 70,000 years ago "is the most unlikely scenario from a climate point of view," Timmermann says. "Northeastern Africa was completely dry. It was one of the worst drought periods in the entire history, so the corridor was closed."

The researchers found conditions were favorable for migration from Africa to the Arabian Peninsula between 107,000 and 95,000 years ago and again 90,000 to 75,000 years ago. (Another window didn't open until 59,000 years ago, after humans were probably already in Australia.) That ease of travel would have allowed people to mate and move freely out of and back into Africa. Back-and-forth mating would make the Africans and non-Africans genetically indistinguishable, obscuring the real date at which people left Africa, Timmermann speculates. Allowing for cross-continent mingling puts people's exodus from Africa at about 80,000 to 100,000 years ago, he says.

The climate study reinforces the idea that people spread out of Africa sooner than the new genetic evidence indicates, says archaeologist Michael Petragnola of the Max Planck Institute for the Science of Human History in Jena, Germany. He is a coauthor of the Pagani study, but says genetics alone won't end the debates over when people left Africa and who they interbred with as they spread. ■

Sugar industry shifted health focus

Payments to authors influenced 1967 report indicting fat

BODY & BRAIN

BY LAURA BELL

Records unearthed from library storage vaults reveal that, in the 1960s, the sugar industry paid Harvard University nutrition experts to downplay studies linking sugar to heart disease, helping to redirect the scientific narrative for decades.

The documents — which include correspondence, symposium programs and annual reports — show that the Sugar Research Foundation (its name at the time) paid professors who wrote a two-part review in 1967 in the *New England Journal of Medicine*. That report was highly skeptical of the evidence linking sugar to cardiovascular problems but accepting of the role of fat. The now-deceased professors' overall conclusion left "no doubt" that reducing the risk of heart disease was a matter of reducing saturated fat and cholesterol, according to researchers from the University of California, San Francisco, who published their report online September 12 in *JAMA Internal Medicine*.

"Why does it matter today? The sugar industry helped deflect the way the research was developing," says study coauthor Cristin Kearns, a dentist at UCSF's Institute for Health Policy Studies. The Harvard team's scientific favoritism helped direct research and policy attention toward fat and cholesterol. The first dietary guidelines published by the federal government in 1980 said there was no convincing evidence that sugar causes heart disease, stating "the major health hazard from too much sugar is tooth decay."

Following the Harvard report, fat and cholesterol controlled the scientific agenda for decades, leading to a craze of low-fat foods that often added sugar. Kearns points out that it was only in 2015 that dietary guidelines finally made a strong statement to limit sugar. Researchers writing this year in *Progress in Cardiovascular Diseases* note that current studies estimate that diets high in

added sugars carry a three times higher risk of death from cardiovascular disease. (The Sugar Association says on its website that "the last several decades of research have concluded that sugar does not have a unique role in heart disease.") The Sugar Association also acknowledged the secret deal, but noted that "when the studies in question were published, funding disclosures and transparency standards were not the norm they are today." Journals now require all authors to list conflicts of interest, especially funding from a source that has a vested interest in the outcome.

That doesn't mean that industry groups no longer have an influence, says Andy Bellatti, strategic director of Dietitians for Professional Integrity. But the influences may be more subtle, he says. "We're not talking about making up data, but perhaps influencing how a research question is framed."

In a commentary published with the new study, Marion Nestle, a nutrition researcher at New York University, cited recent *New York Times* investigations of Coca-Cola-sponsored research and Associated Press stories revealing that a candy trade group sponsored research attempting to show that children who eat sweets have a healthy body weight.

Bellatti says that researchers sometimes turn to commercial sources because "there is such little public funding for nutrition and disease" research.

For that reason, scientists should not reject industry money wholesale, says John Sievenpiper, a physician and nutrition researcher at the University of Toronto. A study of his was once ridiculed on Nestle's blog because the disclosures covered two pages. He says that any scientist who takes industry money should adhere to a higher standard of openness, including releasing protocols ahead of time so reviewers can make sure the research question was not changed midstream to favor a certain conclusion. ■