Can Genetics Solve the Mystery of the Lost Ten Tribes of Israel?

Geneticists will always need to rely on non-genetic evidence to make any historical sense of the data—written texts, oral traditions, and interviews with people about who they are and where their ancestors come from. Without such evidence it is impossible to turn the testimony of DNA into a coherent account of the past, and that process means that there will also always be some degree of imagination involved in the construction of genetic history, just as is the case for historical accounts based on ancient texts or archaeological finds.

See Also: *The Origin of the Jews: The Quest for Roots in a Rootless Age* (Princeton University Pres, 2017).

By Steven Weitzman
Department of Religious Studies
University of Pennsylvania
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Historians seeking to illumine ancient Israelite and Jewish history have long hoped that science might some day overcome the limits of the textual sources they must rely on to understand the ancient history of the Jews.

A half century ago, that hope focused on archaeology conceived as a scientific undertaking with the potential to uncover massive amounts of data about the ancient world: William Albright was so optimistic about what archaeology could reveal, in fact, that he compared it to nuclear physics in terms of its revolutionary impact on human knowledge. But by the time of

Albright's death in 1971, archaeologists had come to realize their field wasn't as objective as it was once assumed to be. Genetics has emerged in archaeology's place as a new source of objective scientific knowledge about Jewish origins. As an article in the Israeli newspaper Haaretz put it, "recreating history now depends not only on pottery shards, flaking manuscripts and faded coins, but on something far less ambiguous: DNA."

Even in the short period since the publication of the *Haaretz* piece a few years ago in 2012, there have been many new studies that seem to bear out the potential of DNA as a new source of historical evidence for ancient Israelite history. As I write this, for example, a news story is circulating about a recently published paper in the *American Journal of Human Genetics* that has identified genetic continuity between present day Lebanese and ancient Canaanites in the Bronze Age, and it is typical of a kind of research that has exploded in the last two decades.[1]

I can't review all of this research in this context, but as a way of introducing it, I want to zero in on a specific question—the fate of the lost

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[1] Marc Haber, Claude Doumet-Serhal, Christiana Scheib, Yali Xue, Petr Danecek, Massimo Mezzavilla, Sonia Youhanna, Rui Martiniano, Javier Prado-Martinez, Michał Szpak, Elizabeth Matisoo-Smith, Holger Schutkowski, Richard Mikulski, Pierre Zalloua, Toomas Kivisild, "Continuity and Mixture in the Last Five Millennia of Levantine History from Ancient Canaanite and Present Day Lebanese Genome Sequences," *American Journal of Human Genetics (*pre-publication proof): http://www.cell.com/ajhg/fulltext/S0002-9297(17)30276-8

ten tribes of Israel. This is one of the most famous mysteries of biblical history, and for centuries, scholar have been trying to solve it by arguing that this or that present-day population represents the descendants of the lost tribes. The quest to identify the descendants of the lost tribes has literally spanned the entire globe, from Africa to East Asia, but the ultimate fate of these Israelites remains a mystery. Can new genetic research finally provide an answer?

Since genetic research may be unfamiliar to some readers, it might help to offer some background on how it works as a kind of historical investigation. Genetics is the study of biological heredity, of what offspring inherit from their parents and how that inheritance determines or conditions the traits of an organism, and scientists over the last century have grown ever more sophisticated in how they study its workings. The earliest geneticists—what are often referred to as race scientists--focused on visible traits they believed to be heritable like the shape of the cranium or the size of the nose, but such observable characteristics were impressionistic, and this kind of evidence was eventually eclipsed by the use of blood groups to trace inheritance, different types of blood classified according to the presence or absence of inherited proteins and sugars on the surface of red blood cells. But that kind of evidence, though more reliable indicator of genetic

inheritance, also turned out to be ambiguous, and scientists did not agree on what it told them about the ancestry of peoples like the Jews.

The kind of research reflected in the Canaanite study mentioned above reflects a "DNA sequencing revolution" that began in the 1970s, when Frederick Sanger (1918–2013), a two-time Nobel Prize winner, developed techniques to figure out the exact sequence of the chemical building blocks (A, G, C, and T) that compose the DNA molecule. The automation of this sequencing process in the 1980s made possible the Human Genome project which set out to identify and map all the genes in the human genome. It represents not just a scientific breakthrough but a historiographical breakthrough in the sense that it has revealed a new form of evidence by which to reconstruct the history of the human species, including the ancient history of the Jews.

There now exist a number of ambitious projects that aim to make the most of this kind of evidence, projects like the Jewish Hapmap Project, co-founded by Harry Ostrer and Gil Atzmon, that aims to construct a genetic map of Jewish diaspora populations around the world, and the Ashkenazi Genome Consortium founded by 11 labs in NY and Israel that by 2013 had sequenced the genome of 128 individuals of Ashkenazic ancestry.

What can this kind of research tell us about ancient Israelite history?

One of the earliest of these studies suggested that it has great potential in this regard. I am referring to the famous genetic study of the *Cohanim*, Jewish males who identify as members of Judaism's priestly clan.[2] According to Jewish law, membership in the Jewish community is based on maternal descent, from mother to child, but priestly descent is passed down paternally, from father to son. The Torah traces the *Cohanim* back to Moses's brother, Aaron, who passed down the status to his male descendants. We do not know for certain that Aaron himself actually existed, but there is evidence from Josephus and rabbinic sources that priestly status was transmitted from father throughout the age of the Temples and the following centuries, and many Jews today believe that the lineage of the priestly caste remains in tact, that present-day *Cohanim* really are the descendants of ancient priests, sharing a common ancestor—Aaron—on the male side.

If priestly status has been consistently transmitted through the paternal line, there would be mutations accumulating on the Y chromosomes of priests over the centuries, the sex determining chromosome that sons inherit

[2] K. Skorecki. S. Selig, S. Blazer, R. Bradman, N. Bradman, P.J. Waburton, M. Ismajlowicz and M.F. Hammer, "Y Chromosomes of Jewish Priests," *Nature* 385 (1997): https://www.ncbi.nlm.nih.gov/pubmed/8985243. For more on this and other genetic-related research mentioned in this essay, see Steven Weitzman, *The Origin of the Jews: the Quest for Roots in a Rootless Age* (Princeton, N.J; Princeton University Press, 2017).

from their fathers, and in theory it might be possible to trace those mutations back to the male or males from whom the whole line descends. This is what geneticists Michael Hammer, Karl Skorecki, and their colleagues wanted to test for, undertaking a study of self-identified *Cohanim* from Israel, the United States, and Britain to determine whether they shared a distinctive genetic inheritance that tied them to one another as co-descendants of a paternal lineage. In theory at least, descent from a common ancestor might have left a signature in the DNA of present-day descendants, and that signal is what these geneticist were looking for.

The focus of their analysis was an array of haplotypes found on the Y chromosomes of their subjects. A haplotype is a group of genes within an organism inherited together from a single parent. Haplotypes on the male side tend to mutate at a relatively rapid rate, which means that when two males share a distinctive haplotype, that is evidence that they share a common ancestor in the relatively recent past. This is what Hammer, Skorecki, and their team discovered for self-identified priests: a haplotype that distinguished the Y chromosomes of a good number of *Cohanim* from that of nonpriestly Jewish males. The Cohen Modal Haplotype, as this haplotype came to be known, was present in about half of the test subjects, suggesting that a large number shared a common ancestor on their paternal

side. There was no way to identify who this ancestor was, but since the relevant genetic signature showed up among both Ashkenazic and Sephardic *Cohanim*, the authors of the study reasoned that this common ancestor must have lived *before* the split between the two populations sometime in the last millennium. The second of the two studies placed this ancestor between 2,100 and 3,250 years ago, a conclusion that many media outlets took as scientific evidence that the *Cohanim* really did descend from Aaron, as Jews have long believed.

From the vantage point of almost twenty years later, we now know that the conclusions reached by the Cohen study and other research from the same period haven't held up so well: they have been questioned in various ways, and even the authors of the original study have significantly revised their conclusions. But even so, there is no denying that such research opened up a new resource for understanding ancient Jewish history, and there has followed in the last two decades a rash of new studies that have used increasingly refined methods and drawn on bigger data sets. Among these studies is at least one that bears directly on the mystery of the ten lost tribes of Israel, and it suggests that genetic research may indeed be able illumine the fate of the lost ten tribes.

According to the conventional historical account of Jewish origin, the

Jews descend from the tribe of Judah, one of the Twelve Tribes of Israel that survived the Babylonian Exile along with members of the tribes of Levi and Benjamin. The descendants of Judah and Levi survive to this day, but what happened to the other tribes, the famous lost tribes of Israel? According to the Bible, they were deported during the Assyrian conquest of Canaan in the eighth century BCE and were presumably assimilated into the populations of the places to where they were exiled. The mysterious whereabouts of the ten lost tribes of Israel has inspired many claims that this or that people in Africa or Asia represent their descendants, but their fate, of course, remains a mystery.

This is where recent genetic research may be relevant—and more specifically, the work of a Stanford geneticist named Marc Feldman, director of the Morrison Institute for Population and Resource Studies at Stanford and a renowned population biologist. I came to know Feldman when I was a faculty member at Stanford, and he told me about a research project that he had been working on that potentially bears on the fate of the ten lost tribes. That project—a study of the genetic ancestry of present-day Samaritans—has since been published, and it is worth noting not just for what it reveals about the fate of the lost tribes of Israel but as an example of what genetics

may be able to tell us about ancient Israelite history in general.[3]

The Samaritans are a contemporary community of about 750 people who live in Nablus and in Holon, a suburb of Tel Aviv. The Samaritans are relevant here because they believe themselves descendants of the biblical Israelites—and more specifically the tribes of Ephraim and Manasseh, who are supposedly among the tribes lost during the Assyrian period. Jews do not traditionally accept the Samaritan claims of Israelite descent and they haven't done so since antiquity. According to the historian Josephus, the Samaritans were really descendants of the non-Israelite population resettled in the region of the northern kingdom of Israel by the Assyrians after they exiled the Israelite tribes who lived there, and their claim to be the descendants of the Israelites was a lie.

But the Samaritans themselves tell a different story. According to their chronicles, written in a much later period, their ancestry goes back to the biblical Israelites, and it is the Jews who are the imposters. For their part, modern historians differ in how they describe the Samaritans' origin. Some argue that they originated as a breakaway Jewish sect during the Second

[3] Peter J. Oefner, Georg Hõlzl, Peidong Shen, Isaac Shpirer, Dov Gefel, Tal Lavi, Eilon Wolf, Jonathan Cohen, Cengiz Cinnioglu, Peter A. Underhill, Noah A. Rosenberg, Jochen Hochrein, Julie M. Granka, Jossi Hillel, Marcus W. Feldman, "Genetics And The History Of The Samaritans: Y-Chromosomal Microsatellites And Genetic Affinity Between Samaritans And Cohanim," *Human Biology* 85 (2013): 825-838.

Temple period, but others maintain that they indeed descend from the ancient Israelites as the Samaritans themselves claim.

There is no way to resolve the origin of the Samaritans or whether they share a common ancestry with Jews through the methods that scholars normally use to illumine the origin of a people. The historical documentation—Josephus and Samaritan chronicles from a much later period—can all be questioned for various reasons, and the debate has not been resolved by the excavation of the Samaritan sanctuary on Mount Gerizim, the ancient sanctuary of the Samaritans near present-day Nablus. Hence the value of genetic study. Feldman and his team were not the first to study the Samaritans in this way, but they brought to the study of the Samaritans new analytic techniques that have allowed for a more comprehensive and precise analysis of the genetic data.

So what did Feldman and his associates find? After analyzing samples from twelve Samaritan males and comparing them with samples from Jews of various backgrounds and other populations, they found that the Samaritan Y chromosomes were closest not just to Jews but to Israeli Jewish priests. Josephus was wrong to have described the Samaritans as imposters: according to genetic research, they share a common ancestry with the Jews, which suggest in turn that their self-understanding of themselves as the

descendants of the Israelites might be correct after all, the Samaritans descending from tribes other than Judah. Scholars have sought out the lost Israelites in remote locations like India or Africa. The research of Feldman and his team suggests that some of their descendants have been hiding in plain site in a Tel Aviv suburb.

This discovery didn't receive the same kind of public attention that the Canaanite study has, but it is a wonderful example of the potential of genetic research to illumine historical questions that scholars cannot resolve in other ways. But before we accept it, a little skepticism is in order. Over the last two decades, even as geneticists have expanded their ability to interpret genetic data, there has also arisen a critique of this kind of research which throws its use as an historical source into question. Perhaps the most famous of such skeptics is the anthropologist Nadia Abu El-Haj whose earlier work on Israeli archaeology provoked a lot of bitter controversy, and some would criticize her work on Jewish genetics as well.[4] But she is hardly the only one to raise questions about the use of genetics to illumine Jewish history—other anthropologists and historians of science, including Israeli scholars, have called this kind of research into question. It is

[4] See Nadia Abu El Haj, *The Genealogical Science: the Search for Jewish Origins and the Politics of Epistemology* (Chicago: University of Chicago Press, 2012).

important to note some of this criticism because it challenges the popular belief that DNA represents a less ambiguous source of evidence than texts or archaeological artifacts.

One of the criticisms of the skeptics stems from the observation that the data, however impressive, does not speak for itself; it has no intrinsic meaning but has to be interpreted in order to tell a story; and geneticists do not realize the extent to which their interpretations read into the evidence more than is really there.

In support of this point, one might cite what has happened to the Cohen study over the last two decades since its initial publication in the late nineties. The research attracted a lot of public attention because it seemed to offer scientific proof for the belief that present-day *Cohanim* all descend from a common male ancestor in antiquity, but over the next two decades, as geneticists refined their techniques and expanded the data sets they were working with, it got harder to reconstruct a clear cut historical narrative from the genetic evidence or to align it with the biblical account or Jewish tradition.

Other Near Eastern populations, it turned out, shared the same genetic signature, and even the authors of the original study came to see that the DNA of present-day *Cohanim* reflected multiple lineages. They maintained

that the most common lineage still went back to a male ancestor living in Temple times, but some have recently questioned that dating too, arguing that even this lineage emerged in a more recent historical period. Self-correction is part of the scientific process, but skeptics like Abu El-Haj argue that bias, simplification, and distortion of the genetic data are built into the very act of converting the genetic evidence into a historical narratives, and that, as a result, this kind of research will never be less subjective or debatable than textual study or archaeology.

Applying this critique to the Samaritan study, we can see that it too can be made to fit within different historical narratives. When I had a chance to review the Samaritan study published by Marc Feldman and his colleagues, I pointed out to him that there was another way to understanding some of the findings from a historical perspective. For the authors of the study, the genetic connection supported the Samaritans' perception of themselves as descendants of the tribes of Israel, but to me, the Cohen connection called to mind another episode, not an historical event known from biblical sources but a post-biblical event known from an account written by the first century historian Josephus.

In his account of how the Samaritan temple came to be built, Josephus describes how the Samaritans acquired their priesthood, a narrative that

appears in *Jewish Antiquities* 9.302-347. In the age of Alexander the Great, he tell us, the elders of Jerusalem rose up against a high priest in Jerusalem named Manasses for marrying the daughter of the Samaritan governor, insisting that the priest either divorce his Samaritan wife or give up his priestly role. Manasses chose instead to defect to the Samaritans, accepting appointment as the high priest of their newly built temple on Gerezim. The part of this story that is relevant here is that Manasses wasn't alone in his defection: according to Josephus, many Israelites and priests not only joined him in his defection: *they too married with Samaritans.*

If we believe the testimony of Josephus, in other words, there might be another explanation for why Jews and Samaritans share an ancestry on the male side. The two populations needn't share a common Israelite ancestry; their convergent ancestry might come from an episode in the fourth century BCE when a group of male priests married Samaritan women and became a part of the Samaritan community.

When I called this episode to Feldman's attention, especially the part about Jerusalem priests marrying Samaritan woman, he acknowledged that it might account for the link between Samaritans and *Cohanim* that he and his co-researchers discerned. I am not siding with Josephus that the Samaritans are imposters, and his own testimony invites its fair share of skepticism. My

point, is that the historical sources, as few as they are, allow for more than one way of narrating the genetic history of the Samaritans. In fact, Feldman's findings, which revealed a close connection between the Samaritans and Jewish *Cohanim*, is arguably more consistent with the episode that Josephus recounts.

I am simplifying a lot of scientific and historiographical issues here, but I hope it is sufficient to suggest that the genetic research is not as unassailable as its publication in scientific journals might suggest. Genetic history is a developing field, and perhaps someday, scientists will be able to resolve the ambiguities we have noted here. But even then, the basic issue that the skeptics point to will not go away. Geneticists will always need to rely on non-genetic evidence to make any historical sense of the data—written texts, oral traditions, and interviews with people about who they are and where their ancestors come from. Without such evidence it is impossible to turn the testimony of DNA into a coherent account of the past, and that process means that there will also always be some degree of imagination involved in the construction of genetic history, just as is the case for historical accounts based on ancient texts or archaeological finds.

So what then are we to make of recent efforts to use genetics to illumine the ancestry of the Jews. There are certainly reasons to be open to it

and engage it as a potential source of evidence. But one shouldn't simply discount the skepticism or assume that genetic evidence is more reliable or certain in its interpretation than other kinds of evidence simply because it arises from a scientific field rather than a humanistic one.