The Hidden History of Men

A research team braves Central Asia to capture a surprising genetic record of human migration and military conquest

By Robert Kunzig

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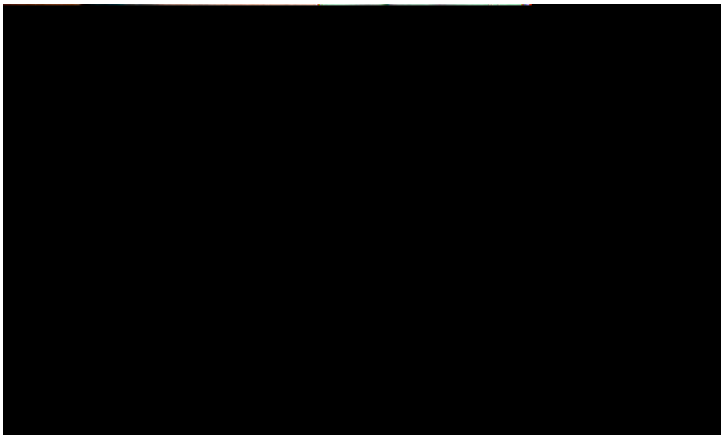
One day last fall, in the home freezer of Spencer Wells, there were these things: a large leg of lamb, a few quarts of milk, and underneath, DNA samples from 2,500 people in Central Asia. Wells is an anthropological geneticist and an energetic collector of DNA, especially Y chromosomes. He lived then in an old stone house outside Geneva, but he was raised in Lubbock, Texas. His own Y chromosome, like his name, hails from Connecticut˜an ancestor was governor there in the 17th century. Before that, Wells,s chromosome came from southern England, and before that, maybe 30,000 years ago, it came from Central Asia. From then and there to here and now, it was passed on, like an indelible stain, by a thousand fathers to a thousand sons, one after the other, until it ended up in Wells,s father, a Lubbock lawyer, and then in Wells.

OUT OF AFRICA

Photograph by Grant Delin; Model: Ben Augustine/Gilla Roos; Tattoo: Leticia Valle



These genetic markers, denoted by the letter M, indicate where and when different Y chromosome lineages spread around the globe

M168: 50,000 years ago

M130: 50,000 years ago

M89: 45,000 years ago

M9: 40,000 years ago

M45: 35,000 years ago

M173: 30,000 years ago

M20: 30,000 years ago

M242: 20,000 years ago

M3: 10,000 years ago

M172: 10,000 years ago

M17: 10,000 years ago

M122: 10,000 years ago

The DNA samples in the freezer, then, are samples of Wells‚s own roots˜and of those of a good part of humanity. Before Wells collected the samples, the region was pretty much terra incognita, genetically speaking. Now some geneticists see it as a second font of human diversity. In Wells‚s view, the grasslands of Central Asia, so reminiscent of the East African savannas with their abundance of big game, are where the human race fattened up after it left Africa, 50,000 or 60,000 years ago. „It was essentially a meat locker,‰he says. „Loads of food. And that allowed them to build up the population density to then go out and move westward and then eastward.

The westward branch of humanity entered Europe; the eastward branch eventually crossed the Bering Strait and entered North America, and there the two branches met again in 1492. By that time they had come to seem very different from each other. Traces of how human beings had fanned out across the planet, acquiring superficial racial differences along the way, are written in our DNA and especially in the Y chromosome.

Before long, the record of that ancient migration will begin to vanish. Our ancestors took tens of thousands of years to spread around the planet; people today move from Lubbock to Geneva or from Tamil Nadu to Texas in hours. In the process they wipe out genetic clues to the past. Think of our genes as the vestiges of an ancient library in which geneticists are trying to piece together and decipher the books; now think of that ruin being paved over for a new airport. Archaeologists would want to mount a rescue dig˜exactly what anthropological geneticists are doing these days. That, along with a young man,s taste for adventure, is what has repeatedly sent Wells bouncing across the Central Asian steppes in a Land Rover. The DNA he has brought back records not just our distant history but also our more recent past˜and in particular what happened around 800 years ago, when a prodigious fornicator named Genghis Khan splashed into the gene pool like a cannonball.

Wells is a tall, handsome man in his thirties, with strawberry blond hair and a chiseled face that quickly turns ruddy in the sun. Words stream out of him without a trace of a Texas accent˜after Lubbock and before Geneva he went to Harvard and Stanford. He felt bottled up in Lubbock, he says, and is drawn to places like India, where you step out of a taxicab to face cows and crowds and people of many colors speaking strange languages: „It,s incredible, and it,s overwhelming. I love the feeling of being immersed.

At Harvard, where he got his Ph.D., Wells studied fruit flies with Richard Lewontin and became interested in understanding the reasons for genetic variation within a particular group. A popula5 23crlashs dcue to direale, for

Y chromosome. Two researchers there, Peter Underhill and Peter Oefner, had recently invented a technique for rapidly finding DNA mutations˜markers˜at the same point in the genomes of two different people. The invention proved useful for tracing human migration. Most spontaneous mutations do neither harm nor good but simply accumulate in the genome, one at a time, as they are passed from one generation to the next. A mutation

HISTORY OF Y'S GUYS

The X and Y chromosomes carry the genes that determine sex. Men have one X, inherited from their mothers, and one Y, inherited from their fathers. Only 5 percent of the Y chromosome,s DNA mingles with the X chromosome. The Y thus provides an unadulterated record of inheritance from father to son over generations. By analyzing Y chromosome samples from around the world, geneticists can know how and when humans originated in Africa and how they colonized the globe.

In the 1990s the Stanford group and Michael Hammer of the University of Arizona showed that „Adam lived in Africa: The Y chromosome tree has its trunk and roots there. Earlier work with mitochondrial DNA, a nonchromosomal kind that escapes recombination, passing intact from mother to daughter˜had shown that „Eve lived in Africa. Beginning around 50,000 years ago, the genetic evidence suggests that modern humans first migrated out of Africa. In his book, Spencer Wells sketches what is known of the subsequent story, but a lot of it is pretty murky.

As early as 1991, Cavalli-Sforza proposed the Human Genome Diversity Project: an effort to collect DNA samples from hundreds of populations worldwide. To Cavalli-Sforza and other geneticists who joined him, the proposal was altruistic in creating a record for all humanity of its history at a time when many of the world,s smaller populations were facing absorption into a globalized culture. Some groups reacted with outrage at the suggestion that they donate their blood to Western science˜it smacked of exploitation. Cavalli-Sforza,s idea became hugely controversial, and the U.S. government never funded it. The research hasn,t stopped, however. It has simply trickled on in a less organized way, driven in part by entrepreneurial scientists like Wells.

Cavalli-Sforza encouraged his young colleagues to pick an area of the world in which to do fieldwork. Wells picked Central Asia˜„a black box˜we knew nothing about it. Central Asia, to Wells, means the region from the Black Sea in the west to Lake Baikal farther east. It includes all the former Soviet „stans, from Turkmenistan to Tajikistan and on into Mongolia. It is a region of endless steppes cut by soaring mountains. It is, even today, an intimidating expanse of bad roads and many languages.

Wells,s first expedition was to Uzbekistan, where in 1996 he and Ruslan Ruzibakiev, an immunologist at the Academy of Sciences in Tashkent, sampled DNA from 550 Uzbeks. There are more than 100 different ethnic groups in Uzbekistan. The chief result, Wells recalls, was that they needed to survey a much wider region if they wanted to understand the diversity of Y chromosomes.

That wider survey took place in 1998, and though it covered a lot of ground, Big Science it wasn,t. It was five men crammed into a Land Rover, along with many boxes of syringes, tourniquets, and chemicals for extracting DNA from blood. A small research grant from the Alfred P. Sloan Foundation paid for the equipment, but the Land Rover itself was donated by the vehicle,s manufacturer. „We chipped in a little bit of our own money for living expenses, says Wells. „We also had friends who were very interested in this, who would give us a few hundred dollars here and there, which we collected in a big pot.

One morning in April they drove through the Channel Tunnel to France. They didn,t stop to collect samples until they hit Georgia, because Europe,s DNA is old hat. After that they didn,t stop collecting until they had been to Kyrgyzstan and back, a total of 25,000 miles. They slept in borrowed rooms or offices, and even in yurts; they bonded with their local facilitators over streams of vodka. They had small adventures. A potentate in Uzbekistan insisted on driving the Land Rover; he gunned it and, top heavy with gear, it promptly rolled over. The man then hailed a passing car and left Wells and his companions nursing their bruises. Later, in Kyrgyzstan, a policeman tried to shake them down on the pretense that the Land Rover,s color, red, was illegal. Wells stood firm.

One problem they did not have, he says, was getting blood donors. Local research contacts did a lot of the footwork, and the inmates of urban

hospitals, both patients and staff, pro[illegible] rich source of blood. But We[illegible]s and his crew also visited factories a[illegible]lages, sometimes going door to door. On occasion they found them[illegible]s staying for a dinner of, say, sheep intestines and koumiss, which is f[illegible]ted mare,s milk. „It,s one of the worst things I,ve ever tasted, says [illegible]ana Zerjal, a graduate student who joined the expedition for a month[illegible]zbekistan and Kyrgyzstan.

To each donor or group of don[illegible] Wells gave what he calls his blood speech, explaining DNA, the [illegible]ose of the expedition, their role in it, and then asking for „in[illegible]ed co[illegible]t. On the television version of , for which W[illegible] tr[illegible]ed the world in 2002, retracing some of his earlier steps, he visits a man in southeastern Kazakhstan whose blood had been sampled on the 1998 expedition and who has turned out to have an important Y chromosome marker called M45. At a festive dinner, Wells gives him the blood speech again and concludes with a toast: „To your very important blood, which has brought us together. The man seems happy and relieved: As Wells candidly explains, he thought Wells had come back to tell him he had cancer.

Scenes like that demonstrate that truly informed consent can be an elusive goal in anthropological genetics, and yet it seems clear that Wells has done no harm to the man and has done our knowledge of the past a lot of good. M45 is an important branching point on the human family tree. One branch leads to M173, which is a mutation shared by most people of Western European descent. The other branch leads to M3, which is shared by most Native Americans. European and Native American men also have M45, but in Central Asia there are men, like Wells,s Kazakh dinner companion, who have M45 but neither of the two later mutations˜they have a large range of different ones instead. That indicates Central Asia is where M45 originated and where both Europeans and Native Americans originated, from a single source.

By counting the number of mutations that have happened since M45, Wells and his colleagues estimate that M45 is about 35,000 to 40,000 years old. The European marker, M173, happened roughly 30,000 years ago, which is when the first cave paintings appeared in France. M3 is present only in Native Americans, and so it must have happened after humans first crossed

the Bering Strait and arrived in the Americas. Archaeologists have long debated the timing of that momentous event; most favor a date of around 13,000 or 14,000 years ago, but a few have held out for one as early as 30,000 years ago.

Wells argues that 30,000 years ago has to be the wrong date. The evidence is another marker, M242, that he and Mark Seielstad of Harvard identified. It arose after M45 but before M3, in the Asian population that was bound for America; Native Americans have M242, and so do some people still living in Central Asia. The Ice Age ancestors of Native Americans must have had that marker when they crossed the Bering Strait, and so the time of M242,s first appearance puts an upper limit on the time of their passage. „We can definitely rule out a date prior to 20,000 years ago, says Wells.

Hammer and his Arizona colleagues, anthropologists Stephen Zegura and Tatiana Karafet, have recently confirmed that result. Their own Y chromosome collections tell them that the genetic separation of the Asian and American populations occurred no earlier than 17,000 years ago. And they think they have narrowed down a source region, an Asian ancestral home for Native Americans˜the Altai Mountains of southwestern Siberia and western Mongolia.

The Altai is a remote region of 14,000-foot alps, deep river valleys, and large high-altitude lakes. „I think that has been a place where people have been for a long time, Hammer says, „and have spawned many descendant populations. And I think some of those descendants ended up in the Americas. The Paleolithic migration into Europe, like the Paleolithic migration into North America, may have also departed from the Altai region, although it may have been from elsewhere in Central Asia or other locations. After 1492, in any case, those two great rivers of humanity, which had diverged 30,000 years earlier, began to converge again in America, and their waters commingled. Hammer estimates that 17 percent of Native American men today have Y chromosomes inherited from Europeans. (In African American men the European admixture may be from 5 to 30 percent.) These percentages show that history, and not just natural selection, has a big effect

on the human gene pool˜and that conquerors tend to spread their Y chromosomes.

EURASIAN JOURNEY

Spencer Wells and his team covered about 25,000 miles in their 1998 genetic survey of Central Asia. The map on the opposite page traces the expedition (red). The inset map shows the entire route and their return through northern Europe. The orange shading represents the approximate extent of Genghis Khan,s empire at the time of his death in 1227. Wells,s results show the presence of a particular Y chromosome variant in about 8 percent of the sampled male population in Central Asia. Because that variant originated in Mongolia not too long ago, Wells and his team contend that its prevalence in Central Asians reflects the influx of Genghis Khan and his powerful kin.

Genghis Khan was born east of the Altai Mountains, at the northern edge of the vast Mongolian steppe in 1162. His biographers agree, unsurprisingly, that he was driven by a lust for power. He was also driven by lust. Rashid ad-Din, vizier to a later khan, quotes Genghis as having said, „Man’s greatest good fortune is to chase and defeat his enemy, seize his total possessions . . . use the bodies of his women as a nightshirt and support, gazing upon and kissing their rosy breasts, sucking their lips which are as

sweet as the berries of their breasts. Rashid says Genghis brought a new wife home from every campaign, maintaining a harem of 500. His interest in sex was enduring. In his sixties and ailing, he crossed the Gobi Desert to massacre the Tanguts and died on that campaign. According to one legend,

As Zerjal screened Central Asian Y chromosomes for 16 different microsatellites, one combination showed up repeatedly. It was far more common than expected, and men all over Central Asia had it˜which is also not what you‚d expect. „Suddenly, I thought, ŒWow, this is Genghis Khan,, says Zerjal. At first, Tyler-Smith says, „We thought it was more or less a joke.

which is likely to be on the Y chromosome. And although the rest of Genghis Khan,s genome has certainly, if Zerjal and Tyler-Smith are right, made an outsize contribution to the Central Asian gene pool, it has been chopped to bits and mixed in so thoroughly over the centuries by genetic recombination that no one today is likely to have his whole suite of genes for any particular trait. What they have, in his intact Y chromosome, is more

The fastest and most famous case of evolution by natural selection is the case of the British peppered moths: In the 19th century, as mills and factories began to darken the air with soot, a rare all-black mutant quickly became more common in Britain than the normal white moth with black spots because it was less conspicuous to predators. Genghis Khan,s Y chromosome, says Tyler-Smith, spread at a comparable rate through Central Asia. „It shows that a kind of social selection can operate in humans, whereby people inherit status and the reproductive advantage that goes along with that, he says. „It can have a large effect on the genetics.

Man does not evolve by natural selection alone. Darwin even believed that sexual selection˜in choosing mates, we choose the genes we pass on to the next generation˜was a more important source of „differences in external appearance between the races of man. That idea has never really been tested, says Wells. In recent decades geneticists, beginning with Richard Lewontin, Wells,s adviser, have clearly showed how insignificant the genetic differences among races are: The diversity within any single population is far, far greater. „But, by God, says Wells, „I can tell the difference between somebody who comes from the Outer Hebrides and someone who comes from Cambodia. They

We are headed toward a world in which we will have erased the historical record in our genes just as we have acquired the means to read it. For several years now Wells has been trying to organize an effort to do on a global scale what he already did in Central Asia˜similar to the ill-starred Human Genome Diversity Project. The idea is simply to preserve a genetic snapshot of humanity. „It,s the sort of thing where, once you lose the information, you,re never going to get it back, he says. „It is our single, unique human history, and it would be nice to know what that is as we hurtle into the future and start to change our own genetics.

„The clock is ticking. We need to get out there and do some more sampling.