



—THE—
GENOGRAPHIC
—PROJECT—

Certificate of Y-chromosome DNA testing

In recognition of your participation in the Genographic Project, we hereby certify that

William Kinsey Koerber

belongs to:

Haplogroup G2 (P15)

The designations for all twelve loci examined for this purpose are listed here,
along with the Short Tandem Repeats (STRs) outcome for each.

393	19	391	439	389-1	389-2	388	390	426	385a	385b	392
14	15	10	12	12	17	13	22	11	14	14	11

July 25, 2008



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM



HAPLOGROUP G2 (P15)

Your Y-chromosome results identify you as a member of **haplogroup G2**.

The genetic markers that define your ancestral history reach back roughly 60,000 years to the first common marker of all non-African men, *M168*, and follow your lineage to present day, ending with *P15*, the defining marker of haplogroup *G2*. Some in this lineage also carry the markers *P16 (G2a)* and *M286 (G2b)*.

If you look at the map highlighting your ancestors' route, you will see that members of haplogroup *G2* carry the following Y-chromosome markers:

M168 > M89 > M201 > P15

What's a haplogroup, and why do geneticists concentrate on the Y chromosome in their search for markers? For that matter, what's a marker?

Each of us carries DNA that is a combination of genes passed from both our mother and father, giving us traits that range from eye color and height to athleticism and disease susceptibility. One exception is the Y chromosome, which is passed directly from father to son, unchanged, from generation to generation.

Unchanged, that is unless a mutation a random, naturally occurring, usually harmless change occurs. The mutation, known as a marker, acts as a beacon; it can be mapped through generations because it will be passed down from the man in whom it occurred to his sons, their sons, and every male in his family for thousands of years.

In some instances there may be more than one mutational event that defines a particular branch on the tree. This means that any of these markers can be used to determine your particular haplogroup, since every individual who has one of these markers also has the others.

When geneticists identify such a marker, they try to figure out when it first occurred, and in which geographic region of the world. Each marker is essentially the beginning of a new lineage on the family tree of the human race. Tracking the lineages provides a picture of how small tribes of modern humans in Africa tens of thousands of years ago diversified and spread to populate the world.

A haplogroup is defined by a series of markers that are shared by other men who carry the same random mutations. The markers trace the path your ancestors took as they moved out of Africa. It's difficult to know how many men worldwide belong to any particular haplogroup, or even how many haplogroups there are, because scientists simply don't have enough data yet.

One of the goals of the five-year Geographic Project is to build a large enough database of anthropological genetic data to answer some of these questions. To achieve this, project team members are traveling to all corners of the world to collect more than 100,000 DNA samples from indigenous populations. In addition, we encourage you to contribute your anonymous results to the project database, helping our geneticists reveal more of the answers to our ancient past.



Keep checking these pages; as more information is received, more may be learned about your own genetic history.

Your Ancestral Journey: What We Know Now

M168: Your Earliest Ancestor

Fast Facts

Time of Emergence: Roughly 50,000 years ago

Place of Origin: Africa

Climate: Temporary retreat of Ice Age; Africa moves from drought to warmer temperatures and moister conditions

Estimated Number of *Homo sapiens*: Approximately 10,000

Tools and Skills: Stone tools; earliest evidence of art and advanced conceptual skills

Skeletal and archaeological evidence suggest that anatomically modern humans evolved in Africa around 200,000 years ago, and began moving out of Africa to colonize the rest of the world around 60,000 years ago.

The man who gave rise to the first genetic marker in your lineage probably lived in northeast Africa in the region of the Rift Valley, perhaps in present-day Ethiopia, Kenya, or Tanzania, some 31,000 to 79,000 years ago. Scientists put the most likely date for when he lived at around 50,000 years ago. His descendants became the only lineage to survive outside of Africa, making him the common ancestor of every non-African man living today.

But why would man have first ventured out of the familiar African hunting grounds and into unexplored lands? It is likely that a fluctuation in climate may have provided the impetus for your ancestors' exodus out of Africa.

The African ice age was characterized by drought rather than by cold. It was around 50,000 years ago that the ice sheets of northern Europe began to melt, introducing a period of warmer temperatures and moister climate in Africa. Parts of the inhospitable Sahara briefly became habitable. As the drought-ridden desert changed to a savanna, the animals hunted by your ancestors expanded their range and began moving through the newly emerging green corridor of grasslands. Your nomadic ancestors followed the good weather and the animals they hunted, although the exact route they followed remains to be determined.

In addition to a favorable change in climate, around this same time there was a great leap forward in modern humans' intellectual capacity. Many scientists believe that the emergence of language gave us a huge advantage over other early human species. Improved tools and weapons, the ability to plan ahead and cooperate with one another, and an increased capacity to exploit resources in ways we hadn't been able to earlier, all allowed modern humans to rapidly migrate to new territories, exploit new resources, and replace other hominids.

M89: Moving Through the Middle East

Fast Facts



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM

Time of Emergence: 45,000 years ago

Place: Northern Africa or the Middle East

Climate: Middle East: Semiarid grass plains

Estimated Number of *Homo sapiens*: Tens of thousands

Tools and Skills: Stone, ivory, wood tools

The next male ancestor in your ancestral lineage is the man who gave rise to M89, a marker found in 90 to 95 percent of all non-Africans. This man was born around 45,000 years ago in northern Africa or the Middle East.

The first people to leave Africa likely followed a coastal route that eventually ended in Australia. Your ancestors followed the expanding grasslands and plentiful game to the Middle East and beyond, and were part of the second great wave of migration out of Africa.

Beginning about 40,000 years ago, the climate shifted once again and became colder and more arid. Drought hit Africa and the grasslands reverted to desert, and for the next 20,000 years, the Saharan Gateway was effectively closed. With the desert impassable, your ancestors had two options: remain in the Middle East, or move on. Retreat back to the home continent was not an option.

While many of the descendants of M89 remained in the Middle East, others continued to follow the great herds of buffalo, antelope, woolly mammoths, and other game through what is now modern-day Iran to the vast steppes of Central Asia.

These semiarid grass-covered plains formed an ancient "superhighway" stretching from eastern France to Korea. Your ancestors, having migrated north out of Africa into the Middle East, then traveled both east and west along this Central Asian superhighway. A smaller group continued moving north from the Middle East to Anatolia and the Balkans, trading familiar grasslands for forests and high country.

M201: Living in the Fertile Crescent

Fast Facts

Time of Emergence: 30,000 years ago

Place of Origin: Middle East or Caucasus Mountains

Climate: Middle East: Semiarid grass plains

Estimated Number of *Homo sapiens*: Approximately 100,000

Tools and Skills: Stone, ivory, wood tools



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM

Your genetic trail continues with a marker that arose around 30,000 years ago, in a man born along the eastern edge of the Middle East, perhaps as far east as the Himalayan foothills in Pakistan or India. He has had relatively few descendants, and members of this clan are rarely present in population frequencies at greater than a few percent.

Around 10,000 years ago, as the last ice age ended, your ancestors, along with the other people living in the Fertile Crescent of the Middle East discovered how to grow food. The Fertile Crescent extends from the Mediterranean Sea to the Persian Gulf where the Euphrates and Tigris rivers form an extremely fertile floodplain. Today the region includes all or part of Israel, the West Bank, Jordan, Lebanon, Syria, and Iraq. Your ancestors were part of the Neolithic Revolution, the point at which humans changed from nomadic hunter-gatherers to settled agriculturists.

Control over their food supply marks a major turning point for the human species: the beginning of civilization. Instead of small clans of 30 to 50 people constantly moving to follow the seasons and the herds, they began to settle in much larger groups, occupying a single territory. This required a much more complex social organization, one that moved from the kinship ties of a small tribe to the more elaborate relations of a larger community. Larger settled communities spurred the need for trade, writing, and calendars, and pioneered the rise of modern sedentary communities and cities.

The early farming successes spawned population booms and encouraged migration throughout much of the Mediterranean world. Your farming ancestors began moving out of the Middle East, through the islands and along the shores of the Mediterranean, through Turkey into the Balkans and the Caucasus Mountains.

It was once thought that the advancing farmers displaced or eliminated the hunter-gatherers of Europe. However DNA studies show that while the spread of agriculture did involve the movement of some people into Europe who had not been there before, for the most part farming was adopted by the existing Europeans. In other words, the culture, rather than the people, spread.

Haplogroup G, which is rarely present in population frequencies of greater than a few percent, has several closely related "brother" haplogroups: *H*, *I*, and *J*. Haplogroup *H* is largely confined to the Indian subcontinent. Members of haplogroup *I* spread north through central Europe and into Scandinavia, where the group is well represented today. Haplogroup *J* is very common in the Middle East, where many Jews, Arabs, and others belong to it. These three haplogroups probably arose between 20,000 and 30,000 years ago. Haplogroups *J2* and *E3b*, along with *G*, came to Europe primarily during the spread of agriculture within the last 10,000 years.

Today, small numbers of men belonging to haplogroup G can be found in China, Indonesia, Taiwan, the Philippines, and the Polynesian islands of the Pacific. In the Republic of Georgia (the Caucasus Mountains region south of Russia and north of Turkey) members of G make up as much as 30 percent of the population. Around 14 percent of the men on the island of Sardinia belong to this group, as well as ten percent of the men in north central Italy, eight percent of the men in northern Spain, almost seven percent of the men in Turkey, and lesser percentages in the Czech Republic, Slovakia, the Ukraine, Lebanon, Greece, Hungary, Albania, Croatia, and Ethiopia. *G* is still represented in the Middle East some of these people are Arabs, some are Jews, many are neither. Across northwestern Europe, only one to three percent of the men belong to haplogroup *G*.

Small numbers of Gs can also be found in Syria (Arabs), Russia (Adygeans), Uzbekistan (Tartars and Karakalpaks), Mongolia, and western China (Uygurs).

P15:



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM

Fast Facts

Time of Emergence: 10,000 years ago

Place: Middle East

Climate: Ice Age

Estimated Number of *Homo sapiens*: 100,000

Tools and Skills: Middle Upper Paleolithic

About 10,000 years ago one of your ancestors was the first to display the genetic marker *P15*, which now defines the haplogroup *G2*.

The *G2* lineage arose in the Middle East, though *P15* descendants soon spread westward, through modern Turkey, into southeastern Europe. During the ten thousand years when the ice sheets were at their maximum, individuals living outside of the warmer refugia would have been unable to survive and were thus effectively eliminated from the gene pool. This reduced the genetic diversity of the surviving populations and helped those lucky lineages to become fixed at higher frequencies in the subsequent generations.

When the glaciers finally began to recede, the *G2* lineage expanded northward and eastward to repopulate Europe and carried the marker *P15* along for the ride. Evidence of these journeys can be seen by the marker's presence in western Eurasia. The *G2* lineage is common throughout today's Jewish populations. It is found at 7 percent in Yemenite Jews; 10 percent Ashkenazi Jews from Bulgaria, Turkey, and Morocco; and 15 percent of Spanish Jews are *G2*.

This is where your genetic trail, as we know it today, ends. However, be sure to revisit these pages. As additional data are collected and analyzed, more will be learned about your place in the history of the men and women who first populated the Earth. We will be updating these stories throughout the life of the project.



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM

Time of Emergence: 10,000 years ago

Place: Middle East

Climate: Ice Age

Estimated Number of *Homo sapiens*: 100,000

Tools and Skills: Middle Upper Paleolithic

About 10,000 years ago one of your ancestors was the first to display the genetic marker *P15*, which now defines the haplogroup *G2*.

The *G2* lineage arose in the Middle East, though *P15* descendants soon spread westward, through modern Turkey, into southeastern Europe. During the ten thousand years when the ice sheets were at their maximum, individuals living outside of the warmer refugia would have been unable to survive and were thus effectively eliminated from the gene pool. This reduced the genetic diversity of the surviving populations and helped those lucky lineages to become fixed at higher frequencies in the subsequent generations.

When the glaciers finally began to recede, the *G2* lineage expanded northward and eastward to repopulate Europe and carried the marker *P15* along for the ride. Evidence of these journeys can be seen by the marker's presence in western Eurasia. The *G2* lineage is common throughout today's Jewish populations. It is found at 7 percent in Yemenite Jews; 10 percent Ashkenazi Jews from Bulgaria, Turkey, and Morocco; and 15 percent of Spanish Jews are *G2*.

This is where your genetic trail, as we know it today, ends. However, be sure to revisit these pages. As additional data are collected and analyzed, more will be learned about your place in the history of the men and women who first populated the Earth. We will be updating these stories throughout the life of the project.



Global field science supported by the Waitt Family Foundation



A research partnership of National Geographic and IBM