



John Campbell
Paternal Haplogroup

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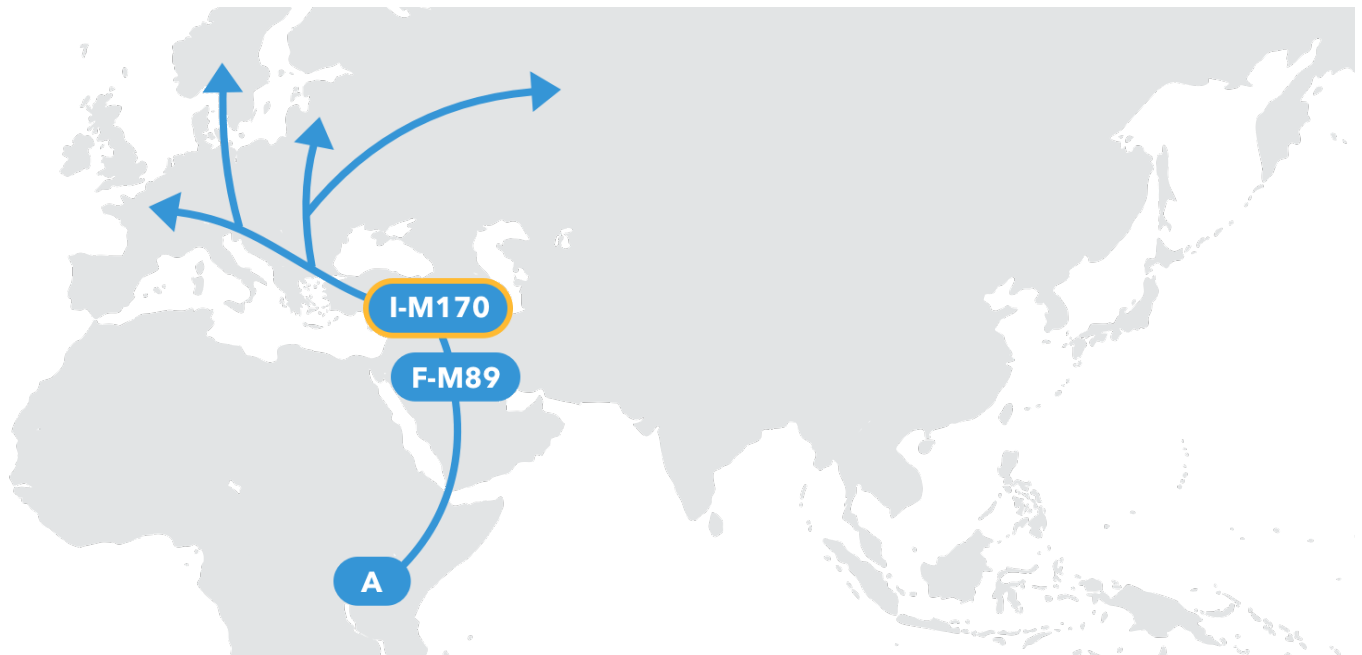
You descend from a long line of men that can be traced back to eastern Africa over 275,000 years ago. These are the men of your paternal line, and your paternal haplogroup sheds light on their story.



John, your paternal haplogroup is I-M223.

As our ancestors ventured out of eastern Africa, they branched off in diverse groups that crossed and recrossed the globe over tens of thousands of years. Some of their migrations can be traced through haplogroups, families of lineages that descend from a common ancestor. Your paternal haplogroup can reveal the path followed by the men of your paternal line.

Migrations of Your Paternal Line



275,000 Years Ago

Haplogroup A

The stories of all of our paternal lines can be traced back over 275,000 years to just one man: the common ancestor of haplogroup A. Current evidence suggests he was one of thousands of men who lived in eastern Africa at the time. However, while his male-line descendants passed down their Y chromosomes generation after generation, the lineages from the other men died out. Over time his lineage alone gave rise to all other haplogroups that exist today.

76,000 Years Ago

Haplogroup F-M89

For more than 100,000 years, your paternal-line ancestors gradually moved north, following available prey and resources as a shifting climate made new routes hospitable and sealed off others. Then, around 60,000 years ago, a small group ventured across the Red Sea and deeper into southwest Asia. Your ancestors were among these men, and the next step in their story is marked by the rise of haplogroup F-M89 in the Arabian Peninsula.

48,000 Years Ago

Haplogroup I-M170

While some men turned east, your paternal ancestors turned west. Men bearing haplogroup I-M170, which diverged from its brother lineages over 40,000 years ago, were among the first inhabitants of Ice Age Europe. Around 20,000 years ago, most humans living in Europe were pushed back out of the north by massive glaciers. When the Ice Age ended, however, humans expanded out of their southern refuges to recolonize the continent.

30,000 Years Ago

Origin and Migrations of Haplogroup I-M438

Men carrying haplogroup I are found almost exclusively in Europe, where they make up about 20% of the total population. In fact, men bearing haplogroup I were among some of the very first Homo sapiens to inhabit Europe between 30,000 and 45,000 years ago.

Your ancestral lineage split off from its sibling branch about 30,000 years ago. Archaeological evidence indicates it was a time of rapid change in Europe, as a new culture known as the Gravettian moved westward across the continent. The Gravettian people introduced new stone tool technology, as well as novel art forms typified by the distinctive fertility symbols known as "Venus" figurines.

Not long after these men arrived in Europe (at least on the scale of human history), the advancing Ice Age pushed most of the continent's inhabitants back out of the interior and into its southern fringes. Only Iberia, the Italian peninsula and the Balkans were mild enough to support substantial numbers of humans. As a result, the distribution of the haplogroup today reflects the migrations that took place as the glaciers began retreating about 12,000 to 15,000 years ago.

The men of haplogroup I-M438 radiated outward from the Balkans into the eastern half of the continent. Their descendants are found most concentrated in eastern Europe and western Russia, where they make up 40% of the male population in Bosnia and 30% in Croatia. Some, however, moved farther north and west. Nearly 40% of men on the Mediterranean island of Sardinia carry haplogroup I-M438, and they are also relatively common in the Netherlands and Germany. Finally, they can also be found in Sweden, particularly in the northern province of Vasterbotten, where their ancestors likely arrived with the more recent migration of German and Dutch immigrants during the 17th century.

I-M223

20,000 Years Ago

Your paternal haplogroup, I-M223, traces back to a man who lived approximately 20,000 years ago.

That's nearly 800 generations ago! What happened between then and now? As researchers and citizen scientists discover more about your haplogroup, new details may be added to the story of your paternal line.

Today

I-M223 is rare among 23andMe customers.

Today, you share your haplogroup with all the paternal-line descendants of the common ancestor of I-M223, including other 23andMe customers.

1 in 82,000

23andMe customers share your
haplogroup assignment.

Doggerland: A Real-Life Atlantis

I-M170



One of the places that was repopulated as the Ice Age waned no longer exists. During the Ice Age and for some time afterward, lower sea levels exposed much of the area that is now covered by the North Sea. Known as "Doggerland," the region must have been occupied by men bearing haplogroup I, because today it is abundant in all of the countries surrounding the North Sea.

As the meltwaters of the retreating Ice Age glaciers caused sea levels to rise, the low-lying forests and wetlands of Doggerland gradually became inundated. Doggerland's inhabitants retreated to the higher ground that is now the North Sea coast. I-M170 is especially common today in Scandinavia and is somewhat common in England, Germany and the Netherlands.

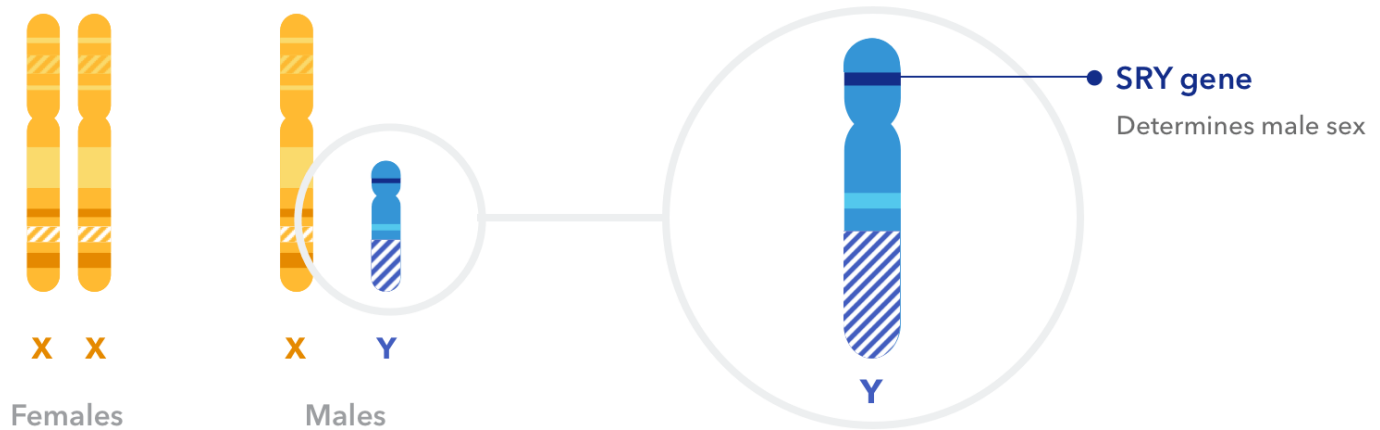
The Genetics of Paternal Haplogroups

The Y Chromosome

Most of the DNA in your body is packaged into 23 pairs of chromosomes. The first 22 pairs are matching, meaning that they contain roughly the same DNA inherited from both parents. The 23rd pair is different because in men, the pair does not match. The chromosomes in this pair are known as "sex" chromosomes and they have different names: X and Y. Typically, women have two X chromosomes and men have one X and one Y.

Your genetic sex is determined by which sex chromosome you inherited from your father. If you are genetically male, you received a copy of your father's Y chromosome along with a gene known as SRY (short for *sex-determining region Y*) that is important for male sexual development. If you are genetically female, you received a copy of the X chromosome from both of your parents.

The Y chromosome is used to determine paternal haplogroups

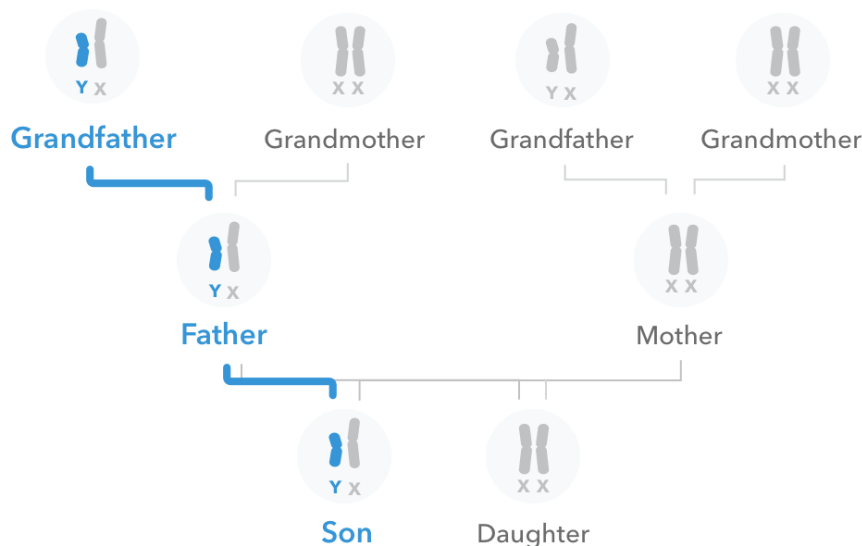


Paternal Inheritance

Each generation, fathers pass down copies of their Y chromosomes to their sons essentially unchanged. Between generations, the matching chromosomes in the other 22 pairs make contact and exchange segments of DNA. This process shuffles the genetic information that is passed down from parent to child, making it difficult to trace genealogy over many generations. Except for two tiny sections at the chromosome's tips, however, the Y skips this step. Instead, a nearly identical copy is handed down each time.

But, every so often, small changes to the DNA sequence do occur. These changes, called mutations, create new genetic variants on the Y chromosome. Because the Y does not recombine between generations, these variants collect in patterns that uniquely mark individual paternal lineages.

Fathers pass their Y chromosome down to their sons

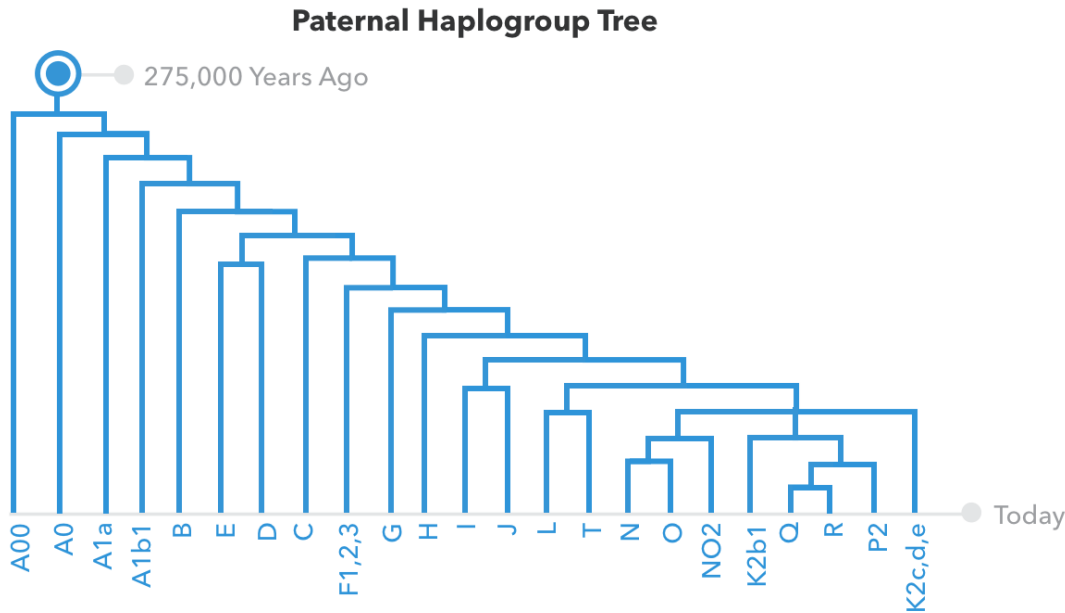


Paternal Haplogroup Tree

To trace the genetic history of paternal lineages, researchers compare the variants found in Y-DNA sequences from around the world. The result is a tree of Y chromosomes that shows how all paternal lines are related.

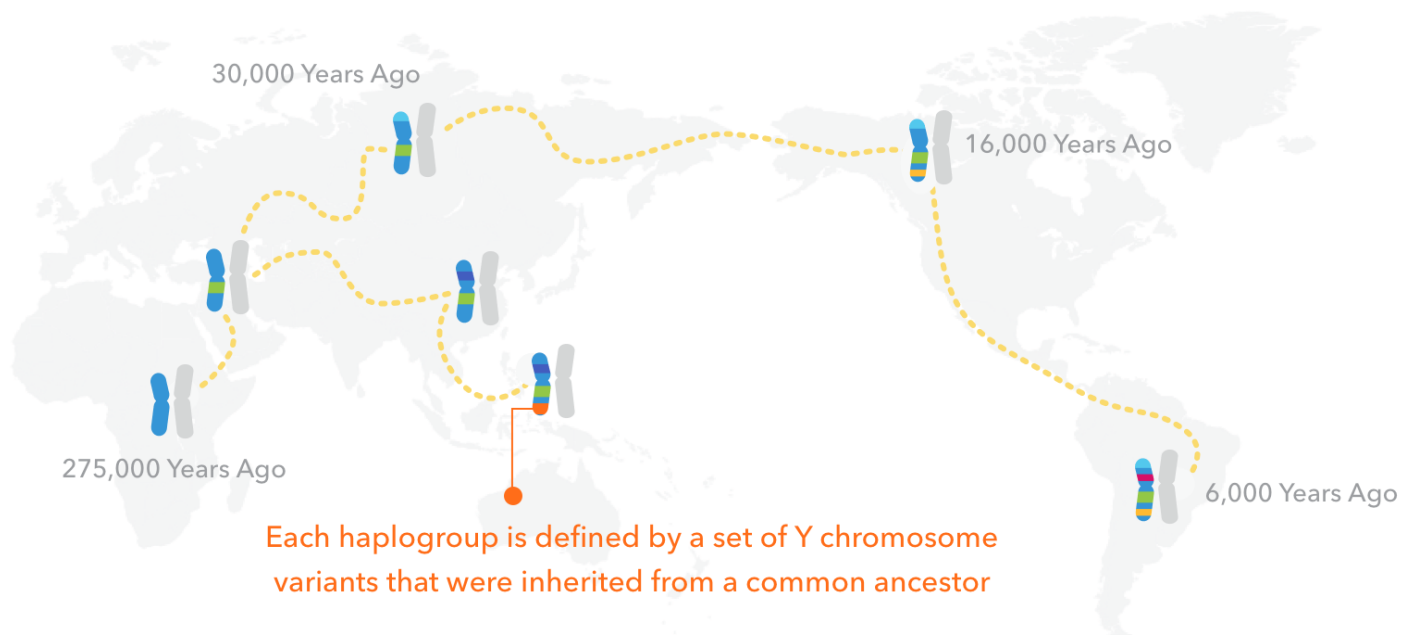
A paternal haplogroup is a cluster of branches on the tree that stem from a common male ancestor and share a particular set of variants. To keep track of all the branches, the major sections of the tree are named with one or more capital letters. Each haplogroup name starts with the letter of the major branch from which it stems and ends with the name of a variant that identifies a particular subgroup.

Visit the scientific details to see your lineage in the tree of all paternal haplogroups.



Tracing Male Migrations

Because closely related haplogroups tend to share geographic roots, researchers can use the modern distributions of haplogroups around the world to trace major migrations, from the voyage to Australia over 40,000 years ago to the peopling of North and South America in the last 16,000 years.



Do more with your Haplogroup results.

- Contribute to research and help us understand patterns of genetic variation around the world.
- Visit DNA Relatives to identify relatives that may be on your paternal line.
- Visit the Forums to meet other customers interested in discussing haplogroups.

Scientific Details

Your haplogroup can tell you about your paternal line.

Each generation, fathers pass copies of their Y chromosomes on to their sons. Whereas most of the genome exists in two copies that exchange pieces between generations in a process called recombination, the Y chromosome is transmitted unshuffled. Because of this unusual pattern of inheritance, the Y contains rich information about paternal lineages.

A small number of DNA changes, called mutations, generally occur from one generation to the next. Because the Y chromosome does not recombine between generations, these mutations accumulate in patterns that uniquely mark individual lineages, and scientists can compare the resulting sequence differences by constructing a tree. This tree shows how paternal lineages relate to one another, including the observations that all human paternal lineages share a most recent common ancestor approximately 275,000 years ago.

The term "haplogroup" refers to a family of lineages that share a common ancestor and, therefore, a particular set of mutations. Each paternal haplogroup is named with a letter indicating the major cluster of branches to which it belongs, followed by the name of a mutation that is shared by a subset of the major cluster.

We identify your haplogroups by determining which branches of the Y-chromosome tree correspond to your DNA. Because more closely related lineages tend to share geographic roots, your haplogroup can provide insight into the origins of some of your ancient ancestors.

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Change Log

Your report may occasionally be updated based on new information. This Change Log describes updates and revisions to this report.

Date	Change
July 30, 2018	We updated the paternal haplogroup algorithm to consider an expanded set of variants on the Y chromosome. As a result, certain customers on version 5 of the genotyping chip received updated assignments - most often more precise ones.
Sept. 7, 2017	For customers in certain branches of R1, an outdated story about the possible origins of one paternal lineage in the Ashkenazi Jewish population has been removed.
Aug. 4, 2017	The standalone Paternal Haplogroup report was created, featuring new design elements and content.
May 23, 2017	Certain customers in the E and J branches received updated paternal haplogroup results due to improvements in our assignment algorithm. Additional changes were made to naming conventions used in certain assignments in the K and R branches.
Nov. 15, 2016	The algorithm and naming convention used for assigning paternal haplogroups was updated.
Oct. 21, 2015	Haplogroups report created.

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