GENETIC GENEALOGY
AND
DNA TESTING

by Ted Steele

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Over the past years, more and more genealogists have been exploring their genetic genealogy by having their DNA tested. Because DNA testing involves some significant choices, and interpreting the results involves mastering the world of genetics, this monograph has been drafted to get you started on your genetic genealogy journey.

The journey into genetic genealogy involves learning the language of that science. For that reason, a partial glossary of terms is included at the end of this monograph. Throughout the discussion, when a scientific term is used that is further explained in the glossary, the term "**q.v.**" (*quod vide,* meaning "which see") indicates that an explanation of that term can be found in the glossary.

WHY BOTHER? WHAT WILL A DNA TEST REVEAL ABOUT MY FAMILY HISTORY?

Before exploring genetic genealogy and DNA testing, it is worthwhile to discuss what all the fuss is about. There are really two answers to the question, "Why bother?"

- To learn about your paternal or maternal "deep ancestry." This means that you will learn about the journey that your ancient ancestors (e.g., 60,000 years ago) made as mankind left Africa and spread out across the world. The answer to this question can be found by having a 37-marker test performed.
- To learn about more recent ancestors (e.g., within the past few hundred years) and to discover possible genetic cousins. By expanding from the introductory 37-marker test into more thorough DNA tests, you can identify your relationship to previously studied groups of people. These tests will also confirm the geographic region from which your nearer-term ancestors originated.
- By signing a release form to make your data available to match with others, you may be introduced to others who have also had their DNA tested who may share a common ancestry with you.

Most testing services also sponsor surname studies, a way in which participants with a common shared surname can coordinate and compare their results with others in the surname group. These studies also may offer DNA testing services at group rates, thereby reducing your costs for the test(s).

When you submit your application for a DNA test, you are also encouraged to provide the results of your genealogical research on your family history. You do this by simply posting your GEDCOM file (a data file that can be produced by virtually any genealogy software) to the DNA testing site or to the surname study site, if you are participating in a surname study group. This allows participants to explore the family histories of those who may have a DNA match.

BENEFITS OF Y-DNA TESTING

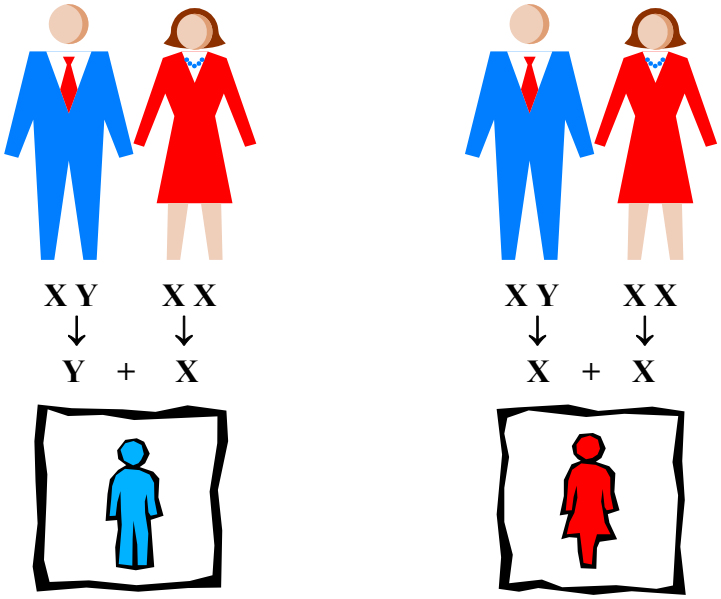
When you conduct a y-DNA test of your paternal ancestry (especially at the 37-marker level or higher), the following genealogical benefits may result.*

- Eliminate or confirm relationships.
  - DNA matching can either confirm or eliminate a relationship with other individuals. You may also discover others, previously unknown to you, who share an earlier ancestor.
- Focus research to related families.
  - Having the scientific evidence of a genetic relationship allows you to focus on families through traditional genealogical research with greater confidence.
- Direct research into a geographic area.
  - Knowing *where* your ancestors came from is a key factor in successful family history research. DNA testing can help to lead you in the right direction.
- Establish country or region of origin.
  - Because DNA testing can provide the migration paths of our ancestors, knowing where your DNA places you in the "family of man" can yield direct evidence for the country of origin.
- Confirm variant surnames are family.
  - The spelling of surnames may change over the centuries, but DNA may provide the link to others who share that ancestry, even though their surname and yours have grown apart.
- Identify pre-surname migration.
  - Even the most basic (e.g., 37-marker) DNA test will provide you with your "deep ancestry" and the migration path of those long-ago ancestors.
- Strengthen weak paper trails.
  - If your paper-based research leads to a dead end or to areas of question, DNA test results can shed new light on your family history.
- Avoid pursuing false connections.
  - In addition to its power to prove relationships, DNA testing can also disprove a relationship, thereby preventing you from spending time researching the wrong branch of your family tree.

THE BASICS: BOYS AND GIRLS

Each of us has two biological parents, and we inherit traits from each of them. In addition to our brown eyes or curly hair, however, we also inherit an amazing array of genetic information from each of our parents.

* This benefits list is courtesy of the *World Families* website <**http://worldfamilies.net**>. Used with permission.



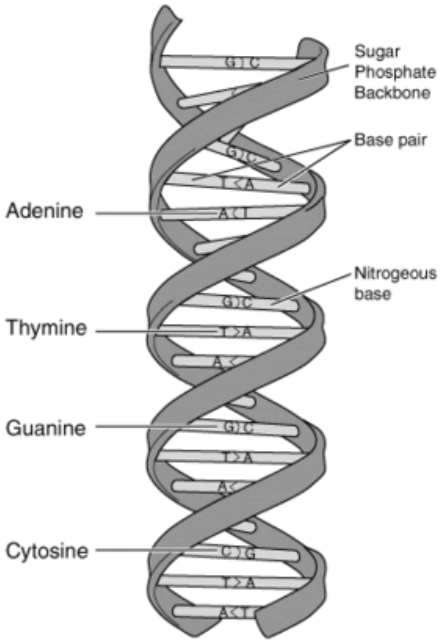
Making a Boy *Making a Girl*

One of the characteristics that we are born with is our gender: male or female. A single pair of inherited chromosomes determines our gender. These sex chromosomes are called X and Y, and we get one from each parent. If we receive an X from our mother and a Y from our father, we are a boy. If we receive one X from our mother and another X from our father, we are a girl. This simple fact forms the basis for all of genetic genealogy.

HUMAN DNA: CHROMOSOMES, GENES, AND BASE PAIRS

Each strand of human DNA contains twenty-three chromosomes. There are twenty-two **autosomes** (q.v.) and one sex chromosome. The autosomes contain the genes that determine all of our characteristics other than gender: e.g., height, weight, eye color, and potential inherited diseases. So a complete human DNA molecule (comprised of two strands twisted together in the now-familiar "double helix") contains twenty-two pairs of autosomes and one pair of sex chromosomes—either X–X (a girl) or X–Y (a boy).

Each human chromosome contains from 200 to more than 3,000 genes. At the molecular level, each gene is a long strand of DNA made up of thousands of pairs of just four molecules: adenine (A), cytosine (C), guanine (G), and thymine (T). As illustrated on the next page, adenine and thymine link together to form one kind of pair, while cytosine and guanine link to form a second pair. This unique pairing ensures that each strand will exactly replicate its partner when the cells divide. These pairs of molecules— A-T and C-G —are called **base pairs**, and they form the basis for all of genetic genealogy.



A portion of a human DNA strand, showing the pairing of adenine (A), cytosine (C), guanine (G), and thymine (T) (from Wikipedia: en.wikipedia.org/wiki/Base_pair)

The total collection of all genes in an organism is called that organism's **genome** (q.v.). Current results from the mapping of the human genome indicate that it contains about 20,000–25,000 genes. Each gene, in turn, may contain thousands of base pairs. Estimates now place the human genome at just under three billion base pairs.

MUTATION: THE BASIS FOR DIVERSITY

If everything in the world was always perfect, each strand of DNA would always replicate itself exactly. In the world of DNA and its fundamental building blocks, those base pairs, every T would link with its A, and every C would link with its G. But reality, as we know, is often not perfect. So sometimes a change occurs, and a T will be replaced with a G, or a C will become an A. When this happens, a mutation in the DNA strand has occurred. Sometimes these mutations are harmful and don't last. But sometimes, they can result in beneficial new traits and will be incorporated into the population. These successful mutations result in the process called natural selection, made famous by Charles Darwin.

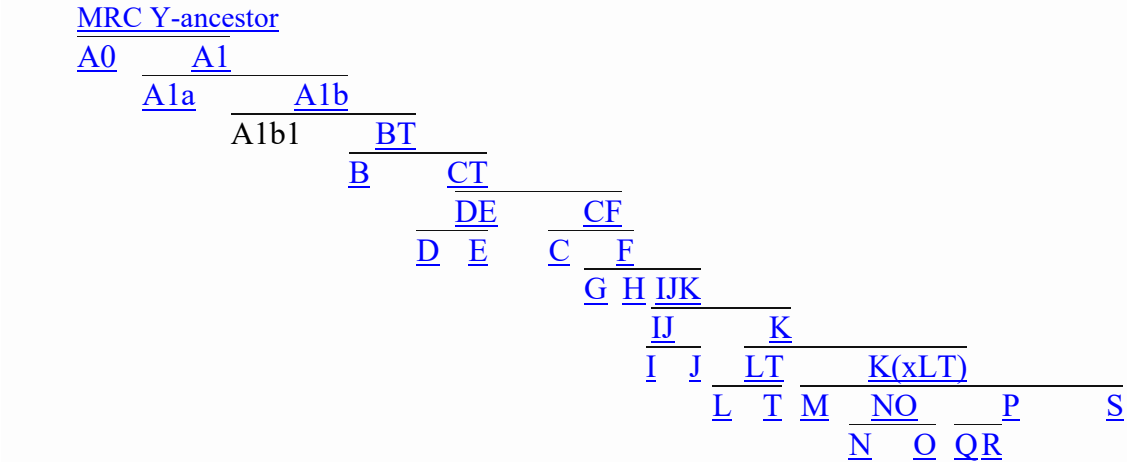
THE DIVERSITY OF HUMAN ANCESTRY

The fossil record and genetic evidence indicate that all humans today are descended from ancestors who lived in Africa about 150,000 years ago. About 60,000 years ago, as the African climate changed, tribes began migrating out of Africa, following the better weather and the animals that they hunted.

Over vast stretches of time, different tribes followed differing migration paths and eventually populated different parts of the world. And, over time, through genetic mutation (evolution) each tribe developed its own characteristic DNA variation.

Genetic scientists who have studied the DNA of the world's civilizations have identified twenty-three unique sets of human DNA. Each DNA set has been assigned a letter (or pair of letters) from A through R. These groupings, which are called **haplogroups**, are the results of those genetic mutations in the indigenous African tribes as they scattered across the globe.

Evolutionary tree of Human Y-chromosome DNA (Y-DNA) haplogroups



HUMAN Y-CHROMOSOME DNA HAPLOGROUPS
*(Wikipedia: <**http://en.wikipedia.org/wiki/Haplogroup**>)*

GENETIC DIVERSITY: HAPLOTYPES AND HAPLOGROUPS

As we saw above, each human chromosome contains hundreds of genes and millions of base pairs. Because of the genetic evolution of different populations throughout the world, each has a unique collection of base pairs in each chromosome of their DNA. The specific assortment of base pairs within a chromosome is called its **haplotype** (q.v.).

Of importance to genetic genealogy is the study of two specific haplotypes: that of the Y-chromosome for men and of mitochondrial DNA (mtDNA) for women. The Y-chromosome haplotype is passed from father to son and mtDNA from mother to her children of both sexes.

Haplotypes of indigenous peoples from around the world have been (and continue to be) studied and grouped into **haplogroups** (q.v.), a collection of haplotypes that define a specific genetic population somewhere in the world. You can think of haplogroups as branches on the Family Tree of Man.

The woman who is at the root of all mtDNA haplogroups lived in Africa about 150,000–170,000 years ago. She has been designated by anthropologists as "Mitochondrial Eve." The National

Geographic Society's Genographic Project states, "… we can say with certainty that all of us trace our maternal lineage back to this one woman."

Several websites explore haplotypes and these ancestral migration routes, including:

- *Wikipedia* (Haplotype definition) **http://en.wikipedia.org/wiki/Haplotype**
- *Wikipedia* (discussion of Y-chromosome DNA haplogroups) **http://en.wikipedia.org/wiki/Human_Y-chromosome_DNA_haplogroups** Note: This site contains a thorough discussion of the major Y-chromosome haplogroups and their geographic distributions.
- *Wikipedia* (discussion of human mitochondrial DNA haplogroups) **http://en.wikipedia.org/wiki/Human_mitochondrial_DNA_haplogroups** Note: This site contains a thorough discussion of the major mitochondrial DNA haplogroups and their geographic distributions.
- *The International HapMap Project* **www.hapmap.org/originhaplotype.html.en**
- *DNA Heritage Y-Haplogroup Map and Tree* **www.dnaheritage.com/ysnptree.asp**

DNA TESTING

In recent years, several testing laboratories have been established in the United States and other countries to perform DNA tests for the express purpose of identifying ancestral origins for genealogical purposes. You may request a test kit from any of these firms, identified on page 8.

The DNA test kit will typically contain literature about the testing company and detailed instructions on how to gather your DNA samples. The kit may contain two or three swabs and an equal number of collection tubes. The swab is rather like a combination of a small toothbrush and a Q-tip. It is a plastic stick, about six inches long, with a fiber head on one end. You use the swab to scrape the inside of your cheek by rubbing back and forth. When done, you place the fiber head of the swab into the collection tube and seal the tube. More recently, the kits contain just a collection tube. You simply spit into the tube until it is filled with saliva up to a line. You then mail the sealed tube(s) back to the testing lab and wait for your results.

It must be pointed out that most of these DNA tests are ***not*** designed to provide any medical information for the individual, nor do they provide information on possible genetic diseases.

Testing your Paternal Line

Men (only) have the option of testing their strict paternal line of descent: their father's father's father's father's father's … father. This is because all men inherit genetic material from their father through the Y-chromosome. Some firms, therefore, call a paternal test the yDNA test.

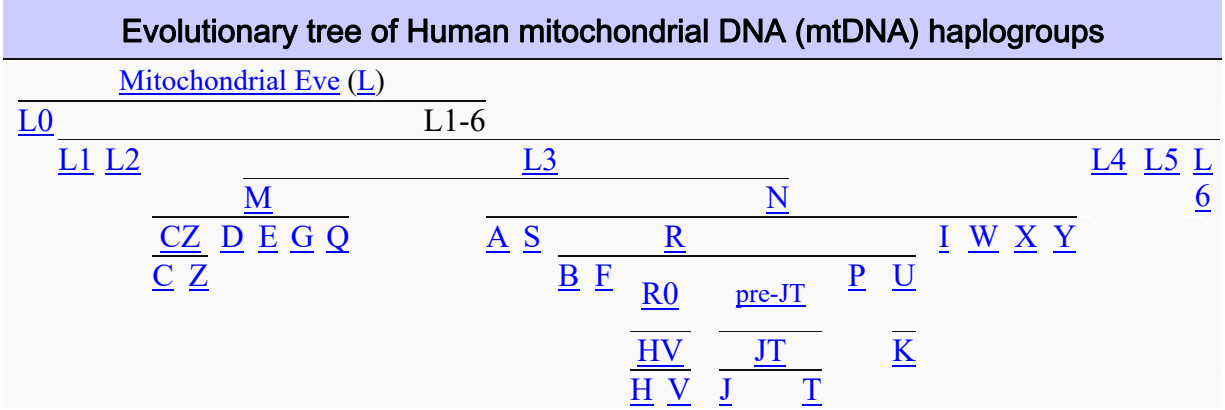
Most genetic testing companies offer yDNA tests at several different levels. The following options are typical, listed in order of increasing cost:

- **37-marker test**. This is the most basic test. The results of a 37-marker test will yield your "deep ancestry"—your paternal ancestry from about 10,000 years ago. This is done by studying the specific mutations in your DNA (your haplotype) and comparing it to the DNA of known migration patterns of ancient tribes.

- **67-marker test**. This is similar to the 25-marker test, but the additional markers provide a better likelihood of matching to a surname group. Two persons with a 67-marker match shared a common ancestor "in recent times."
- **111-marker test**. This test is for people who have a serious interest in detailing their genetic genealogy. It is a high resolution test, and two persons with a match share a common ancestor "in very recent times."
- **700-market test**. The latest test, and the most expensive, this test "is for expert users, it will provide 100K SNPs and additional STRs, however these markers will not provide more refined matching."*

Testing your Maternal Line

Both men and women have the option of testing their strict maternal line of descent: their mother's mother's mother's mother's mother's … mother. All women inherit genetic material from their mother through mitochondrial DNA (mtDNA). Since men inherit through both the X- and Y-chromosomes, men can also test their maternal line. Men do not pass the mtDNA on to their children, however.



HUMAN MTDNA HAPLOGROUPS

(Wikipedia: http://en.wikipedia.org/wiki/Human_mitochondrial_DNA_haplogroups)

As of this writing, only FamilyTreeDNA offers this mitochondrial test. As with yDNA testing, mtDNA tests also come at differing levels, each with increasing cost:

- **mtDNAPlus**. Similar to the Y-chromosome 37-marker test, this test provides information on your deep ancestry (about 10,000 years ago).
- **Full mtDNA Sequence**. This is the most complete test. As the name implies, it tests your entire mtDNA sequence.

Testing for Close(r) Relatives

The previous two tests (yDNA and mtDNA) provide only information on the linear paternal or maternal lines and potential connection with genetic cousins, typically identifying potential

* From the FamilyTreeDNA website.

common ancestors many generations back. In recent years, most testing companies have started offering tests with the potential to identify closer common ancestors.

This test examines the autosomes—the rest of the human chromosome (not the sex chromosome used in the yDNA test)—which you inherit from both parents, all four grandparents, etc. As such, this test is similar to the now-familiar DNA paternity test. In this case, however, the results can be used to identify potential relationships to another person within, say, the last five generations. This test will also provide you with a map of your ethnic heritage, e.g., the percentages of your African, Asian, and/or European ancestors.

This test is the most useful for finding "genetic cousins"—people who share more recent ancestors in common with you. As a result, it has become the most popular of all the DNA tests, and it is the only test offered by many of the companies listed here.

TESTING COMPANIES

Where do you go to get a DNA test kit? There are several choices, and there will undoubtedly be more choices in the future. The field of genetic genealogy continues to change rapidly, with new testing companies being formed and older ones either going out of business or being acquired by other firms. In the United States, the following companies are among those currently providing DNA testing:

- African Ancestry: **http://www.africanancestry.com**
- AncestryDNA: **http://ancestrydna.com**
- Family Tree DNA: **http://www.familytreedna.com**
- Genetic Genealogy: **http://www.dnaancestryproject.com**
- The Genographic Project: **www3.nationalgeographic.com/genographic/index.html**
- MyHeritage: **http://www.myheritage.com/dna-tests**
- Sorensen Molecular Laboratory: **http://www.smgf.org** [Acquired by Ancestry.com]
- 23andMe: **https://www.23andme.com**

Because there are relationships among several of these and other firms now involved in genetic genealogy, we will provide some background and further detail on several of these companies and their business partners.

African Ancestry

This Maryland firm **http://www.africanancestry.com** was founded by Rick Kittles, a molecular biologist, and his partner, Gina Paige. Specializing in managing projects for families of African descent, African Ancestry uses Sorensen Genomics for their lab work. (See Sorensen Molecular Genealogy Foundation on page 9.) They claim that their test can identify the African country of origin.

AncestryDNA

This is the genetic testing service offered by Ancestry.com. In March 2012, Ancestry.com acquired the DNA testing facilities of Sorenson Genomics (see page 9) to establish this service. They now offer only the autosomal test.

FamilyTree DNA
FamilyTreeDNA isnow the only testing company to offer all three types of DNA tests: yDNA, mtDNA, and autosomal DNA. Family Tree DNA was founded by Bennett Greenspan, who now serves as their president. Their chief scientist, Dr. Michael Hammer, is a biotechnology research scientist at the University of Arizona. In addition to their labs at the University of Arizona, however, they also staff a new Genomics Research Center in Houston, Texas. The lab work for many of the surname studies is now done at this Texas center.
Family Tree DNA customers have the option to post their DNA results on either or both of two public databases: *Ysearch.org* and *MitoSearch.org*. Your results can be exported to those websites at your discretion, if you wish to share your results with other individuals or other labs. They also support a large number of surname studies and ethnic studies, e.g., for African, Jewish, or Native American ancestries.

Genetic Genealogy
Genetic Genealogy is the DNA testing firm of Genebase, a Canadian-headquartered company with its American office in Seattle, Washington.They began offering DNA tests in 2005. One of their offerings is the "DNA Ancestry Project." According to their website, "The DNA Ancestry Project is an online CD-ROM software kit, which is available in leading software retailers worldwide. Using the DNA Ancestry Project, users can conduct genetic genealogy research through User-to-User connections and User-to-Laboratory data source connections provided in Genebase."

The Genographic Project
Perhaps the best known genetic genealogy project is the one being conducted by the National Geographic Society. Called the Genographic Project, complete information on this effort can be found at their website **https://www3.nationalgeographic.com/genographic/index.html**. This effort is jointly sponsored by the National Geographic Society and IBM and is under the direction of Spencer Wells, a pioneer in genetic genealogy. As stated on their website, "The Genographic Project [is] a five-year effort to understand the human journey—where we came from and how we got to where we live today. This unprecedented effort will map humanity's genetic journey through the ages." The Genographic Project doesn't actually do DNA testing. That is done by FamilyTree DNA at their labs at the University of Arizona. Individuals may contribute their DNA samples to this project through the FamilyTree DNA lab.

MyHeritage
MyHeritage is the company that makes and markets a genealogical software program called Family Tree Builder. In February 2012, they partnered with Family Tree DNA (see page 8) to offer DNA tests to their customers. Family Tree DNA is the lab that does all of the testing for the DNA samples provided to MyHeritage.

Sorensen Molecular Genealogy Foundation (SMGF)
SMGF grew out of discussions in 1999 between philanthropist James LeVoy Sorenson and Brigham Young University professor Scott Woodward. Dr. Woodward was the president and chief scientific officer of SMGF. The laboratory work for SMGF was performed by Sorenson Genomics, in Salt Lake City, Utah. The Sorenson Database contains more than 60,000 DNA samples and family trees from men and women around the world. SMGF was acquired by

Ancestry.com in 2012; Ancestry has stated that the Sorenson website and database will be maintained.

23andMe
Based in Mountain View, California, this testing company was founded in 2007. It is named for the twenty-three pairs of human chromosomes and is perhaps best known through its association with Dr. Henry Lewis Gates on his *African American Lives* and *Finding Your Roots* television series. They offer two autosomal DNA tests: one that provides simply ancestry reports and another that includes "health predisposition" information.

World Families Network
Many of the surname projects done by FamilyTree DNA are managed by World Families Network **http://worldfamilies.net**. This organization was founded by Dr. Richard Barton and Terry Barton, who met through their common interests in researching their Barton family history and (later) in genetics. World Families Network is "a company focused on helping other families using DNA testing to find their family roots."

THE COSTS OF DNA TESTING

The field of DNA testing continually changes as new scientific discoveries are made and as the testing technology improves. Also, of course, costs of these services will vary from firm to firm and will change over time. As of 2019, however, the more common tests are priced as follows.[*]

yDNA Tests (all at FamilyTreeDNA):

- 37-marker test: ~$170
- 67-marker test: ~$270
- 111-marker test: ~$360
- 700-marker test: ~$650

mtDNA tests: ~$200

Autosomal tests: ~$60–$200

Most companies offer package deals, in which the costs of ordering multiple tests in combination are reduced. Each company offers different packages, and you should check their current websites before ordering. Also, as noted above, some companies offer reduced pricing, if the DNA tests are ordered through a surname project.

[*] These cost estimates were taken from the various websites included here in 2019. Other testing companies have similar pricing. As noted, these prices may well change over time.

A PARTIAL GLOSSARY

For most of us, understanding genetic genealogy requires learning a completely new vocabulary. This partial glossary has been prepared, often with the help of Wikipedia, to assist you in the morass of new terms you will encounter. There is also a thorough glossary of genetic genealogy terms on the Ancestry DNA website at **https://support.ancestry.com/s/article/DNA-Glossary-of-Terms-1460090079080**, on the FamilyTree DNA website at **https://www.familytreedna.com/learn/glossary/**, and on the National Human Genome Research Institute's (NHGRI) website at **http://www.genome.gov/10002096**.

Autosome. Any of the non-sex chromosomes in a DNA molecule. In human DNA, there are twenty-two pairs of autosomes. A single autosome consists of a large number of genes. For example, autosome 1 in humans (the largest autosome) contains 3,141 genes, while autosome 21 (the smallest) contains between 200 and 400 genes. Individual genes are currently being studied, for example, to determine their role in human health.

Chromosome. A long, continuous piece of DNA (a single DNA molecule), each of which contains many genes. Human DNA contains twenty-three chromosomes: there are twenty-two pairs of autosomes (non-sexual chromosomes) and one pair of the two sexual chromosomes, called X and Y. If this pair is X-Y, the resulting human is a male; if the pair is X-X, the resulting human is a female.

DNA. Deoxyribonucleic acid. The chemical structure that contains all of the genetic information for the growth and development of an individual. Physically, the DNA molecule is an intertwined double helix comprised of a long "backbone" of a sugar molecule called deoxyribose and four attached nucleotide bases: adenine (A), cytosine (C), guanine (G), and thymine (T). These two strands are held together by hydrogen bonds between the bases. Specifically, adenine will link only to thymine (A-T) and cytosine only to guanine (C-G). Because of this unique linking, the entire base sequence in one strand is identically repeated in the other strand.

Gene. An identifiable section of a genomic sequence, corresponding to a unit of inheritance (a trait).

Genetic Sequence. The succession of letters representing the actual sequence of base units in a DNA strand. For example, the genetic sequence "AATAGTCTGACC" represents a particular section of DNA and its four nucleotide bases: adenine (A), cytosine (C), guanine (G), and thymine (T).

Genome. A contraction of "gene" and "chromosome." The entire genetic coding of an individual's DNA structure. All hereditary information for an individual is included in the person's genome. (Sometimes called a genetic blueprint.)

Genotype. The specific genetic sequencing of an individual. The DNA structure of an individual that results in that person's **phenotype** (q.v.).

Haplogroup. A collection of haplotypes used to define genetic populations around the world. There are two broad definitions of haplogroups: yDNA haplogroups (paternal ancestries) and mtDNA haplogroups (maternal ancestries). The African woman who is at the root of all mtDNA haplogroups is known as "Mitochondrial Eve."

Haplotype. A contraction of "haploid genotype." A haplotype is the genetic structure of a single chromosome. Through the process of mutation, different haplotypes emerged in various regions of the earth. Thus, the genetic sequence of an individual will yield that person's haplotype, which then identifies the ancient migration route of his or her ancestors. Your haplotype is the specific set of values for the **tested markers** (q.v.).

Human Genome. The DNA structure of humans, it contains twenty-four distinct chromosomes (twenty-two autosomes plus the two sex chromosomes, X and Y), about three billion base pairs, and an estimated 20,000–25,000 genes.

Human Mitochondrial DNA haplogroups. Human mitochondrial DNA was first sequenced in 1981 by the Cambridge Reference Sequence (CRS). Since then, many human mitochondrial DNA haplogroups have been identified and assigned the following letter codes: A, B, C, CZ, D, E, F, G, H, pre-HV, HV, I, J, JT, K, L0, L1, L2, L3, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

Human Y-chromosome DNA haplogroups. The Y Chromosome Consortium (YCC) is a group involved in a collaborative effort to study genetic variation on the human Y chromosome. They have established the recognized definitions of Y-DNA haplogroups, designated by the letters A through R. Many of these letter designations are further sub-divided. For example, the haplogroup designated as K5 is found in humans living in New Guinea; haplogroup Q is believed to have originated in Siberia. (See **http://en.wikipedia.org/wiki/Human_Y-chromosome_DNA_haplogroups** for a thorough discussion.)

Marker. A marker is one physical location on the chromosome. Most yDNA tests include a specified number of markers (e.g., 37-marker test, 67-marker test, etc.).

Mitochondrial DNA (mtDNA). Mitochondrial DNA is DNA that is located in the mitochondria (a separate membrane-enclosed structure) within a cell, not in its nucleus. In all mammals, including humans, the mitochondrial DNA is inherited ***only*** from the mother. Because there is usually no change in mtDNA from parent to offspring, mtDNA is used to track maternal lineage.

Mutation. A change to the base pair sequence in DNA which occurs during cell division. Mutations create variations in the gene pool of a population. Through the process of natural selection, less favorable mutations are removed from the gene pool while more favorable mutations are favored. This process results in evolution. Specific human mutations have been classified into **haplotypes** (q.v.) and are used to identify the deep ancestral origins of an individual.

Phenotype. The physical appearance of an individual, including distinguishing traits, such as hair color, eye color, height, weight, etc.

SNP (pronounced "snip"). A Single Nucleotide Polymorphism (SNP) is a variation in the DNA sequence that occurs when a single nucleotide—A, T, C, or G—in the genome differs between members of a species. For example, two sequenced DNA fragments from different individuals, AAGC**C**TA to AAGC**T**TA, contain a difference in a single nucleotide. This constitutes a SNP. When a SNP is retained in a population, it defines a new **haplogroup** (q.v.).

yDNA. The Y chromosome is the only chromosome that does not occur in pairs. A male child has an X-Y sex chromosome; that Y chromosome is passed uniquely from father to son. Thus, the Y chromosome forms the "DNA signature" of the paternal line. That portion of the DNA strand from the Y chromosome is called yDNA.

WEBSITES

In addition to the sites mentioned earlier in the text, these websites also offer further information on genetic genealogy and DNA testing:

- *Context Info* (DNA basics): **http://www.contexo.info/DNA_Basics**
- DNA 101: Y-Chromosome Testing: **http://blairdna.com/dna101.html**
- Genetics and genealogy: **http://genealogy.about.com/library/authors/ucroderick1e.htm**
- *Human Genome Project*: **http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml**
- International Society of Genetic Genealogy: **http://isogg.org**
- Kerchner DNA: Genetics 101: **http://www.kerchner.com/dna-information.htm**
- National Human Genome Research Institute (NHGRI): **http://www.genome.gov**
  See their glossary at **http://www.genome.gov/glossary.cfm.**
- *World Families*: **www.worldfamilies.net**

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DNA Test Kit Record

You may use this page to record the progress and results of your own DNA testing.

Item	Date	Comments
DNA test kit ordered		
DNA test kit received		
DNA test kit returned		
DNA test results received		

My DNA test Kit No. _____ **Password _____**

My yDNA haplotype is: _____ **My mtDNA haplotype is: _____**

Important Websites

Website	Address	Comments / Password(s)
My DNA testing site		
My Surname project		
My y-Haplogroup site		
My mt-Haplogroup site		
My geographic project		
The Genographic project	**https://www3.nationalgeographic.com/genographic/index.html**	
ySearch	**http://www.ysearch.org**	
yBase	**http://www.ybase.org**	

Notes: