

GENETIC GENEALOGY

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DNA

DNA, or deoxyribonucleic acid, is like an instruction manual for living things. It is made up of something called nucleotides, which are like the building blocks of life. These nucleotides come in four different flavours:

- adenine (A)
- thymine (T)
- cytosine (C)
- guanine (G)

What makes DNA amazing is its shape, which looks like a twisted ladder or a spiral staircase. This shape is called a double helix.

The ladder has pairs of these nucleotides holding it together, and they always follow a rule: A pairs with T, and C pairs with G. It's your genetic code.

Every living thing has its own unique DNA code, which is what makes you different from your friends, family, and even animals.

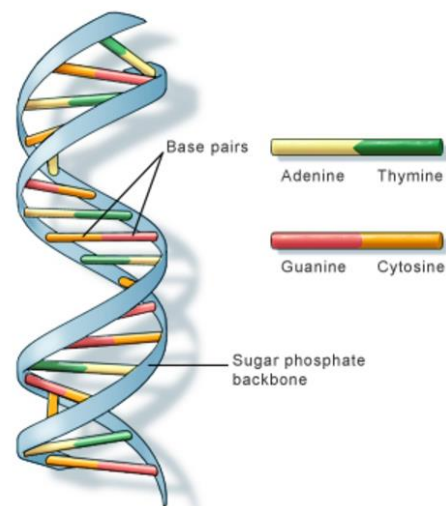
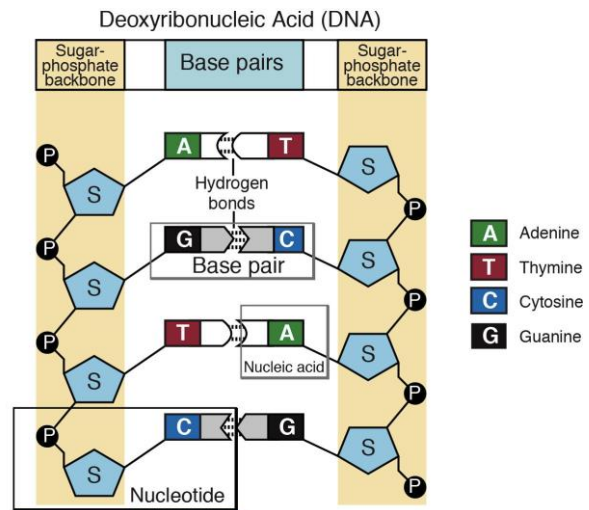
Your DNA contains all the instructions for how your body works, like how your hair colour, eye colour, and even things like how tall you might grow are determined by your DNA.

When cells in your body need to make something, like a protein to help with digestion or to build new tissues, they follow the instructions in your DNA.

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Genetic genealogy combines DNA testing with traditional genealogical methods to identify biological relationships and trace ancestral lines. This approach allows individuals to uncover their ethnic background, identify genetic traits and find relatives they may not have known existed.

Genealogical DNA tests are used in genetic genealogy to help determine your ancestry and genealogical origins. These tests compare the results of a DNA test with those already tested by others in order to determine genetic similarities and provide information about how closely people are related. Tests are conducted using DNA samples, typically from a cheek swab or saliva.



There are three main types of genealogical DNA tests: autosomal (atDNA), mitochondrial (mtDNA), and Y-chromosome (Y-DNA).

- **Autosomal DNA** testing is useful for finding relatives within the past five to seven generations, and can help people learn more about their ethnic ancestry. *(Autosomes are like the general instruction books that contain information about things like the colour of your hair, your height, and many other traits – they are not related to gender)*
- **Mitochondrial DNA** testing looks at the DNA found in the mitochondria, and can be used to trace a person's direct maternal ancestry. *(mitochondria are like the batteries that provide energy to your cells, which, in turn, help your body do everything from running, playing, thinking, and even breathing)*
- **Y-chromosome DNA** testing examines the DNA found on the Y chromosome, which is passed down from father to son. These tests are useful for tracing a male's direct paternal ancestry. *(the Y-chromosome is like a special piece of genetic code that determines whether your gender is male - It carries all the information that tells the baby's body to develop into a boy)*

Population Genetics is a branch of genetic genealogy that studies the different frequencies in which DNA occurs in a population. This is usually done by sampling different genomes in the population, such as blood samples or cheek swabs.

Biogeographical origin (ethnicity) can be predicted using computer algorithms and proprietary calculations to estimate what percentage of an individual's DNA comes from particular ancestral groups. This can be a really interesting way to learn more about your family history and where you come from.

Human Migration can be studied in genetic genealogy with the use of haplogroups. *A haplogroup is a genetic population that shares a common ancestor.* When different populations migrate, they often take their haplogroups with them. Therefore, the distribution of haplogroups tends to show the spread of human migrations through time and space.

Genetic genealogy uses autosomal DNA single nucleotide polymorphisms to discover recent common ancestors between two or more people. This is done by examining the SNPs on your chromosomes and comparing them to other people's chromosomes. If two people share a long stretch of DNA, it is likely they share a common ancestor.

An SNP, which stands for Single Nucleotide Polymorphism, is a tiny variation or difference in a person's DNA. Polymorphism means that there can be more than one version of a particular nucleotide at a specific spot in your DNA. Instead of everyone having the exact same DNA sequence in that spot, some people might have an A, while others have a T, C, or G.

An SNP is like a small difference in the DNA code at a specific location in your genetic instructions. These differences can be inherited from your parents, and they contribute to the unique traits and characteristics that make you, you. Scientists study SNPs to understand how they relate to things like diseases, traits (like eye colour), and how different people respond to medications.

Autosomal DNA is the most common type of DNA used in genetic genealogy. Autosomal DNA is found in the 22 pairs of chromosomes that don't contribute to sex and gender and can be used to find biological relationships (of all kinds) through DNA.

SUMMARY

DNA testing for genealogy works like a genetic family tree. Here's a simple summary:

- **Sample Collection:** First, you give a small sample of your DNA. This is often done by swabbing your cheek or spitting into a tube. It's painless and easy!
- **DNA Analysis:** Scientists then examine your DNA. They look at specific parts of it that have unique patterns passed down through generations.
- **Comparison:** They compare your DNA to a big database of other people's DNA. This helps find matches with others who share similar DNA patterns.
- **Ancestry Information:** Based on these matches, they can estimate where your ancestors might have come from. For example, if you have a lot of DNA matches from Ireland, it suggests Irish roots.
- **Family Connections:** DNA testing can also help you find relatives you didn't know you had. You might discover cousins or distant family members.

So, DNA testing helps you learn about your family history, where your ancestors lived, and even connect with relatives you might not have known about. It's like a genetic treasure hunt to uncover your past!

