Basics of DNA

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Handout

What it is and what it does

DNA is in every cell of our bodies. It contains information on our parents and ancestors before them. The beauty of DNA is that it connects us to the past. We all carry bits of our ancestors with us. It helps us define our ethnicity, the way we look and even provide health information.

What types

Genealogists work with four different kinds of DNA. They are autosomal (atDNA), mitochondrial (mtDNA), Y-DNA and X-DNA. Each type gives us a unique way of looking at our ancestry and provide different tools for solving genealogical questions.

How we use it

We all have two kinds of family trees. There is a genealogical tree that we build using records of all kinds. The second is a genetic tree. It is made up of people whose DNA we inherit. In many cases, they are much the same. By using both genetic data and genealogical research we can identify unknown parents and ancestors, discover ethnic roots and family secrets. It can even be used to identify criminals, victims and unknown soldiers.

Fundamental truths of Genetic Genealogy

- DNA doesn't lie, but it can be misinterpreted
- DNA is only one piece of evidence. It requires genealogy to be useful.
- DNA is not a silver bullet. With current technology, it is not always possible for DNA to help us solve a genealogical question.

It will get easier

With every new thing, there is always a learning curve. Learn a little and try it out. Once you feel comfortable with that process, add the next. There have been about 30 million DNA tests taken at the major genealogy-based testing services and that is growing daily. The technology and research tools are also constantly improving. Things we though were impossible or impractical a couple of years ago are not workable.

Glossary of terms

Autosomal DNA (atDNA): 22 pairs of non-sex chromosomes found in the nucleus of a cell.
Autosome: One of the numbered non-sex chromosomes
Cell: The basic unit of life that contains DNA
Centimorgans: A unit of measurement used to imply distance along a chromosome
Chromosome: A DNA molecule found in the nucleus of living cells
Chromosome Browser: A visual representation of shared DNA between two test takers
DNA (deoxyribonucleic acid): A double-stranded molecule containing genetic information
DNA Match: Two test takers that share DNA
DNA Segments: A position on a chromosome where two test takers share DNA
Ethnicity estimate: Inferred ancestral origins based on comparing an individual's DNA to that of a genetic reference population
Endogamy: The custom of marrying only within the limits of a local community, clan or tribe.
FTDNA Projects/Surname groups: A free research group of test takers at FamilyTreeDNA that share a common ancestry
Genetic genealogy: The practice and study of using DNA in genealogical research
Half-identical region: An area of the genome commonly tested for mt-DNA research
Haplogroup: Group of people that share genetic mutations and a common ancestor
Haplotype: A test taker's specific market results
Marker: A specific commonly test region of DNA
Matrilineal: The direct maternal line
Mitochondrial DNA (mtDNA): This is a type of DNA found in the mitochondrial of a cell. It is passed down from mother to daughter in the matrilineal line
Most recent common ancestor (MRCA): The common ancestor closest to two or more DNA **matches:** People that share DNA
Mutation: A variation in DNA that occurs over generations
Nucleotide: One of four building blocks of DNA (adenine, cytosine, guanine, and thymine)
Nucleus: The cell's control center
Patrilineal: The direct paternal line
Phasing: Separating DNA matches into maternal and paternal groups
Recombination: The mixing of autosomal DNA with the creation of a child
Reference groups: People with whom a test taker's DNA is compared that represent specific ethnic or geographic groups
Shared cM Project: A reference work produced by Blaine T. Bettinger for evaluating relationships based on the amount of shared DNA.
SNP "snip" (Single nucleotide polymorphism): A variation of a single DNA base pair. They represent nucleotide differences and are used to help establish relationships between matches
STR (Short Tandem Repeats): A repeated DNA sequence. Used to help establish relationships between matches
Terminal SNP: The snip that most closely defines the test taker
X-DNA: A chromosome males inherit only from their mothers and females inherit from both parents.
Y-DNA: A chromosome on males inherit from their fathers

Resources For Genealogist on DNA

Books:

The Family Tree Guide to DNA Testing and Genetic Genealogy by Blaine T. Bettinger
Genetic Genealogy in Practice by Blaine T. Bettinger and Debbie Parker Wayne
Advanced Genetic Genealogy: Techniques and Case Studies by Debbie Parker Wayne [editor]
Professional Genealogy by Elizabeth Shown Mills [editor] Chapter 16 "Genetics For Genealogy"

Websites/Blogs:

The Genetic Genealogist [Blaine Bettinger] https://thegeneticgenealogist.com/
DNAeXplained – Genetic Genealogy [Roberta Estes] https://dna-explained.com/

Facebook Groups:

Genetic Genealogy Tips & Techniques
All Genetic Genealogy
New Mexico DNA Discussion
DNA Detectives
AncestryDNA GEDmatch 23andMe FTDNA

YouTube Channels:

Blaine Bettinger
Maurice Gleeson
Diahan Southard
Family History Fanatics
Ancestry
FamilyTreeDNA

Webinars:

Legacy Family Tree Webinars (some free but worth the $50 annual fee for all access)
https://familytreewebinars.com/