

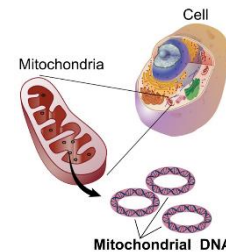


DNA Basics: Getting Started with Genetic Genealogy

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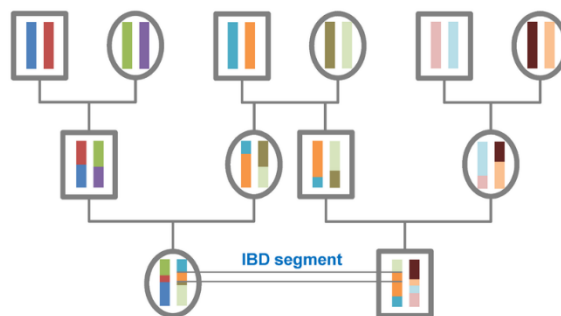
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- What is genetic genealogy?
 - The use of commercial, direct-to-consumer DNA tests combined with traditional genealogical methods to figure out relationships
- How can genetic genealogy be utilized?
 - Find family and confirm relationships
 - Learn about secrets in the family tree
 - Locate unknown biological relatives
 - Identify the unidentified
 - Law enforcement
- Before you get started, some considerations:
 - Are you prepared for what a DNA test might reveal? Would new information be received positively or negatively?
 - Do you have a plan if you learn about another family member's secrets?
 - Have you read the terms of service?
- Different types of DNA tests
 - Mitochondrial DNA (mtDNA)
 - Follows the matrilineal line (i.e., mother's mother's mother, etc.)
 - Not to be confused with X-DNA
 - Can tell you about deep ancestral roots
 - Example: The Romanovs
 - Can learn basic haplogroup at 23andme and uploads to other third-party sites; full testing available at Family Tree DNA (FTDNA)
 - Arguably the least useful for finding family because of its slower mutation rate, but has its uses
 - Y-DNA
 - Follows the patrilineal line (i.e., father's father's father, etc.)
 - STR versus SNP testing
 - Can determine more distant relationships, but not the exact relationship.
 - Can be helpful to determine surnames, but less useful in populations where surnames were recently adopted (e.g., Ashkenazi Jews)
 - Example: Thomas Jefferson and Sally Hemings
 - Can learn basic haplogroup at 23andme and upload to other 3rd party sites.
 - Y-37, Y-111, and Big-Y 700 at Family Tree DNA (FTDNA)



- X-DNA
 - X-DNA is included in raw autosomal DNA testing; viewable at 23andme, FTDNA, and GEDmatch
 - Males only inherit X from their mothers, while females receive an X chromosome from each parent.
 - Females effectively inherit one of their X chromosomes from their paternal grandmother

- Autosomal DNA
 - We have 22 pairs of autosomes (the 23rd pair is the sex chromosomes)
 - 50% DNA randomly inherited from each parent.
 - Recombination
 - What is a centimorgan (cM)?
 - A unit of measure for the frequency of genetic recombination
 - Autosomal testing is the focus of the major commercial DNA testing companies
 - The Big Four: AncestryDNA, 23andme, Family Tree DNA (FTDNA), and MyHeritage



- What can you expect when you take a DNA test?
 - First: Which test will meet your needs?
 - Follow the directions!
 - Create an account
 - Spit or swab into a tube
 - Decide on level of privacy
 - Wait for results for several weeks
 - In the meantime, build your tree and learn what to expect when the results arrive
- What the “Big Four” DNA tests have in common
 - Test autosomal DNA
 - Ethnicity estimates
 - DNA matches
 - Various tools to aid in analysis.
 - Messaging abilities
- AncestryDNA
 - A spit-based test
 - Largest database
 - Ability to attach trees to your DNA results
 - Can look at shared matches, color code groups, add notes
 - Can transfer raw data to other commercial sites and third-party tools

- I almost always recommend testing here first if the primary goal is to locate family
- 23andme
 - Spit-based test
 - DNA given in terms of percentages.
 - Ancestry composition chromosome painting
 - Known for providing health reports
 - Includes X-DNA, haplogroups
- MyHeritage
 - Swab test
 - Israeli company that is popular among Europeans
 - Includes trees, how many cMs matches share with matches in common
 - Several filters for searching, including searching family by ethnicity
 - Chromosome browser
- Family Tree DNA (FTDNA)
 - Swab test
 - Y-DNA and mtDNA testing
 - Family Finder (autosomal DNA)
 - Can compare and sort matches
- Shared cM Project
 - The go-to third-party tool for genetic genealogy to assist with relationship predictions

The Shared cM Project 4.0 tool v4
 Read more about the tool and this update

March 2020
 Elaine T. Bettinger
 www.thegeneticgenealogist.com
 More about this project
 CC 4.0 Attribution License
 Interactive version v4 by Jonny Peri at DNA Painter
 Click here to contribute data to the shared cM project
 Last updated 28th March 2020

Important

- For relationships more distant than Half 2C, the averages were determined only for relationships in which DNA was shared.
- The more distant a relationship, the more likely it is that you won't share DNA at all (read more)
- These statistics do not cater for pedigree collapse or endogamy

Other versions
 New: with option to add a second amount
 Beta with updated probabilities
 With editable boxes
 Shared cM 3.0 (2017) version

Filter
 Enter the total number of cM for your match here:

 or enter %

How to read this chart
 Relationship
 Average
 Range
 (low to high;
 99th percentile)

Then any relationships that fit will stand out below
 Click here for a shareable link to the cM amount above

Most distant common ancestors
 Assuming no pedigree collapse or endogamy, and that you're related in just one way, the furthest back you might need to go to find common ancestors for a match of 435cM is 2nd-Great-Grandparent level or generation 5 on your pedigree chart.
 The connection may be closer. Also, depending on your family, this match could be a close younger generation relative, such as the descendant of your sibling.

Relationship probabilities (based on stats from The DNA Geek)
 New: View these relationships in a tree

82%	Great-Great-Aunt / Uncle Half Great-Aunt / Uncle Half 1C 1C1R Half Great-Niece / Nephew Great-Great-Niece / Nephew
17%	Half GG-Niece / Nephew † Half GG-Aunt / Uncle † 2C Half 1C1R 1C2R
0.77%	Great-Grandparent † Great-Grandchild † Half Aunt / Uncle † Half Niece / Nephew † Great-Aunt / Uncle 1C Great-Niece / Nephew

† This relationship has a positive probability for 435cM in theDNAgeek's table of probabilities, but falls outside the bounds of the recorded cM range (99th percentile)

Click on any relationship to view a histogram
 Read more about cousin relationships

Selected Resources for Genetic Genealogy Basics

Books

Blaine T. Bettinger (2019). *The Family Tree Guide to DNA Testing and Genetic Genealogy* (2nd Edition).

Blaine T. Bettinger and Debbie Parker Wayne (2016). *Genetic Genealogy in Practice*.

Diahan Southard (2020). *Your DNA Guide*.

Blogs and Articles

The Genetic Genealogist, Dr. Blaine Bettinger, <https://thegeneticgenealogist.com/>

The DNA Geek, Dr. Leah Larkin, <https://thednageek.com/>

DNAeXplained, Roberta Estes, <https://dna-explained.com/>

Kitty Cooper's Blog, Kitty Cooper, <https://blog.kittycooper.com/>

Your DNA Guide, Diahan Southard, <https://www.yourdnaguide.com/>

Facebook Groups

DNA Detectives

DD Social

Genetic Genealogy Tips & Techniques

DNA Roundtable

Online Courses

Genetic Genealogy, Autosomal DNA (National Genealogical Society)

Understanding and Using DNA Test Results (National Genealogical Society)

DNA: Introduction to Genetic Genealogy (National Institute for Genealogical Studies)

DNA: Autosomal DNA – Testing for Everyone (National Institute for Genealogical Studies)

DNA: Tracing Maternal & Paternal Lines (National Institute for Genealogical Studies)

Excelsior College courses

Institutes and Conferences

Genealogical Research Institute of Pittsburgh (GRIP)

Institute of Genealogy & Historical Research (IGHR)

Salt Lake Institute for Genealogy (SLIG)

RootsTech

Institute for Genetic Genealogy (i4GG)

NGS Family History Conference

Other Resources

Legacy Family Tree Webinars

Genealogy journals

Genealogical societies, including DNA SIGs