



Using DNA to Break Down Brick Walls

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*"I have not failed. I've just found
ten thousand ways that won't work."
- Thomas Edison*

Every genealogist has encountered the proverbial “Brick Wall” at least once in their genealogical lifetime. This brick wall could result from misinformation derived from family folklore, a loss of resources, or of sources not yet tapped.

DNA is just one tool that can be used to help break through these brick walls. Although DNA cannot provide all the answers you are seeking, it may be key to proving or disproving family connections or in offering direction to determine who to look at and where to start in your next phase of research.

Research Goal

Before DNA can be employed as a useful tool, however, one must have a clear research **GOAL** in mind. Your research goal should include a ***focused research question*** which includes the following 3 key elements:

- Who is the subject of your research?
- What identifiers distinguish this person from others?
- What major life event would you like to learn about?



Start with What you Know

Once you have your focused research question narrowed down, the next step towards breaking down that brick wall is to start with what you know. Go through all of the records again and record every scrap of information you can glean from them. Timetables, spreadsheets, and research logs might be helpful to organize the material. Also, make a careful note of the conflicting information that your research presents because it will be important to resolve these issues later on.

Look at What you Don't Know

What information was missing from those records? Why and how is this information important in answering your research question?

Form a Hypothesis

A hypothesis is an educated guess that is based on prior knowledge and observation and that can be either supported or refuted through some kind of testing. In genealogy, we test our hypothesis through the examination of records and sources and their subsequent analysis.

Support your Conclusion

Once you have stated your hypothesis, it is important to find additional information to support your hypothesis. This is part of the testing phase. If you hypothesize that the John Smith living in Henry County, Virginia in 1850 is the same John Smith living in Elbert County, Georgia, in 1890, then you need to find, evaluate, and analyze the records that support this conclusion.

No Direct Evidence?

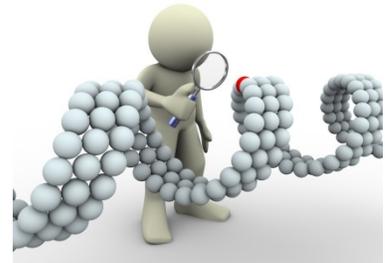
After all of your review and hypothesis, you may have found a lot of evidence to support your conclusion. But you still have not found any documents that tell you *directly* that John Doe was the father of Jane Doe. So what do you do? You look to see if the next tool in your genealogical toolbox could be useful to provide additional evidence to support your conclusion.

DNA Testing can be a very useful tool in breaking down your brick wall. Although finding the right DNA test can be a daunting task, having a tangible and focused research question will help you pick the test that's right for you.



Finding the Right DNA Test for YOU

When you decide to take a DNA test, you must then decide **what test** to take. There are three types of test: Y-DNA, mitochondrial DNA (mtDNA), and the autosomal DNA (atDNA). Each test will help you solve different genealogical problems.



The Y-DNA Test

Y-DNA is only found in males and it is passed down from father to son relatively unchanged from generation to generation. If you are male, you should have the same Y-DNA signature that your paternal grandfather had. It will only give you information about your direct paternal line. This type of test can be very useful in researching specific paternal surname lineages and origins. Adoptees wanting to learn the surname of their biological father will also benefit from this test.

The Mitochondrial DNA Test

Like the Y-DNA, Mitochondrial DNA (mtDNA) is passed down from a female to her children relatively unchanged from generation to generation, giving information on your direct maternal lineage. mtDNA is found in both males and females. A mother will pass down her mtDNA to both her sons and daughters; however, a son will NOT pass it down to his children. mtDNA testing is useful when testing a hypothesis. For example, mtDNA testing can help determine if wife number 1 or 2 was your ancestor.

The Autosomal DNA Test

The Autosomal DNA (atDNA) test tells about your *recent ancestry* from *both* sides of your family. Unlike the Y-DNA and mtDNA, which are passed down relatively unchanged through each generation and only in a single line, the atDNA changes randomly as it is passed down. This random recombination results in you receiving bits and pieces of DNA from each ancestor as part of your genetic makeup. It is also responsible for causing you and your siblings to receive different segments of DNA from your parents, which results in the possibility of your and your siblings having different matches. Both males and females can take this test, and it is very useful for filling in the gaps in your family tree, breaking down brick walls, and helping adoptees find their birth families.

Steps for Success when Working with atDNA

1. Focus your search
2. Find your matches
3. Review your matches' online family trees
4. Look for surnames of interest
5. Exchange information and be specific!!
6. Create relationship reports
7. Determine if you have the right DNA connection
8. Know your limitations
9. Don't Stop There! – Look for other matches, organize your data, explore other lines, & stay in touch!



Familial Relationship Charts for DNA Testing

The probability that a relative shares enough DNA to be picked up by the at DNA test	
Relationship	Probability
2nd cousins or closer	> 99%
3rd cousin	> 90%
4th cousin	> 50%
5th cousin	> 10%
6th cousin and more distant	Remote, < 2%

Source: <https://www.familytreedna.com/learn/autosomal-ancestry/universal-dna-matching/probability-relative-share-enough-dna-family-finder-detect/> (17 July 2014)

Expected Amounts of DNA Shared between Family Members			
Relationship	Range of Total DNA Shared	Expected Amt DNA Shared	Expected Amt DNA Shared
Parent / Child / Identical Twins	3300-3700 cMs	3400 cMs	50 %
Full Siblings	2200-3400 cMs	2550 cMs	50 %
Grandparents / Half-Siblings / Uncle / Aunt	1150-2300 cMs	1700 cMs	25 %
1st Cousins / Great-Grandparents / Great-Aunt/Uncle / Half Aunt/Uncle	250-2100 cMs	850 cMs	12.5 %
1st Cousins 1x removed, Half 1 st Cousins	150-850 cMs	425 cMs	6.25 %
2nd Cousins, 1st Cousins 2x removed	45-520 cMs	213 cMs	3.125 %
2nd Cousins 1x removed, Half 2 nd Cousins	10-400 cMs	106 cMs	1.563 %
3rd Cousins, 2nd Cousins 2x removed	5-250 cMs	53 cMs	0.781 %
3rd Cousins 1x removed	0-170 cMs	27 cMs	0.408 %
4th Cousins	0-127 cMs	13 cMs	0.195 %

Source: <https://thegeneticgenealogist.com/2017/08/26/august-2017-update-to-the-shared-cm-project/>

DNA Testing Company Comparison Chart				
	Family Tree DNA	Ancestry.com	23AndMe	MyHeritage
Website	www.familytreedna.com	www.ancestry.com	www.23andme.com	www.myheritage.com
Types of Test	Y-DNA, mtDNA, atDNA "Family Finder" test	autosomal (atDNA) – "AncestryDNA" test	autosomal (atDNA) – "Relative Finder" test & Health Report	autosomal (atDNA) – "MyHeritageDNA" test
How to Contact Matches	Email addresses of matches are provided	Ancestry.com Messaging System	23AndMe Messaging System	MyHeritage Messaging System
Compare Chromosome Segments?	Yes – using the Chromosome Browser	No – You cannot see chromosome segments you match on	Yes – if match is willing to share genomes with you	Yes – using the chromosome browser
Criteria for Matching Segments	7.69 cM 500 SNPs	5 cM Unknown	7 cM 700 SNPs	8 cM Unknown
Database Size	850,000	>9,000,000	5,000,000	1,200,000
Allows Transfers	Yes	No	No	Yes

Source: ISOGG wiki (website): https://isogg.org/wiki/Autosomal_DNA_testing_comparison_chart

Terminology

Ethnicity – AKA Admixture – the genetic mixing together of previously separated populations

Haplogroup – genetic population group of people who share a common ancestor on the direct paternal or maternal line. Consist of letters and numbers and are determined by the SNPs you have

Haplotype – A series of numerical markers values

Mutation – A change to your DNA sequence caused by a mistake in the copying process; They are rare and occur at random, and become fixed and passed down from gen to gen; They are identified by their SNPs & used to identify your haplogroup

Non-Paternal Event (NPE) – An event that caused unexpected DNA results: a name change, unwed mother gave son her surname, adoptions result from surrender of child or when a man adopted his wife's child and gave them his name, and illegitimate births

SNPs (Single Nucleotide Polymorphism) – replacement of a base with another

STRs (Short Tandem Repeats) – a sequence of bases A, T, C, and G repeated many times which are then counted on each marker and reported as a numeric value

References

DNA Testing Companies:

- Family Tree DNA – <http://www.familytreedna.com/> – Y-DNA, mtDNA, atDNA “Family Finder” test
- Ancestry.com – <http://www.ancestry.com> – autosomal (atDNA) – “AncestryDNA” test
- 23AndMe – <http://www.23andme.com> – autosomal (atDNA) – “Relative Finder” test
- MyHeritage – <http://www.myheritagedna.com> – autosomal (atDNA)

3rd Party Resources:

- Gedmatch.com – Chromosome Browser, ethnicity predictors, matches to others
- Promethease.com – Provides DNA Health Report based on literature and SNPedia.com.
- Dna.land – Citizen Science, population ancestry, building the human genome, relative matching
- GenomeMate.org – A tool for managing DNA Comparisons
- DNAPainter.com – Map DNA Segments to your Ancestors
- Genetic Affairs – automates the retrieval of new genetic matches
- DNALeeds.com – a colorful methodology for clustering your genetic matches

DNA Resource Information:

- International Society of Genetic Genealogy (ISOGG) Wiki - <http://www.isogg.org/wiki/>
- Charles F. Kerchner's DNA 101 Page – <http://www.kerchner.com/books/introg&g.htm>
- DNA 101 Tutorials – <http://learn.genetics.utah.edu/content/chromosomes/types4/>
- Comparing Autosomal Results – <http://www.Gedmatch.com>
- Download your autosomal Results - <http://www.dnagedcom.com/>
- Getting Started with autosomal Results – <http://www.dnaadoption.com>

Additional Resources:

- Blaine Bettinger & Debbie Parker Wayne, *Genetic Genealogy in Practice*, 2016. (Workbook)

Autosomal DNA Resources:

- Understanding your ftDNA Family Finder results - <https://www.familytreedna.com/learn/ftdna/webinars/>
- Maurice Gleeson: Using DNA in Genealogy Research - <https://www.youtube.com/watch?v=qDv3lZw2h9c>
- 23AndMe's Getting Started Video - <https://www.youtube.com/watch?v=dw6b1jtKmJk>
- Ancestry.com's Academy - <https://academy.ancestry.com/academy/course/ancestry-dna-101>
- Jim Bartlett's Segmentology Blog - <https://segmentology.org/>
- Blaine Bettinger's Genetic Genealogy Tips and Tricks Facebook Page - <https://www.facebook.com/groups/geneticgenealogytipsandtechniques/>