

Tackling Tough Cases Using Y-DNA

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I. DNA Tests Review

- Currently three main types of DNA tests for genealogy with variations:
 1. Y-chromosome (Y-DNA) used for patrilineal (direct paternal) line
 2. Mitochondrial DNA (mtDNA) used for matrilineal (direct maternal) line
 3. Autosomal DNA (atDNA) tests for all ancestral lines, but useful for fewer generations back
 4. X chromosome (X-DNA) is not a separate test, but atDNA results usually include data on this
- All 3 tests provide variations of three major components.
 1. Results from specific DNA base values; format of these results depends on which test was taken
 2. People in the testing company's database who match the tester (have a significant amount of identical DNA)
 3. Estimation of biogeographical or ethnic origins for the test's relevant line(s)

II. Y-DNA Review

A. Inheritance

- Y-DNA is only found in males and is passed down the patrilineal line
 - Most of the time it undergoes no significant changes.
 - Random mutations do occur and accumulate over time.

B. Two kinds of Y-chromosome Testing

- Short Tandem Repeat (STR)
 - A short series of base values is repeated at a particular location (marker) on the Y chromosome
 - The number of repeats can change over time and be passed on.
 - Total number of DYS marker values reported varies with level of test: 37, 67 or 111
 - The closer two testers' results match (smaller genetic distance), the closer the relationship
 - Can give an estimated haplogroup (ancient paternal ancestry)
- Single Nucleotide Polymorphism (SNP)
 - A SNP is a genetic change in a particular base pair; also passed on to subsequent generations
 - Gives more precise haplogroup, i.e., specific sub-clade
- STR-37, STR-67, STR-111 & Big Y available from FamilyTreeDNA; also pre-defined individual SNP tests

III. Using Y-DNA for Research Challenges

A. Testing Goals

- Finding a surname
- Refuting surname connections
- Distinguishing family groups within a surname
- Determining patrilineal geographic origins
- Determining patrilineal ethnicity

B. Finding an Unknown Surname

- STR test at FTDNA, minimum 37 markers

- Examine matches, check for surname pattern
 - Can download list as .csv file, save as .xlsx
 - Interpret genetic distances (number of differences between tester and match)
 - <https://www.familytreedna.com/learn/y-dna-testing/y-str/expected-relationship-match/>
 - Significant matches to a different surname?
 - At 37 markers – 0 or 1
 - At 67 & 111 markers – 0 to 2
 - Track your matches and their test results to find MRCA
 - Database, Kit # or UserID, Genetic Distance, Match Surname, First & Middle Name, Point of Contact, Email, Match Date, Sent Dt (contacted match), Rec'd Dt (match reply), Most Distant Known Ancestor, MDKA Origin, MRCA, atDNA?, Cousin – e.g., 2C1R, Tree URL, GEDMatch ID, Y-DNA Haplogroup, Terminal SNP, Haplotype – markers & values (get directly from match or from surname project)
 - Y-DNA TIP report
 - Compares a tester with a selected match & predicts the probability they share a common ancestor within the last “x” number of generations
 - Takes mutation rates into account. Different markers change at different rates, so not all equal genetic distances are really equal! E.g., G.D. = 3 is more significant if markers change slowly, less so if fast.
- C. Refuting a Surname Connection
- Lack of a surname match is not sufficient; may just not have tested
 - Lack of matching haplogroup is stronger
 - Be careful that it's not just a difference in level of subgroup detail
- D. Distinguish Family Groups
- Use surname DNA project – “a group of genealogy researchers who share a surname, or a genetic link to the surname, and who join together to use Y-DNA testing, paper trails and research to identify those with whom they share a common ancestor.” – WorldFamilies.net
 - Includes variations of the surname
 - Compare your Y-STR test results to other members to identify family group, find MRCA
- E. Determine Patrilineal Geographic and/or Ethnic Origins
- Based on haplogroup & subclade
 - Often refined later by testing company
 - Google search for more information
- F. What if no helpful Y-DNA matches?
- Upload results to Ysearch.org – public database sponsored by FTDNA
 - Join geographic/haplogroup project
 - Identify targeted testing candidates
 - Who'd carry the Y-DNA needed to answer the research question?
 - Since patrilineal lines can “daughter out”, may need to go back, then forward to find a suitable candidate
 - No limit to how many generations go back, but remember increasing likelihood of encountering an MPE (AKA NPE)
 - NPE rate is 1-2%, so for every 100 children, 1 or 2 are not the offspring of the parent or parents identified
 - Consider a different test

- If don't have matches at low number of markers, won't have them at higher level, either; upgrading won't help
 - If TiP report shows a likelihood of a common ancestor with a Y-DNA match in last 5 or 6 generations, an autosomal test can be extremely helpful
 - Predicted level of cousinship can point to the most likely patrilineal common ancestor
- G. Keep in mind Y-DNA limitations
- Y-DNA testing can determine the likelihood of whether two people are related on their patrilineal line
 - It cannot determine how!
 - Exact Y-DNA matches could be father/son, brothers, paternal uncle/nephew, paternal first cousins, or even more distant cousins
 - Y-DNA test results can be used in a proof argument along with documentary evidence and possibly autosomal DNA test results

IV. Using Y-DNA Results As "Proof"

A. What Is the Role of DNA?

- Remember the importance of a research question and hypothesis?
 - A hypothesis with enough evidence to support it becomes a conclusion
- DNA results are a record, like a deed, a census, etc.
 - But despite its superior accuracy, DNA should never be the only evidence used to reach a conclusion
- Amount of DNA-related info to include can vary greatly
 - Just one match may be the key OR
 - An entire project including many tests could be required to prove an assertion

B. What Should Be Included from a Y-DNA Test?

- Testing company
- Tester's info – Name, Kit #, Contact info
- Date tested
- Number of markers tested
- STR results – marker names & values
- Haplogroup & subclade
- Names & contact info for significant matches (obtain permission)
- Genetic distance, whether on fast or slow moving markers
- TiP Report results
- MRCA, if determined

C. An Application

Lineage society applicant Thomas Hunter believes he is a descendant of patriot Jonathan Hunter. Jonathan's son in the direct line is believed to be Samuel Hunter. However, there isn't strong documentary evidence for this generational link. Furthermore, there were two Samuel Hunters in the same area around the same time. How might Y-DNA testing be used to help support the hypothesis that the Samuel Hunter who was the father of Thomas' fourth great-grandfather was the son of the patriot Jonathan Hunter?

Find and test patrilineal descendants of both Samuel Hunters. Also find and test documented patrilineal descendants of Jonathan Hunter that are not through Samuel. Compare to each other and to the applicant, using the procedures about which we've learned.

V. Additional Resources

Books

- Bettinger, Blaine. *The Family Tree Guide to DNA Testing and Genetic Genealogy*, Family Tree Books, 2016.
- Hill, Richard. *Finding Family: My Search for Roots and the Secrets in My DNA*, CreateSpace, 2012.

Blogs

- *Deb's Delvings*. Debbie Parker Wayne – <http://desdelvings.blogspot.com/>
- *The Genetic Genealogist*. Blaine T. Bettinger – <http://www.thegeneticgenealogist.com/>
- *DNAExplained – Genetic Genealogy*. Roberta Estes – <http://dna-explained.com/>
- *The Independent Guide to DNA Testing*. Richard Hill – <http://www.dna-testing-adviser.com/>
- *The Legal Genealogist*. Judy G. Russell – <http://www.legalgenealogist.com/blog/> (About DNA on Sundays)

Other Web Sites

- International Society of Genetic Genealogists – <http://www.ISOGG.org>
- Kelly Wheaton's Beginners Guide to Genetic Genealogy – <http://tinyurl.com/geneticgenealogyguide>