Solving Mysteries Using DNA

Paula Williams – pkwilliams823@gmail.com

William Andrew Johnson was raised by his mother's second husband, Griggs Andrew Johnson, and Griggs is whom William identified as his father to his children and any other entities who asked. No birth record has been found, and formal adoptions were not common practice in the 1880s as they are now. Using the paper trail and family lore, Griggs (who went by Andrew or Andy) ***was*** William's father, and so his descendants believed.

Until a conversation with a more distant family member suggested that William and his younger brother John were **half**-brothers. Which was the truth? The records or distant family lore?

DNA can be used to help solve mysteries like this.

Types of DNA Testing

There are four types of DNA tests used for genealogy: **Y-DNA** (inherited by males from their fathers), **mitochondrial DNA** (inherited by everyone from their mothers), **X-DNA** (inherited by all from their mothers, and by daughters from their fathers) and **autosomal DNA** (inherited from each parent). Autosomal DNA testing is the most commonly used test for genealogical questions, but depending on our research question, we may wish to use more than one type of test.

When trying to solve the paternity of men no longer living, we will need to test their descendants. The ideal descendants to test depend upon the type of testing being used. (Note that mitochondrial (or mtDNA) testing is not appropriate in this case since William would not pass his mtDNA to his children. Similarly, X-DNA is not appropriate because William only inherited X-DNA from his mother, and her identity is known.)

Y-DNA Testing

Y-DNA testing tests the Y-chromosome, inherited by males from their fathers, who inherited it from their fathers, etc. Because a man has only one Y chromosome, he passes it (mostly) unchanged to each of his sons. Mutations can happen randomly, but most of the time, two brothers will have identical Y-chromosomes, and so will each of their descendants. In this case study, neither William nor his brother is alive, so we want to test patrilineal descendants of each and compare the results.

There are two types of Y-DNA testing – Short Tandem Repeat (STR) testing looks at specific markers known to mutate along the Y chromosome, and Single Nucleotide Polymorphism (SNP) testing. The most common SNP testing is FamilyTreeDNA's Big Y test, which attempts to sequence the entire testable area of the Y chromosome. Big Y would be useful for a large-scale family study, but for the puzzle of William and his brother, the cheaper STR test will suffice, at least to start.

The two descendants (William's grandson and nephew) not only do not appear as Y-DNA matches to one another, but they have completely different haplogroups (R-M269 and I-M253). This supports the family lore that William and his brother were half-brothers.

Or does it? The two testers certainly did not share a patrilineal ancestor with these haplogroups, but we need to rule out the possibility of one or both testers or their fathers having paternity questions themselves, as well as the possibility that one or both was adopted, and the pair did not even share a mother. Y-DNA alone will not tell us that. Assuming that the testers were indeed half-brothers, we also have the question – if William's father was not Andrew, then who was he? The Y-DNA matches may be of help, but we put them aside for now. The most common surname among the closest matches was Taylor.

Autosomal DNA Testing

Autosomal DNA comes from both of our parents, and both of their parents, and so on, and we can match people who descend from both sides of our family. Autosomal DNA is useful for solving puzzles like that of William Johnson's family. (Autosomal DNA *could* solve William's paternity puzzle, but the Y-DNA helped cut through small town interrelatedness. Also, autosomal testing was not as widely available when this puzzle first presented itself!)

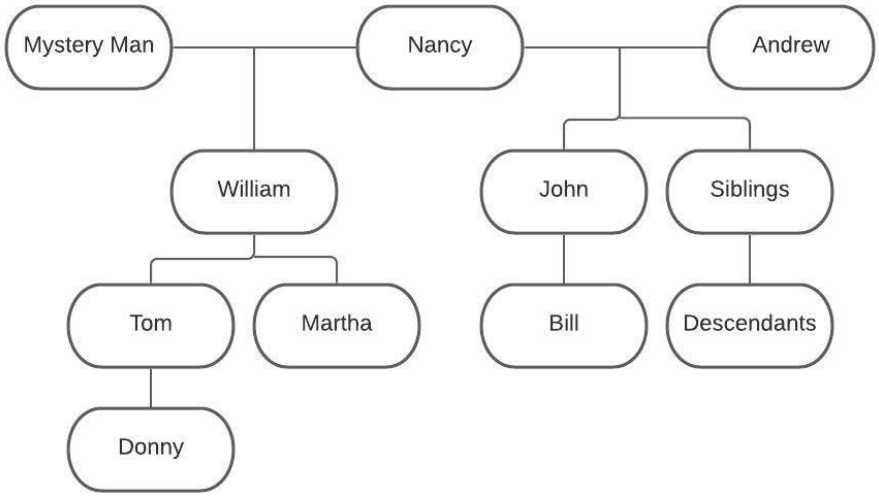
For Y-DNA, we could only consider testers in a patrilineal line to our puzzle ancestor(s), but for autosomal DNA, any descendant can test. Ideally, we would test the oldest living generation. Where William's grandson was the ideal choice for Y-DNA testing, having William's daughter do an autosomal DNA test gets us a generation closer to our ancestor. She inherited 50% of William's autosomal DNA, where his grandson only inherited about 25%, and his great-grandchildren only inherited about 12.5% on average. When it comes to target testing relatives, the more, the merrier, but we may need to be strategic. Testing other descendants of William can be helpful.

Autosomal testing answers some of the questions we had about William's grandson and nephew. They do share autosomal DNA, and at appropriate amounts for the testers to be half first cousins once removed. If either tester's father were someone unknown, the path to their shared ancestor would be broken and they would not share autosomal DNA at those amounts. The nephew (John's son) also shares autosomal DNA with people related to Andrew Johnson's family, and William's grandson does not.

Shared Matches

When we take a DNA test, we get a list of people who share DNA with us – our DNA matches. When we view individual DNA matches, we can then see a list of shared matches (sometimes called "In Common With" or "Relatives in Common"). These are people who share some amount of DNA with us and with each other.

There are two reasons why someone appears on the shared matches list. The first, and most common, is that you, the match you are viewing, and the shared match all share a common ancestor. A second reason, and one we do have to keep in mind, is that you and the match you are viewing share one common ancestor, the shared match, and the match you're viewing share a second common ancestor amongst themselves, and you and the shared match share yet another common ancestor. Of course, the former situation is more helpful, but in either case, these shared matches are part of our matches' and our ancestors' FAN clubs and can provide important clues, context, and evidence. These shared matches guide the rest of our research.



The DNA that Martha shares with Bill or descendants of John's siblings comes from Nancy and Nancy alone. John and his siblings share Andrew as a father, while

William's father is a mystery. Therefore, we are interested in the shared matches with Bill and his cousins only as a group of shared matches we wish to **exclude** from our analysis. Similarly, we want to exclude matches who descend from William's wife (Tom's and Martha's mother). Automated clustering tools at Ancestry and at MyHeritage may be helpful in isolating matches of interest.

Then, we work to identify those who remain. A useful technique is to then build a research tree (perhaps a "Quick & Dirty" tree) where we add the pedigrees for our matches of interest, often researching the pedigrees ourselves using whatever tidbits of information we can gather, with the goal of seeing how the matches are connected. When we find a common ancestor for a cluster of matches, we will want to do descendancy research for the descendants of that ancestor to find where we may fit into the family.

If we have multiple match clusters that we are unable to exclude as maternal or as being related to William's mother Nancy, we will look for a couple that connects the clusters. A child of that couple would then be related to each of the connected families.

Two distinct families kept coming up in Martha's closest matches in our focus group. As we conducted genealogical research of the key DNA matches, we found a marriage uniting the two families. Then, the goal becomes determining which of the couple's children could possibly be William's biological father. We could rule out the family's daughter, since we are looking for a father. We could also rule out candidates by age. Probability tools such as What Are the Odds or BanyanDNA might help point us in the right direction, or at least help us rule out some possibilities. Target testing the descendants of the remaining sons can help solve the mystery, as can further genealogical research to determine where each son was living at the time William was conceived.

DNA is key to solving this mystery but does not solve it without genealogical research.

Selected Resources
(All URLs valid as of 14 November 2025)

Ancestry. "Grouping and Filtering AncestryDNA Matches." https://support.ancestry.com/s/article/Grouping-and-Filtering-AncestryDNA-Matches

Bettinger, Blaine. "Clustering Shared Matches." *The Genetic Genealogist*, posted 3 January 2017. https://thegeneticgenealogist.com/2017/01/03/clustering-shared-matches/

-----. "Building Quick & Dirty Trees to Identify Genetic Matches." YouTube video posted 11 October 2018. https://www.youtube.com/watch?v=UmOZXCxsqNU.

-----. "The DNA Era of Genealogy." *The Genetic Genealogist*, posted 17 December 2016. https://thegeneticgenealogist.com/2016/12/17/the-dna-era-of-genealogy/

-----. "The Growing Phenomenon of the Unlinked Family Cluster." *The Genetic Genealogist*, posted 16 March 2023. https://thegeneticgenealogist.com/2023/03/16/the-growing-phenomenon-of-the-unlinked-family-cluster/

-----. "Sub-Clustering Shared Matches." *YouTube* video posted 1 May 2019. https://www.youtube.com/watch?v=6ApidzEyA_k

-----. "Using Autosomal DNA for 18th and 19th Century Mysteries." Webinar for New York Genealogical and Biographical Society, posted 13 February 2018. https://www.newyorkfamilyhistory.org/

----- and Debbie Parker Wayne. "Genealogical Applications for Y-DNA." *Genetic Genealogy in Practice*. Arlington, Va.: National Genealogical Society, 2016. Pages 23-44.

Bush, Angie. "Introducing Custom Clusters: A Smarter Way to Find Matches that Matter." *Ancestry Blog*, posted 21 October 2025. https://www.ancestry.com/c/ancestry-blog/dna/using-custom-clusters-to-find-dna-matches

-----. "Pro Tools Enhanced DNA Shared Matches." *Ancestry Blog*, posted 20 June 2024. https://www.ancestry.com/c/ancestry-blog/pro-tools-dna-matches/

Jones, Thomas W., PhD, CG. "Perils of Source Snobbery." *OnBoard* 18 (May 2012):9-10, 15. Online, https://bcgcertification.org/skillbuilding-perils-of-source-snobbery/

-----. "Systematically Using Autosomal DNA Test Results to Help Break Through Genealogical Brick Walls." Webinar at *Legacy Family Tree Webinars*, 6 October 2017. https://familytreewebinars.com/webinar/systematically-using-autosomal-dna-test-results-to-help-break-through-genealogical-brick-walls/

LegacyTree Genealogists. "Using DNA to Solve Genealogy Brick Walls." *LegacyTree Blog*, posted March 2019. https://www.legacytree.com/blog/using-dna-to-solve-genealogy-brick-walls

Mills, Elizabeth Shown. "FAN + GPS + DNA: The Problem-Solver's Great Trifecta." *Legacy Family Tree Webinars*, posted 7 October 2016. https://familytreewebinars.com/webinar/fan-gps-dna-the-problem-solvers-great-trifecta/

-----. "QuickLesson 17: The Evidence Analysis Process Map" *Evidence Explained: Historical Analysis, Citation & Source Usage*. https://www.evidenceexplained.com/content/quicklesson-17-evidence-analysis-process-map

-----. "QuickLesson 24: Evaluating DNA as Evidence." *Evidence Explained: Historical Analysis, Citation & Source Usage*. https://www.evidenceexplained.com/content/quicklesson-24-evaluating-dna-evidence

MyHeritage. "How to Use Labels to Break New Ground with Your DNA Matches." *MyHeritage Knowledge Base*. https://education.myheritage.com/article/how-to-use-labels-to-break-new-ground-with-your-dna-matches/

Perl, Jonny. "Eight ways you can use ancestral trees at DNA Painter." *DNA Painter Blog*, posted 11 March 2018. https://dnapainter.com/blog/eight-ways-you-can-use-ancestral-trees-at-dna-painter/

-----. "Introducing WATO plus, a new tool for investigating family mysteries." *DNA Painter Blog*, posted 26 February 2024. https://dnapainter.com/blog/introducing-wato-a-new-tool-for-investigating-family-mysteries/

-----. "What Are the Odds? An Online Tool That Can Help Solve DNA Puzzles." Webinar at *Legacy Family Tree Webinars*, 3 June 2020. https://familytreewebinars.com/webinar/what-are-the-odds-an-online-tool-that-can-help-solve-dna-puzzles/

Southard, Diahan. "Shared DNA Matches - the Only DNA Tool You will Ever Need." *RootsTech 2023* lecture. https://www.familysearch.org/rootstech/session/shared-dna-matches-the-only-dna-tool-you-will-ever-need

Stanbary, Karen. "DNA Analysis Methodology: Defeat the Genealogy Gremlin with Pedigree Evaluation, Mitigation, and Reasoning (a 2023 Reisinger Lecture)." Webinar at *Legacy Family Tree Webinars*, 20 October 2023. https://familytreewebinars.com/webinar/dna-analysis-methodology-defeat-the-genealogy-gremlin-with-pedigree-evaluation-mitigation-and-reasoning/

Vance, David. *The Genealogist's Guide to Y-DNA Testing for Genetic Genealogy: Second Edition*. Self-published, 2024.

Wayne, Debbie Parker. "MAXY DNA: Correlating mt-at-X-Y DNA with the GPS." Webinar at *Legacy Family Tree Webinars*, 16 May 2017. https://familytreewebinars.com/webinar/maxy-dna-correlating-mt-at-x-y-dna-with-the-gps/

Wilson, Rick T. "Custom Clusters: An Evaluation and Application." *My Family Matters*, 11 November 2025. https://myfamilypattern.com/custom-clusters

Williams, Paula. "5 Questions to Answer About Your DNA Matches." Webinar at *Legacy Family Tree Webinars*, 15 August 2025. https://familytreewebinars.com/webinar/5-questions-to-answer-about-your-dna-matches/

Woodbury, Paul. "Anchors are the Way: Leveraging Multiple forms of DNA Evidence in Your Research." Webinar at *Legacy Family Tree Webinars*, 7 February 2024. https://familytreewebinars.com/webinar/anchors-are-the-way-leveraging-multiple-forms-of-dna-evidence-in-your-research/

-----. "Right Place, Right Time, Right Person: Intersections of DNA and Document Evidence." Webinar at *Legacy Family Tree Webinars*, 2 November 2022. https://familytreewebinars.com/webinar/right-place-right-time-right-person-intersections-of-dna-and-document-evidence/