

# Genetic Genealogy Journey

## Logging and Analyzing atDNA Matches

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In the last issue we learned how to analyze the genealogical data of our genetic matches to find a potential common ancestral couple. If surname and family tree comparisons indicate the same ancestral couple between three or more autosomal DNA (atDNA) matches, and the DNA testers have accurate family trees, we have credible evidence that the testers descend from the indicated ancestral couple or, possibly, another yet unidentified ancestral couple the testers have in common.

The matching DNA indicates the testers are related. The “accurate family tree” is a critical component to identify the ancestors that DNA was inherited from. Going beyond the surname and tree comparisons to track the DNA segment is the next step. Logging this analysis and the conclusions is an essential step in genetic genealogy. Just as we keep a documentary research log to track our paper-trail research, we need to log our genetic genealogy research and analysis.

### LOGGING GENETIC GENEALOGY RESEARCH

As more genealogists and family members take a DNA test each of us finds more and more people on our list of those with whom we share DNA—our DNA match list. The DNA match list at each company only includes others who have tested at that same company. Those of us who have tested at more than one company may want to combine the match data from all of the companies for ease of access and correlation.

Tracking how we are related to these hundreds of DNA matches allows us to correlate documentary evidence with the DNA evidence. In the same way that we must focus our documentary research to make progress, we should focus our genetic genealogy research. After identifying the “low-hanging fruit,” the common ancestors that we can identify looking at shared surnames and at family trees, identifying how we are related to other DNA matches gets more difficult. The sheer number of people on a DNA match list can be overwhelming. In order to make progress we have to focus on one or a few similar segment matches at a time and log our theories and conclusions.

Just as there are many ways to track or log documentary research, there are many ways to log genetic genealogy research. Some testing companies provide a way to keep notes on their website. Some of us prefer to keep such logs on our own computers to facilitate analysis of results from multiple testing companies and to track things not supported by the testing company tools. Logging can be done with a spreadsheet, text documents, or one of many genetic genealogy tools such as *GenomeMate*<sup>1</sup> or those found on a third-party site such as *GEDmatch*<sup>2</sup> or *DNAGEDcom*.<sup>3</sup> These tools provide for comparison of DNA data between people who tested at different companies and

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All URLs accessed 13 November 2014.

<sup>1</sup> “GenomeMate: A Tool for Mapping DNA Comparisons,” *GenomeMate* (<http://genomemate.org/>).

<sup>2</sup> “GEDmatch: Tools for DNA and Genealogy Research,” *GEDmatch* (<http://gedmatch.com/>).

<sup>3</sup> “Autosomal Tools,” *DNAGEDcom* (<http://dnagedcom.com/>).

provide some analysis tools not available at all of the testing companies. As always, be sure to read and understand the terms of service before uploading your DNA data or downloading a tool to your computer.

A genetic genealogy log starts with information downloaded from the testing company website and we then add notes as we research each DNA match and determine how we may be related. Most companies, and some third-party tools, provide a way to download a list of your DNA matches. This usually includes the tester's name (real or a pseudonym), electronic contact information, sometimes the total shared DNA amount and/or a prediction of our relationships based on the amount of DNA shared, and genealogical information such as surname lists or links to a family tree. Some companies also provide the matching DNA segment data.

Exactly how to download this data varies between the testing companies and sometimes changes as new web features are incorporated by the companies. For current instructions the company's forums or learning center and the blog posts of genetic genealogists are a great source.

## DNA SEGMENT ANALYSIS EXAMPLES

The DNA data in table 1 will be the focus of analysis in this article. Table 1 indicates several DNA matches who all match me on an overlapping segment of chromosome one.

### *Identifying and Confirming the Most Distant Common Ancestral Couple*

Once family trees and surname lists have helped identify an ancestral couple as the source of the DNA we share with a match, we should map that DNA segment to that couple and place this conclusion into our research log. In the beginning our DNA analysis can only map DNA to an ancestral couple it was inherited from, not the male or female of the couple. Mapping the DNA segments ensures we only confirm one ancestral couple for each DNA segment and provides clues for which ancestors to focus on when we have a DNA match who does not have a family tree researched back to the common ancestral couple.

If I have a DNA segment I share with several other testers who have John Ryan (ca. 1795–after 1830) and Ellender Dearman (ca. 1800–after 1870) as the most distant common ancestral couple in their well-researched family tree and we have no other common ancestors, I can conclude the DNA segment we share was inherited from either John Ryan or Ellender Dearman or segments came from each of them. By linking genetic cousins and a common ancestral couple I have evidence to confirm the accuracy of this portion of my family tree. By mapping this chromosome segment, making a note of this common ancestral couple as the source for this DNA segment, I can use this to determine where to focus research in looking for a common ancestor for any other DNA tester who matches me on this same segment in the future.

For each person in your DNA match list there will often be multiple segments where your DNA matches the other person. Focusing on the larger segments makes it more likely a common ancestor will be located. Larger segments are usually seen in closer relationships; the DNA segments can get shorter with each generation of descendants. Most genetic genealogists focus on matching DNA segments that are over five or seven centimorgans (cM). A centimorgan is a unit for measuring

genetic linkage, but is not a true length measurement as a foot or an inch is.<sup>4</sup> As we become more advanced in the future, we may become more concerned about the technical meaning and how it can affect our analysis. For our purposes now, we will define a centimorgan as a length of DNA.

Three of these DNA matches (Table 1 rows A, B, and C) also list John Ryan and Ellender Dearman as an ancestral couple in a well-researched family tree. This DNA match supports the conclusions reached from the documentary research and confirms John Ryan and Ellender Dearman as common ancestors of testers A, B, C, and myself. All three of these people match me on the same segment of chromosome one, even though the exact start and stop points of the match varies. Random recombination of DNA in each person allows for differing start and stop points on a segment inherited from the same common ancestor; the segments overlap covering some of the same area.

One of these DNA matches (Table 1 row D) has a well-researched family tree that does not include John Ryan and Ellender Dearman, but does include Henry Parker, another of my ancestors. This may look like contradictory evidence from the DNA analysis, but it is not. We inherit a set of chromosomes from our mother and a set from our father. In my case, Henry Parker is a paternal ancestor while the Ryan-Dearman couple are maternal ancestors. The DNA data is consistent with my documentary research once we understand we have two copies of chromosome one, one from each of our parents. Locating another person on my DNA match list who shares the same segment as person D shares and who has Henry Parker as an ancestor would allow me to confirm this segment and map it to Henry Parker and his yet unknown spouse.

Three or more testers sharing the same or overlapping DNA segments and a common ancestral couple confirms a portion of a family tree. If the testers have another yet unidentified ancestral couple in common the DNA could come from that other ancestral couple and not the first couple identified. Just as new findings in documentary research can change our conclusions, new findings in our genetic data can also change our kinship conclusion.

Table 1. Some DNA Matches on a Segment of Chromosome 1					
The first five columns come from DNA test data.					
Identification of the common ancestral couple is from a well-researched family tree.					
Match Name	Chromosome	Start	Stop	cM	Common Ancestral Couple
A	1	105,078,888	157,142,033	28.1	John Ryan – Ellender Dearman
B	1	109,025,783	146,193,119	15.7	John Ryan – Ellender Dearman
C	1	115,478,706	148,683,537	7.8	John Ryan – Ellender Dearman
D	1	102,563,851	114,399,681	12.3	Henry Parker – unknown spouse
E	1	105,078,888	157,142,033	28.1	Henry Stone – Ellender Dearman
F	1	105,078,888	157,142,033	28.1	Solomon Dearman – unknown spouse

<sup>4</sup> “Centimorgan,” *Wikipedia, the Free Encyclopedia* (<http://en.wikipedia.org/wiki/Centimorgan>).

### *Confirming One Spouse of an Ancestral Couple*

In addition to being able to help other DNA matches focus on the Ryan-Dearman line when we share DNA on this same segment, a future DNA match may help me determine whether the DNA segment was inherited from John Ryan or Ellender Dearman and identify likely parents for further research.

A new DNA cousin may match me on all or part of this segment that was inherited from John Ryan and/or Ellender Dearman. This new DNA match (Table 1 row E) may have their family tree traced back to Ellender Dearman and a later husband, Henry Stone. Because the ancestor in common is Ellender, but we descend from different husbands of Ellender, then the DNA must have come from Ellender as she is the common ancestor between the two DNA testers.

Focused testing of cousins on one side of the family tree can also be used to determine which person a DNA segment was inherited from. If Ellender did not have children with different fathers I could have searched for a cousin who was related to me only through Ellender and not through John Ryan. The DNA results of that cousin could help determine whether DNA was inherited from Ellender and not John.

### *Using the DNA Matches to Extend My Family Tree*

Another new DNA cousin (Table 1 row F) may match me on all or part of this segment inherited from Ellender Dearman. This new DNA match may have their family tree traced back to Solomon Dearman (ca. 1780–1837) and be descended from Solomon Dearman Jr. who had a sister named Ellender Dearman. This is a strong clue for me to research Solomon Dearman as the father of my Ellender. The descendants share DNA and Ellender Dearman is in both trees. Documentary research is needed to confirm the DNA indications.

## CONCLUSION

This detailed DNA analysis requires much more time and effort than just looking at a surname list and a family tree requires. We must understand more about DNA inheritance and genetic genealogy tools. That extra effort may help us break through some of our brick walls and extend our trees another generation.

Once a thorough search for all of the deeds for an ancestor has been done in a given courthouse, future visits to that same courthouse are not likely to provide new evidence from deeds. More people are taking DNA tests for genealogical purposes every day. This makes DNA the genealogical resource that keeps on giving. Someone who takes a DNA test next week, next month, next year, may provide more evidence for confirmation or extend a family tree. A thorough research plan should include revisiting the testing company websites on a regular basis to look for new matches and correlate that data with existing genetic genealogy research.

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