

DNA and Your Family Tree

DNA TESTING FOR genealogy became available to consumers in 2000, and every day attracts more participants. The vendor with the largest database reports over 181,000 test result records in their database, showing how quickly this new science has been adopted by genealogists.

In just a few years, DNA testing has moved from a few DNA projects by the early adapters, to over 4700 projects representing over 74,000 surnames, with participants in over 190 countries. We are still at the beginning of this new discipline, and the rate of testing is increasing every day.

BENEFITS OF DNA TESTING

DNA testing provides information not available in the paper records, which is extremely valuable information. Perhaps you are trying to sort out two families in the same area, to determine which of the two Williams is the William in your tree. DNA testing can provide the answer. Or perhaps you have reached a brickwall, because you can't find the prior location for your most distant ancestor. DNA testing may provide clues or provide matches to investigate. Or perhaps you are trying to make the connection to the ancestral country. DNA testing may provide clues or provide matches to investigate.

There are both short term and long term benefits of using DNA testing for your family tree. The benefits of DNA testing for genealogy research are varied, and range from validating the research, to uncovering the origin of the surname. The list below covers the typical applications:

- Discover information to help with our family history research
- Discover which family trees are related
- Discover information which

Susan C. Meates shows how DNA testing can benefit your genealogy research.

may solve research problems, and/or resolve brickwalls

- Sort out multiple families found in the same location
- Confirm or get clues regarding migrations
- Confirm suspected events, such as illegitimacy and adoption
- Find any mistaken connections in family trees
- Validate family history research
- Bridge gaps in the paper records
- Confirm surname variants or find previously unknown variants
- Discover information to define the major branches of the tree going back to the origin of the surname
- Discover information about the evolution of the surname
- Discover clues regarding the origin of the surname
- Combine results with research in early records to determine the number of points of origin for the surname
- Preserve DNA results for future research, to protect against any male line becoming extinct
- Discover information about your distant origins

Y DNA

The primary test for genealogy follows the direct male line, which is a male, his father, his father's father and back in time. You must be male or find a male to take this test. This DNA test looks at locations on the Y chromosome, called markers. The Y chromosome is passed from father to son, typically unchanged. In most cultures, the surname follows the Y chromosome, making this test very valuable for genealogy research. Males inherit a Y chromosome from their fathers, and an X chromosome from their mothers. Females inherit an X chromosome from both their father and mother. These chromosomes are known as the sex chromosomes, since an XY combination is a male, and the XX combination is a female.



The chart in Figure 1 shows the Y chromosome being passed from father to son. If all the males shown by black squares are tested, they would be expected to have an exact or close match. Since this section of the Y chromosome is passed from father to son, typically unchanged, a son will match his father, and match his grandfather, and back in time. Occasionally a small change occurs, where a marker will increase or decrease by one.

Y DNA results are a string of numbers, and the length of the string is determined by the number of markers tested. The numbers represent a count of short repeats of DNA at a location. Vendors offer tests ranging from 10 markers to 67 markers. When deciding how many markers to test, more markers result in more information. Below is a 37 marker result.

12 22 15 10 13 15 11 14 11 12 11
 28 15 8 9 8 11 24 16 20 29 12 14
 15 15 10 10 20 21 14 14 16 19
 34 35 12 10

Two men who are related would be an exact or a close match. Since men who are related will be an exact or close match, the test result contains no personal information.

The result above would represent the direct male line of the man tested. This would be himself, his father, his father's father, and back in time. The same result would be expected for other males in this direct male line, such as his brother.

There are cases where the link between the Y chromosome and surname are broken. These include name change, adoption, and an illegitimate birth, where the male child takes the mother's surname. If you have two brothers, and one is adopted and one is a biological son, you would expect two different Y DNA test results.

Y DNA testing is very valuable in sorting out who is related. For example, testing is very valuable when you are faced with multiple families in an area, and you are not sure which family belongs to your family tree. You may encounter in census records two

households where there are two men had an identical first name. The paper records were inconclusive in sorting out the families, and DNA can be used to provide the answer. Direct line male descendants were identified and tested for each household. One participant representing one household matched the result for

any male lines with the possibility of extinction, then it would be important to test the remaining male while it is still possible. For example, perhaps your mother's brother is the last male in his direct male line, and he has two daughters. Testing him will preserve his sample for future research, and ensure that his direct

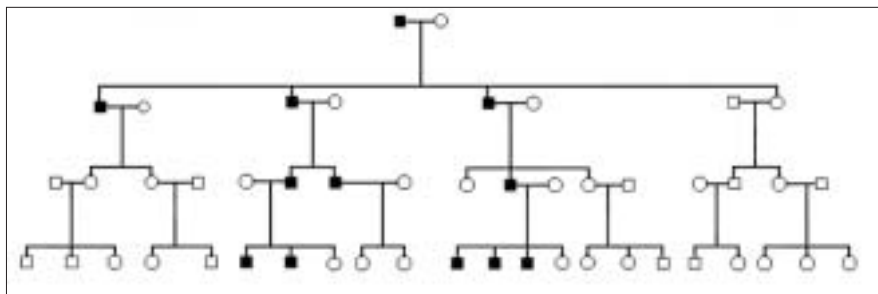


Figure One: The chart above shows the Y chromosome being passed from father to son. If all the males shown by black squares are tested, they would be expected to have an exact or close match.

the genealogist's father, and the other participant representing the second census household had a different result. Therefore, the genealogist was able to identify the household that belonged to her family tree, and select the right William from the two

male line is represented in the project for his surname, providing a benefit to all genealogists researching that surname. In addition, when you reach the brick wall on this branch of your tree, his result will be available.

Several DNA testing vendors

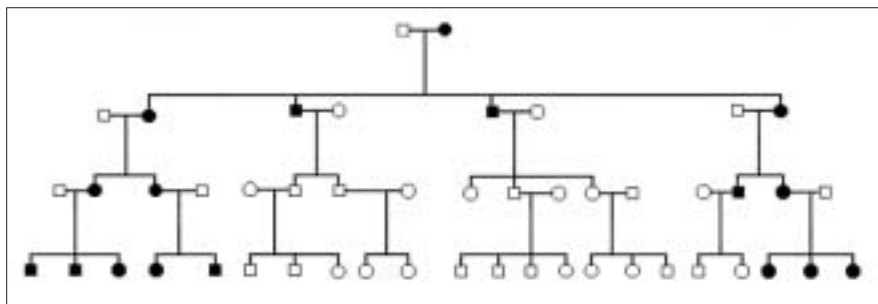


Figure Two: The chart above shows the path of mtDNA in a family tree. The black circles and squares show who has inherited the mtDNA that was passed down from the female at the top of the tree.

Williams in the census. This saved a lot of research time, and avoided the risk of connecting her tree to the wrong family.

You can test the different direct male lines in your family tree, by finding a male to take the test. For example, if you want to learn about your mother's direct male line, you could test her brother, her father, or a descendant of a brother.

If your family tree contains

provide storage of the sample, ranging up to 25 years, at no additional charge. The discipline of DNA testing for genealogy, called genetic genealogy, is relatively new, and many scientific advances are expected in the future. Having a sample on file ensures that you will be able to take advantage of these scientific advances. When selecting a vendor, consider whether storage is provided, and the length of time.

mtDNA

A mtDNA test tells you about a direct female line, which would be your mother, her mother, and back in time. Both males and females inherit mtDNA from their mothers, and only women pass on mtDNA.

Figure Two, on the previous page, shows the path of mtDNA in a family tree. The black circles and squares show who has inherited the mtDNA that was passed down from the female at the top of the tree.

mtDNA testing has less genealogical applications than Y DNA testing. It can be used to sort out females, and to determine which females are related. For example, an ancestor had multiple daughters and you aren't sure which wife was the mother of the third daughter. By testing a direct female line descendent of the third daughter, and an earlier and later daughter, you can determine which wife was the mother of the third daughter.

mtDNA is considered more an anthropological test, and will tell you about the distant origins of the direct female line. This distant origin is also known as clan mother or daughter of Eve.

GETTING STARTED

Regardless of where you are in your family history research, it is never too early to add DNA testing to your research. Plus, you can benefit from testing the various direct male lines in your family tree. All that is needed is to find a living male in a direct male line to test. This enables you to add DNA research to any direct male line that occurs in your family tree.

As your research goes back further up a branch, the DNA information will provide additional information to benefit your research.

The place to start is to decide which branch of your tree is the highest priority. If there is a living direct line male for the branch you select, you are ready to proceed. If any direct male lines are at risk of going extinct, making these a priority will ensure that you get a sample.

Visiting the vendor sites is the

first step in selecting a vendor. Most of the vendors provide a surname search facility, which will tell you if a Surname Project exists for your surname. Y DNA testing is organized into Surname Projects, due to the role of the surname in interpreting results. It is important



Using a DNA test kit, like the one shown here, is a quick and painless process. You simply swab the inside of your mouth, put the tips of the applicator into small test tubes of fluid, and mail the kit back to the vendor.

to find a Surname Project, if one exists, since ordering a test kit within a Surname Project usually provides a discount. If a Surname Project doesn't exist, you can consider starting a project, so that the discount is provided for the test kit. There is no cost to start a project. Another option is to order under a Geographic Project to get the discount, and when a Surname Project is established, join the project.

When ordering a Y DNA test, often there will be several test choices, depending on the number of markers tested. The more markers the more information, as well as additional cost. In most cases, you can select a lower number of markers and upgrade later. This approach will enable you to space out the cost of testing. The tests are categorized as low resolution and high resolution. A test is categorized as low resolution, if less than 23 markers are tested. These low resolution tests are best at determining who is not related. High resolution tests range from 23 to 67

markers. These tests have the advantage of providing sufficient information to determine accurately the degree of relatedness.

Ordering a test kit is done online, and the kit arrives in the mail, with directions. A painless process of swabbing the inside of your mouth, and putting the tips of the applicator into small test tubes of fluid, is quick and easy to do. The test kit is then mailed back to the vendor.

Test results at some vendors include a private Personal Page at the vendor's website, where you can click Match to see whom you match, as well as other selections to learn more about your ancestry. The vendor may also provide a certificate and report in the mail. When selecting a vendor, price is not the only issue. The size of the database is important, and the more tools provided, the more you will gain from testing, maximizing your investment.

CONCLUSION

DNA testing for genealogy will provide information not available from the paper records. Often this information will provide clues to further your research, including overcoming brickwalls, sorting out families at the same location, bridging migrations and bridging lost or destroyed records. More advanced applications include finding the ancestral homeland, and determining the location of the surname origin.

FOR REFERENCE

Vendors

- Family Tree DNA
<http://www.FamilyTreeDNA.com>
- DNA Heritage
<http://www.DNAheritage.com>
- Ancestry (formerly Relative Genetics)
<http://www.Ancestry.com>

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