DNA Genealogical Test Types

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INTRODUCTION

Genealogy is, usually, the pursuit of familial information in either online contexts and resources or in on-site contexts and resources, or in both. There is, however, one scientific set of tests that can be useful in providing genealogical information – DNA testing of yourself or of one or more family members. This area of study has become so popular (and so heavily advertised) that an entire sub-specialty... genetic genealogy... seems to have appeared.

But, like anything in science, genealogical DNA testing is only a tool; and like any tool, it is useful only if it "fits" the task at hand and if it will produce the results that are desired by the user of this tool. It is not a genealogical panacea, nor is it THE answer for all genealogical questions or problems.

Used properly, and with its limitations in mind, it can be a very useful tool in the genealogical toolbox. This exceedingly brief compilation (one of my objectives was to keep it under a dozen pages in length) has the goal of providing a relatively concise description of the types of DNA tests that exist, as well as information on their correct (and incorrect) uses. Another objective of this brief is to provide a useful series of links to online information concerning both genetic genealogy as a whole as well as to the specifics behind the three major types of genealogical DNA tests.

To that end, the rest of this brief is divided into coherent sections, with appropriate online references provided within each section. This brief must be viewed either as a starting place for further information seeking, or as an extremely concise overview of genealogical DNA testing. It is, by no means, intended as a thorough treatment of this area nor is it a document that details "everything" you may wish to know about genealogical DNA testing. Scientific details, FAQs, testing company information, and more detailed information can be found at the URL links that are provided... and from any additional links on those sites themselves.

Useful information on DNA Testing and Genealogy can be found at the following URLs (which are active as of the date of this document):

Genetic Genealogy
http://isogg.org/wiki/Genetic_genealogy

Can Your DNA Tell You Your Ancestry?

https://skeptoid.com/blog/2015/08/18/dna-tell-ancestry/

What Can DNA Testing do to Help You Find Your Ancestors?

https://familysearch.org/blog/en/dna-testing-find-ancestors/

The Bogus-ness of DNA Testing for Genealogy Research

http://rebeccaskloot.blogspot.com/2006/06/bogus-ness-of-dna-testing-for.html

Tracing Your Ancestry
https://www.technologyreview.com/s/405384/tracing-your-ancestry/

DNA Ancestry Tests Are 'Meaningless' for Your Historical Genealogy Search

http://www.medicaldaily.com/dna-ancestry-tests-are-meaningless-your-historical-genealogy-search-244586

What is genetic ancestry testing?

https://ghr.nlm.nih.gov/primer/testing/ancestrytesting

What is the best DNA ancestry test one can purchase on the internet?

https://www.quora.com/What-is-the-best-DNA-ancestry-test-one-can-purchase-on-the-internet

How To Choose the Right DNA Test For Your Family Genealogy Project

http://www.myfamilydnatest.com/

Sorting out the DNA Tests Available for Genealogy

http://genealogy.about.com/od/dna_genetics/a/dna-tests.htm

My DNA Results From 4 Companies
http://www.genealogyjunkie.net/my-dna-results-from-4-companies.html

Which DNA Test is Best for Me?

http://dnaandfamilytreeresearch.blogspot.com/2016/04/which-dna-test-is-best-for-me.html

Best DNA Ancestry Test: 23andMe vs Ancestry vs FTDNA vs Geno 2.0

http://www.exploringlifesmysteries.com/23andme-vs-ancestry-vs-ftdna-vs-geno-2-0/

2015: Most bang for the DNA buck

http://www.legalgenealogist.com/2015/02/02/2015-most-bang-for-the-dna-buck/

DNA Testing & Genealogy

http://www.johnbrobb.com/JBRdna.htm

Using DNA Testing for Family Research

http://www.rcgswi.org/dna-article.html

Research in Ancestry DNA: What you can learn from your DNA

http://www.raogk.org/dna/

Types of DNA Tests
http://www.geneticgenealogysig.org/dna-testing/types-of-dna-tests/

DNA Testing for Genealogical Research

https://www.legacytree.com/blog/dna-testing-for-genealogical-research

DNA Testing: What the Different Types Can Tell You

http://www.ancestralfindings.com/dna-testing-what-the-different-types-can-tell-you/

Understanding genetic ancestry testing

http://isogg.org/wiki/Understanding_genetic_ancestry_testing

4 Kinds of DNA for Genetic Genealogy

https://dna-explained.com/2012/10/01/4-kinds-of-dna-for-genetic-genealogy/

Understanding Genetics
http://genetics.thetech.org/ask-a-geneticist/limits-mtdna-testing

DNA Fact or Science Fiction? 6 Genetic Genealogy Myths
http://www.familytreemagazine.com/article/dna-fact-or-science-fiction

Genetic Genealogy: My AncestryDNA Results

http://www.emmajolly.co.uk/blog/2015/03/genetic-genealogy-my-ancestrydna-results/

ISOGG Wiki
http://isogg.org/wiki/Wiki_Welcome_Page

I Have The Results of My Genetic Genealogy Test, Now What?

https://familyhistorydaily.com/genealogy-help-and-how-to/what-do-dna-results/

https://familyhistorydaily.com/genealogy-help-and-how-to/understanding-dna-results/

Y-DNA TEST

The main use of Y-chromosome DNA testing is to be able to confirm relations on the direct paternal line (father to son; as well as son to father to grandfather and so on). This test is well suited for you if you have reached a dead end on your direct paternal line – and you are a male. The Y-chromosome is only passed down from father to son, women don't have a Y-chromosome. Women who wish to see a valid Y-DNA test result can ask a brother, father, or paternal uncle to take this test.

In human genetics, a Y-chromosome DNA haplogroup (this information will be provided as part of a Y-chromosome DNA test) is a genetic group defined by the differences in the non-recombining portions of DNA from the Y chromosome. Your Y-DNA haplogroup indicates the ancient "ethnic" ancestry of your paternal line. In addition, some haplogroups are clearly associated with certain ethnic groups.

If two people have the same Y-DNA haplogroup, it means that they will usually share a common patrilineal ancestor more recently than two people from different haplogroups – but that common ancestor may still have lived a very long time ago

The fundamental 'limitation' of Y-chromosome testing is that it only represents a small fraction of your total ethnic ancestry. Go back just four generations and you have 16 great-great grandparents. At that point both the Y-DNA and mtDNA tests each represent only 1/16 of your genetic ancestry. A Y-DNA test will provide information ONLY on your direct personal paternal descent/ancestry line.

Y-chromosome testing usually is offered at several levels of genetic "markers" – 37 markers, 67 markers, and so forth; and a test for more markers is more expensive than is a test for fewer markers. For most genealogical DNA purposes, the 37-marker test is sufficient, although the 67-marker test can increase the percentage certainty of DNA matches.

Useful information on Y-DNA testing can be found at the following URLs:

Understanding genetic ancestry testing

https://www.ucl.ac.uk/mace-lab/debunking/understanding-testing

Sorting out the DNA Tests Available for Genealogy

http://genealogy.about.com/od/dna_genetics/a/dna-tests.htm

Reading and Comparing DNA Test Results
https://www.familytreedna.com/reading-and-comparing-test-results.aspx

My DNA Results From 4 Companies
http://www.genealogyjunkie.net/my-dna-results-from-4-companies.html

DNA Types Used for Genetic Genealogy

http://www.searchmytree.com/DNA_Types.php

DNA Testing & Genealogy

http://www.johnbrobb.com/JBRdna.htm

Using DNA Testing for Family Research

http://www.rcgswi.org/dna-article.html

Types of DNA for Family Research

http://dnahunters.com/learning-center/types-of-dna-for-family-research/

Types of DNA Tests
http://www.geneticgenealogysig.org/dna-testing/types-of-dna-tests/

Y Chromosome DNA Tests

http://isogg.org/wiki/Y_chromosome_DNA_tests

DNA Testing for Genealogical Research

https://www.legacytree.com/blog/dna-testing-for-genealogical-research

DNA Testing: What the Different Types Can Tell You

http://www.ancestralfindings.com/dna-testing-what-the-different-types-can-tell-you/

The 3 Types of DNA Tests for Ancestry & Genealogy VISUALIZED!

http://www.rootsandrecombinantdna.com/2015/03/the-3-types-of-dna-tests-for-ancestry.html

Types of DNA Test Suitable For Genealogy Purposes
http://www.irish-genealogy-toolkit.com/types-of-dna-test.html

What types of DNA tests are available?

http://www.genie1.com.au/blog/59-dna-test-types-available

4 Kinds of DNA for Genetic Genealogy

https://dna-explained.com/2012/10/01/4-kinds-of-dna-for-genetic-genealogy/

MITOCHONDRIAL DNA (mtDNA) TEST

The main use of Mitochondrial DNA testing is to be able to confirm relations on the direct female line (mother to all of her children), and exclude people who are not related. This test may be suitable if you have reached a dead end on your direct maternal line.

Both males and females receive mtDNA from their mothers, so both men and women can test their mtDNA. For both genders, mitochondrial DNA is inherited only from the mother. Men have their mother's mtDNA, but do not pass it on to their offspring. Women have their mother's mtDNA and will pass it on to both their female and male children.

Given this scenario, women inherit their mother's mtDNA unmixed with the father's and pass it on generation to generation from female to female. Males carry their mother's mtDNA, but do not pass it on. This makes it possible for us to compare our mtDNA with that of others to determine whether we share a common female ancestor. A mtDNA test will provide information ONLY on your personal direct female descent/ancestry line.

Your mtDNA test results will indicate your mtDNA haplogroup (which is very different from your Y-chromosome haplogroup!). This haplogroup number and information will provide a clue as to the "ethnicity" of your maternal line. If you share a full mtDNA sequence with someone, your common matrilineal ancestor could be anywhere from 1 to 40+ generations ago

The fundamental 'limitation' is that your mtDNA-ancestors represent only a small fraction of your total "ethnic" ancestry. Go back just four generations and you have 16 great-great grandparents. At that point both the Y-DNA and mtDNA tests each represent only 1/16 of your genetic ancestry.

Useful information on mitochondrial DNA testing can be found at the following URLs:

Understanding genetic ancestry testing

https://www.ucl.ac.uk/mace-lab/debunking/understanding-testing

Sorting out the DNA Tests Available for Genealogy

http://genealogy.about.com/od/dna_genetics/a/dna-tests.htm

Reading and Comparing DNA Test Results
https://www.familytreedna.com/reading-and-comparing-test-results.aspx

My DNA Results From 4 Companies
http://www.genealogyjunkie.net/my-dna-results-from-4-companies.html

DNA Types Used for Genetic Genealogy

http://www.searchmytree.com/DNA_Types.php

DNA Testing & Genealogy

http://www.johnbrobb.com/JBRdna.htm

Using DNA Testing for Family Research

http://www.rcgswi.org/dna-article.html

Types of DNA for Family Research

http://dnahunters.com/learning-center/types-of-dna-for-family-research/

Types of DNA Tests
http://www.geneticgenealogysig.org/dna-testing/types-of-dna-tests/

DNA Testing for Genealogical Research

https://www.legacytree.com/blog/dna-testing-for-genealogical-research

DNA Testing: What the Different Types Can Tell You

http://www.ancestralfindings.com/dna-testing-what-the-different-types-can-tell-you/

The 3 Types of DNA Tests for Ancestry & Genealogy VISUALIZED!

http://www.rootsandrecombinantdna.com/2015/03/the-3-types-of-dna-tests-for-ancestry.html

Types of DNA Test Suitable For Genealogy Purposes
http://www.irish-genealogy-toolkit.com/types-of-dna-test.html

What types of DNA tests are available?

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4 Kinds of DNA for Genetic Genealogy

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Mitochondrial DNA Tests
http://isogg.org/wiki/Mitochondrial_DNA_tests

AUTOSOMAL DNA (atDNA) TEST

This type of DNA test currently is being heavily advertised via many types of media – the "I thought I was German but found out that I was Scottish" types of advertisements (you know, having the last name of McDonald and his mother's maiden name being MacIntosh, and spending every Xmas with Uncle Angus and Aunt Catriona should have been a tip-off for this person!).

atDNA is short for Autosomal DNA. Autosomal DNA is a term used in genetic genealogy to describe DNA which is inherited from the autosomal chromosomes. An autosome is any of the numbered (#1-#22) chromosomes, as opposed to the sex chromosomes. Humans have 22 pairs of autosomes and one pair of sex chromosomes (the X chromosome and the Y chromosome).

Without getting too technical, an atDNA testing company analyzes your autosomal DNA (all of your ancestral lines), which includes almost the entire genome—all 22 pairs of non-sex chromosomes—instead of looking only at the Y-chromosome (yDNA) or the mitochondrial DNA (mtDNA). A yDNA test follows one family line on the chart, from son to father to grandfather and so on. An mtDNA test also follows only one line, the maternal line, from child to mother to grandmother and so on. The autosomal test (atDNA) looks at your 'entire' family tree.

Your Y-DNA came exclusively from your father down the paternal line. And your mtDNA came exclusively from your mother down the maternal line. But 22 of your 23 chromosome pairs are a mixture from both sides of your family. Autosomal DNA is inherited from both parents. Therefore, an autosomal DNA test may be taken by either a male or a female.

Autosomal DNA tests have been designed to look at chromosomes 1 -22 to trace all of your ancestral lines for four or five generations (further back than that and the confidence level of this test drops off sharply). They can confidently identify relationships within about 5 generations (equivalent to your great-great-great-grandparents) by analyzing thousands of data points on your autosomal chromosomes: #1-#22). Your results are automatically compared to other people who have tested with the same company that you chose to use for your particular test.

To indicate your "ethnic" origins, your atDNA profile is compared (by the testing company) to a number of distinct genetic profiles for a number of regions (e.g., AncestryDNA uses 26 regions) around the world. By finding similarities between your atDNA profile and the regional profile(s), the testing company can find where your ancestors "most likely" lived and can estimate just how much of your DNA 'likely' came from each particular region. The nature and validity of this 'estimation' is a point upon which a number of discussions/arguments are ongoing in the literature. Of course, the atDNA test cannot determine the "ethnicity" of any of the specific people in your ancestry.

A recent television commercial from one of the more heavily advertised atDNA testing companies makes a statement along the lines of... "and he found out that he was 34% Eastern European." I would put this kind of statement into an 'interesting but not all that useful' category. This testing company's own web site (https://www.ancestry.com/dna/ethnicity/eastern-european) notes that 'Eastern European" includes people who may identify themselves as: Polish, Slovak, Czech, Austrian, Russian, Hungarian, Slovene, Romanian, Serbian, Ukrainian, Belarusian, Moldovan, Lithuanian, Latvian, Bosniak, and/or Croatian. In short, not exactly a pinpoint determination!

Then, add to this the fact that portions of this part of the world (eastern Europe) have been invaded by, migrated through, and/or settled by peoples that we would today call Germans, Italians, Bulgarians, Turks, Tartars, Huns, Swedes, Danes, and Vikings and you have a real potential for quite a 'diverse' collection of DNA within "Eastern Europe." And this is not to mention the genetic additions that may have been made by incursions of the Roman Empire, or Frankish/Gothic tribes. Thus, having an "Eastern European" genetic component in your background, "somewhere," hardly bears any special meaning.

The atDNA test can be used to 'identify' cousins – assuming that they also have taken this test from the same testing company that you have (each testing company maintains their own internal database of participants and their test results; as well as using their own testing and analysis procedures). But these tests can't reveal just how you're related to that new-found cousin (e.g., the son of your father's brother will have the same 'cousin' designation is the daughter of your mother's mother's sister). Thus, in the case of fifth cousins, the testing company may just be able to say that the two of you share great, great, great, grandparents. They cannot tell you where the two of you may fit in your common family tree.

Another issue with autosomal DNA testing is that... "It is also common to find that people get very different percentages from different testing companies. This is partly because each company uses different databases and the individuals within them are categorized in different ways: there is no "correct" way to categorize human beings . Each company also uses its own algorithms to make the estimates, and the target time depth varies from company to company but is often not explicitly stated."
(https://www.ucl.ac.uk/mace-lab/debunking/understanding-testing)

Useful information on autosomal DNA testing can be found at the following URLs:

A Review of AncestryDNA – Ancestry.com's New Autosomal DNA Test

http://thegeneticgenealogist.com/2012/04/02/a-review-of-ancestrydna-ancestry-coms-new-autosomal-dna-test/

Understanding genetic ancestry testing

https://www.ucl.ac.uk/mace-lab/debunking/understanding-testing

Comparing Admixture Test Results Across Companies (otherwise known as "ethnic" breakdowns): FTDNA, AncestryDNA, 23andMe, and Geno 2.0 - My Review

http://www.yourgeneticgenealogist.com/2012/12/comparing-admixture-test-results-across.html

Sorting out the DNA Tests Available for Genealogy

http://genealogy.about.com/od/dna_genetics/a/dna-tests.htm

Genealogy and Ethnicity DNA Testing – 3 Legitimate Companies

https://dna-explained.com/2016/01/22/genealogy-and-ethnicity-dna-testing-3-legitimate-companies/

My DNA Results From 4 Companies
http://www.genealogyjunkie.net/my-dna-results-from-4-companies.html

DNA Types Used for Genetic Genealogy

http://www.searchmytree.com/DNA_Types.php

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What types of DNA tests are available?

http://www.genie1.com.au/blog/59-dna-test-types-available

Autosomal DNA Testing for Genealogy

http://www.dna-testing-adviser.com/Autosomal-DNA-Testing.html

Autosomal DNA

http://isogg.org/wiki/Autosomal_DNA

Distribution maps of autosomal admixtures in Europe, the Middle East and North Africa

http://www.eupedia.com/europe/autosomal_maps_dodecad.shtml

Autosomal DNA, Ancient Ancestors, Ethnicity and the Dandelion

https://dna-explained.com/2013/08/05/autosomal-dna-ancient-ancestors-ethnicity-and-the-dandelion/

Genealogy and Autosomal DNA Matches: Common Errors in "Proving" An Ancestor, and the Allure of Easy Gateway Ancestors

http://ourpuzzlingpast.com/geneblog/2015/04/19/genealogy-and-autosomal-dna-matches-common-errors-in-proving-an-ancestor-and-the-allure-of-easy-gateway-ancestors/

Gone Fishing: Tips for Using Autosomal DNA Test Results in Your Genealogy Research

https://familysearch.org/blog/en/fishing-tips-autosomal-dna-test-results-genealogy-research/

THUS --

If you wish to obtain a DNA "signature" for you and your direct paternal ancestors and you are a male, a Y-DNA test will provide you with that information. This test also will allow you to compare your Y-DNA information to the Y-DNA information of other males... enabling, for example, the determination of whether or not you are a member of a specific Ives lineage (there are at least 98 distinct Ives lines/lineages known, as of the date of this document, in the New World alone).

Similarly, a mitochondrial DNA test will allow you to identify your genealogical genetic ancestry back through your maternal line; e.g., your mother, your mother's mother, your mother's mother's mother, and so on. This test can be used whether you are a male or a female.

If you are looking for a quick "ethnic identity" genetic snapshot, then an autosomal DNA test may provide that information... but the atDNA test contains numerous caveats and atDNA testing, analysis, and reporting still is company-specific. Naturally, this kind of broad-based "ethnic" information also could be uncovered by thorough genealogical research on your familial ancestry (and usually in a much more person-specific manner), but atDNA is a legitimate method of finding non-specific cousin-type relations (within the 5-generation limitation of the atDNA testing process) of whom you currently may be unaware.

Any of these types of genealogical DNA tests will become more and more useful (in a "real world" sense) as the numbers of participants increase\ over time, and as the available databases containing these data sets expand (and, with regard to atDNA testing, become interchangeable among testing companies). But the caveat still stands that genealogy DNA tests should be considered as an adjunct potentially useful tool to be used in conjunction with archival, informant, and records genealogical research; it is not a substitute for such research. And, as with any tool, it should not be used without a specific purpose or goal in mind.