

## **DAR POLICY STATEMENT AND BACKGROUND**

### **Using DNA Evidence for DAR Applications**

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Effective January 1, 2014, DAR will begin accepting Y-DNA evidence in support of new member applications and supplemental applications as one element in a structured analysis. This analysis will use a fill in the blank form found on the DAR website.

#### **Policy Background**

DAR's decision not to accept DNA evidence in the past was based on two factors. The first factor was that the science was not good enough to point to a specific ancestor with any reasonable level of confidence, but only to a family group. The second factor involved attempting to overcome this inaccuracy. This resulted in the need for multiple (perhaps a dozen or more) DNA tests, each of which would have to be accompanied by a submitted and verified lineage. This mountain of documentation would then become one element in an analysis.

#### **Scientific Background**

All humans have two types of DNA within each of their cells. These types are Mitochondrial-DNA and Chromosomal-DNA.

Mitochondrial-DNA (Mt-DNA) is found in the mitochondria within the cell. All Mt-DNA from the male is lost during fertilization. All of our Mt-DNA comes from our mother.

Chromosomal-DNA is found in the nucleus of the cell and consists of 23 pairs of coiled strands called chromosomes. Approximately half of the chromosomal-DNA comes from our father and half from our mother. Half of your father's chromosomal-DNA comes from his father and half from his mother. This is true for both parents for all generations and figuring out what part of a chromosome came from which ancestor is an extremely complicated process.

The 23<sup>rd</sup> pair of chromosomes (designated X and Y) determines the sex of the individual. If a person is X-X they are female; if they are X-Y they are male. A male cannot receive any Y-DNA from his mother because she does not have any. For this reason all the complication of determining which parent provided the chromosomal-DNA is eliminated when considering only Y-DNA. When discussing Chromosomal-DNA, but not including the sex chromosomes, we use the term Autosomal-DNA.

Before any DNA is passed from a parent to an offspring it must be duplicated. Sometimes during this duplication process mistakes are made. These mistakes are called mutations. For most of the chromosomal-DNA there is a 50-50 chance that a parent may pass the mutated

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DNA to their offspring. It is 100% certain that a male offspring received the mutated Y-DNA from his male parent (women have no Y-DNA).

Different parts of the chromosomes mutate at different rates. By comparing the mutations at specific locations (called markers) of two different persons we can begin to determine how closely related they might be. Since mutations are passed from parent to child, the more mutations that two people have in common the more likely they share a common ancestry—this is the basis of genetic genealogy.

#### **Genealogical DNA Testing**

Most companies in the business of providing genealogical DNA testing offer a range of tests. The tests include, but are not limited to, Mt-DNA, Autosomal-DNA and Y-DNA. Due to the differing mutation rates and analytical difficulties each test has drastically different uses. Within each test there are usually several levels of accuracy offered.

Normally Mt-DNA is sampled (tested) at 1150 out of a possible 16569 marker locations. However, Mt-DNA mutates in a manner that does not allow its use for genealogical purposes and will not be discussed any further.

Autosomal-DNA is tested at more than 500,000 out of nearly three billion available marker locations across the 22 pair of autosomal chromosomes. Autosomal-DNA is a relatively new test that offers tremendous opportunities in the future, but its complexity limits its current genealogical usefulness. The genealogy staff's DNA study group will continue to monitor developments with this test.

Currently, Y-DNA is tested at between 12 and 111 marker locations depending on the company and desired level of accuracy. Y-DNA is the most attractive test for genealogical purposes because of the lack of complexity and its mutation rate. Currently the 37 marker Y-DNA test is one of the best tests available on the basis of cost and the recently improved accuracy. Scientific advances have increased the accuracy of the 37 marker test to the point where it might be usable by DAR applicants.

#### **Genealogical Use**

The current accuracy of the 37 marker Y-DNA test does not allow for positively identifying descent from a specific ancestor, but does provide a high degree of certainty (95%) that two living men share a common ancestor at more than 150 years but less than 200 years, if they

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match at all 37 marker locations. Based on this increased accuracy of the 37 marker Y-DNA test, we are proposing a structured procedure by which DAR applicants may use DNA evidence in an analysis submitted with an application or supplemental application.

#### **Structured Presentation**

To submit DNA evidence on a DAR application an applicant will have to meet all the below listed criteria. Although these criteria are restrictive, they acknowledge the current level of the science, respect DAR's existing standards, protect the reputation of its verified lineages, address the difficult to prove child or grandchild of the patriot link, allow the verification of a paper without the need for a degree in genetics, save the genealogy staff from a potential tidal wave of paperwork.

The applicant will have to address all eight of the criteria that follow to submit Y-DNA.

1. The applicant will have to submit documentation to complete the lineage on her application in normal fashion with one exception. There will be one unproven father-son link for which she is submitting the Y-DNA evidence.
  
2. At the point where the applicant cannot prove the father-son link, one of her tested male's will have a lineage with a previously proven link between the same father and a different son. The birth date of this father will have to be more than 150 years but less than 200 years earlier than the birth date of the younger of the two tested males. This time frame requirement is based on the statistics of the test. Given the expected ages of the two tested males choosing the younger or the older will have little consequence. However, this 150-200 year time frame coincides well with the ages of the children and grandchildren of the patriot—consistently the hardest generational links to prove on an application. This test should not be used in an attempt to prove the fathers, grandfathers, or great grandfathers of the applicant.
  
3. This process cannot be used for new ancestors at this time because they would have no proven lineage with which to compare the Y-DNA supported lineage.
  
4. The Y-DNA test results will be submitted as part of an analysis. Overall, an analysis is a last resort. The applicant or her proxies should have conducted a reasonably exhaustive search to find direct evidence of the needed relationship. The applicant will have to list everywhere she has searched as part of the structured presentation. A search of online sources only is not a reasonably exhaustive search. Traditional direct evidence of the generational link is always better and preferred to analysis with or without Y-DNA evidence.

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5. The surnames of the two tested males and the maiden name of the applicant or her mother will have to be the same (with obvious spelling variations understood).

6. One of the two males tested will have to be a close male relative of the applicant. Usually this male will be her father, brother, grandfather, uncle or grandfather's brother. This man will then have the same direct lineage to the patriot as the applicant. The applicant will have to submit the results of this man's 37 marker Y-DNA test and potentially a document of two to connect this man to her lineage..

7. The second male tested will have to have a different, but still direct lineage to the patriot— **that has been previously proven to the DAR**. This second male would likely be the brother, father or grandfather of a previous applicant or any of their male offspring. The lineage of this second male cannot include any analyses, and if necessary must be brought up to current DAR standards with additional documentation. The applicant will also have to submit the results of this second male's 37 marker Y-DNA test, a signed statement from the man indicating his acknowledgement of participation in the application process, documentation linking him to this previously proven lineage. This is the most difficult criteria of the analysis and the one most pivotal to its success.

8. The applicant's two submitted 37 marker Y-DNA tests will have to have identical results. The 37 markers we require are the 37 markers specified on the member's website. If the males were tested at more than 37 markers we only need the results of the specified 37 markers. If the males were tested at less than 37 markers or not the specified markers, they will have to upgrade their existing test or be re-tested. In all cases the two tested males will have to have identical results at all 37 specified markers.

As previously stated this is an extremely restrictive set of conditions. However, what results is a comparison between a known lineage (*i.e.* previously proven to DAR) and a proposed lineage (the applicant's current submission) with the high degree of certainty for accepting this link arising from the fact that the Y-DNA test indicates that the two tested males are related within 200 years with 95% confidence.

#### Form and Instructions

This structured presentation will be done using a fill in the blank form that will be found on the Members' Website. The form will consist of seven sections on four separate pages. These pages will be filled out, printed out, signed, and submitted with the application.

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Section 1—will contain the applicant’s name and national number. The name blank will be one line and the national number just six characters.

Section 2—will contain a two line box where the applicant will have to state what she is trying to prove.

Section 3—will contain a ten-line box for the applicant to enter all the locations she has searched and resources used.

Section 4—will contain blanks to enter the names of the two men the applicant had tested. There will be a one line blank available for each entry with her nearest male relative being number one and the second tested male number two. This number (one or two) will also be written on submitted Y-DNA results. There will also be one line for listing the national number for the previously proven lineage that links the second male tested to the same patriot found on the current application.

Section 5—will contain a one line space for the applicant’s signature and the date.

Section 6—will contain a modified “page2/page 3” to record the lineage and sources of the second tested male. This section will be spread over two pages to accommodate most potential lineages. As stated above this is a previously proven lineage so a national number is the principal source. We are not updating this lineage, but simply making sure it is valid by bringing it up to current standards.

Section 7—will contain a pre-printed statement about the DAR application process, the use of Y-DNA evidence, and that the signer is acknowledging his participation in the process. There will also be a one line space for this second tested male to sign and date the form. This will be the fourth page.

### **Staff Training**

The staff will have to be trained to recognize that Y-DNA evidence is being submitted, and how to properly evaluate it. This training will be conducted during normal genealogy staff meetings which will lessen the cost and impact to the verification of applications and supplemental application.

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#### **Important Considerations**

The DAR has accepted paternity tests for many years and this will not cease even if DNA evidence is submitted. A DNA based paternity uses a special set of marker locations in a modified autosomal test. This test usually compares the DNA of two living persons and achieves certainties of 99.9999% or better. This is not a normal service provided by genetic genealogy testing companies.

Although DNA testing is a novelty and some believe it may be the future of genealogy, we do not want it to replace traditional genealogy on DAR applications if there is any other alternative.

Since we are only discussing Y-DNA testing and women do not have a Y-chromosome we can establish father-son links, but not father-daughter, mother-daughter or mother-son links.

Most genetic genealogy companies report their results in terms of generations. However, generations cannot be measured in a scientific experiment, but must be calculated by assuming an arbitrary number of years per generation. We reject this approach entirely. Our statistics indicate that if two men match 37 markers exactly they have a common ancestor within 200 years with 95 % confidence.