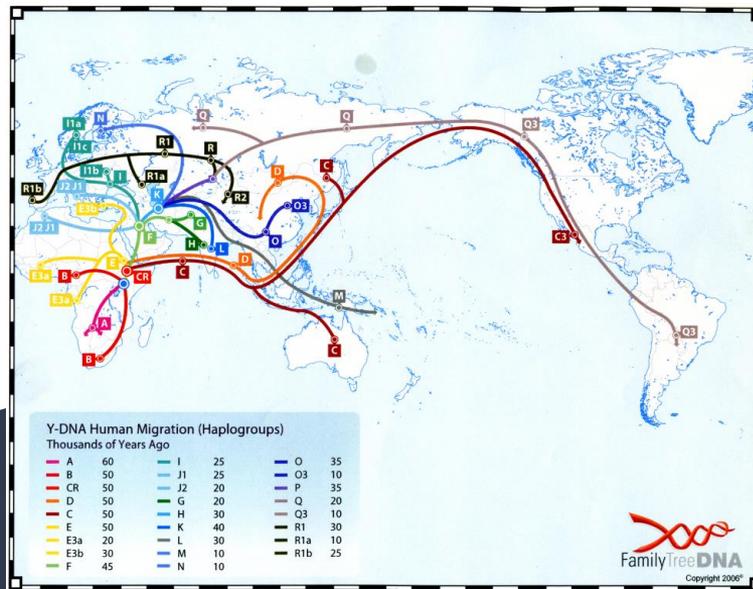


# DNA Testing: Mitochondrial DNA and Y-DNA

Sarah Stoddard



# Types of DNA tests



DNA tests focus on that .1% of genes that vary between different humans

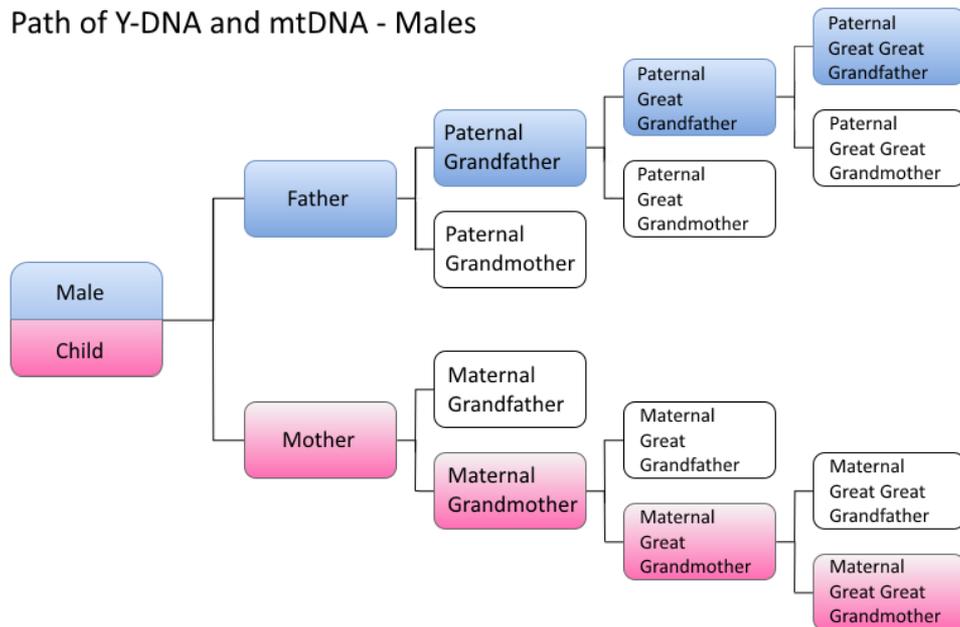
There are **three** main types of “unique DNA” testing

1. Autosomal DNA (at-DNA) test
2. Y DNA
  - a. On the Y chromosome, male to male inheritance
3. MtDNA-mitochondrial DNA
  - a. Mitochondrion - a specific part of your cells that you get from your mother only

# Chart of Y-DNA and MtDNA inheritance

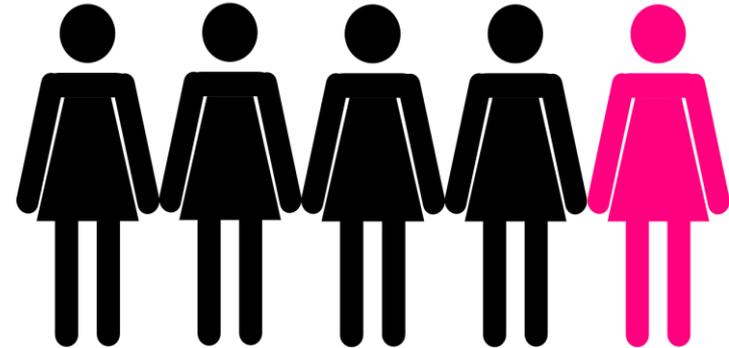
- Men can have Y DNA or MTDNA tested
- Women can only have their MTDNA tested

Path of Y-DNA and mtDNA - Males



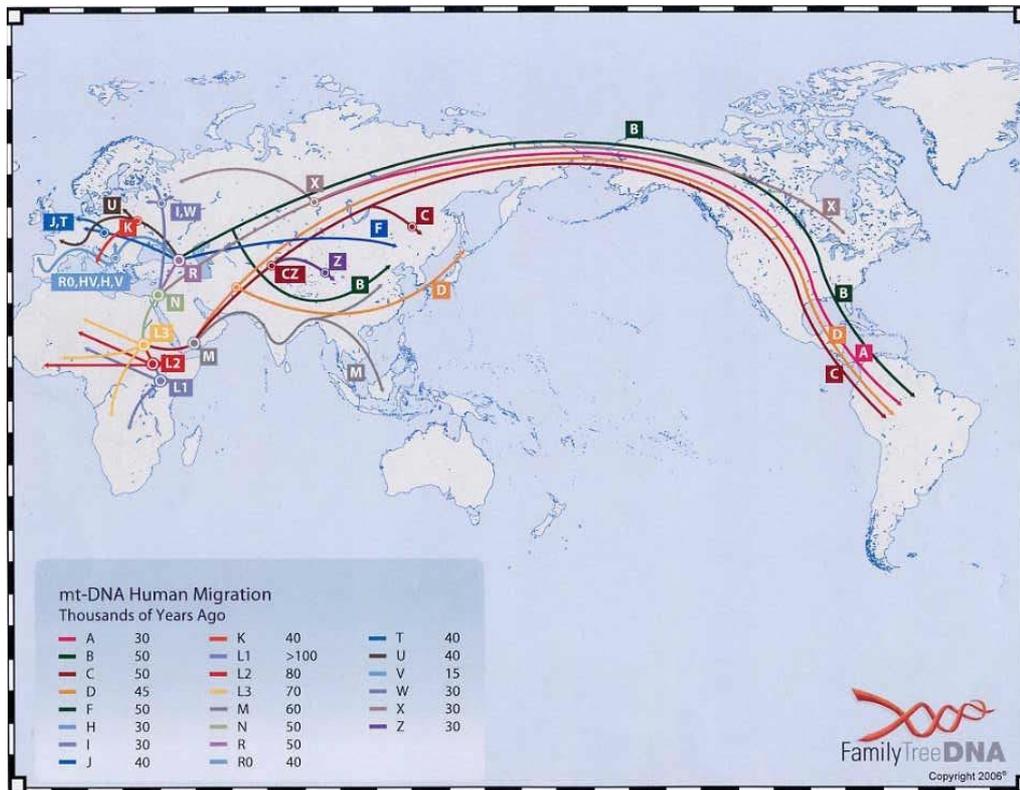
# MtDNA Facts

- Mitochondria have their own distinct DNA
  - Only inherited from your mother
  - Changes slowly over time
  - Mutation rates can vary
- Haplogroup
  - designates region of the world the line was from many thousands of years ago
  - about 4,000 identified haplogroups
- 23andMe and Living DNA give MtDNA haplogroup information, but FamilyTree DNA also gives more detailed marker information



# MtDNA Haplogroups of the World

- Letters A-Z
- Represent ancient migrations
- Subgroups-people from the same haplogroup with certain unique mutations
- Subgroups have letters and numbers added, L1b, H5a, etc



# Example MTDNA Results

## Haplogroup - H5a5

### Your Origin



H5a is found at its highest frequency in Central Europe and is 13-17,000 thousand years old. It is found at low frequency in Europe, where it likely originated, and is found at a very low frequency in the Caucasus and Near East.

\*Based on Build 17 from:  
van Oven M, Kayser M. 2009. *Updated comprehensive phylogenetic tree of global human mitochondrial DNA variation*. Hum Mutat 30(2):E386-E394.  
<http://www.phylotree.org/> (Build 17)

USAGE POLICY: Use of the above Haplogroup description requires written permission from Gene by Gene.

### Your Results

RSRS Values

rCRS Values

#### Extra Mutations

309.1C 309.2C 315.1C 522.1A 522.2C C4739T A16302G C16519T

#### Missing Mutations

HVR1 DIFFERENCES FROM RSRS					HVR2 DIFFERENCES FROM RSRS					CODING REGION DIFFERENCES FROM RSRS				
A16129G	T16187C	C16189T	T16223C	G16230A	G73A	C152T	C195T	A247G	309.1C	A769G	A825t	A1018G	G2706A	A2758G
T16278C	A16302G	T16304C	C16311T	C16519T	309.2C	315.1C	C456T	522.1A	522.2C	C2885T	T3594C	G4104A	T4312C	T4336C

<https://www.cbc.ca/news/canada/newfoundland-labrador/dna-reveals-newfoundland-mystery-1.5098101>

# Why take an MtDNA test?



- Large scale population studies
- Identify ethnic origins on the female line
- Support or disprove a relationship on the female line
- Can join locality/common interest projects (Jewish, Newfoundland, etc)

# Who tests



- Yourself (Male or female)
- A direct female line descendant of a female ancestor you have questions about

# How do I take a MtDNA test?

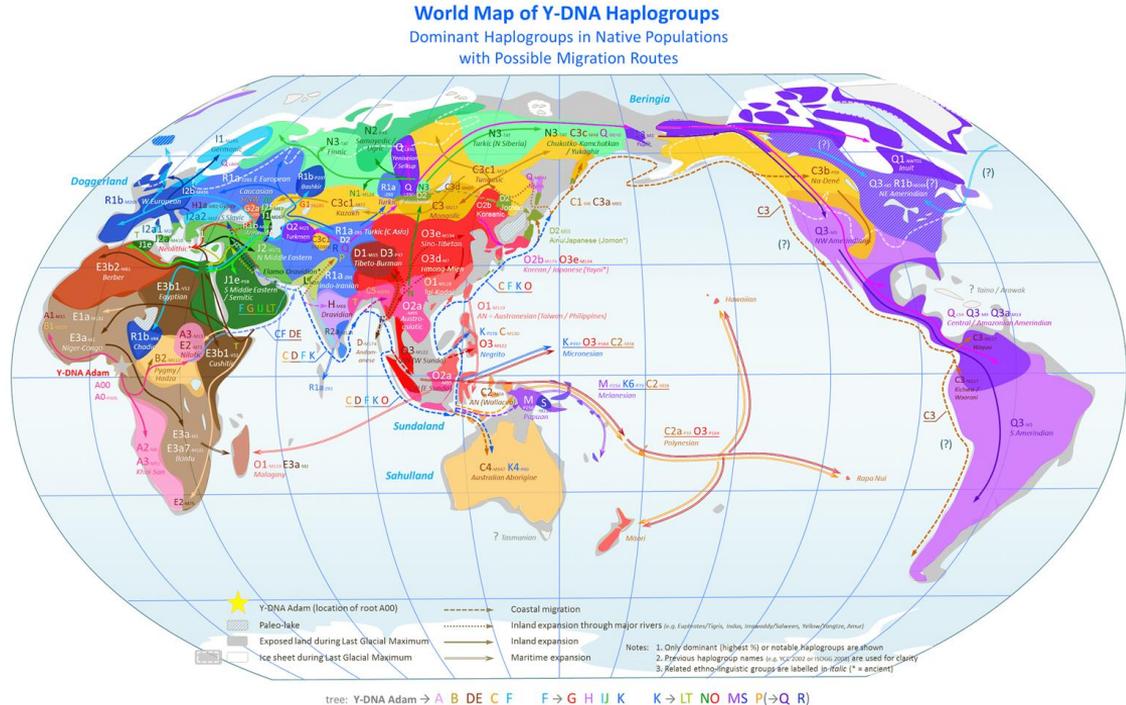


## Basic Testing Process

1. Order a mtDNA full sequence test kit from Family Tree DNA
2. Follow cheek swab instructions
3. Mail in sample per instructions

# Y DNA Facts

- Passed down through direct male line
- Y DNA test checks for mutations on Y chromosome
- Average of one mutation every 150 years
- Haplogroups Letters A-Z
- Subgroups represent people from the same haplogroup with certain mutations in common
- Represents ancient migrations
- Useful for historical research and surname research



# Scholarly Uses of Y DNA data

“Surprising DNA found in ancient people from southern Europe.”  
National Geographic, 14 March 2019

“Genetic Legacy of the Mongols.”  
American Journal of Human Genetics,  
March 2003



# Why take a YDNA test? – Family History Research Reasons



- Differentiate between family groups with the same surname but different ancestors
- Prove or disprove “paper trail research”
- Solve a mystery (immigration or name change, brick wall, adoption/NPE)
- Identify ethnic origins on the male line

# Who tests?



- Self (if male)
- Your father, brother, or other male relative with the surname you are researching
- Others with the surname you are researching whose relationship is unknown

# How to Test

## Order a Y DNA kit from Family Tree DNA- Cheek Swab Test

### Different Levels of testing

- Y-37 (the minimum) \$119
- Y-111-\$249
- Big-Y 700-\$449 (10,000,000 base pairs)



# Y DNA matching statistics

## Different Levels of Testing

- Y-37 (SNP)
- Y-111 (SNP)
- Big-Y 700 (STR)

If you have a Y DNA question, start with 37, upgrade later if necessary

PROBABILITY FOR MOST RECENT COMMON ANCESTOR (MRCA)			
Number of matching markers	50% probability that the MRCA was no longer than this number of generations	90% probability that the MRCA was no longer than this number of generations	95% probability that the MRCA was no longer than this number of generations
10 of 10	16.5	56	72
11 of 12	17	39	47
12 of 12	7	23	29
23 of 25	11	23	27
24 of 25	7	16	20
25 of 25	3	10	13
35 of 37	6	12	14
36 of 37	4	8	10
37 of 37	2 to 3	5	7
65 of 67	6	12	14
66 of 67	4	8	9
67 of 67	2	4	6

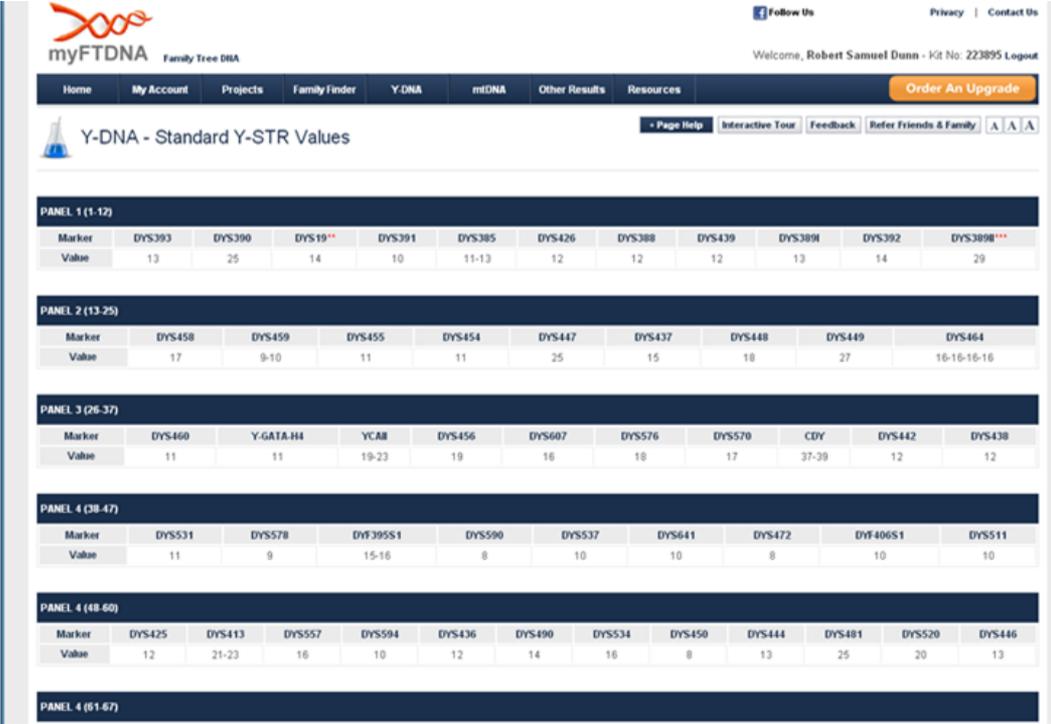
# Example Results of Y DNA test

- Haplogroup info
- Mutation/Marker info

Matching surname

+ Matching Markers

= Recent Genealogical  
Relationship



myFTDNA Family Tree DNA

Welcome, Robert Samuel Dunn - Kit No: 223895 Logout

Home My Account Projects Family Finder Y-DNA mtDNA Other Results Resources Order An Upgrade

Y-DNA - Standard Y-STR Values

PANEL 1 (1-12)

Marker	DYS393	DYS390	DYS19**	DYS391	DYS385	DYS426	DYS388	DYS439	DYS389	DYS392	DYS389B**
Value	13	25	14	10	11-13	12	12	12	13	14	29

PANEL 2 (13-25)

Marker	DYS458	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464
Value	17	9-10	11	11	25	15	18	27	16-16-16-16

PANEL 3 (26-37)

Marker	DYS460	Y-GATA-H4	YCAII	DYS456	DYS607	DYS576	DYS570	CDY	DYS442	DYS438
Value	11	11	19-23	19	16	18	17	37-39	12	12

PANEL 4 (38-47)

Marker	DYS531	DYS578	DYS395S1	DYS590	DYS537	DYS641	DYS472	DYS406S1	DYS511
Value	11	9	15-16	8	10	10	8	10	10

PANEL 4 (48-60)

Marker	DYS425	DYS413	DYS557	DYS594	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446
Value	12	21-23	16	10	12	14	16	8	13	25	20	13

PANEL 4 (61-67)

# Match List Example

- Genetic Distance= number of markers different
- Lists earliest known male line ancestor
- Can contact matches

67 MARKERS - 16 - MATCHES			
Genetic Distance	Name	Earliest Known Ancestor	Y-DNA Haplogroup
0	David O. Dunn  Y-DNA111 FF BigY	HughDunn bc1775 WashingtonCoPA>John>Sam>DB BIGY	R-A15877
2	Mr. Colin Peter Dunn  Y-DNA67	Herbert Dunn b 1874 Minnesota	R-M269
2	Mr. Virgil E Dunn  Y-DNA67 FF	Hugh Dunn bc1640>Joseph>Benajah>Zephaniah>Benajah	R-M269
2	Azariah Dunn c/o C. McKenzie  Y-DNA111 BigY	AzariahDunn1757 d1833 RobertsonCoTN>Levi>Levi BIGY	R-A15877
2	Mr. Henry		R-BY198
3	Mr. Gerald Charles Dunn  Y-DNA111 FF	Nelson C Dunn b1808 PA>Charles Juan b1871 KY	R-M269
3	Mr. Dennis Michael Dunn  Y-DNA67	Samuel Michell Dunn bc1807 VA>Martin V 1837>Wm	R-M269
4	Donald Wayne Kimball  Y-DNA111 FF BigY	Wm Kimble/Kemble b1769 Rockaway NJ d1812 NJ BIGY	R-A15877

# DNA Surname projects

## Surname & Geographical Projects



Watch Family Tree DNA Founder & CEO Bennett Greenspan  
"Joining A Surname Project"

▶ Watch This Video Now

### FamilyTreeDNA Surname, Lineage and Geographical Projects

Projects create opportunities for people to work with others to explore their common genetic heritage. FamilyTreeDNA encourages customers' participation in projects. Membership is free and voluntary. Members may join or leave a project at any time, however, it is important to note that while FamilyTreeDNA does not impose a limit in the number of projects one can join, we will not tolerate joining multiple projects with the purpose of data mining or finding information that is not relevant to one's personal ancestral origins. FamilyTreeDNA reserves the right to remove people from projects at its sole discretion or if it feels that a participant is abusing the system in a way that may infringe another participant's privacy.

By joining a project, you reaffirm the Terms and Conditions of the FamilyTreeDNA Website, in particular those pertaining to participation in Projects, which describe the possible public display by some Projects Managers of member results, and your right to opt out of certain display settings, which may be found on the FamilyTreeDNA Website [here](#).

Below is an index of the 10,542 projects that are currently run through FamilyTreeDNA.

#### Y-DNA SURNAME PROJECTS

(1)	A (275)	Á (2)	B (751)	C (621)
D (358)	E (164)	F (299)	G (389)	H (494)
I (44)	J (93)	K (307)	L (349)	M (659)

**Woodall**  
146 members

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Jefferson Woodall

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The Woodall Surname DNA Project currently has 146 members located in Australia, Canada, England, Scotland, United States and Wales. We have identified 22 unrelated Woodall families with 22 distinctly different Y-DNA Patterns, and 14 Haplogroups so far. This Project is open to all Woodalls who are interested in working together to find their common heritage through the sharing of information and DNA testing. All spelling variations of the Woodall name are welcome.

# Woodall Surname Project – Surprises

“We have learned one Woodall family group is fathered by an American Indian...and another family group was mothered by a Woodall but fathered by a Duncan....

Based on the results received to date, we have identified nineteen (19) Woodall families.

The testing...has confirmed, for the most part, the hard work of Woodall family researchers of the over the last 30 years. However, there are to date at least five cases where the paper trail generated by research has NOT been confirmed by DNA.”

**-Woodall Surname Project**

Family 01		John Woodall, born 1702 or 1706 in England and died in 1769 in England																																										
1	34483	Woodall	-	13	22	14	11	11	13	12	12	14	13	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	17	14	16	17	36	38	12	12	11	
				(Unk)																																								
2	38568	Woodall	R1b1b2	13	23	14	11	11	13	12	12	13	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	17	14	16	17	36	38	12	12	11		
				(John, William)																																								
3	81001	Woodall	R1b1b2	13	23	14	11	11	13	12	12	13	13	29																														
				(John, Christopher)																																								
4	85417	Woodall	R1b1b2	13	23	14	11	11	13	12	12	13	13	29	17	09	10	11	11	24	15	18	29	16	16	17	17			11	09	19	23	17	14	16	17	35	38	12	12			
				(John, David Willis)																																								
5	112889	Woodall	R1b1b2	13	23	14	11	11	13	12	12	14	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	17	14	16	17	36	38	12	12	11		
				(Charles, Jehu, Perry)																																								
6	23877	Woodall	R1b1b2	13	23	14	11	11	13	12	12	14	13	29																														
				(Charles, William, James, Isaac, Edward)																																								
7	131418	Boggs	R1b1b2	13	23	14	11	11	13	12	12	14	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	17	14	16	17	35	38	12	12			
				(Unk)																																								
8	43438	Woodall	R1b1b2	13	23	14	11	11	13	12	12	14	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	17	14	16	17	35	38	12	12			
				(Charles, William, William)																																								
9	57346	Woodall	R1b1b2	13	23	14	11	11	13	12	12	14	13	29																														
				(Benjamin)																																								
10	34602	Woodall	R1b1	13	23	14	11	11	13	12	12	14	13	29	17	09	10	11	11	24	15	18	29	15	16	17	17			11	09	19	23	16	14	16	17	36	38	12	12			
				(Charles, William, Steven)																																								
11	26623	Woodall	R1b1b2	13	23	14	11	11	13	12	12	14	13	29	18	09	10	11	11	24	15	18	29	15	15	16	17			11	09	19	23	17	14	16	17	35	38	12	12			
				(Charles, William, James, Isaac, Robert)																																								
Family 02		John Woodall, born 1702 or 1706 in England and died in 1769 in England																																										
1	27640	Woodall	I1a	13	23	15	10	14	14	11	14	11	12	11	28	15	09	08	08	11	23	16	20	28	12	14	15	15																
2	108721	Woodall	I1a	13	23	15	10	14	14	11	14	11	12	11	28	15	08	09	09	11	23	16	20	28	12	14	15	15																
Family 03		William Wagner Woodall, born June 1818 Jones Co., GA (Native American)																																										
1	33237	Woodall	Q1a3a	13	24	14	9	14	18	11	12	12	13	15	31																													
				(Daniel Anderson)																																								
2	33472	Woodall	-	13	24	14	9	14	18	11	12	12	13	15	31																													
				(Charles Pinckney)																																								
3	38916	Woodall	-	13	24	14	9	14	18	11	12	12	13	15	31																													
				(James Henry, Jacob Marion)																																								
4	62387	Woodall	-	13	24	14	9	14	18	11	12	12	13	15	31																													
				(William Andrew Jackson)																																								
5	27213	Woodall	Q1a3a	13	24	14	9	14	18	11	12	12	13	15	31	17	09	09	11	11	26	14	19	29	14	15	15	17			10	10	19	22	16	17	17	17	36	39	10	11		
				(James Henry, Charles Pinckney)																																								
6	57797	Woodall	O1a3a	13	24	14	9	14	18	11	12	12	13	15	31	17	09	09	11	11	26	14	19	29	14	15	15	17			10	10	19	22	16	17	17	17	36	39	10	11		

# The Beauty of Collaboration in DNA Surname Projects

All,  
As we chart our family past the fourth generation, we are no longer relying on modern hard fact records, or the first hand testimony of surviving or relatively recently deceased ancestors. Any combination of misunderstood paper gleanings, as well as the possibility of the grafting-in of other DNA types... would give us the DNA patchwork our Woodall Surname Project has thus far produced.

**However, just look at the friendships we have grown and larger network of Woodall researchers we have developed!**

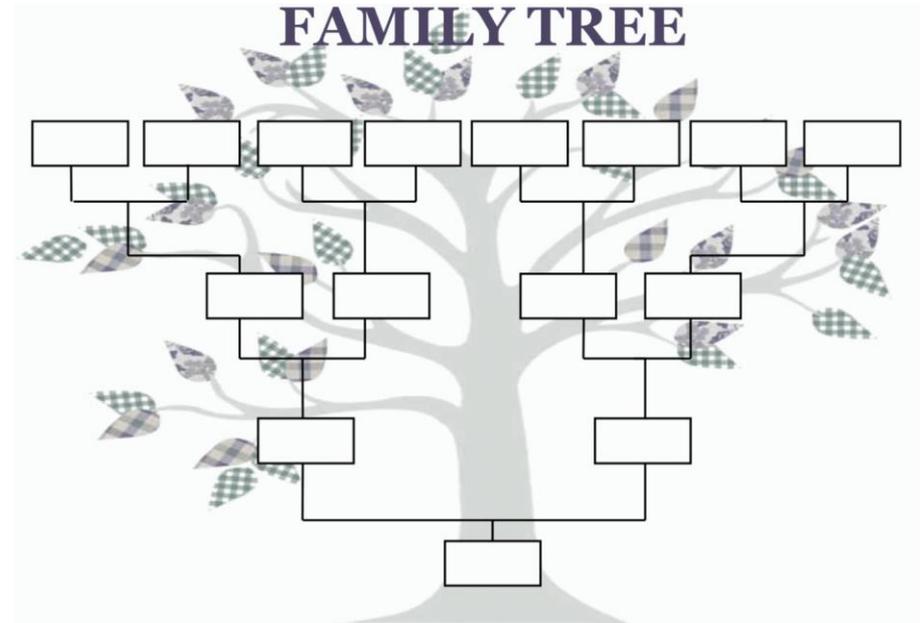
There's nothing wrong with our results, (or past efforts) it just means that instead of having an absolute certainty about the paper trails developed in the past, we need to open up our investigations to other possibilities, both paper-wise and DNA-wise. The two evidence methods complement each other, but neither one is an end all solution for a genealogy mystery.

*Jeff Woodall-July 2005*



# When you get your results in 1–2 months:

- We can help in the BYU Family History Library (virtual help desk)  
<https://fh.lib.byu.edu/contact-information/>
- Attach a family tree/oldest ancestors to your DNA results on Family Tree DNA's website
- Join surname/region project, if applicable



# Helpful links

Family Tree DNA's "Learn" section

<https://www.familytreedna.com/learn/>

Family Tree DNA scholarly papers on Y DNA research

<https://www.familytreedna.com/y-dna-papers.aspx>

International Society of Genetic Genealogy Wiki  
article on Y DNA

[https://isogg.org/wiki/Y\\_chromosome\\_DNA\\_tests](https://isogg.org/wiki/Y_chromosome_DNA_tests)

International Society of Genetic Genealogy Wiki  
article on MtDNA

[https://isogg.org/wiki/Mitochondrial\\_DNA\\_tests](https://isogg.org/wiki/Mitochondrial_DNA_tests)

Haplogroup.org-Learn More about Y-DNA and MtDNA  
Haplogroups

<https://haplogroup.org/>