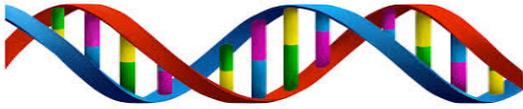


Using DNA Testing for Genealogy



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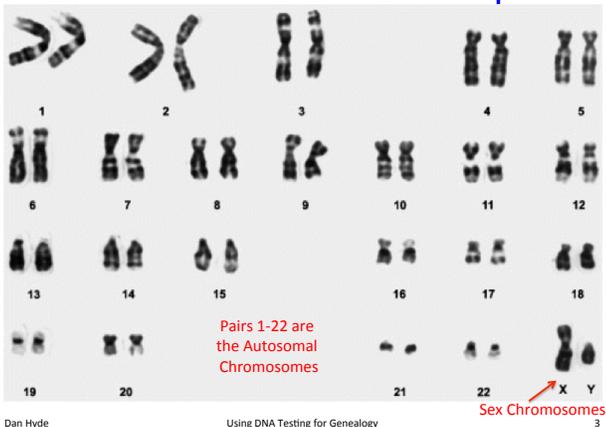
Presented at Jackson Brigade Reunion, Marietta, Ohio on August 5, 2016

Three DNA Tests useful for Genealogy Called "Genetic Genealogy"

- **Y-DNA test** – looks at markers on Y chromosome
- **Mitochondrial test (mtDNA)** – looks at markers on Mitochondrial DNA
- **Autosomal DNA test (atDNA)**– looks at markers on chromosomes 1-22 (non sex ones).

First, some background in Biology to describe terms.

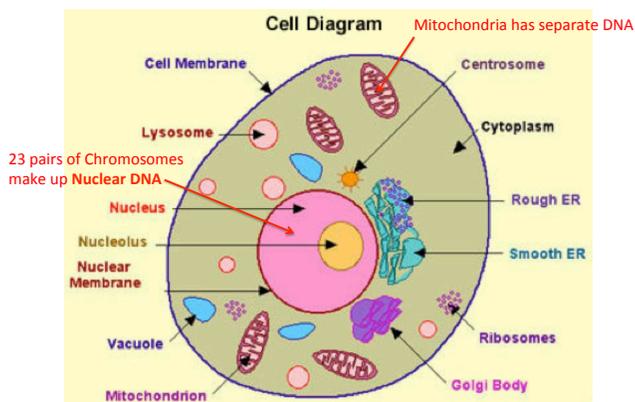
Human Chromosomes – 23 pairs



Facts about Nuclear DNA

- 23 pairs of Chromosomes make up **Nuclear DNA**
 - Over 3 billion **base pairs** or **nucleotides**.
 - Adenine (A), Cytosine (C), Guanine(G), and Thymine(T)
 - DNA is long sequence of the **nucleotides**.
 - The A-C-G-T letters
 - **Single Nucleotide Polymorphism (SNP)** "snip" – a small genetic change that occurs within a DNA sequence, e.g., an A to a G. Occurs infrequently, e.g., once in several thousand years - used to determine **Haplogroup** (your ancient ancestry).
 - All humans share 99.5% of same DNA.

Cell's Mitochondria has own DNA



Facts about a Cell's Mitochondria

- In a cell's cytoplasm, they provide energy for the cell. Hundreds in a cell.
- **Mitochondrial DNA (mtDNA)** – genetic material passed from mothers to their children, but only daughters pass it on.
- About 16,000 base pairs and SNPs occur.
- Useful for tracing **direct maternal line**.
- Valuable for identification of **degraded remains**, e.g., a thousand-year old tooth.

Samuel Lewis Hays Case

- Family tradition - Samuel Lewis Hays (1794-1871) was **illegitimate** son of George Jackson, son of John Jackson.
- Dan contacted by Jason Hickman, descendant of Samuel Lewis Hays. Excitement about resolving Samuel Lewis Hays' case.
- Jason's paternal grandmother was Hannah Mace. Her grandfather was the **illegitimate** son of Peregrine Hays, son of Samuel Lewis Hays.
- Jason's cousin Don Mace took DNA test and to everyone's surprise he exactly matches several **Sharpes!**

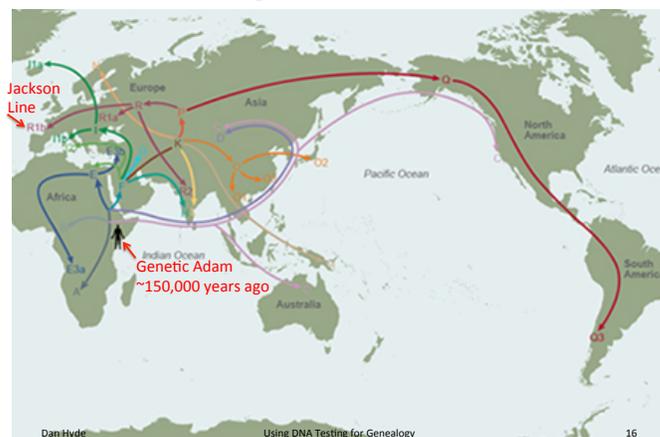
Samuel Lewis Hays Case (cont.)

- Gilmer Co., WV divorce proceedings **dissolved** Jason's 3rd Great Grandmother, Anne Helmick's **marriage** to Timothy McCune. In it, Anne's husband Timothy McCune and several witnesses testifying on his behalf reveal that she was **living with Peregrine Hays** and had been for several years. From this affair several children were born. Jason's 2nd Great Grandfather Peregrine Mace's **birth entry** lists Perry Hays as his father.
- The recent DNA match with the **Sharpes** proves this false and makes Jason believe that Anne was familiar with her final husband Daniel **Sharpe** long before they were married in the 1860s.

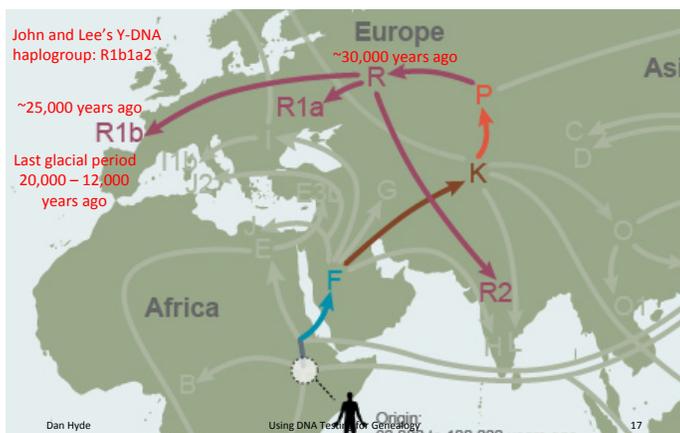
Second Test: mtDNA Test

- Looks at markers in **Mitochondrial DNA**.
- Genetic material passed from mothers to their children, but **only** daughters pass it on.
- About 16,000 **base pairs** and **SNPs** occur.
- Somewhat useful for tracing **direct maternal line**. BUT **mutates too slowly for genealogy**.
- Used by **genetic anthropologists** to trace female migration paths.
- More stable over time. Valuable for identification of degraded remains, e.g., a ten thousand-year old tooth.
- Both males and females can take test. Cost \$200

Human Migration Paths - Males



Ancient Ancestry – Y-DNA Haplogroups



Test 3: Autosomal DNA Test - Newest

- Looks at markers on **chromosomes 1-22** (non sex ones).
- We inherit a mix of **autosomal DNA** from both parents (**about 50% each**) but it is **shuffled** and **diluted** with each new generation.
- atDNA** is **scrambled** when woman's **egg** and man's **sperm** are made.
- You share about 50% **atDNA** with a sister or brother but a **different 50%** with each sibling!
- Share 25% of a grandparent's; 12.5% g-grandparent's; etc.
- Back more than 5 generations **too diluted** to be useful.
- Share 12.5% with 1st cousin; 3% with 2nd cousin; 0.05% 5th cousin
- Can determine if close relative, e.g., g-aunt, is a full or half relative.
- Can determine if g-grandpa and g-grandma were first cousins.

Autosomal DNA Test (cont.)

- Good for finding **matches** up to 5th cousins.
- Common ancestor with a 5th cousin is a ggg-grandparent.
- **Problem:** Need to determine as many descendants from your 32 ggg-grandparents as possible.
 - Say, on average, 5 children from each union live to marry and have children that's 12,480 possible people to research in the resulting four generations! Yipes!
- Both males and females can take test. Cost \$99 at FTDNA.
 - FTDNA calls **Family Finder**
 - 23andMe calls **Relative Finder**
 - Ancestry.com calls **AncestryDNA**

Taking DNA Test is Easy!

- DNA tests used in Genealogy uses special markers that reveal no sensitive medical information or information useful to Police. No fear of Police pounding on your door!
- Scrape inside of cheek and mail the swab in.
 - Some companies use saliva sample.
- Done in comfort of your home.
- Hardest part is not eating or drinking for the hour before! 😊

Taking DNA Test is Easy!



Kit from Family Tree DNA

DNA Testing Companies

- **Family Tree DNA** – focuses on DNA for genealogy.
 - Y-DNA; mtDNA; haplogroups; SNPs; atDNA (*Family Finder*) 700,000 markers; swab test
- **Ancestry.com** – focuses on genealogy.
 - atDNA (*AncestryDNA*), 700,000 markers; saliva sample.
- **23andMe** – focuses on health issues and genealogy.
 - atDNA (*Relative Finder*), haplogroups - tens of thousands of markers; saliva sample.
- **Gen 2.0** – focuses on human migration patterns.
 - National Geographic Project
 - SNP tests to determine haplogroups (ancient ancestry)
 - swab test

Resources

Websites

- Jackson Brigade's DNA Project** - <http://www.jacksonbrigade.com/dna-project/>
International Society of Genetic Genealogy (ISOGG) - <http://www.isogg.org>
Family Tree DNA - <https://www.familytreedna.com>
Ancestry DNA - <http://dna.ancestry.com>
23andMe - <https://www.23andme.com>
Geno 2.0 - <https://genographic.nationalgeographic.com>

Books on Genetic Genealogy

1. **Trace Your Roots with DNA: Using Genetic Tests to Explore your Family Tree** by Megan Smolenyak and Ann Turner, Rodale, 2004. Best single book on subject.
2. **Hey, America, Your Roots are Showing** by Megan Smolenyak, Citadel Press, 2012. Very good follow up of Megan's first book.
3. **DNA and Social Networking: A Guide to Genealogy in the Twenty-First Century** by Debbie Kennett, The History Press, 2011. Very good book.
4. **Genetic Genealogy: The Basics and Beyond** by Emily D. Aulicino, AuthorHouse, 2014. Not as good as Megan and Ann's book but discusses recent developments.

Resources

Books on Ancient Ancestry

- **The Seven Daughters of Eve** by Bryan Sykes, Norton Press, 2001. National Bestseller, very readable book on the science that reveals our genetic ancestry.
- **Saxons, Vikings, and Celts** by Bryan Sykes, Norton Press, 2006. The genetic roots of Britain and Ireland. Very readable.
- **Journey of Man: A Genetic Odyssey** by Spencer Wells, Random House, 2002. Story of human origins in Africa and dispersals across the world.
- **Deep Ancestry: Inside the Genographic Project** by Spencer Wells, National Geographic, 2007. Describes the National Geographic's Genographic Project.