DNA Testing: How it works and how it can help in your family research

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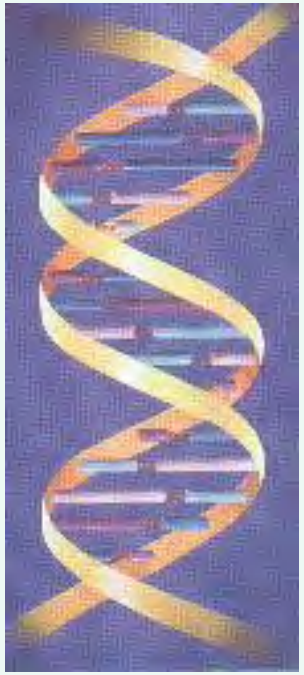


My background and interests in DNA testing

Training

- B.A. in European history
- M.A. in Church history
- Ph.D. in Plant Breeding and Genetics

DNA Tests I have done personally

- **FamilyTreeDNA.com**
  - Y chromosome including "Big Y"
  - Full mitochondrial DNA sequence
  - Autosomal Test "Family Finder"
- **23andMe.com**
  - Autosomal Test, including health info
- **Ancestry.com**
  - Autosomal Test
- **MyHeritage.com**
  - Autosomal Test

Hickman County TN HS 50th Reunion - 1980

R.T. “Cap” Sisco of Copeville, Collin County, TX
1865 – 1945

John Francisco / Sisco ~1725 - ~1804 – Came to NC about 1750 from "up north"

Jacob Francisco / Sisco ~1755 - ~1816 – Married Rebecca Shipman (mother a Burleson?)

John Andrew Sisco 1789 – 1867 b. NC; d. Hickman County, TN

William Walker Sisco 1829 – 1887 Confederate veteran

John Thomas Sisco 1848 – 1930

Jacob Andrew Sisco 1881 – 1920

Paul Hardeman Sisco 1912 – 1984

Paul Hardeman Sisco, Jr. 1945 -

Sisco surname 1840

Francisco surname 1840

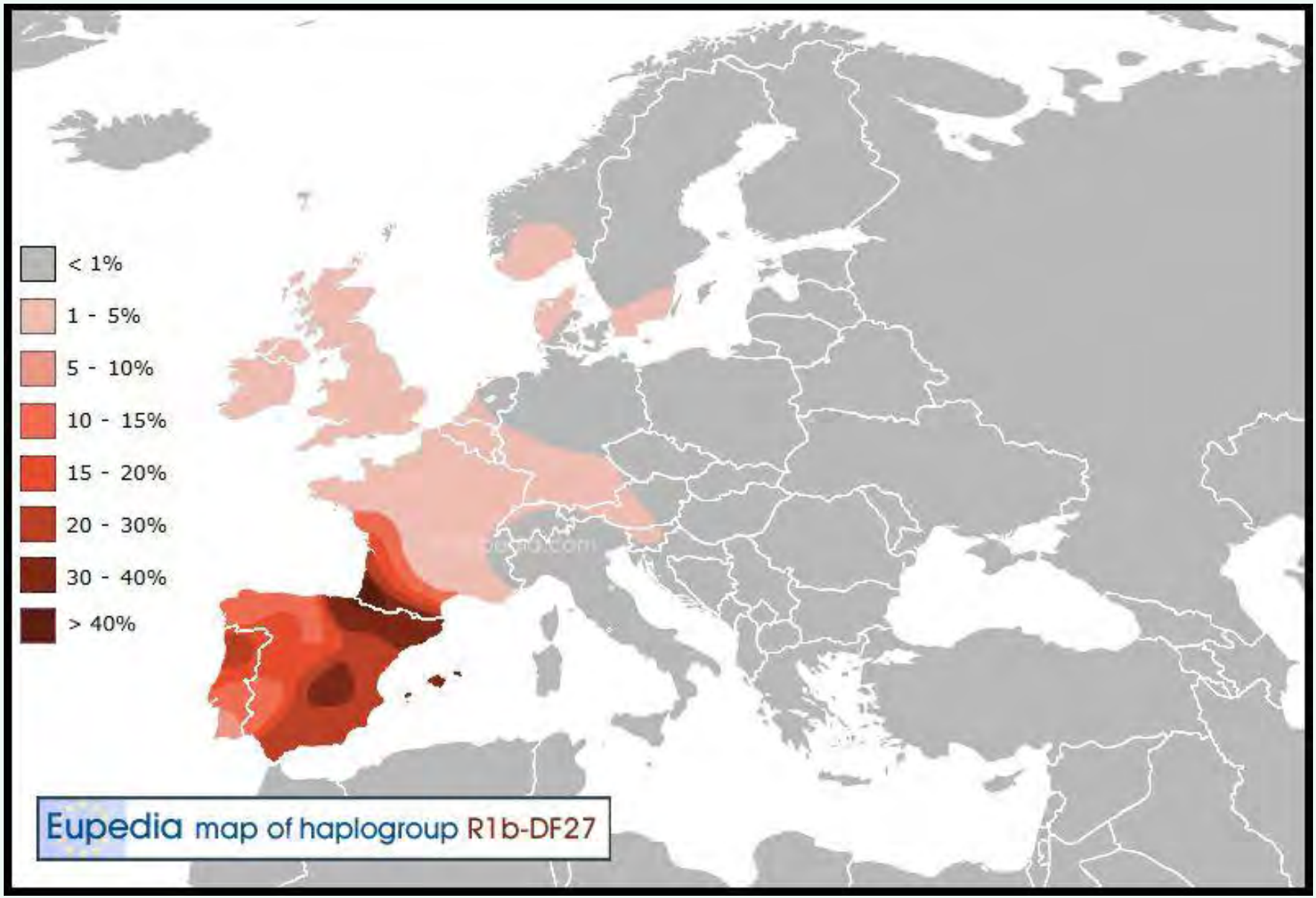
Eleanor “Totsie” Francisco Arens

Henry Francisco (Fran Sisco, Sisco) of Whitehall, NY
1686 - 1820

"An Old Man of the Age of Louis XIV":
(Extracted from Remarks Made on a Short Tour Between Hartford and Quebec in the Autumn of 1819 by Benjamin Silliman Jr., S. Converse, New Haven, Connecticut, 1820)

Two miles from Whitehall, on the Salem Road to Albany, lives Henry Francisco, native of France ... (probably) the oldest man in America. He believes himself to be 134 years old, and the country around believe him to be of this great age. When we arrived at his residence (a plain farmer's house, not painted, rather out of repair and much open to the wind), he was upstairs at his daily work of spooling and winding yarn. This occupation is auxiliary to that of his wife, who is a weaver ... Supposing he must be very feeble, we offered to go upstairs to him, but he soon came down, walking somewhat stooping and supported by a staff, but with less apparent inconvenience than most persons exhibit at 80 or 90. His stature is of middle size, and although his person is rather delicate and slender, he stoops but little, even when unsupported. His complexion is very fair and delicate, and his expression bright, cheerful and intelligent. His features are handsome, and considering what they have endured through one-third part of a second century, they are regular, comely and wonderfully undisfigured by the hand of time. His eyes are a lively blue: his profile is Grecian and very fine; his head is completely covered with the most beautiful and delicate white locks imaginable ... He informed us that his father, driven out of France by religious persecution, fled to Amsterdam. By his account, it must have been on account of the persecutions of the French Protestants, or Huguenots, in the latter part of the reign of Louis XIV. At Amsterdam his father married his mother, a Dutch woman, five years before he was born, and, before that event, returned with her into France. When he was five years old, his father again fled on account of "de religion," as he expressed it (for his language, although very intelligible English, is marked by French peculiarities). He says he well remembers their flight and that it was in the winter, for, he recollects, that as they were descending the hill, which was covered with snow, he cried out to his father, "O fader, do go back and get my little carriole" [wagon] ...

Francisco/Sisco/Cisco Y chromosomal origin


< 1%
1 - 5%
5 - 10%
10 - 15%
15 - 20%
20 - 30%
30 - 40%
> 40%
Eupedia map of haplogroup R1b-DF27

Marti and Bob Duncan and Scott and Gloria Cisco
Peterborough, Ontario, May 2009

Eleanor “Totsie” Francisco Arens

Burlesons in Western North Carolina

Burlesons in Western North Carolina

**Tom Loren Burleson with
Coach Norm Sloan of
NC State University**

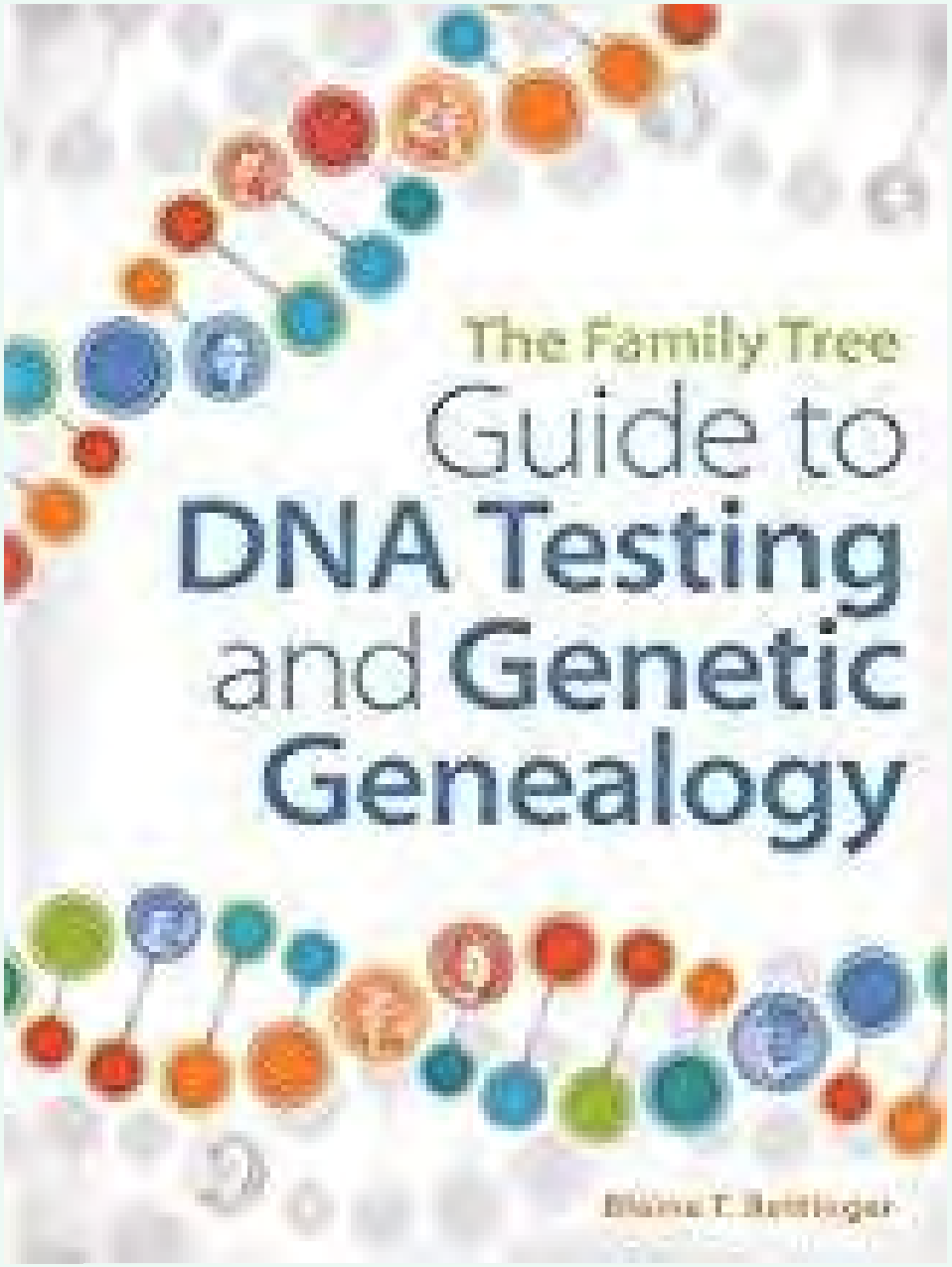
Outline

Uses of DNA markers in Family Research

1. **Y chromosome** analysis for male lineage
2. **Autosomal DNA** analysis to discover both distant cousins and close maternal and paternal relatives
3. Determination of **ancestral heritage** (*e.g.* European, Asian, West African, Ashkenazi Jewish, etc.)
4. Predictions about **health and appearance** based on DNA profile

Types of DNA Markers

1. **S**imple **T**andem **R**epeats = **STR**'s
2. **S**ingle **N**ucleotide **P**olymorphisms = **SNP**'s



Blaine T. Bettinger

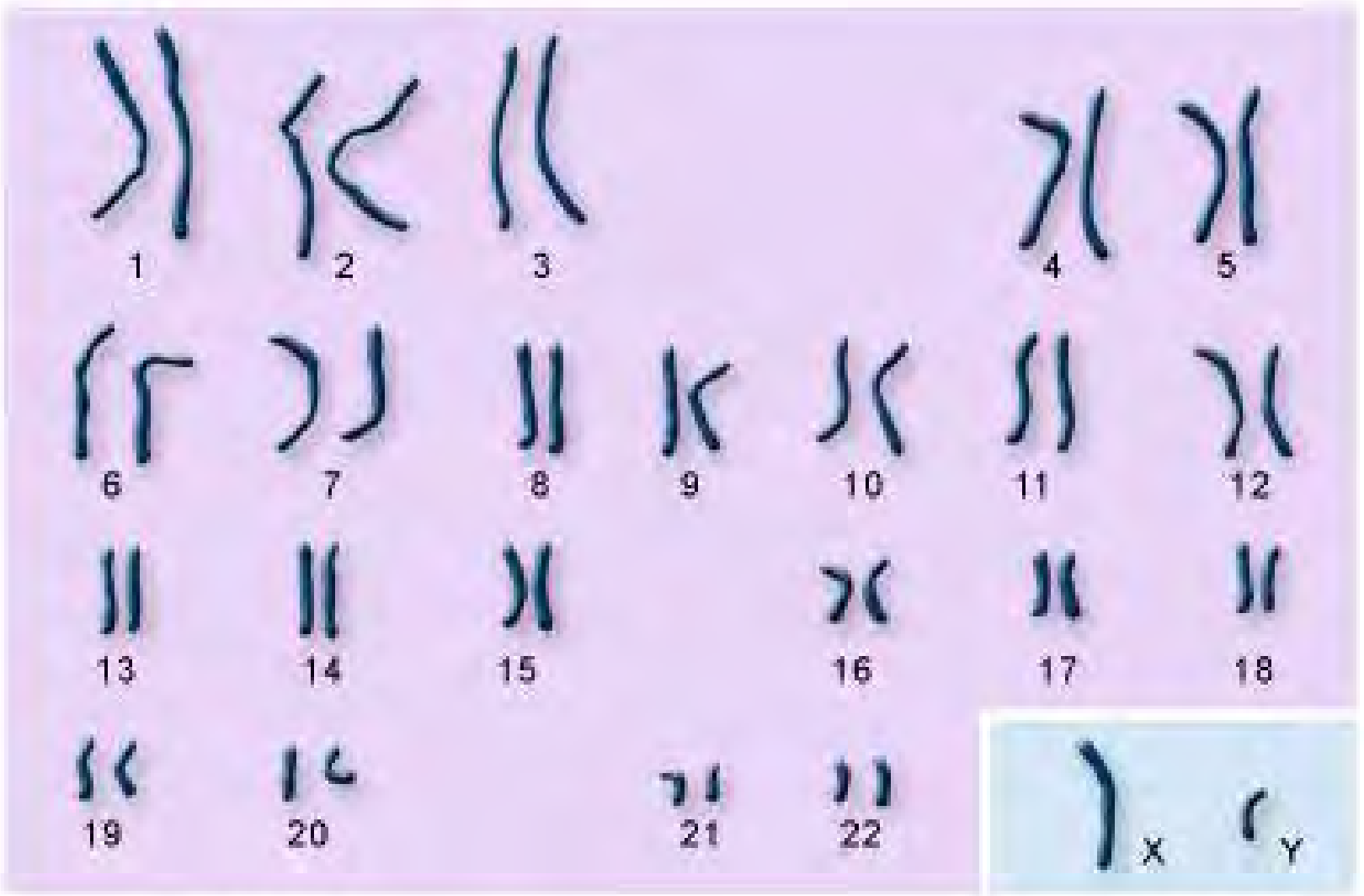
Caveats

1. You must have a thick skin. Family secrets may be revealed.
   a. Adulteries
   b. Adoptions
   c. Name changes
2. For every genetic rule there is an exception, *i.e.*, a little knowledge can be a dangerous thing.
3. DNA analysis cannot answer every genealogical question.

Part I

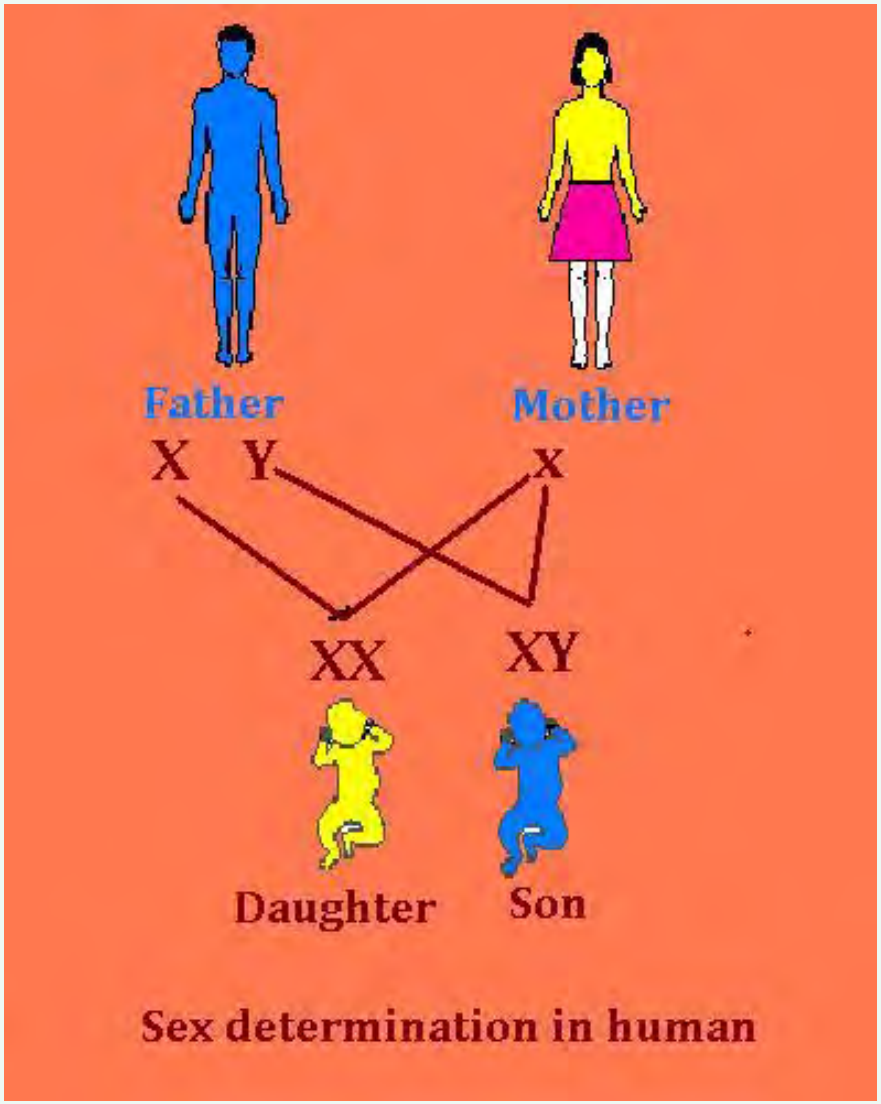
The Y chromosome and what it can tell you

The 23 pairs of human chromosomes

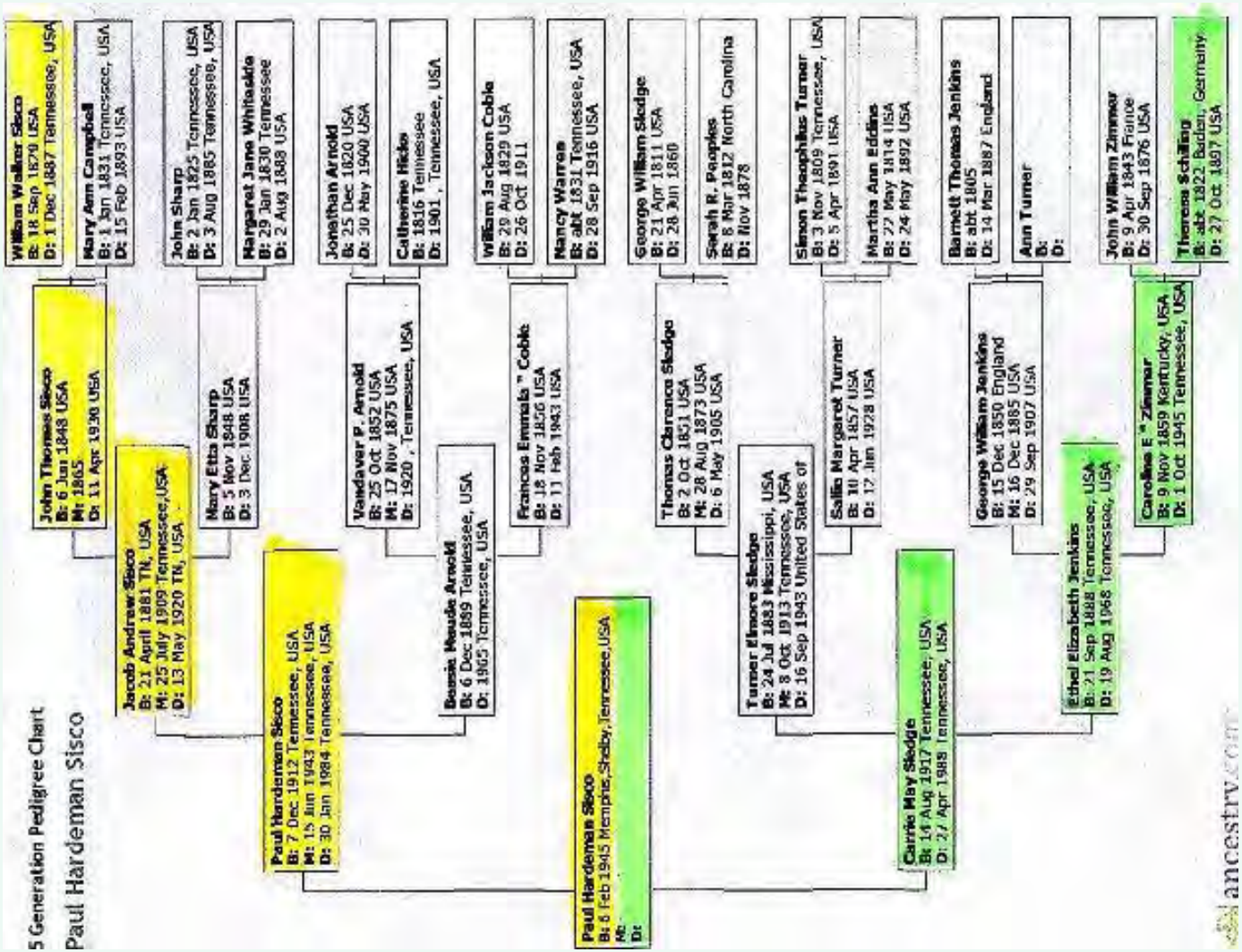


The 23rd pair: the sex chromosomes

Sex Determination in Humans



Y chromosome ancestry



Y chromosome in yellow

Why the Y chromosome is so useful

1) The Y chromosome contains **very few genes.** It does not affect a person's appearance, health, etc.
2) **Thus it can tolerate a lot of spontaneous genetic mutations** without damage to the individual, *e.g.* **Simple Tandem Repeats.**
3) Other than spontaneous mutations, however, **the Y chromosome is stable over many generations**. It does not exchange much DNA sequence with the companion X chromosome.
4) So if two men have very similar Y chromosomes, they are almost certainly descended from a common male ancestor through the male lineage, often = surname in western cultures.

Key Concept

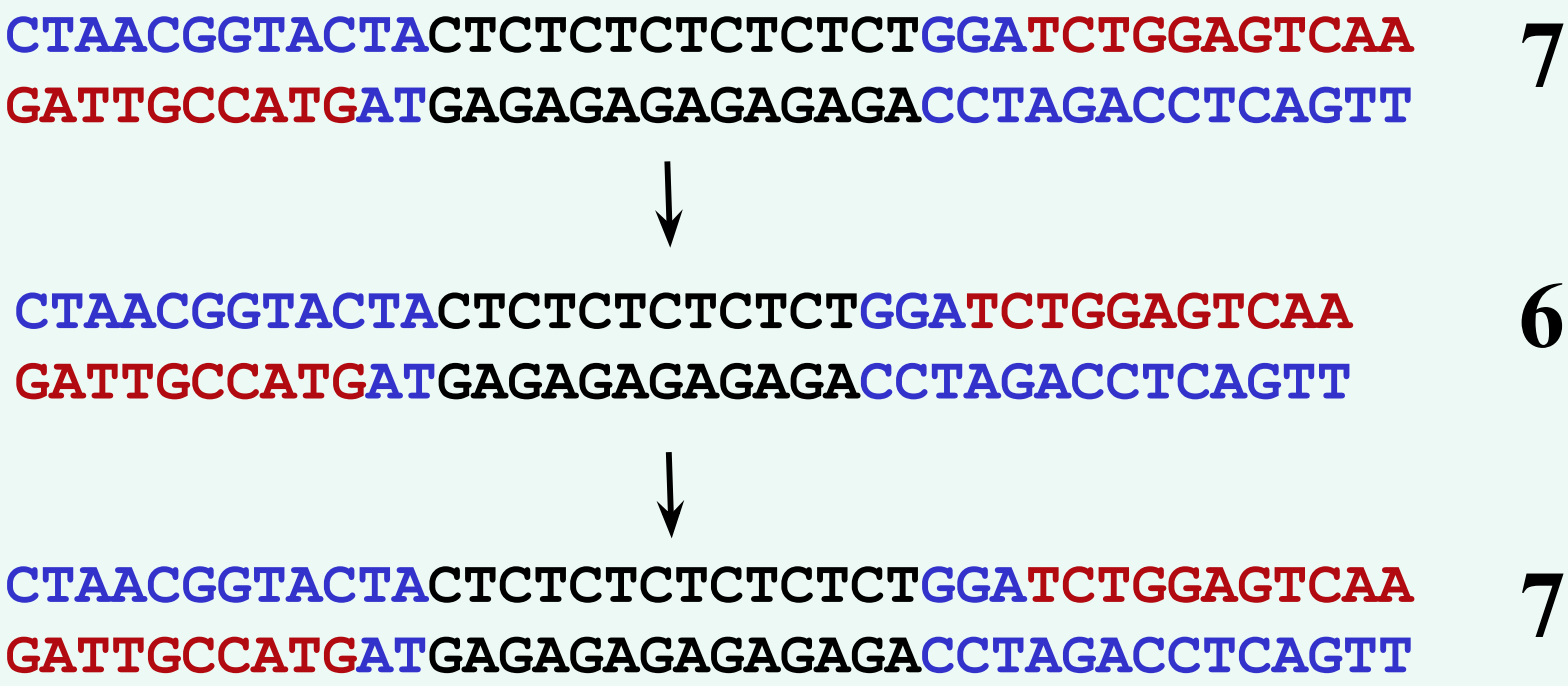
Identity by Descent vs. Identity by Chance

The more mutations two people have in common, the less likely the similarity in DNA sequence is by chance

How is "similarity" between Y chromosomes determined?

STRs = Simple Tandem Repeats

Mutations in these happen more often; unstable; useful for identifying close relatives (*e.g.* within 10-15 generations)



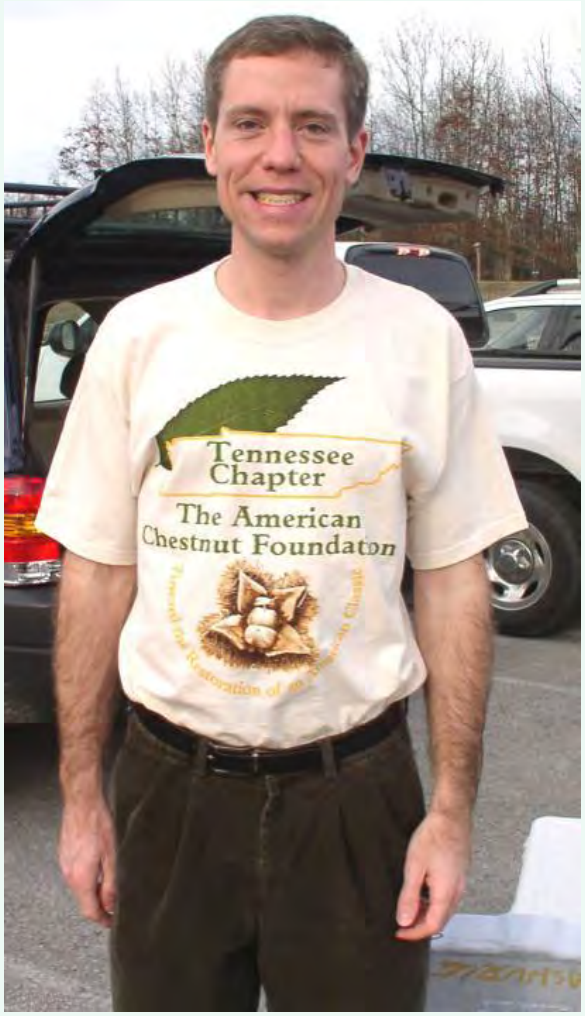
Tested only at FamilyTreeDNA.com

Burleson men tested who have a common male ancestor

Name	Paternal Ancestor Name	DYS 393	DYS 390	DYS 19	DYS 391	DYS 385	DYS 426	DYS 388	DYS 439	DYS 389i	DYS 392	DYS 389i i	DYS 458
Stanley Ray Burleson	Jonathan Aaron Burleson, 1830-1891	13	22	14	10	12-14	11	14	14	12	11	28	15
Tom (burleson) Clark	Aaron Burleson 1768 TN	13	22	14	10	12-14	11	14	12	12	11	28	
Clarence Ray Burleson	John Crawford Burleson, 1736-1776	13	22	14	10	12-14	11	14	12	12	11	28	15
Samuel Evans Burleson Sr.		13	22	14	10	12-14	11	14	12	12	11	28	15
Donald Burleson		13	22	14	10	12-14	11	14	12	12	11	28	16
Mr. Tony Lee Burleson Ph.D.		13	22	14	10	12-14	11	14	12	12	11	28	15
George Robert Burleson	Aaron Burleson, b. 1695 and d. 1763	13	22	14	10	12-14	11	14	12	12	11	28	15
Dennis Burleson	David Franklin Burlason, b. 1755 and d. 1832	13	22	14	10	12-14	11	14	12	12	11	28	15
Richard Earl Burleson		13	22	14	10	12-14	11	14	12	12	11	28	15
Louis Burleson Jr.		13	22	14	10	12-14	11	14	12	12	11	28	15
John Hill Burleson		13	22	14	10	12-14	11	14	12	12	11	28	15
John Hoyle Burleson	Isaac Burleson b.1750 d.1811 Montgomery Co NC	13	22	14	10	12-14	11	14	12	12	11	28	15
Frank Edward Francisco		13	22	14	10	12-15	11	14	12	12	11	28	15
Randy Lee Burleson	Willie Lee Burleson	13	22	14	10	12-14	11	14	12	12	11	28	15
Otto Schuster	John Burleson, b. 1767 and d. 1824, Morgan Co., AL	13	22	14	10	12-14	11	14	12	12	11	28	15
Edward Spirn Burleson	Burleson	13	22	14	10	12-14	11	14	12	12	11	28	15

The term“Genetic Distance” used by FamilyTreeDNA is misleading

Burleson men have an uncommon Y chromosome STR profile



Clint Neel of Tennessee – descendant of Niall of the Nine Hostages

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Another type of genetic marker

SNP's

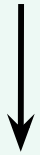
Single Nucleotide Polymorphisms

Useful for following human migration over thousands of years

SNPs = Single Nucleotide Polymorphisms

Rare mutations; usually stable over thousands or even millions of years; useful for defining large groups of related people (Haplogroups) and the pattern of human evolution. Key concept: Accumulation of SNPs over time

AGCCTCGACTGGACTT



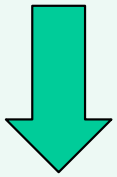
AGCCTCGGCTGGACTT

These individual polymorphisms are given names like R1b-DF27 and I-M253

Route of Human Migration out of Africa

National Geographic's Genographic Project

Africa
50,000 Years Ago



Middle East
Y chromosome SNP Mutation **1**

Europe
40,000 Years Ago

Y chromosome SNP Mutations **1+2**

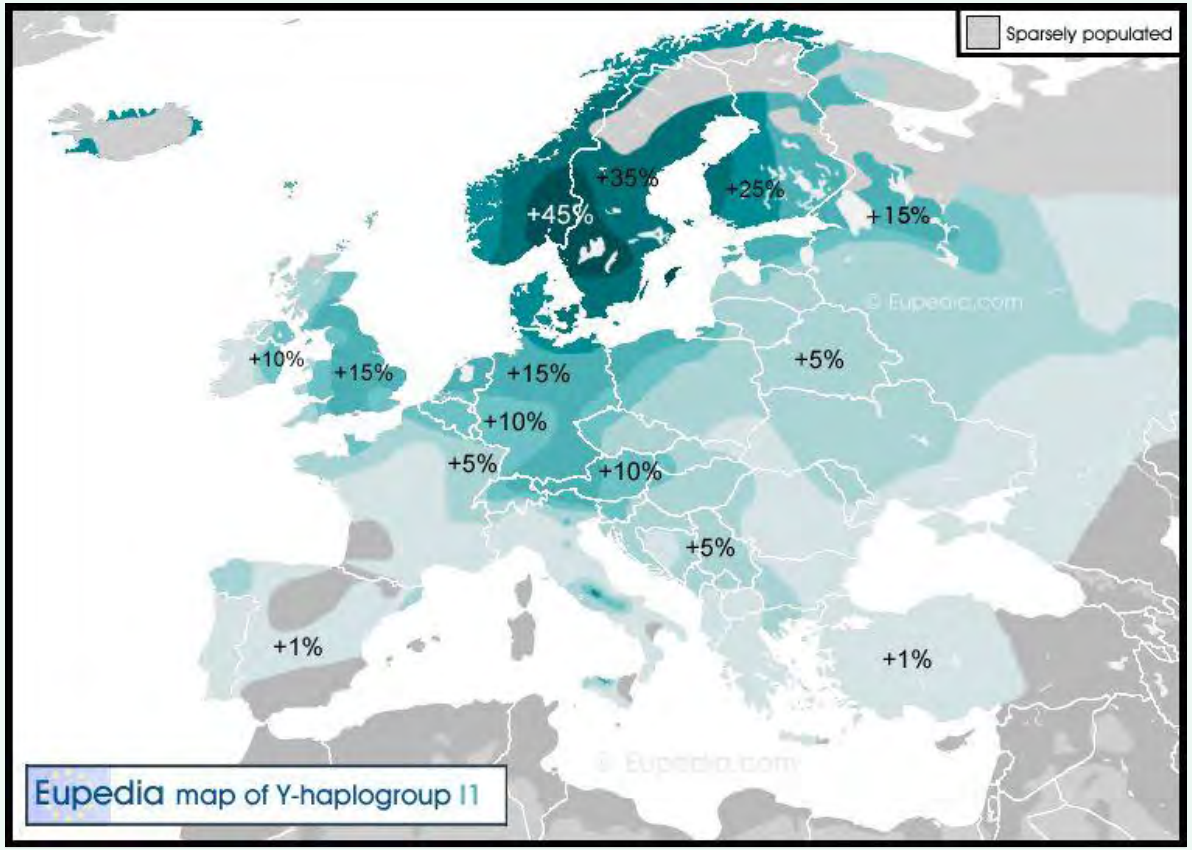
Asia
40,000 Years Ago

Y chromosome SNP Mutations **1+3**

Route of Human Migration out of Africa

National Geographic's Genographic Project

Burleson Y chromosome "terminal SNP" (so far) I-M253 = "I1"



M253 mutation occurred 3000 – 5000 years ago

52% of men in southern Sweden have this mutation in their Y chromosome

“The Vikings” on the History Channel

What further Y chromosome testing can help Burleson family research?

- **1. Test more "northern" Burleson men**

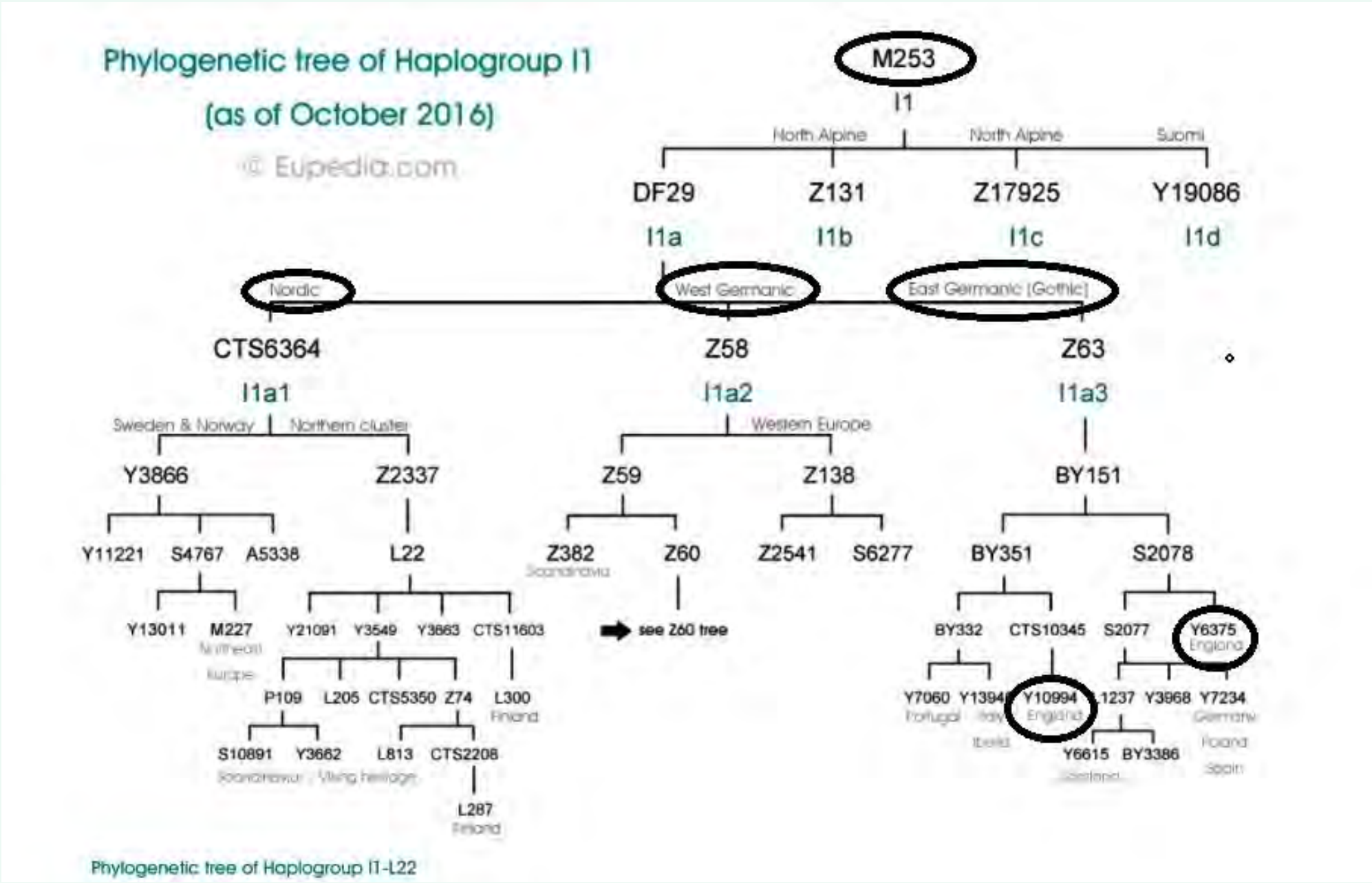
What further Y chromosome testing can help Burleson family research?

- 1. Test more “northern” Burleson men
- 2. Test Burleson men in Europe

The Fulp Family were able to determine their German town of origin and the original spelling of their name “Volpp”

What further Y chromosome testing can help Burleson family research?

- 1. Test more "northern" Burleson men
- 2. Test Burleson men in Europe
- 3. **Do additional testing to find out to which subgroup of I-M253 Burleson men belong = new "terminal SNP"**



Phylogenetic tree of Haplogroup I1-L22

https://www.eupedia.com/europe/Haplogroup_I1_Y-DNA.shtml

Join the I1 Haplogroup Project at FamilyTreeDNA

Only one Burleson man needs to join

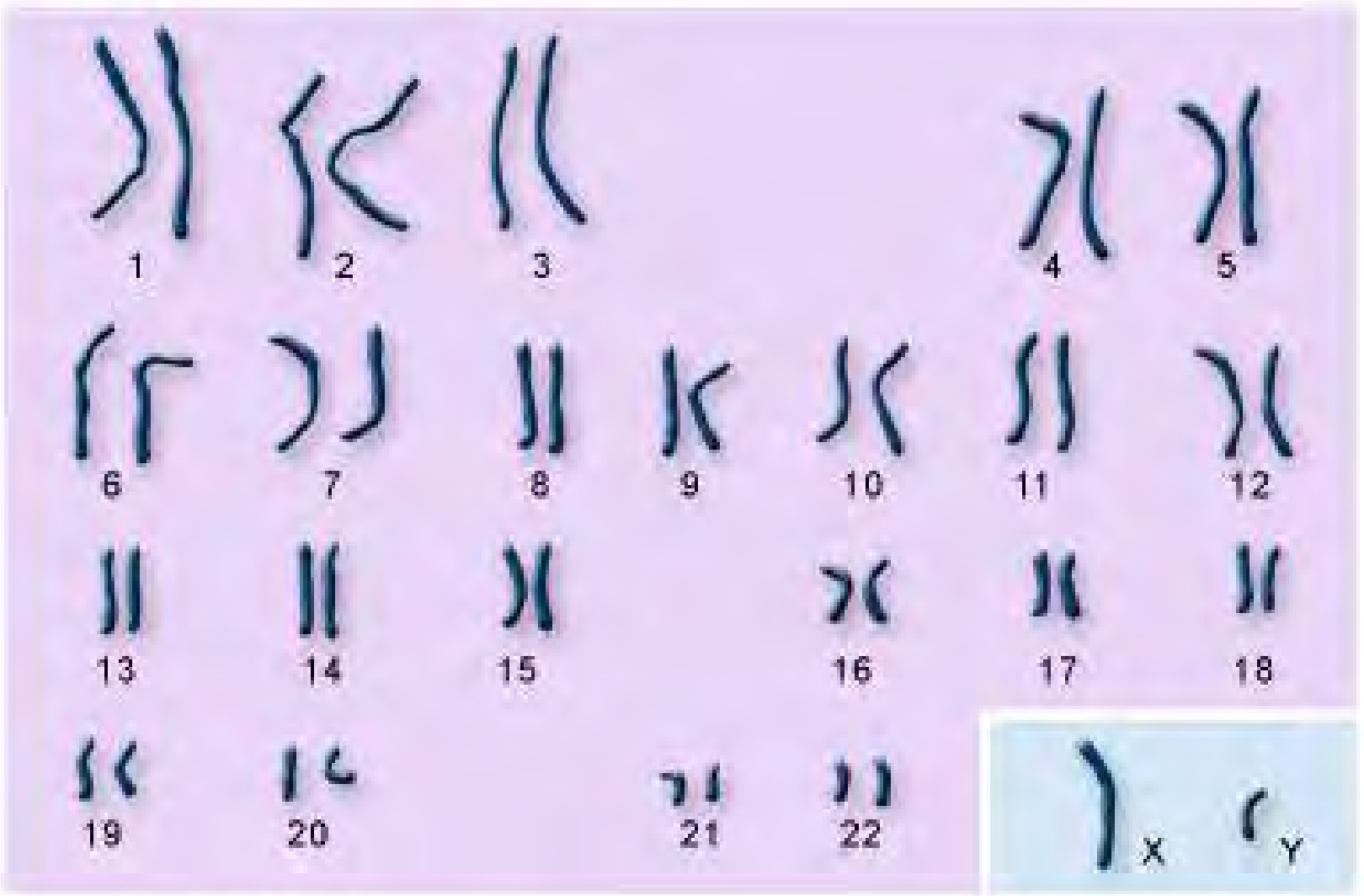
Summary Y chromosome

1) The "standard" Burleson Y chromosome is fairly unique. A 37-marker STR test at FamilyTreeDNA is sufficient to determine whether a particular man belongs to the standard Burleson group.
2) There are some men named Burleson who do not belong to the standard group, but the ones tested so far are also not related to each other except for one father-son pair.
3) Additional testing could be done on northern Burlesons and Burlesons in England.
4) Additional testing could be done to determine the "terminal SNP" of the standard Burleson group. This might help more precisely pinpoint a point of origin.
5) Only one Burleson man needs to do these tests to get the results. Others could help financially.

Good-bye to the Y

Hello Autosomal

The 23 pairs of human chromosomes



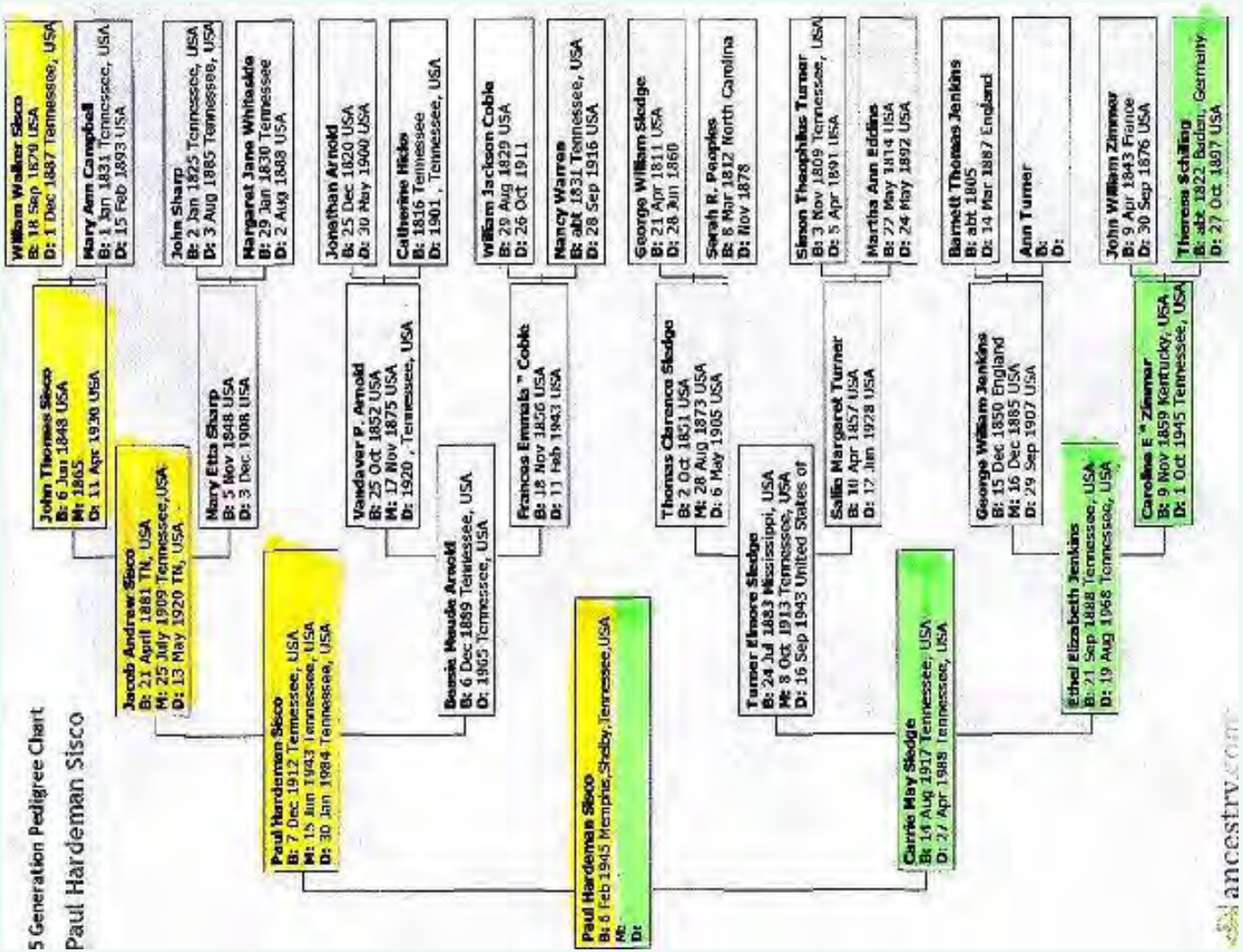
Autosomal DNA inheritance

Sisco
Campbell
Sharp
Whiteside
Arnold
Hicks
Coble
Warren
Sledge
Peoples
Turner
Eddins
Jenkins
Turner
Zimmer
Schilling

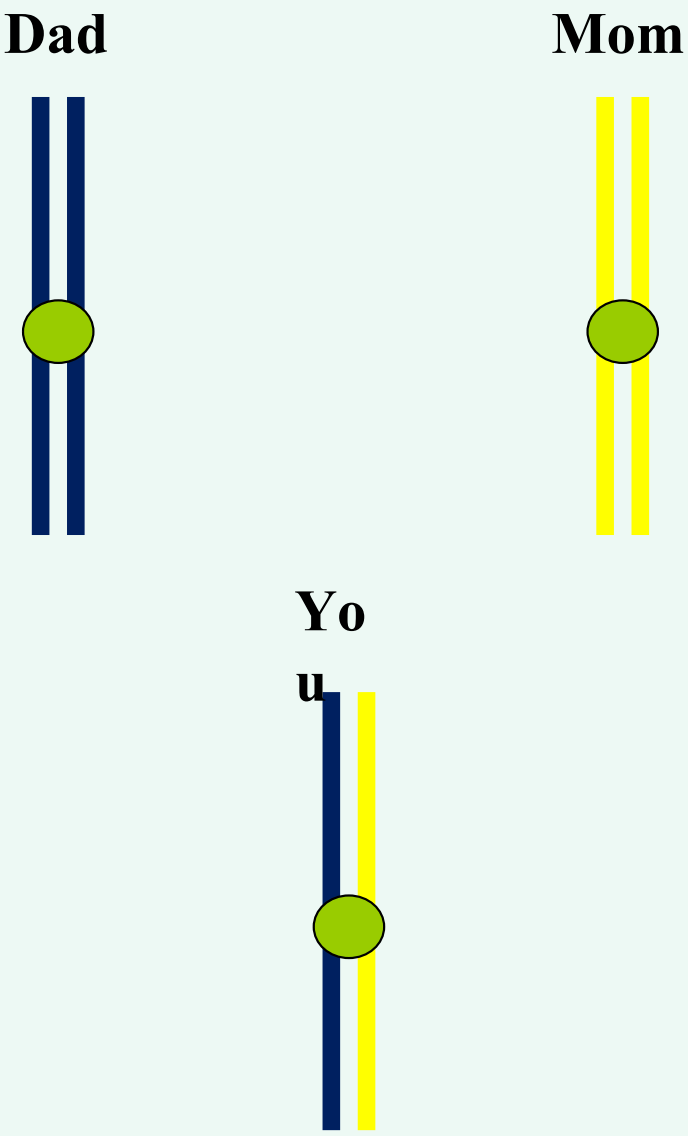
1820

1880

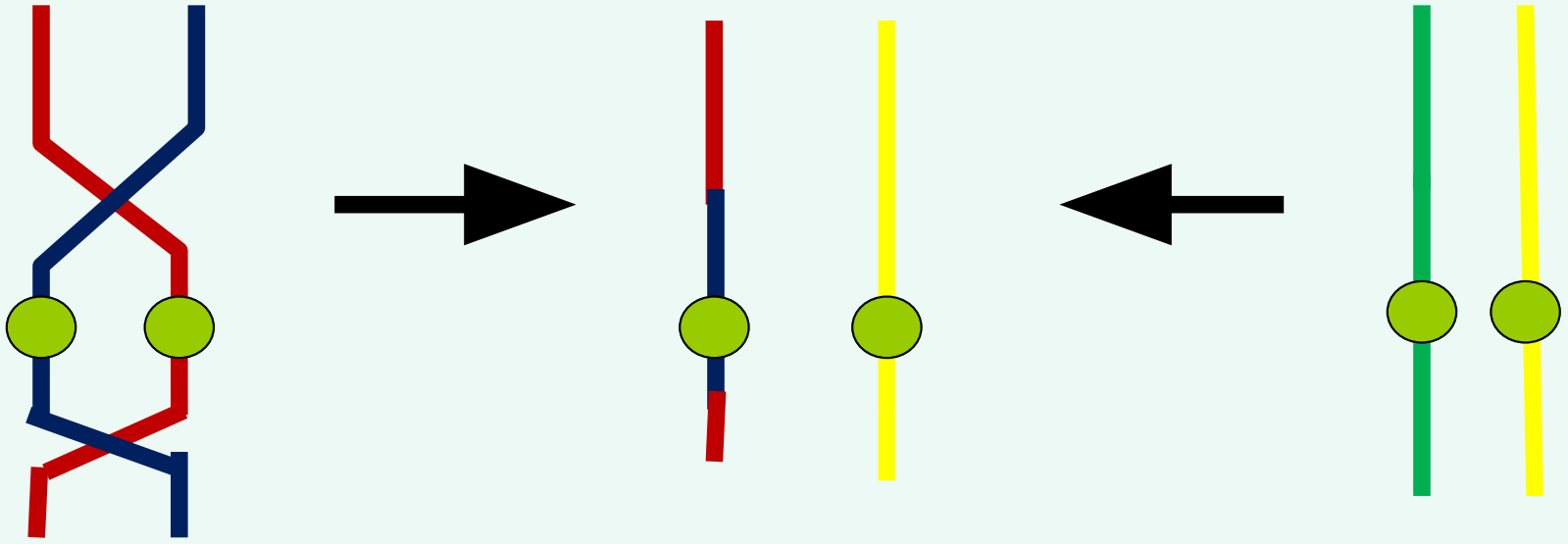
~1/16th of my DNA 6.25%



Autosomal Inheritance



Crossing over (recombination) occurs when the sperm and egg cells are being made

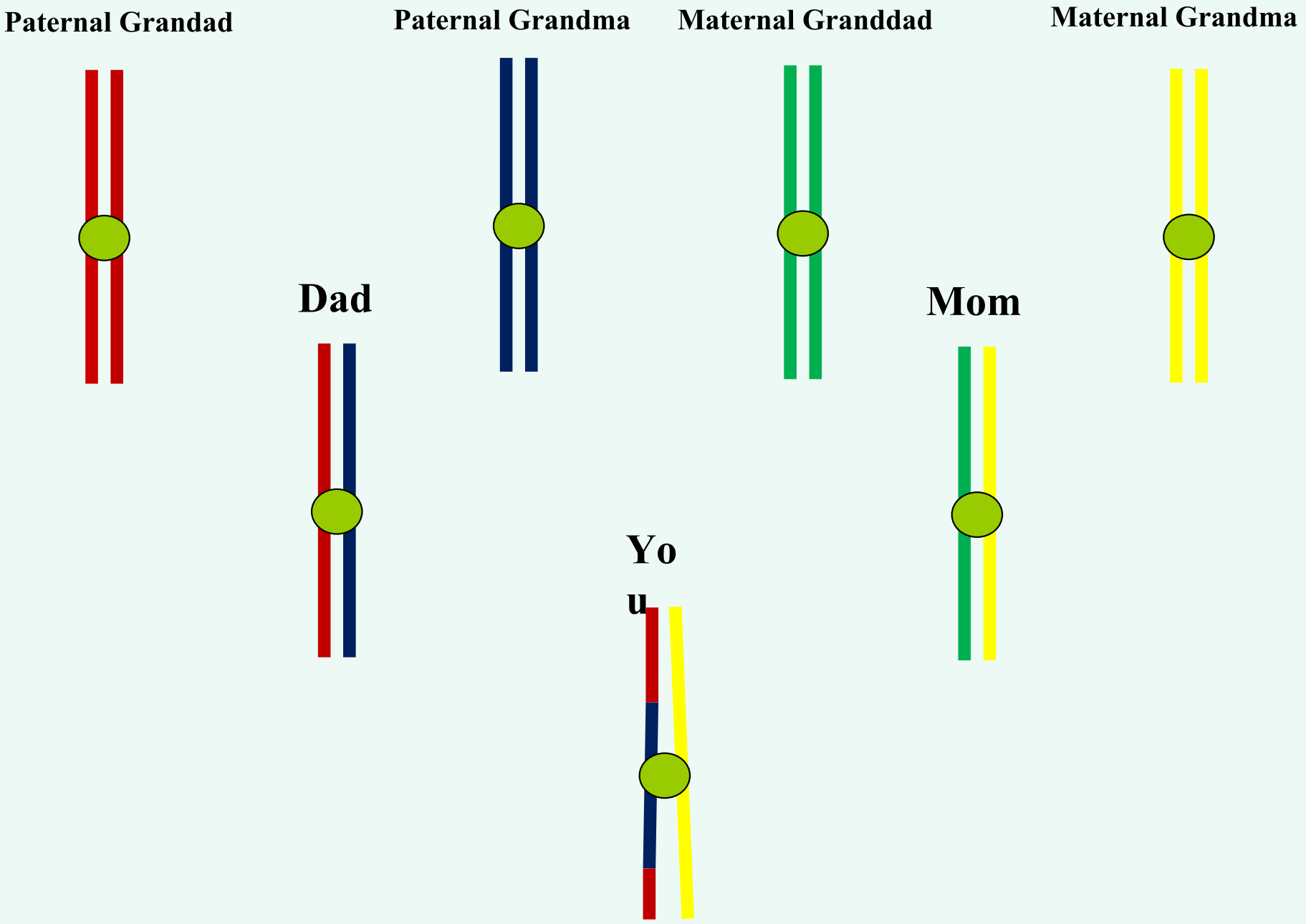


Dad

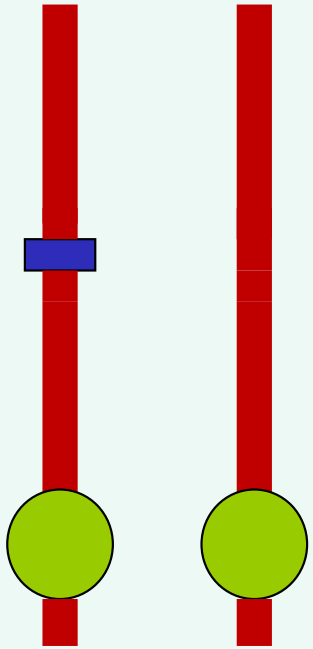
You

Mom

Autosomal Inheritance of One Chromosome

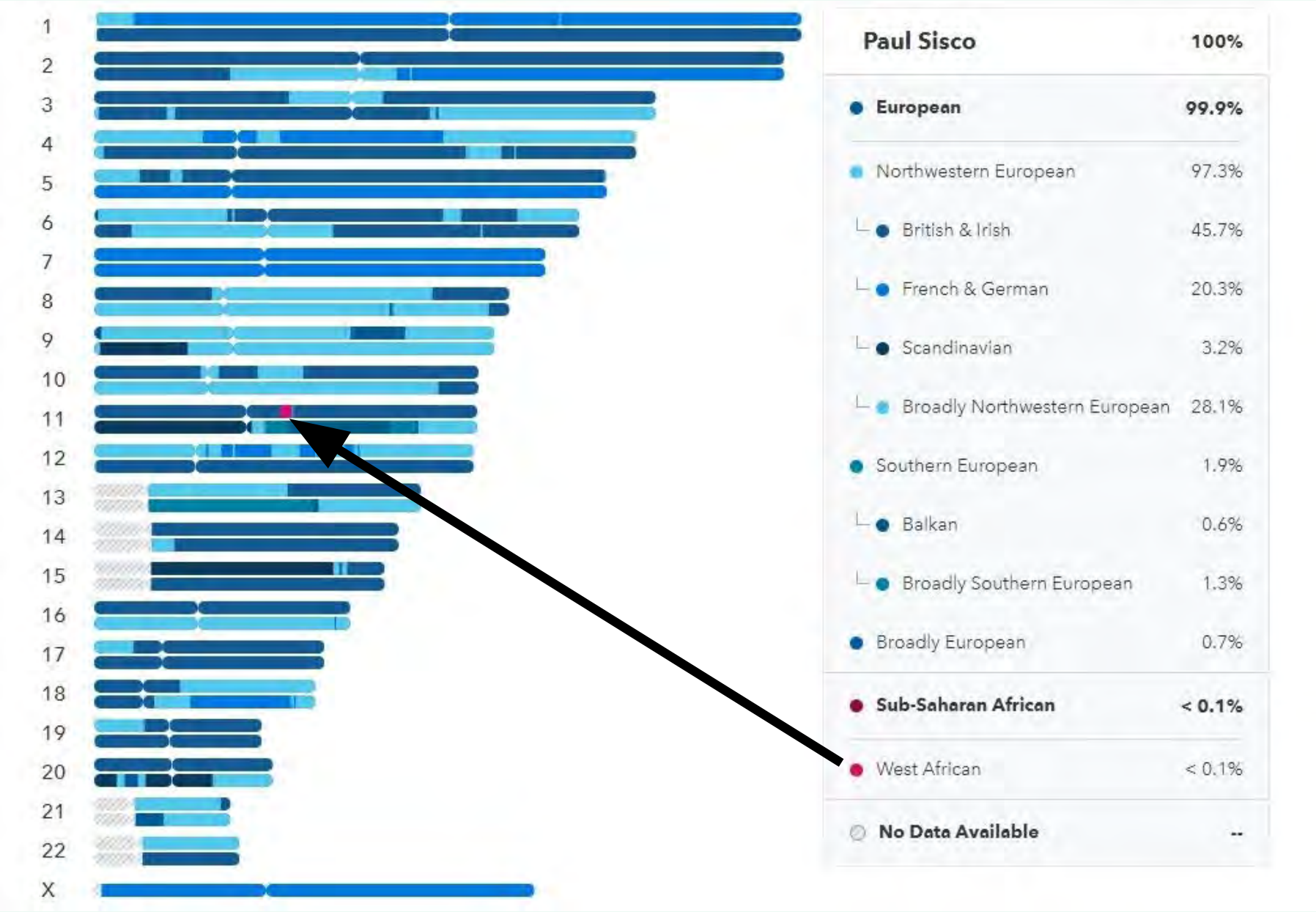


Many generations later
a particular inherited block of DNA is small and only on one of the chromosome pairs

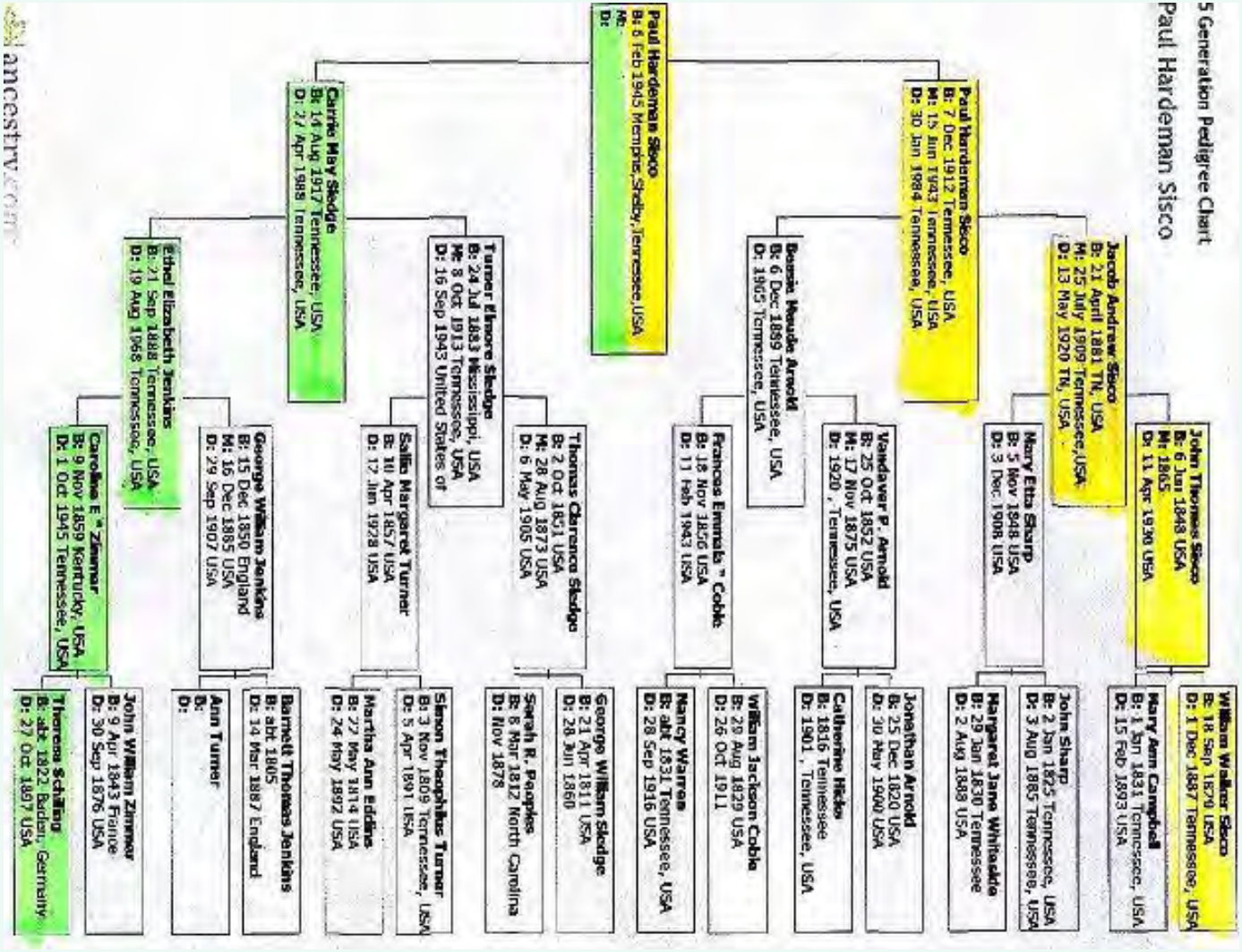


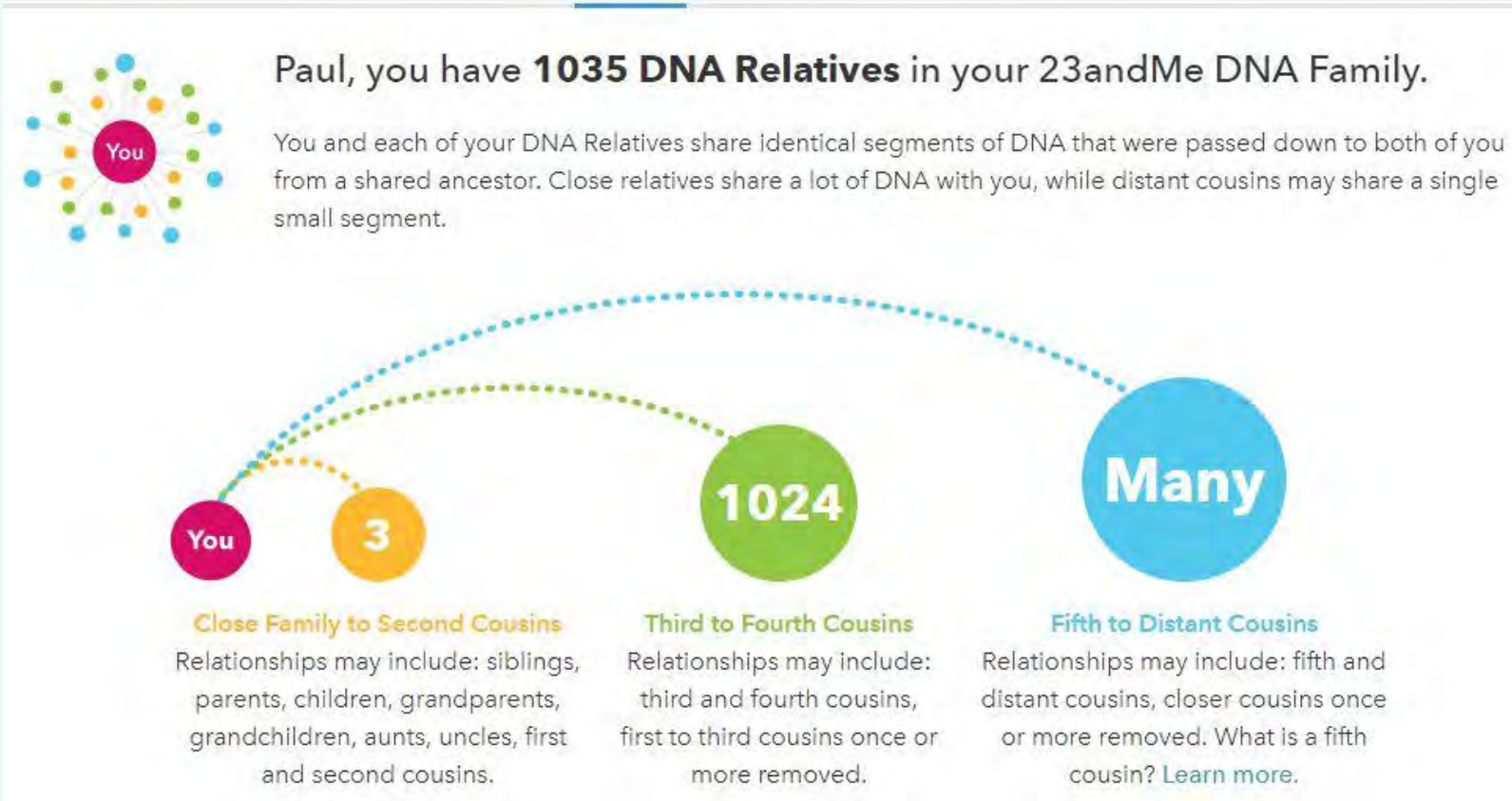
There is a 50/50 chance it will be lost in the next generation because only one chromosome of the pair will be passed on to children

23andme Chromosome Image



Question: Are Gerry Booth and I both descended from Elizabeth Burleson?





Concept of "In Common With" to let you know whether you're related on your Mom's or your Dad's side

Summary Autosomal DNA

1) Your genetic genealogy is only a subset of the people who were your ancestors, because after several generations chances are great that you will lose all of the DNA of a particular ancestor.
2) On the other hand, if you do autosomal testing with FamilyTreeDNA.com, ancestry.com, 23andme.com, or MyHeritage.com, you will discover hundreds of people you do not know but with whom you share DNA.
3) Using "In Common With" will help you tell whether you are related to these people on your Mom or Dad's side. (It might be on both sides!)
4) There are other more complicated ways of determining how you are related.
5) Dealing with folks who do not know their parents can be heart-breaking or heart-warming, if successful.

Using DNA to determine your ethnic origins

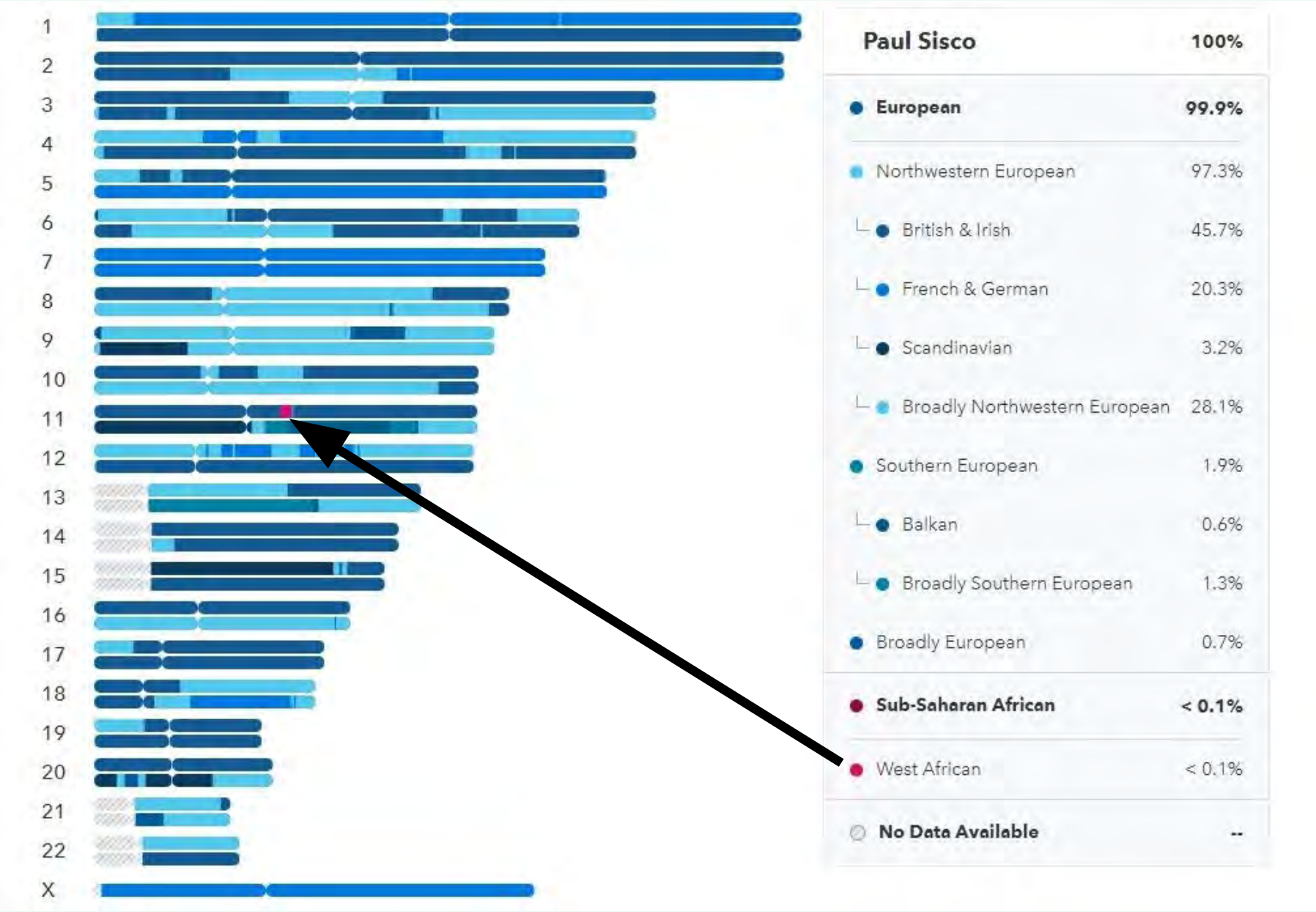
Haplotypes

A series of SNP mutations that define a certain section of one part of one chromosome

CTAACGGTACTATCGGATATCGGGATCTGGAGTCAA — **Haplotype 1 "English"**

CTACCGGTATTATCGGATATCAGGATCTGGGGTCAA — **Haplotype 2 "Italian"**

23andme Chromosome Image



How Ethnic Origins are Determined

https://you.23andme.com/reports/ancestry_composition/details/

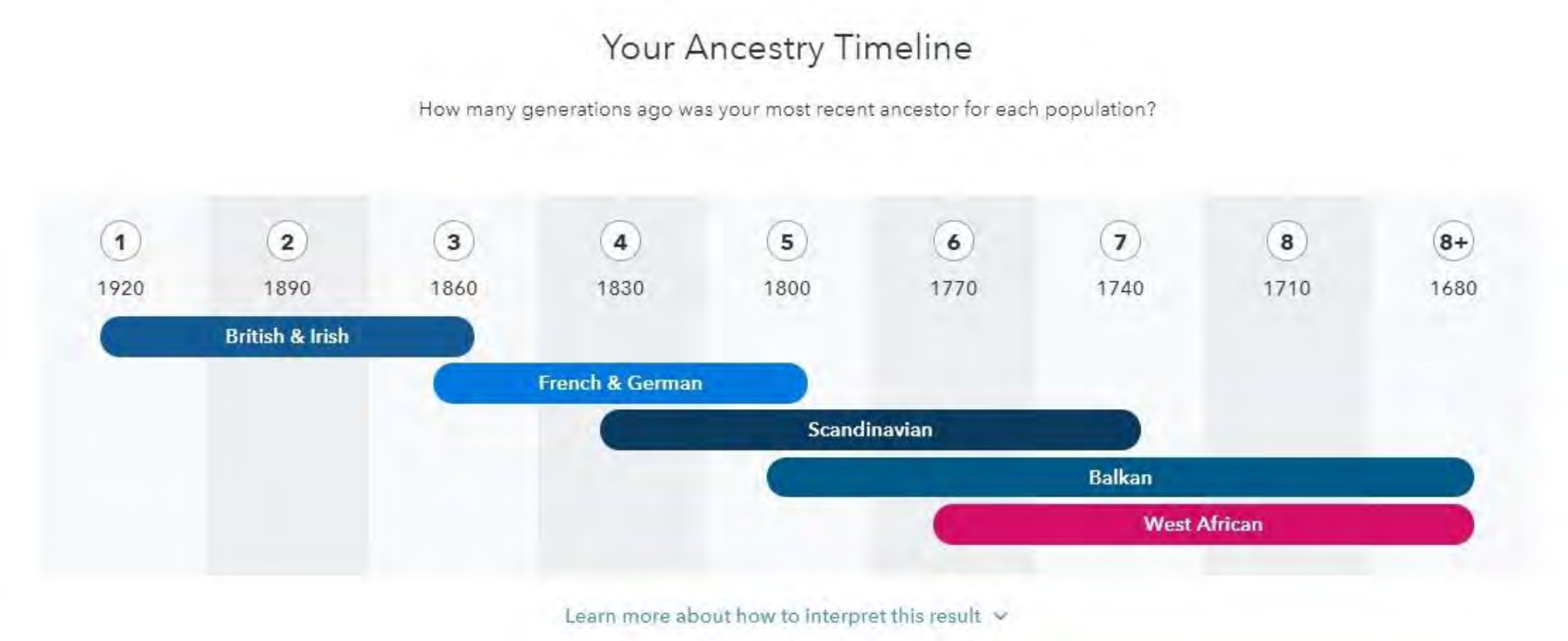
We determine your Ancestry Composition by comparing your DNA to public and private reference data.

To determine your Ancestry Composition, we use an algorithm that looks at short, non-overlapping segments of your DNA. We compare each segment of your DNA to reference DNA sequences. We have defined 31 ancestry populations from around the world using reference datasets that include over 10,000 individuals with known ancestry. When a segment of your DNA matches the reference DNA from a specific population with a high degree of certainty, the segment is assigned to that population. Sometimes the segment matches reference DNA from several populations, in which case it is assigned to a broad ancestry (e.g. Northwestern European). The results of all of these assignments are then tallied across your genome to determine your Ancestry Composition. Read more about how we assign your DNA to different ancestries

But different companies give different results

Reference Group	23andme	FamilyTreeDNA	Ancestry	MyHeritage
British and Irish	46	16	51	53
French and German	20	82	35	
Scandinavian	3	< 2	5	34
Balkan	0.6			
Broadly Southern European	1			
West African	< 0.1			
Siberian		< 1		
Asia South			2	
Iberian			4	12
Italy/Greece			2	

Ancestry Timeline
23andme



Summary Ancestry, Health, and Physical Attribute Estimates

1) A work in progress. Different companies give you different results. But as more people are analyzed, the ethnic estimates **should** get better.
2) Estimates of health risks and physical attributes are also to be taken with a grain of salt. 23andme is the company that has done most of this analysis. Remember that probabilities are probabilities. For example, 23andme says I have only an 18% chance of having a dimpled chin.
3) But 23andme also says I have a higher probability of getting macular degeneration, and this has encouraged me to take the test every year.

Neanderthal Ancestry 23andme

Neanderthal Ancestry 23andme

Neanderthal Ancestry

Neanderthals were ancient humans who interbred with modern humans before becoming extinct 40,000 years ago. This report tells you how much of your ancestry can be traced back to Neanderthals.

You have 282 Neanderthal variants.

You have more Neanderthal variants than 56% of 23andMe customers.
However, your Neanderthal ancestry accounts for less than 4% of your overall DNA.

A Final Note
My Stockyard Connection

Elizabeth Sledge Feightner
1927 - 2018

Paul Sisco

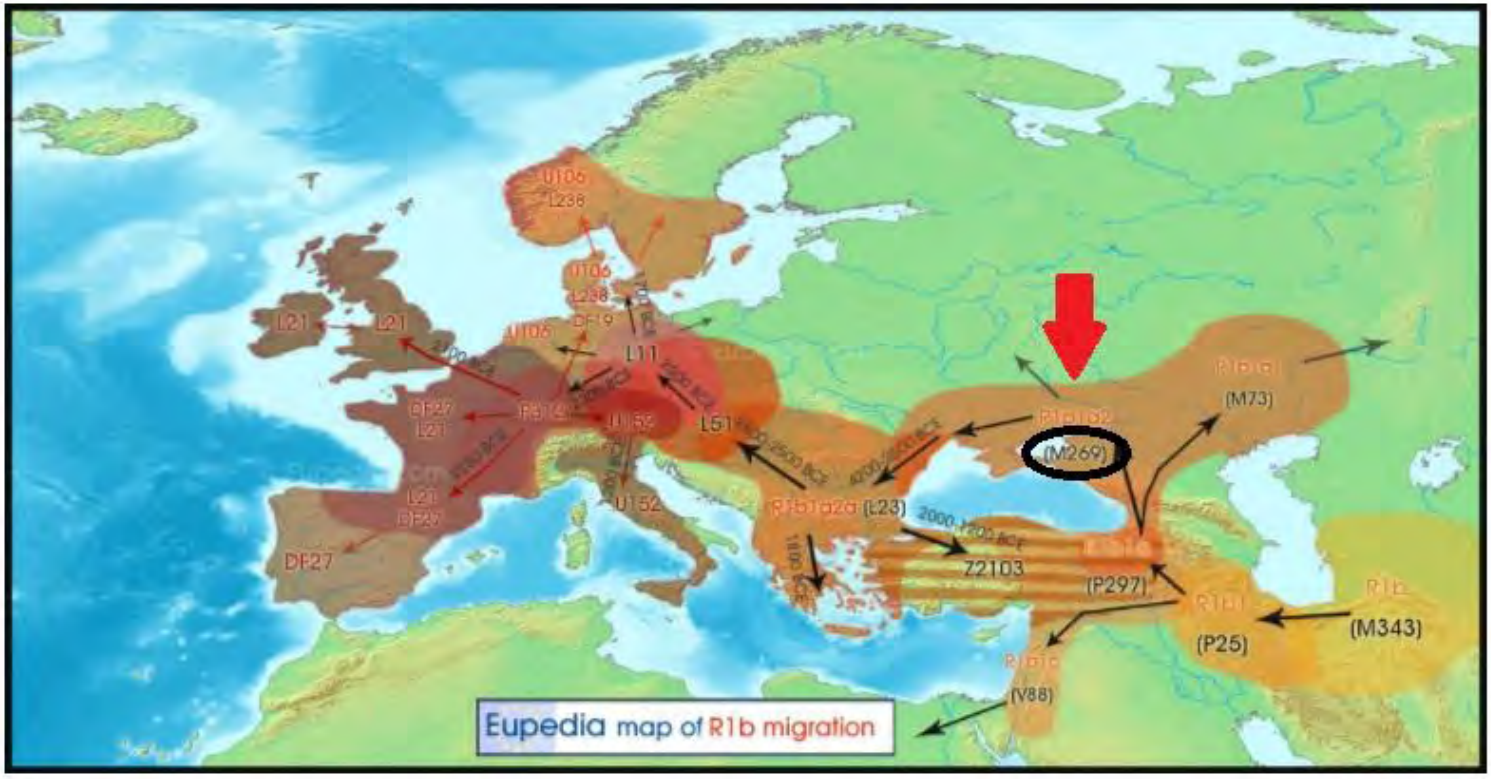
phsisco@gmail.com

Thanks for inviting me!


Y-DNA HAPLOGROUPS
Map with predominant Haplogroups
aged 20±5 kya
Key
R1a-the size of all young clades included paint of the main clade indicated
R1b-the size of all young clades included the paint of the main clade indicated
I1
(Northern Proto-Europeans)
N1
(North Eurasians)
R1b
(Ancestral Eurasians)
R1a
(Indo-Europeans)
J2a
(Proto-Europeans)
G 2
(West Caucasians)
(Northern Southwest-Asians)
J2
E1b1b1b2a1a
(Western North-Africans)
E1b1b1a1
(Mediterraneans)
(Southern Southwest-Asians)
J1

Mr. Lynn R-Jr Burleson	Roy C. Burleson Sr.	Unknown Origin	R-M269
Mr. Lynn Ray-Sr Burleson	Roy C. Burleson, 1895-1976	Unknown Origin	R-M269
Mr. Paul Howard Burleson	Henry Schumacher, Germany 11-00-1832	Germany	R-M269
Ronald Gordon Burleson	Israel S Ward, b.1698 and d. 1779	United States	R-M269
Michael Jay Burleson		England	R-M512

Migration map of Y-haplogroup R1b from the Paleolithic to the end of the Bronze Age (c. 1000 BCE)



Migration map of Y-haplogroup R1b in the Late Neolithic and Early Bronze Age (c. 5500-3000 BCE)

John Franciscus

Simon Goldberg

Jared Ronin

G2c Haplogroup
(= M377 SNP)
>100 surnames
Eastern European
Jewish ancestry