



# **DNA and Ancestry**

**An Update on New Tests**

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# What did we just learn ?

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- **How our early ancestors probably left Africa about 60-100K year ago**
- **How various haplogroups came to be and spread out around the world**
- **Results were based on relatively low-coverage Y-DNA testing technologies available in the mid-2000's**
- **A lot of people got tested, but not a lot of Y-DNA markers**  
(I'll have more to say about this a little bit later in the talk)



# Are the conclusions correct ?

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## Not everyone thinks “Out of Africa” is the whole story

- But majority of geneticists still think this is what happened
- However “Multiregional Hypothesis” is an alternative story
- Active debate still goes on today between these two views

## Multiregional model supported in 1980s and beyond by Prof. Milford Wolpoff and colleagues at U. of Michigan

- Fossils, genomic data, continuity of archaeological cultures
- Contend that modern humans evolved through a combination of adaptation within various regions and broad gene flows

**For more on this go to <http://bloggingheads.tv/videos/2899>**



# Are the conclusions correct ?

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## Newer studies show much older “common male ancestor”

- In 2008 it was thought to be around 60,000 years ago
- New papers indicate maybe 200,000-300,000 years ago

*Scozzari, R., et al (2014)*

**An unbiased resource of novel SNP markers provides a new chronology for the human Y chromosome and reveals a deep phylogenetic structure in Africa**

*Mendez, F., et al. (2013)*

**An African American Paternal Lineage Adds an Extremely Ancient Root to the Human Y Chromosome Phylogenetic Tree**



# What did we NOT learn in the film ?

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## How did the Jewish People come to be 2500-3500 years ago?

- The origins of Jews are relatively recent in the human family
- Differences between ancient “Hebrews” and modern Jews
- Differences between Jewish ethnicity and Jewish religion

## What haplogroups have Jews in them and why?

- Some Y-DNA haplogroups seem to predominate among today’s Jewish populations (J1, J2, E1b, G2c, Q, R1a, R1b)
- Cohen and Levite genetic DNA “types” have been identified
- Jewish DNA testing is a hotbed of recent academic research



# But, I want to find my ancestors 500 years ago, not 5,000 or 50,000 years

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## Most are interested in more immediate Jewish family trees

- Out of Africa is interesting, but what about “Out of Israel”?
- Where did my ancestors go during the Diaspora?
- How did my ancestor end up living in...
  - Germany, Poland, Lithuania (Ashkenazim)
  - Spain, Italy, Greece, Turkey (Sephardim)
  - North Africa, Syria, Iraq, Iran, (Mizrachim)

## Can taking more DNA tests help with these questions?

- Maybe... (a tsunami of Y-DNA results is coming in 2014)

(do you want to be the *family historian* or a *genetic trailblazer*?)



# There are different kinds of DNA tests

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## “Autosomal” DNA tests – *for men and women*



- Tests chromosomes 1-22 you inherited from ALL your ancestors
- Can help identify your close cousins and your ethnic affinities

## “mtDNA” (mitochondrial DNA) tests – *for men and women*

- Tests cell mitochondrial DNA you inherited from your mother
- Identifies your maternal line (mother’s mother’s mother’s...)



## Y-chromosome DNA tests – *for men ONLY, sorry ladies*

- Tests the Y-DNA a man inherited from your father
- Identifies your paternal line (father’s father’s father’s...)







# What are some of the newest tests ?

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## **National Geographic's Genographic Project Geno 2.0**

- Tests autosomal DNA, mtDNA, and Y-DNA (if you are male)
- <https://genographic.nationalgeographic.com/>

## **Family Tree DNA (FTDNA) BIG Y**

- Tests a very large portion of the Y-chromosome (males only)
- <http://www.familytreedna.com/>

## **Full Genomes Corporation Comprehensive Y-DNA**

- Tests a very large portion of the Y-chromosome (males only)
- <https://www.fullgenomes.com/>



# Genographic Project's Geno 2.0

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**Introduced summer of last year – July 2012**

**Currently on sale at \$159 USD for a test (originally \$199)**

**Usable by both men and women, and analyzes:**

- Autosomal DNA (125,000 locations)
- Mitochondrial DNA (3,000 locations)
- Y-DNA (12,000 known SNPs – male only)



**Provides mtDNA and Y-DNA haplogroup identifications**

**Provides rudimentary ethnic identification from autosomal**

***Good test for beginners that have never done a DNA test***



# FTDNA BIG Y

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**A new product from Family Tree DNA**

**Announced recently - November 2013**

**Current cost is \$695 USD for a test**

**Very high (but not total) exploratory Y-DNA coverage**

- About 10 million base pairs (mappable DNA building blocks)

**First results will be known sometime in March 2014**

**Many hundreds of tests ordered since announcement**

***Must be an existing FTDNA customer to order this test***





# Full Genomes Y-DNA Sequencing

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**Private start-up company**

**Started beta tests early 2013**

**Cost is \$1,250 USD for a test**



**Highest Y-DNA coverage available (but costly)**

- Sequencing of about 20-25 million base pairs
- In mappable regions: about 12-16 million base pairs

**Typical results are 25-40 newly discovered mutations**

**Results likely to be analyzed by genetic researchers**

***This test ordered mostly by genetic pioneers/hobbyists***



# Other broad coverage tests

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## BritainsDNA, ScotlandsDNA, IrishDNA, YorkshiresDNA

- Specializes in British Isles deep ancestry tests
- Introduced new Chromo2 test in June 2013 for \$299
- Chromo2 tests over 14,500 Y-chromosome SNPs



***Ordered more by people with British Isles ancestry***

## Gene by Gene (parent company of Family Tree DNA)

- Offers Whole Genome Sequencing for \$7,595

***Targeted toward medical use, not genealogy***



# Why would I do a “broad” Y-DNA test ?

## I’ll use my own Y-DNA as an example case

- I have a “Jewish” Levite SNP (mutation) identified as R-L583
- It’s a subgroup of R-M269 (much of Europe, ~10% of Jews)
- It’s also a subgroup of R-DF13 (considered a “Celtic” group)

***High rate of  
DF13 in  
British Isles  
populations***



***My DF13  
ancestor***

***“No” DF13 in  
Near East  
populations***

# Why would I do a “broad” Y-DNA test ?

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## Wow!! So am I a Celtic Irishman??

- Well, no... (but I'm genetically related to some of them)
- I am also genetically related to Ashkenazi Levite Jews



## When did my genetic paternal line become Jewish?

- Nobody really knows, but will have more information soon
- My Full Genomes testing results will identify new mutations

## New mutations may tell the age of R-L583 and R-DF13

- How old is my Levite line (500 years ago?), my Ashkenazi line (1500 years ago?), my “pre-Celtic” line (3500 years ago?)

## New mutations may identify my close Jewish relatives

- Can provide clues to family linkages when surnames do not...



# Why would I do a “broad” Y-DNA test ?

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## What's the story about other kinds of Ashkenazi Levites?

- All Levites (לוויים) are about 4% of the male Jewish population
- More than 50% of Ashkenazi Levites are in R1a1 haplogroup
- Previous ideas suggested a non-Jewish European founder whose descendants were able to assume Levite status
- One hypothesis was a Turkic-speaking Khazar ancestor, as Khazar rulers may have converted in the 8th or 9th century

## A new paper (*out just last month*) suggests otherwise...

***Phylogenetic applications of whole Y-chromosome sequences and the Near Eastern origin of Ashkenazi Levites***, S. Rootsi, et al., Nature Communications 4, Article number: 2928, *Dec 17 2013*.

*Authors suggest R1a1 Levites have Near Eastern origin, not Khazar*





# Conclusions about the new tests

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**We can find out a lot more than we ever knew in 2008**

**DNA is telling us new things about our Jewish past**

- There is new genetic support for Jewish culture and history

**As we have seen, the newest academic research papers are now taking advantage of these broad coverage tests**

- *You can, too...* in searching out your genealogical roots

**Some final words (for those contemplating a DNA test):**

***Don't ask the question if you don't want to know the answer!!***