



DNA and Ancestry

An Update on New Tests

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What did we just learn ?

- **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 ?

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 ?

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 ?

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

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

“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 ?

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

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

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

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

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

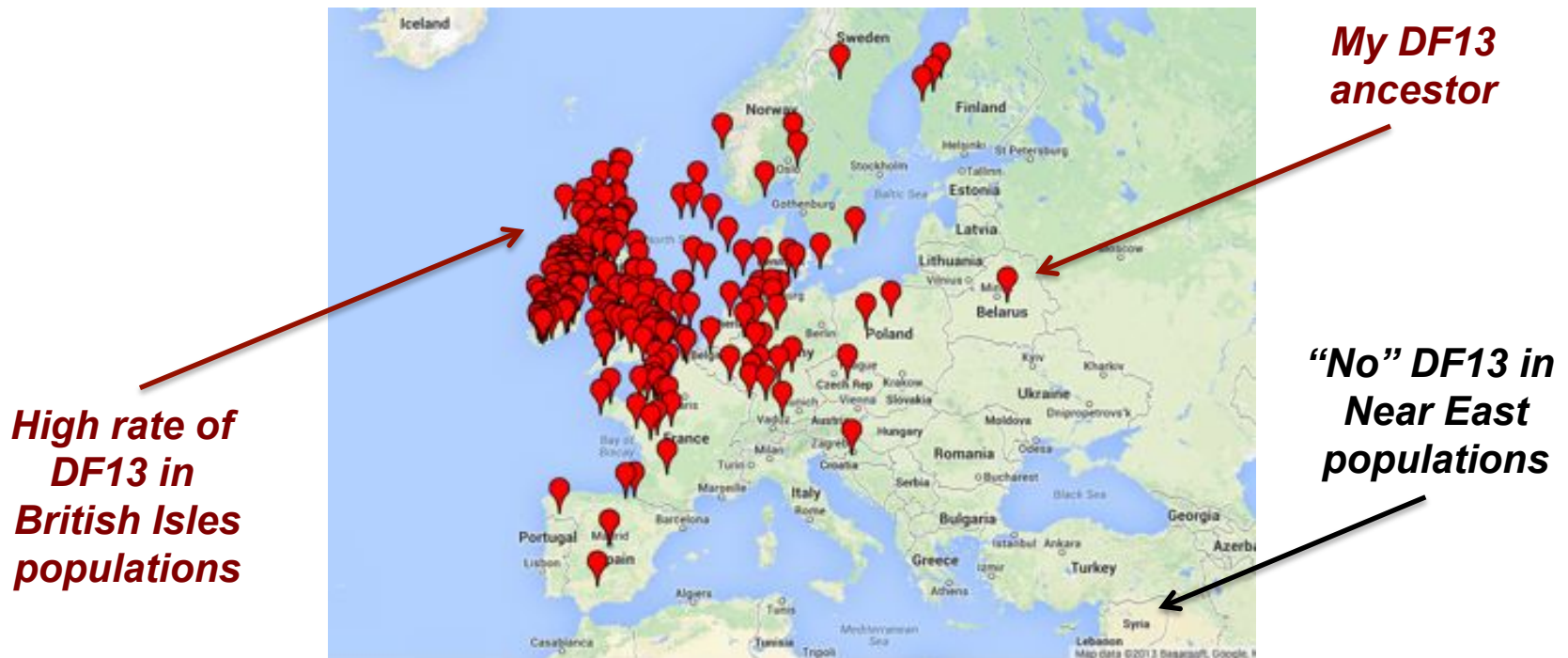
Targeted toward medical use, not genealogy



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)



Why would I do a “broad” Y-DNA test ?

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 ?

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

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!!