

Using DNA in Family Research

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www.GenealogyTechTalks.com

What You Will Learn

- The types of DNA tests
- The testing companies
- Judge strength of DNA match
- DNA Triangulation
- Investigating DNA matches
- Chimerism

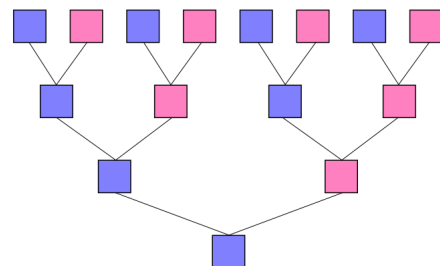
Major Testing Companies

Company	atDNA	Y-DNA	mtDNA	WGS
Ancestry.com	\$99			
23andMe.com	\$99			
MyHeritage.com	\$89			About \$89-\$110 (2x only)
FamilyTreeDNA.com	\$79	Y-37 \$119 Y-111 \$249 Y-700 \$449	\$159	

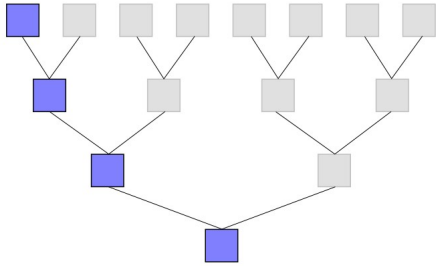
Types of DNA Tests

- atDNA – both lines (autosomes, pairs 1-22)
- Y-DNA – male line (Y-chromosome)
- mtDNA – female line (mitochondria)
- WGC – Whole Genome Sequencing
 - Includes all three of above
 - 30x is the medical standard

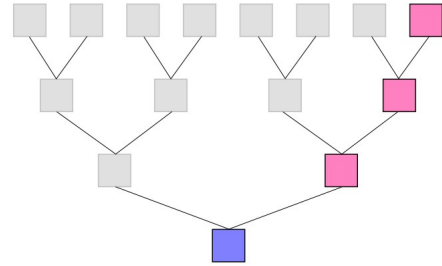
atDNA



Y-DNA



mtDNA



WGS

- Whole Genome Sequencing
- All 23 nuclear chromosomes plus mitochondria
- Only 2x offered by HyHeritage
- 30x is the medical standard

Types of DNA Tests

- Y-DNA – male line (Y chromosome)
 - Father, his father, etc.
 - Their sons, their son's sons, etc.
 - Not daughters or daughter's sons
 - Only males can take this test
- mtDNA – female line (mitochondria)
 - Mother, her mother, etc.
 - Their sons and daughters, etc.
 - Daughter's children, but not son's children
- atDNA – both lines (autosomes, pairs 1-22)
 - All ancestors, aunts, uncles, cousins, etc.
- WGS – all of the above

Pros and Cons of DNA Tests

- Y-DNA – male line (Y chromosome)
 - Pro: brick wall on paternal line, changes slowly
 - Cons: expensive, few other testers, changes slowly
- mtDNA – female line (mitochondria)
 - Pro: brick wall on maternal line, changes slowly
 - Cons: expensive, few other testers, changes slowly
- atDNA – both lines (autosomes, pairs 1-22)
 - Pros: cheaper, many other testers
 - Cons: limited to about 4 to 5 generations
- WGS – male and female lines
 - Pros: the coming standard
 - Cons: low quality or expensive; few other testers

Autosomal DNA Matches

- Cut in half each generation
- Prediction of relationship
- Measured in percent or CentiMorgans (cM)

centiMorgan (cM)

- “Effective” distance along a chromosome
- Compensates for variation in rate of change
- Distance along chromosome with 1% chance of crossover per generation
- Crossover is a “shuffling” of father’s and mother’s chromosomes
- On average, about one million base pairs



Ranges By Relationship

Relationship	Percent	cM
Parent, Child	47-53%	2376-3720 cM
Full Sibling	38-61%	1613-3488 cM
1 st Cousin	4-23%	396-1397 cM
2 nd Cousin	2-6%	41-592 cM
3 rd Cousin	0-2.2%	0-234 cM

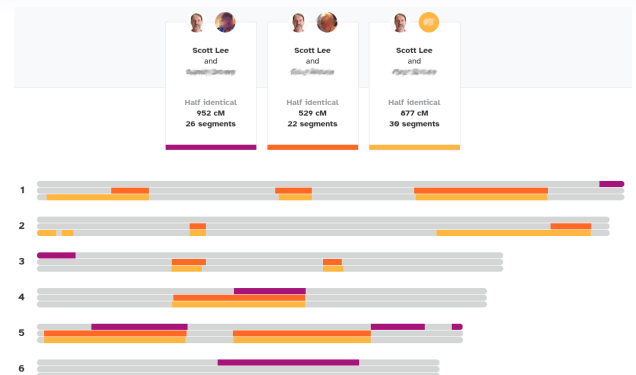


Endogamous Populations

- Widespread inter-marriage in small community
- Tight-knit rural communities
- Multiple generations living in the area
- Small (< 5 cM) matches among distant cousins



Chromosome Browser

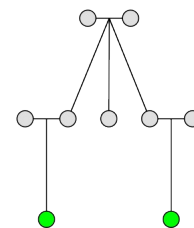


DNA Triangulation

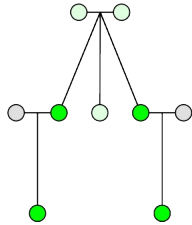
- Use chromosome browser
- Compare three or more matches
- Identify common segments
- Use segments at least 5 to 10 cM
- Reconstruct DNA of ancestors



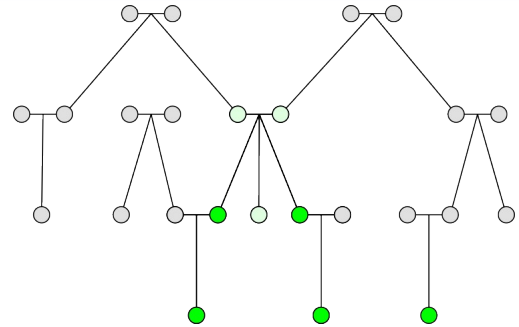
DNA Triangulation



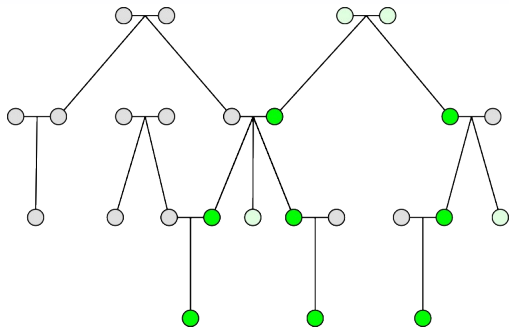
DNA Triangulation



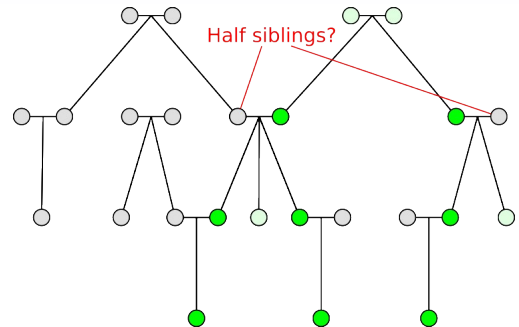
DNA Triangulation



DNA Triangulation



DNA Triangulation



Unknown DNA Matches

- Look at common matches
- Look for known segments
- Estimated relationship may be wrong
- Build their tree (if they haven't)



DNA Confirms Relationships

- Paper records may not be correct
- Identity of father is always hearsay



Chimerism

- Two sets of DNA in one person
 - “Vanishing twin” – one dies and is absorbed by the other
 - Organ transplants and blood transfusions
 - Fetal cells transferred to/from mother
- Usually no outward indication or symptoms
- Two eye colors; two skin tones; birthmarks
- Some experts estimate as high as 10% of humans



Ethnicity Estimates

- Reference Populations
- Native American family legends
- Should be reported as probability range
- Past few hundred years of ancestry



Ancestry.com

- Finds common ancestor of DNA matches
- Requires both testers to build trees
- Many have no tree or only a small tree
- Build your tree down with descendants of your ancestors



Recommendations

- Test with at least Ancestry and 23andMe
- Get relatives to test their DNA
- Build Ancestry.com tree with descendants of your ancestors
- Use chromosome browser to triangulate
- DNA gives evidence, not proof
- Handouts: [GenealogyTechTalks.com/talks/dna](https://www.genealogytechtalks.com/talks/dna)
 - More information on DNA triangulation

