

GENETIC GENEALOGY—WHAT IS IT?

How will it help me with genealogy? What is DNA?

(We will be putting together a study group for this subject, if you are interested in participating, there is a sign up sheet at the back table—we would love to have you join us!).

What is DNA? Briefly....it is the “stuff” that is in almost every cell in our body that determines that we are human beings, hair color, height, everything that makes us unique. You get half from your mother, and half from your father. We share 99.9% of DNA with everyone else....

Basic reasons for getting a DNA test

Basic misconceptions about getting a DNA test

What to expect

--Ethnicity ESTIMATE

- Native American does not show up that readily
- Hispanic shows up as Native American
- Does not break out (for example) Scottish or Italian as such

--List of other people you are genetically related to that have tested with the same company, with an estimate of how you are related (cousin, niece, parent, etc.).

--Raw DNA report—if you want to print it out it is about 20,000 pages! You don't need to do that 😊.

There are three main testing companies: Ancestry, 23andme, and FTDNA. GEDMATCH is another company that you need to know about....it is not a testing company; but you can put your raw DNA results into their database for more matches. And it has a great chromosome browser.

Examples of how this works.....

X DNA; Y DNA

Sources

A handwritten signature in cursive script that reads "Phyllis".

Phyllis Lewellen Chino Valley, Arizona

Feel free to email me at phyllisj49@yahoo.com if I can help!

What is Genetic Genealogy? Genealogy is simply the study of one's family tree or ancestry.

Genetic genealogy uses DNA testing to determine the genetic relationship between individuals.

Why would someone want to use DNA for genealogy? There are many reasons but here are a few of the most common:

- To learn more about one's ancestry
- To confirm that one's family tree reflects one's actual ancestry
- To confirm the relationship between two people
- To validate a theory of where people came from
- **To break down a brick wall in one's genealogy research**
- To find relatives for those that were adopted, gave up a child for adoption or otherwise do not know their ancestry.
- To learn from which ancestor(s) certain traits were inherited
- To learn more about DNA implications for one's health

What are some Common Misconceptions about Genetic Genealogy?

This list is from Blaine Bettinger:

- Genetic genealogy is just for fun.
- I'm a woman, so I can't take a genetic genealogy test myself.
- DNA testing will provide me with a family tree.
- DNA results are too narrow to be worthwhile.
- DNA testing will reveal my health information.
- My parents and grandparents are deceased, so genetic genealogy won't help me.
- Genetic genealogy testing is a violation of privacy.
- Because my mother/father/sibling shares autosomal DNA with that person.
- My ethnicity estimate from the testing company should match my own genealogy.
- The relationship prediction provided by the testing company is the actual genealogical relationship.

What in the world is DNA?



DNA, short for deoxyribonucleic acid, is the molecule that contains the genetic code for organisms.

Each of us has 23 pairs of chromosomes:

22 pairs of autosomes, referred to as **autosomal DNA**, or **atDNA**—this is what we use primarily to assist us with chromosome matching to determine ancestry and relationships.

1 pair of sex chromosomes, these determine whether you are male or female.

All chromosomes come in pairs. Each half of the pair represents, i.e., comes from, one of our parents. We inherit half of our DNA from mother and half from father.

Because of the way DNA mixes, recombines, etc. down through generations, as far as matching via DNA with other relatives, that is only going to be good for about 6 generations or so.

Think of each chromosome as a very long string of beads, each one is coded a certain way. You inherit (fairly randomly) some from each parent. But each parent does not contribute exactly the same DNA “beads” each time they create a human. You will share some of your DNA with siblings, but not all (unless you are an identical twin). You share less with a first cousin, even less with a second cousin, etc. Chromosome segments are measured in centimorgans, or cM’s. We can determine if we have an ancestor in common with someone by looking at DNA for each, and finding segments that match exactly in sufficient numbers (7cM is the best standard, anything less may give you false positives). So what does that look like? This is from Gedmatch:

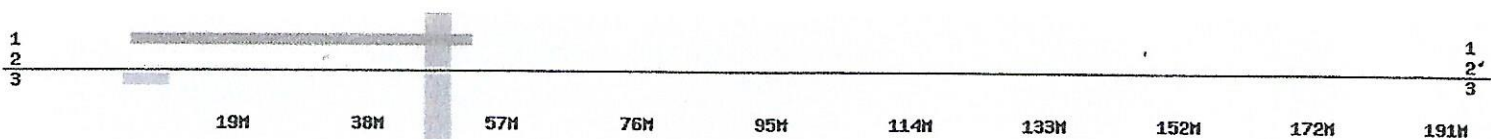
8/24/2017

https://www.gedmatch.com/chrom_match_4c.php?id=96084&kit_num=M258342

Chr 4

Match ID	Type	Name	Matching segments on Chromosome 4	Overlap with previous match
1	F2	Wanda Louise Hatfield (A232324)	7193871 - 55129585 (55.6139 cM)	New Root
2	V3	Scott Hatfield (M222227)	7193871 - 40949619 (47.1809 cM)	7193871 - 40949619
3	F2	*Larry Bauer (Haggerton) (A222030)	6021983 - 12367715 (15.1578 cM)	7193871 - 12367715

Chr 4



match on Chromosome 4

DNA Detectives Autosomal Statistics Chart

Created by Christa Statcup

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cM (centiMorgans)^		Percentage (%) of Shared DNA^^		Group	Relationship	Notes
Average	Range	Average	Range			
3,600		50%			Parent - Child	
2650	2300 - 3900	37%	32%-54%	Group A	Full Sibling	Ancestry, FTDNA and GEDmatch (HIR only)
3600		50%				23andMe (FIR included)
1800	1300 - 2300	25%	18%-32%	Group B	Half Sibling Aunt/Uncle/Niece/Nephew Double First Cousin Grandparent/Grandchild	3/4 Siblings^^^
900	575 - 1330	12.5%	8%-18.5%	Group C	First Cousin (1C) Half Aunt/Uncle/Niece/Nephew Great-Grandparent/Great-Grandchild Great-Aunt/Uncle/Niece/Nephew	
450	215 - 650	6.25%	3%-9%	Group D	First Cousin Once Removed (1C1R) Half First Cousin (½ 1C) Half Great-Aunt/Uncle/Niece/Nephew	
224	75 - 360	3.125%	1%-5%	Group E	Second Cousin (2C) First Cousin Twice Removed (1C2R) Half First Cousin Once Removed (½ 1C1R)	
112	30 - 215	1.56%	0.42% - 3%	Group F	Second Cousin Once Removed (2C1R) Half Second Cousin (½ 2C) First Cousin Three Times Removed (1C3R) Half First Cousin Twice Removed (½ 1C2R)	
56	0 - 109*	0.78%	0% - 1.52%	Group G	Third Cousin (3C) Second Cousin Twice Removed (2C2R)	~10% of 3Cs will not share DNA*
30	0 - 75**	0.4%	0%-1%	Group H	Third Cousin Once Removed (3C1R) Other Distant Cousins	~50% of 4Cs will not share DNA**

^cM =Ancestry.com & FTDNA

^^Percentage of DNA = 23andMe

^^^ 3/4 Siblings are a combination of half siblings and 1st cousins, FIRs are included.

Groups A & B: 99% within the ranges given

Groups C - I: 95% within the ranges given

DNA Detectives Autosomal Statistics Chart Explained

©THEDNADETECTIVES, 2016

Why this chart and not company predictions?

It is preferred that you personally interpret the DNA share vs taking the company's relationship prediction at face value.

Where to find your DNA share:

Ancestry: Click on the match's profile and a little "i" icon will display next to the Confidence Level to give you the cM total (not including X share)

FTDNA: Manually calculate the total cM share with the segments 7cM and higher. (Tip, just add up the tiny segments and remove that total)

23andMe: Percentage listed on the profile.

GEDmatch: Combine autosomal and X DNA share.

Converting to percentages:

If you prefer working with percentages (most of the admins do), then take the total cM share and divide by 71.6 to get an approximate percentage for FTDNA and GEDmatch. For Ancestry.com, divide by 68.

Anomalies and Outliers: It is best if you first look at the average DNA share per relationship (bright bold red column) while comparing what you share with your DNA match, then proceed to look at the ranges. If you are what we may refer to as an 'in-between' share, then you will need to consider two groups of possible relationships. This is why we have added a new feature called "**groups**". There can be many relationships to consider so having you refer to a chart and providing you a group is easier than typing out every single relationship option here in Facebook. Unfortunately, you seldom are working with only one option of a relationship. There are two major factors that contribute to having more relationships to consider than you hoped for:

1. The randomness of DNA inheritance
95-99% of the time your cM share will fall within the correct groupings. However, there are anomalies occasionally, such as seeing a half 1st cousin (or 1C1R) sharing as high as a full 1st cousin, or seeing a 3rd cousin sharing as high as 2%/150cMs. You will need to consider many relationships and use the amount shared as a guide, you must dig into the tree to see what relationships are possible. If you believe you are dealing with an anomaly or an outlier, the only method to know for certain is to test an additional family member to confirm.
2. Endogamy and pedigree collapse within the population
This is dealt with on a daily basis in genetic genealogy, whether it is a specific known endogamous population or your relatives just decided to never move from that southern mountaintop. Also, consider that you may not have cousin marriages in your tree, but you could instead descend from a "bottle neck" population and you are virtually 5th -7th cousins with all the descendants of the founding families of that area.



23andMe Customer Care > Tools > DNA Relatives

Average percent DNA shared between relatives

The following table summarizes the average percent DNA shared for different types of relationships according to our simulations. You may notice that several relationships share the same average percent DNA; this can account for a predicted relationship of aunt/niece for a pair of half sisters.

Relationship	Average % DNA Shared	Range
Identical Twin	100%	N/A
Parent / Child	50%	Varies by specific relationship
Full Sibling		
Grandparent / Grandchild		
Aunt / Uncle		
Niece / Nephew	25%	Varies by specific relationship
Half Sibling		
1st Cousin	12.5%	7.31% - 13.8%
1st Cousin once removed	6.25%	3.3% - 8.51%
2nd Cousin	3.13%	2.85% - 5.04%
2nd Cousin once removed	1.5%	0.57% - 2.54%
3rd Cousin	0.78%	0.3% - 2.0%
4th Cousin	0.20%	0.07% - 0.5%
5th Cousin	0.05%	Variable
6th Cousin	0.01%	Variable

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[DNA View in DNA Relatives](#)

[Viewing Shared Segments of DNA](#)

Related Articles

[Learning more about your matches in DNA Relatives](#)

[Can 23andMe distinguish half vs. full sibling relationships?](#)

[The probability of detecting different types of cousins](#)

[Relationship ranges and the predicted relationship](#)

[Sorting and filtering your matches in DNA Relatives](#)

To learn more, visit the [International Society of Genetic Genealogy website](#).

Still have questions? Contact Us

X DNA and Y DNA—Sex Chromosomes—23rd pair of chromosomes that determines if a person is male or female.

Men have one Y chromosome (from their father) and one X chromosome (from their mother).

Women have no Y chromosome, one X chromosome from father and one X from mother.

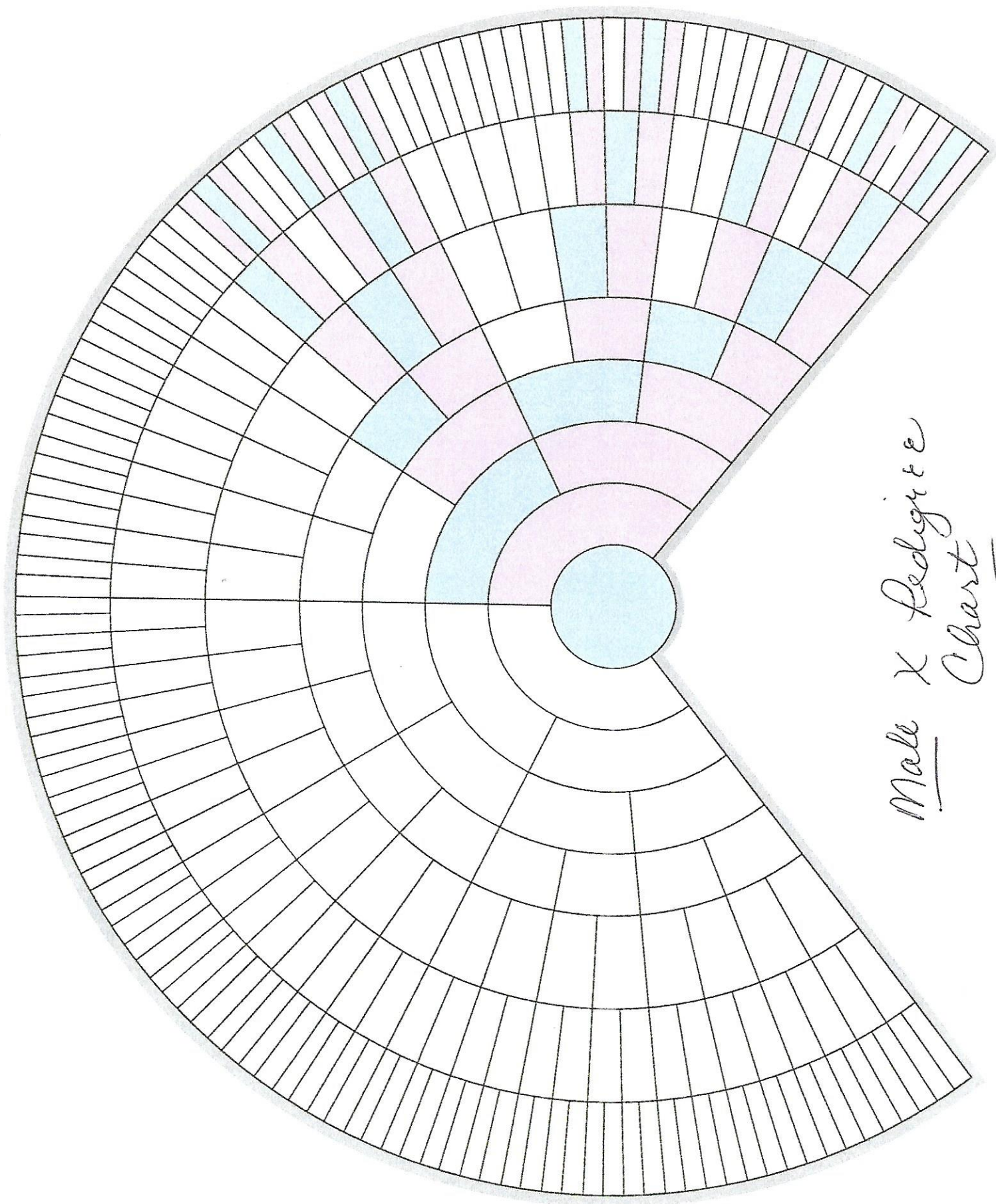
There are separate tests that use Y DNA (only men can take these) and mitochondrial MtDNA tests for women that can assist with determining ancestors. The best tests are through FTDNA.

You can also look at your X DNA matches to assist in determining Ancestry.

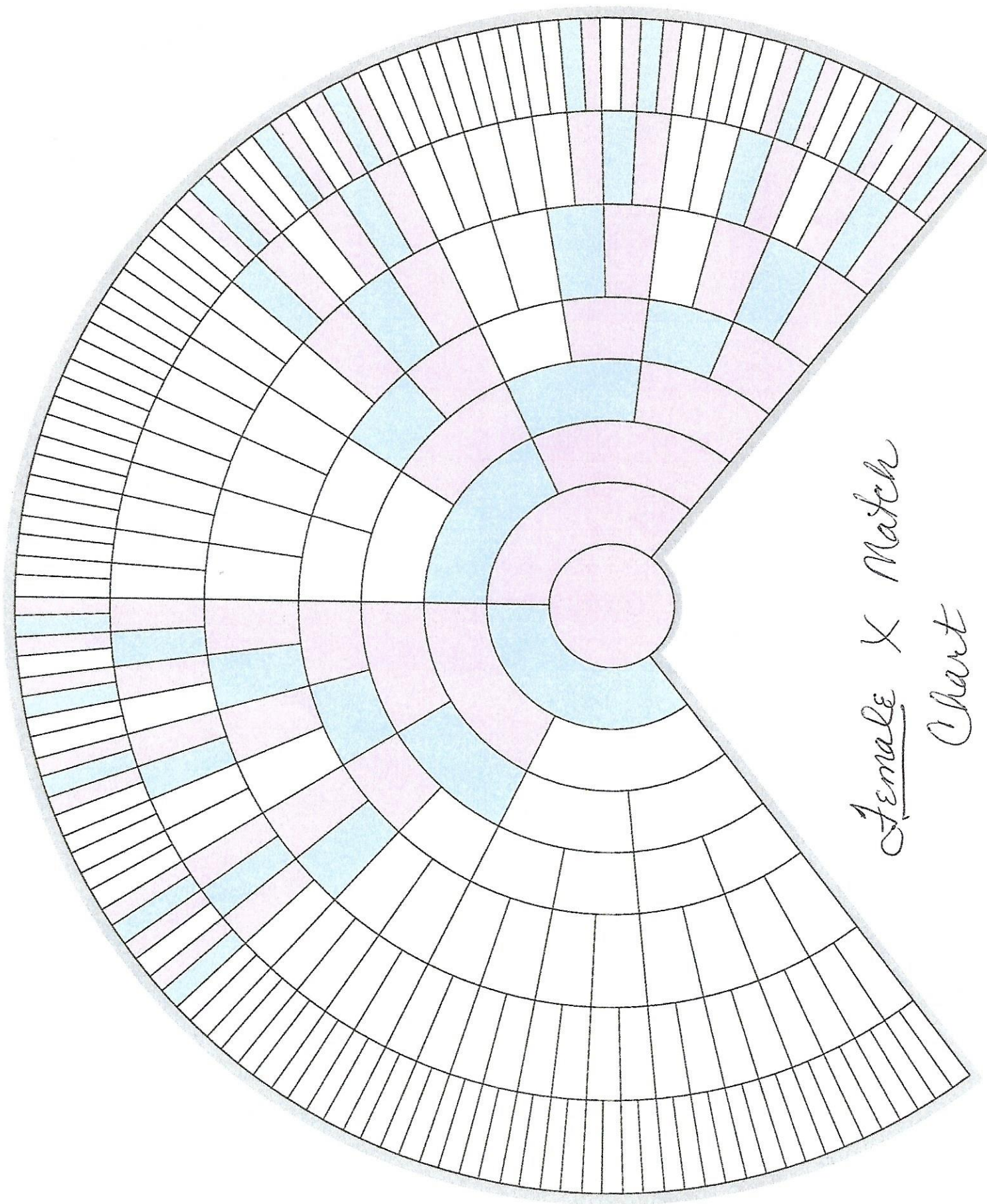
Note: If you are a male, and share an X DNA with someone else, that X DNA came from your mother's side of the family. If you are a female, and share an X DNA with someone else, it could be from your mother's or father's side.

It is a common misconception that if you have X matches, they are all on your mother's side—nope.

Following are charts that assist you in determining X inheritance.



Male X Pedigree &
Chart



*Female X Match
Chart*

Testing Companies

There are three main companies that do DNA testing for heredity/ethnicity and DNA (relative) matching. All provide an ethnicity estimate, as well as a list of those people you are related to ("match") that have tested with that same company. The list will be in order by how closely related you are, and will give an estimate as to how you are related (father, cousin, nephew, etc.).

23andme Usual cost about \$99.

Provides ethnicity estimates (probably one of the better ones out there).

Provides listing of relatives, also, but you have to send a request to a match and get permission to share chromosome information. (Sometimes you get it, sometimes you do not).

Includes email of each match for you to contact them directly.

Health report: 23andme also has a health report (another \$100 cost) that does provide information regarding your health as it related to what they can look for in your DNA. It is helpful, but do not think it is going to tell you everything about your current health! It is genetic information only.

They use percentages of DNA shared versus number of centimorgans.

FTDNA (Family Finder) Usual cost about \$99, goes on sale regularly

Has the fewest number of participants, too bad, because it is one of the most comprehensive ones available. But you will not get as many matches here.

Includes ethnicity estimates.

Provides listing of relatives, and includes a chromosome browser—a way to look at where you share DNA with each person, total number of centiMorgans you share, etc. Very helpful.

Includes family trees for those who have family trees posted (Everybody should! Not all do!) which help you figure out how you might be related to them providing DNA confirmation for your family tree.

You can load your DNA raw data from other testing companies such as Ancestry into FTDNA for \$19. This gives you more matches, and a chromosome browser for those FTDNA matches.

FTDNA is the best site to get Y DNA (paternal, can only get if you are a male) and mT DNA testing (maternal). FTDNA also has many “projects” for particular surnames that help you match your particular line to others.

AncestryDNA The big guys...up to about 5,000,000 participants so you will get more matches here than with either of the other two. Advertise regularly and aggressively. Usual cost about \$99, goes on sale regularly.

Receive ethnicity estimates. Unlike the other two, they do break out Irish if it is there to find. (Others just include it in Great Britain total).

Provide a list of genetic matches, and estimated relationship. But they do not provide a chromosome browser! Boo, hiss!

Some participants include their family tree with their results, others do not.

One thing they do provide that is great is DNA Circles: If your family tree is attached to your DNA results, their computer program looks for your DNA matches that also have family trees and shows you the connection where it can be found.

There are others.....one that has started advertising DNA testing lately is MyHeritage.

MyHeritage has been around for a long time for basic genealogy searches. They have just started offering DNA testing. Unfortunately, it appears they launched this before they were very good at it. Lots of problems with it. IF you are looking for birth family you may want to put your raw DNA into it to find matches (but test in the other three first), but their matching system is not very accurate. Proceed with caution. You can upload your raw data DNA from another testing company to MyHeritage—supposedly free. Proceed carefully. If you get some high matches with MyHeritage (especially people that you do not know how they fit into your tree) if you can get them to put their results (and you do yours) into Gedmatch so you can test for accuracy.

GEDMATCH

Gedmatch is NOT a testing company. It is *free* for basic services.

Anyone who has tested with any one of the three major testing companies can upload their raw DNA results into Gedmatch at no cost. What you then receive is a list of all other people that match you genetically that have loaded their raw DNA from other testing companies (ancestry, 23andme, and FTDNA).

It has a great chromosome browser. You can then look at your matches to find out what chromosomes you match on, find other people that match you and one other match in common. It includes family trees for those who have put them in (here we go again, not everyone does). Your “one to many” match list will look like this:

There are many features in Gedmatch that are very useful. One of the more fun ones is “Are Your Parents Related?” Many people marry a cousin (usually distant enough to not be a big deal) without realizing it. Be not afraid.

Gedmatch also has a heritage section (called Admixture).

ALL of the above include tutorials on their webpages that explain how to use their programs, definition of terms, and so on.

IF you want to, you can subscribe to the Tier 1 Utilities in Gedmatch for \$10 monthly. One of the many tools you can use here is the matching segment search, i.e., find other kits with segments that match yours—chromosome by chromosome, segment by segment. One option is to pay for one month, run all the reports you can, save them in Excel, and work from that report for some time.

GEDmatch.Com Autosomal Comparison - V2.1.1(c)

Comparing Kit M258342 (Phyllis Lewellen) and A681158 (Donald Landes ~~Samuels~~)

Minimum threshold size to be included in total = 500 SNPs

Mismatch-bunching Limit = 250 SNPs

Minimum segment cM to be included in total = 7.0 cM

*first cousin -
his mother and my
mother were
full sisters*

Chr	Start Location	End Location	Centimorgans (cM)	SNPs
1	742,584	29,906,089	55.8	3,575
1	112,403,479	201,599,687	68.2	6,184
2	14,610,212	31,120,895	21.3	1,732
2	75,537,419	88,557,180	12.6	1,153
3	5,115,364	59,898,554	63.2	5,892
3	107,820,260	116,850,680	7.2	821
4	7,188,422	25,625,254	28.0	2,192
4	26,554,247	56,343,470	27.3	2,238
5	58,465,399	104,056,808	40.8	3,812
7	154,912,492	158,763,730	8.4	505
8	10,835,241	21,221,114	18.1	1,904
8	24,912,421	55,385,207	23.3	2,237
8	95,228,334	122,387,731	23.4	2,504
9	36,587	8,869,472	22.0	1,805
9	121,079,397	140,138,244	37.5	2,377
10	116,070	16,742,336	40.0	3,016
10	21,354,941	47,959,596	20.9	2,095
12	61,880	20,551,400	42.2	2,817
15	56,606,075	69,236,452	19.3	1,403
16	45,320	15,062,399	34.7	2,304
16	52,435,093	56,691,789	9.0	668
19	6,271,963	39,944,378	40.2	2,470
19	46,254,576	63,776,118	44.4	2,290
20	55,597,093	59,209,969	13.7	687
22	19,780,181	25,966,606	16.7	755

Largest segment = 68.2 cM

Total of segments > 7 cM = 738.3 cM

25 matching segments

Estimated number of generations to MRCA = 2.1

294648 SNPs used for this comparison.

M431471	2	4,559,807	7,571,595	7.2	704	Michele Thompson	F
M844001	2	4,559,807	7,571,595	7.2	704	Michele Thompson	F
M052728	2	4,579,351	7,955,969	8.5	768	Steven Mooney	M
A323904	2	5,405,907	11,991,904	17.6	999	*Maggie	F
A930566	2	5,405,907	11,991,904	17.6	993	*Eula	F
A327915	2	5,452,684	11,078,995	15.1	861	*JS	M
A785671	2	5,452,684	11,078,995	15.1	861	*JS	M
A790829	2	5,452,684	11,078,995	15.1	861	*JS	M
A709537	2	5,509,001	11,962,271	17.4	981	Lisa Collins	F
A058689	2	5,512,219	11,658,644	16.5	924	*Tony	M
A224090	2	5,541,018	12,289,396	18.1	1,024	*WLM	F
A682393	2	5,541,018	11,710,844	16.6	932	*DixieDee	F
A778107	2	6,002,367	11,787,756	16.1	865	gary young	M
A404275	2	6,705,282	11,814,426	14.8	765	Karen E Moore	F
A596626	2	6,705,282	11,814,426	14.8	765	Karen Moore	F
M162774	2	7,700,876	11,020,947	10	724	Randall Hardy	M
M583117	2	8,484,336	11,796,174	9	718	Susan Hill	U
M406142	2	8,484,336	11,762,290	8.9	716	Darla Jones	F
M141035	2	11,183,423	19,553,715	13.6	1,555	JoAnne Leach	F
A811147	2	11,457,601	18,784,872	12	847	*Amanda	F
M762722	2	11,473,850	16,058,708	8	871	Lauren Johnson	F



DNA for 'Dummies'

There have been many requests from people new to genetic genealogy for basic introductory information. This page links to some excellent resources to help get you started. These articles are used with the permission of the authors, and remain their property. We are grateful that they have agreed to allow us to link to their efforts.

New GEDmatch users looking for basic information on how to use this site should look [HERE](#).

Subject / Title

Author

[Beginners Guide to Genetic Genealogy](#)

Introduction to Genetic Genealogy

Kelly Wheaton

[Autosomal DNA](#)

Part 3 in a series for Geni

CeCe Moore

[Ancestral Origins \(Admixture\)](#)

Part 4 in a series for Geni

CeCe Moore

[Everyone has Two Family Trees](#)

A Genealogical Tree and a Genetic Tree

Blaine Bettinger

[Unlocking the Genealogical Secrets of the X Chromosome](#)

Blaine Bettinger

[More X-Chromosome Charts](#)

Blaine Bettinger

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*Once you sign up for GEDmatch you
will be able to access this —*

SOURCES

There are MANY sources for studying this subject. Each of the main testing companies, as well as Gedmatch, has information on their websites that is very helpful. VERY.

There are many books, Facebook pages, websites, blogs, organizations, you name it.

Books (If you purchase a book be sure it is very recent).

- Guide to DNA Testing and Genetic Genealogy, by Blaine T. Bettinger, 2016, ISBN 978 a 4403 4532 6 Retail \$29.99

- Genetic Genealogy: The Basics and Beyond, Emily D. Aulicino, 2013 Paperback \$19.95 retail, Kindle edition \$3.03.

There are many more; just google genetic genealogy books.

Facebook pages

As with all Facebook pages—these in particular—you must be respectful, non-political, and polite at all times, or you will be removed promptly.

DNA Detectives

This is primarily for people looking for birth family. It was started by and is still maintained by CeCe Moore and others. You do not have to be someone looking for biological family to join; anyone interested in helping others is welcome and appreciated.

It is a CLOSED group: whatever you post will not go onto your personal facebook page. Only those that belong to the group will see it. Do NOT share anything about a specific person outside of the group.

This is an excellent Facebook page to learn from; DNA questions only. If you are not looking for birth family, PLEASE respond to anyone who may get in touch with you regarding possible connections, you may be able to provide a key to unlocking their biological family (I have!).

Ancestry GEDmatch 23andMe FTDNA My Heritage Genealogy DNA

Closed group

Ancestry DNA Matching

Closed group

DNAGedcom User Group—only for assistance with downloading your Gedcom.

Closed group

Blogs (via Facebook)

Your Genetic Genealogist—Cece Moore

She sends out information that genetic genealogists are interested in.
(not a group as such, more like “friending” this site so that you see the announcements)

Genetic Genealogy—Tips and Techniques—Blaine Bettinger

Closed group

Kitty Cooper’s Blog—not a Facebook page-- just Google this—TONS OF GREAT INFORMATION FOR EVERYONE....

Website/Organizations

International Society of Genetic Genealogy ISOOG

“The first society founded (2005) to promote the use of DNA testing in genealogy.”

The mission of ISOOG is to “advocate for and educate about the use of genetics as a tool for genealogical research while promoting a supportive network for genetic genealogists.”

IF YOU DON’T LOOK AT ANY OTHER SOURCES, AT LEAST LOOK AT THIS ONE!

Don’t hesitate to email me if I can help! Have fun!

Phyllis Lewellen

phyllisj49@yahoo.com

How They Are Related

Figure out the common ancestor between two family members. Then pick the first relationship to that ancestor on the top row, and follow down until you match up with the other family member. The result is how the first is related to the second.

