

Using Third Party Tools to Analyze DNA – 8 September 2018

Family Tree DNA (ftDNA), 23andMe and My Heritage have chromosome browsers to help you compare your DNA to that of other testers. This is good as you can see on which chromosome or chromosomes you have significant matches with other testers. However you can't compare your DNA to testers at other companies, and it can be expensive to test at multiple companies. That's where third party tools come into play. Anyone who wishes can use third party tools, tools that may be the key to finding a long-lost cousin who hasn't tested at the same company as you. Or they may be the key to analyzing Ancestry DNA matches to determine which chromosomes you both share DNA. Remember that although Ancestry has a large database of over 10,000,000 testers and family trees you can only determine the number of shared centimorgans and the total number of shared segments. Ancestry doesn't have a chromosome browser nor does the company plan to have one anytime soon. If you want to map a shared match at Ancestry then you need to persuade your match to upload their DNA to either GEDmatch, ftDNA or possibly MyHeritage. In this talk I will look at two popular third party tools, GEDmatch and DNA Painter.

GEDmatch - <https://www.gedmatch.com/select.php>

Getting started with GEDmatch

GEDmatch.com is a popular third party tool that has been available for several years. I have to admit when I first tried to use it I registered and didn't get a response for over a week and I put the site aside. However, I went back to the site recently and had a positive experience logging in and getting started uploading DNA. You need to register the first time you arrive at the login screen and it may take up to a day for your registration to take effect before you can login. (There is some help available to get you started but it is about four years out of date!)

There is currently a problem with using the site's GEDCOM files. 25 May 2018 was the start date for the new GDPR privacy regulations which requires websites with EU (European Union) participants to hide the information for living individuals. Temporarily this is causing the GEDCOMs to be less useful and this is described on a screen prior to the home page – you can't miss it. However some participants have their trees at Wiki Tree and these trees are still available.

The first thing you need to do is upload your files from the company where you have tested. Uploads from ftDNA were very simple and GEDmatch gave clear instructions. There are also instructions for Ancestry.com and My Heritage provided. Folks who tested at 23andMe using the new V5 chip can only upload using GEDmatch Genesis.¹ Uploading raw data to GEDmatch is a two-step process. First one has to download the zipped raw data from the DNA testing company and then upload it to GEDmatch. You will click on the "HERE" button for the correct DNA company for uploading then fill out the form. You do need to give the person's full name but you can choose an alias that will be displayed, along with the e-mail address of the person managing the kit or group of kits. You will need to choose "Yes" that you have authorization and then check the box from the list of options to show that you are being ethical. Then browse on your computer to find where the raw DNA files are stored, select the file to upload then hit the "Upload" button – and wait! Remember you are uploading a large file and it may take several minutes. Be patient! Once the data is uploaded check to see there are no error messages. Your data, as soon as it is processed will be available for one to one comparisons immediately but it

¹ (<https://www.wikitree.com/g2g/442142/is-the-new-23andme-v5-chip-compatible-with-gedmatch> : accessed 15 August 2018)

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will take up to 2 days before it is ready for use in other tests including “One to Many” comparisons.

Using GEDmatch tools

Ethnicity Testing at GEDmatch

There are many **ethnicity or admixture options** you can select at GEDmatch. I am giving information on four:

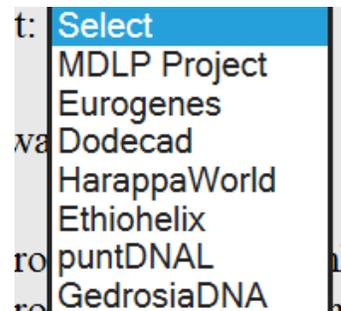
Eurogenes focuses on European ancestry and the default out of 12 possible calculations is Eurogenics 13

Dodecad which has 5 calculators focuses on Eurasian ancestry. Default is Dodecad V3

HarrapaWorld focuses on populations from the Indian sub-continent

Ethiohelix focuses on African ancestry

If you want to know more information about any of these admixture options then use Google or your favorite on-line search to learn more about them



Testing if your parents are related is a good first step. If your parents are from an area of the world where relatives frequently intermarry, for example an island or any isolated population this is really important. My husband and I are not related at all. We are both from England and we were born in different parts of the country. But if your parents or one parent is from Puerto Rico, the Azores, Iceland or some other small island nation this is an important test to run.

Phase DNA for a child when one or both parents have tested. This is easy to set up using the “Phased data generator - Data entry form.” Enter the kit number for the child and the kit number for one or both parents. Two kits will be generated for the child with kit # “xxxx,” a paternal kit number labeled “PxxxxP1” and a maternal kit labeled “PxxxxM1.” The first “P” indicates this is a phased kit. P1 and M1 refer to paternal or maternal DNA.

One to Many Comparison

Enter a kit number in the box for one to many matches, select the default settings (Autosomal and 7cM) and hit return to see many matches

Kit Nbr	Type	List	Select	Sex	GED/WikiTree	Haplogroup		Autosomal				X-DNA			Name (* => alias)	Email
						Mt	Y	Details	Total cM	largest cM	Gen	Details	Total cM	largest cM		
T	F2	L	<input type="checkbox"/>	F		H		A	3585.2	281.5	1.0	X	196	196	*	L.com
T	F2	L	<input type="checkbox"/>	M				A	1990.6	161.1	1.4	X	141.5	103.4	*	L.com
T	F2	L	<input type="checkbox"/>	F				A	1902.7	177.4	1.5	X	196	196	*	L.com
T	F2	L	<input type="checkbox"/>	M				A	19	28.7	4.1	X	0	0	*	zmail.com

Now this looks like a bunch of numbers until you analyze the data carefully. Reading across we have “Kit number” T=ftDNA kit A=Ancestry kit, H=My Heritage kit, M=23andMe kit. Chip type is F2, Click on “L” to get a list of matches for your matches or click on up to 3 boxes in the “Select” row to look at matches of matches. Sex should be obvious. Next 3 columns tell you if the match has a GEDCOM or a Wiki Tree family tree available, then the optional mitochondrial and Y haplogroups. The section on autosomal DNA is perhaps the most interesting – total cM and largest (segment) cM are given for each of your matches. The generation calculator is hard

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to use but as far as I can see it's overly optimistic. What is 1.4 or 1.5 generations? Generations have to be a whole number! The people marked 1.4 and 1.5 are actually 2 generations from me! If you click on the "A" under autosomal details you get a 1-1 comparison with that tester. You can choose to see the 1-1 results displayed as a table, as graphics or both table and graphics. However the way GEDmatch displays graphics differs from the way a typical chromosome browser displays graphics.

Chr	Start Location	End Location	Centimorgans (cM)	SNPs
1	742,584	23,822,734	50.2	6,537
1	163,934,405	207,772,518	44.8	10,152

Chr 1



The dark blue lines represent the area where this tester matches me on two long segments on chromosome 1. All chromosomes will give the same type of result, a result that differs from what one sees in a typical chromosome browser. Below is this comparison from Family Tree DNA.



The X-DNA section functions like the autosomal section – total cM and longest (segment) in cM are both given. GEDmatch will likely not produce an X-match unless you share at least 11 or more cM. The three people at the top of my list are my daughter and her two children. Looking at the amount of X we share you can see that my X chromosome was passed intact to one of my grandchildren! I share the same amount with the grandchild as I do with my daughter. The last two columns are the name (or alias if one was chosen) applied to the kit number and the e-mail address of the person servicing the kits. Kit numbers, names and e-mail addresses are deliberately blocked in this handout.

I haven't talked about the Tier 1 utilities which are only available to testers who donate \$10 per month to GEDmatch. What many people do is periodically donate \$10 so they can use the extra utilities for a month then wait 3 or 4 months before they donate again. Obviously it makes sense to donate in a month when you have a lot of time for genealogy research. One interesting project using Tier One would be to make a Lazarus kit for a closely related deceased person, like my husband's brother who died before we could get him tested. He has two daughters, two full siblings and several first cousins on both his Mom's and his Dad's sides of the family. We could also Phase the daughter's DNA as their mother is alive and could be tested.

DNA Painter - <https://dnainter.com/>

DNA Painter is a chromosome mapping tool that is very easy to use. It was recommended to me by several people in my DNA Interest Group who had used it and loved it. DNA Painter was designed by Jonny Perl, a London UK based web designer and genealogist who won the RootsTech innovation of the year award in 2018. If you wish to learn more about using DNA painter I would recommend the U-tube video "DNAPainter" recorded by Blaine Bettinger <https://www.youtube.com/watch?v=wyjcJxywTZI> Watching his video just once is sufficient instruction to start using this fascinating tool.

After logging on to DNA Painter one needs to "create a new profile." The profile starts as a set of blank chromosomes but, unlike the chromosome browsers at Family Tree DNA, 23andMe or My Heritage, the profile has two chromosomes for each chromosome 1-22 and either one X chromosome if you have indicated the profile is for a male or two X chromosomes if you have indicated the profile is for a female.

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The top chromosome in each pair is a pale blue indicating the DNA comes from Dad's side of the family while the bottom chromosome of each pair is pale pink indicating the DNA comes from Mom's side of the family. Now you are ready to start painting the chromosomes! Data can be uploaded from ftDNA, 23andMe, My Heritage or GEDmatch. If you wish to use Ancestry.com data it will need to be uploaded to either ftDNA or GEDmatch because you don't know which sections of the chromosomes match when no chromosome browser is available. MyHeritage's chromosome browser doesn't include the X chromosome.

I am going to demonstrate the chromosome painting for my granddaughter because both her maternal grandparents have tested their DNA. After some trial and error I found that the best way to start painting was to add both maternal grandparents which completely filled her maternal chromosomes. Then I added two more matches, the first cousin of her maternal grandfather and the 2nd cousin of her maternal grandmother. Any sets of matches can be temporarily removed and reassigned by the click of a button. One can also choose to show all (both paternal and maternal) chromosomes, just the paternal chromosome or just the maternal chromosome. The new shorter segments change the colors I originally used for the maternal grandparents. DNA Painter makes the following provision, and I quote this from the website:²

“Painting the match you have with a parent or full sibling is not recommended. The match you have with a parent will fill the whole of one of the chromosome pairs, both of which are 'pre-painted' because everyone gets their entire set of paternal chromosomes from the father and their entire set of maternal chromosomes from their mother. With full siblings, the issue is that painting the matches you share with them will be confusing because you don't have an easy way to know which segments are maternal and which are paternal.”

When using DNA painter it is important to paint data that is from a known side of the family – either Mom's side or Dad's side. Because most people like to label the chromosomes with the ancestral couple from whom both are related that is the way I did it. And the preferred way is to tentatively assign the DNA to the farthest back ancestor you know. I say tentative because as we do more analysis of our DNA results we are able to determine how some of those more distant matches are related. So essentially DNA Painter is a tool that allows one to map their chromosomes to their ancestors. Let me give you an example:

Our granddaughter shares approx. 25 percent of her DNA with her maternal grandfather. First cousins of the grandfather share 12.5% of this 25% or 3.125% with the granddaughter. Grandfather's 1st cousin is granddaughter's 1st cousin twice removed. If you look at the chart in the ISOGG Wiki that is the average amount of DNA shared by two first cousins twice removed.³ Anyone in common with this granddaughter and cousin Peter are related thru our granddaughter's g-g-grandparents Richard and Ada (Parker) Jennings-Giles, the ancestral couple. So the matches between Cousin Peter and granddaughter will be attributed to this ancestral couple.

DNA Painter is great because one can paint DNA from both Mom's side and Dad's side at the same time. And the use of a whole palette of colors allows one to visualize where granddaughter's DNA is from for both sides of the family at once. Even if a match is unknown to you, it can be assigned to a portion of the tree by a process known as triangulation. You can use a 1st or 2nd cousin for triangulation. A match that triangulates with the tester and a first cousin will have a set of grandparents as the common ancestral couple, with a 2nd cousin then one of your 4 sets of great-grandparents will be the common ancestral couple. So if you haven't already done so, start becoming familiar with GEDmatch and DNA Painter.

² “DNA Painter,” (<https://dnapainter.com/help> : accessed 15 August 2018)

³ “Cousin Tree,” ISOGG Wiki

([https://isogg.org/wiki/Autosomal_DNA_statistics#/media/File:Cousin_tree_\(with_genetic_kinship\).png](https://isogg.org/wiki/Autosomal_DNA_statistics#/media/File:Cousin_tree_(with_genetic_kinship).png) : accessed 15 August 2018)