FamilyTreeAZ.com

Exploring DNA Painter

Ken Waters

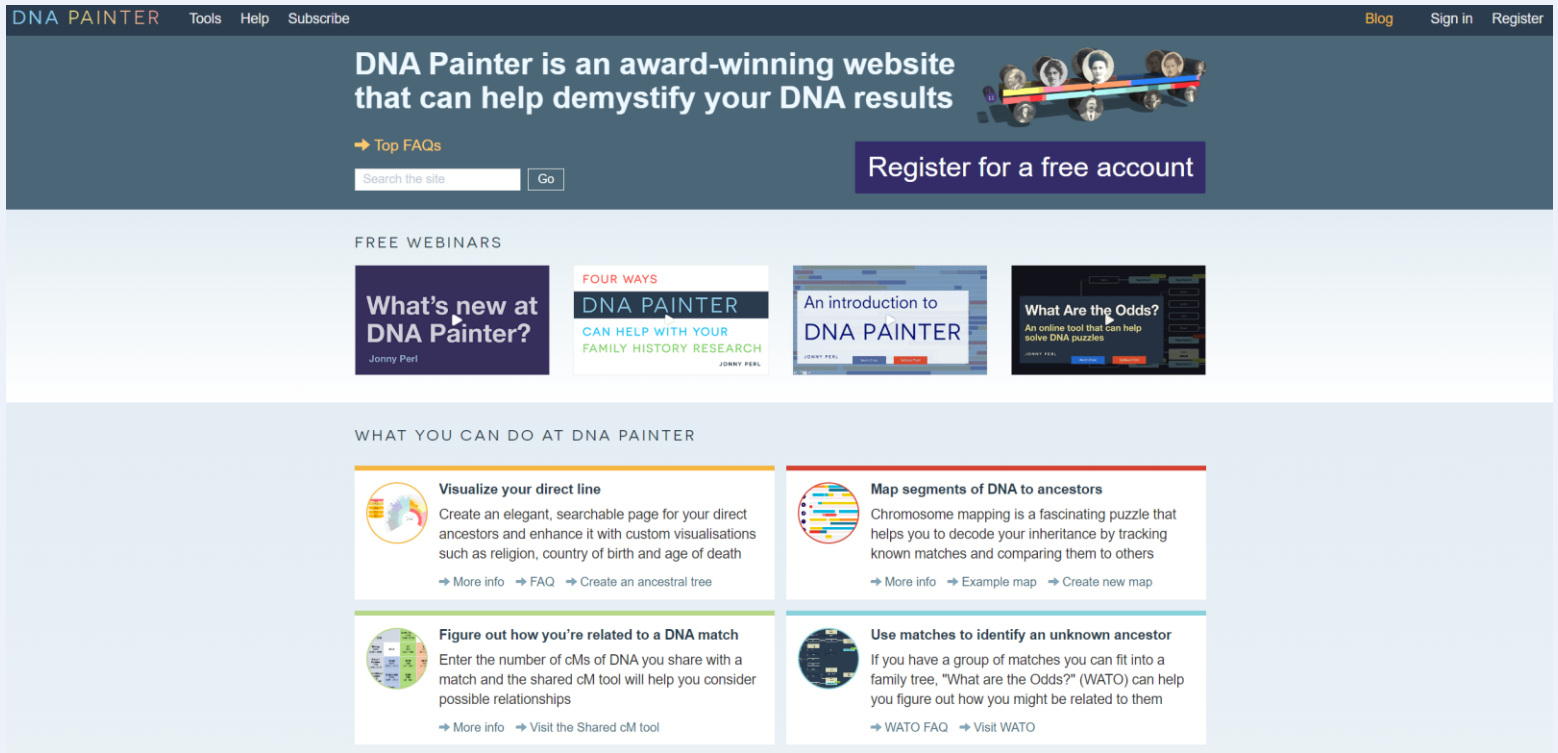
Dec 5, 2022

All slides and handouts can be found at:

http://www.familytreeaz.com/Presentations/

What is “DNA Painter”?

- Website created in ~2017 by Jonny Perl



Jonny Perl, Creator

AWARD

DNA Painter won the grand prize in the DNA Innovation contest at Rootstech 2018 in Salt Lake City, UT.

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Jonny Perl

DNA TESTING • TECHNOLOGY > DNAPAINTER.COM

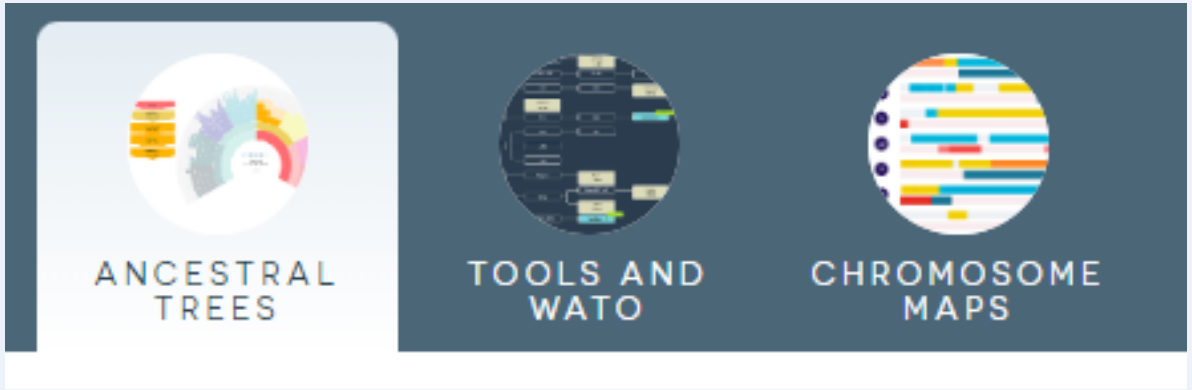
Jonny Perl is a genealogist, DNA enthusiast and web developer based in Swansea, Wales. He is the creator and founder of dnapainter.com, an award-winning web application for chromosome mapping. Jonny has also collaborated with leading genetic genealogists to create other popular tools that help people around the world interpret the results of their autosomal DNA tests. His passion is in exploring new ways of visualising DNA and family tree information to help make it more inviting and user-friendly. Born in Belfast, Jonny has family roots in Ireland, England and Germany.

Special Note

- There is SO much on the DNA Painter site
- Simply can't be covered completely in one hour but we will try to introduce the major elements that you can explore on your own

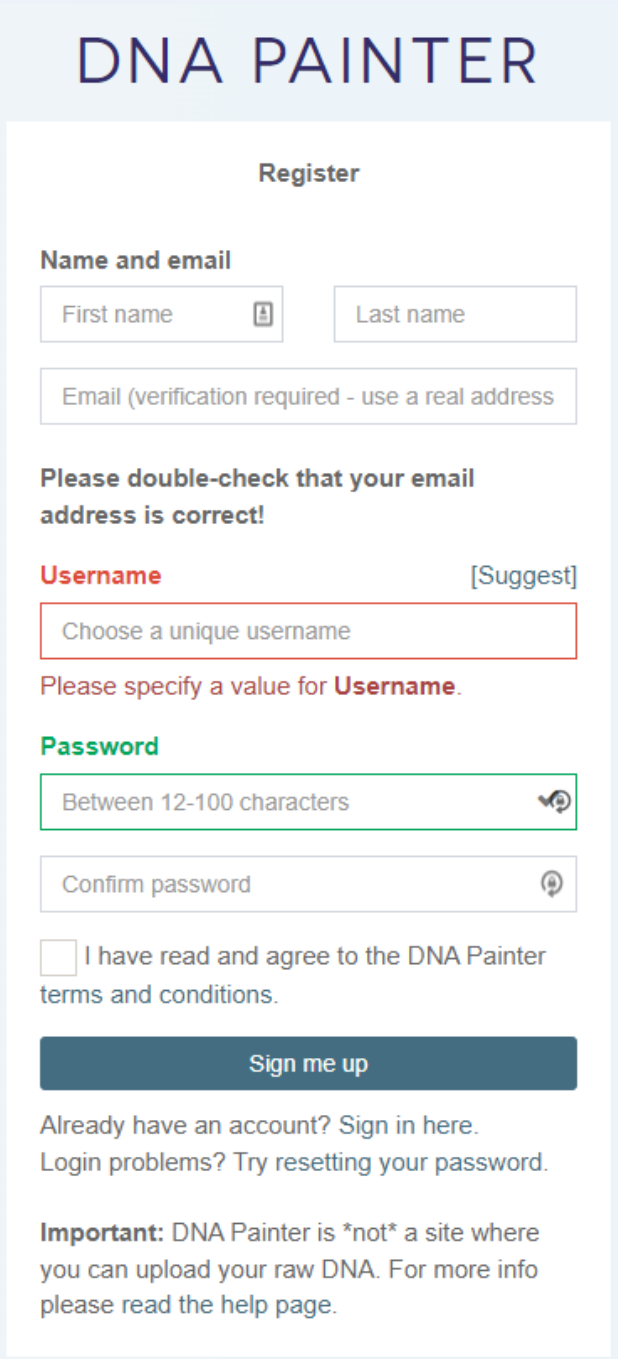
What I will cover

- Shared centiMorgan Project
- WATO (What are the odds?)
- DNA Painter/Chromosome Mapping
- Ancestral Trees
- Cluster Auto-Painter



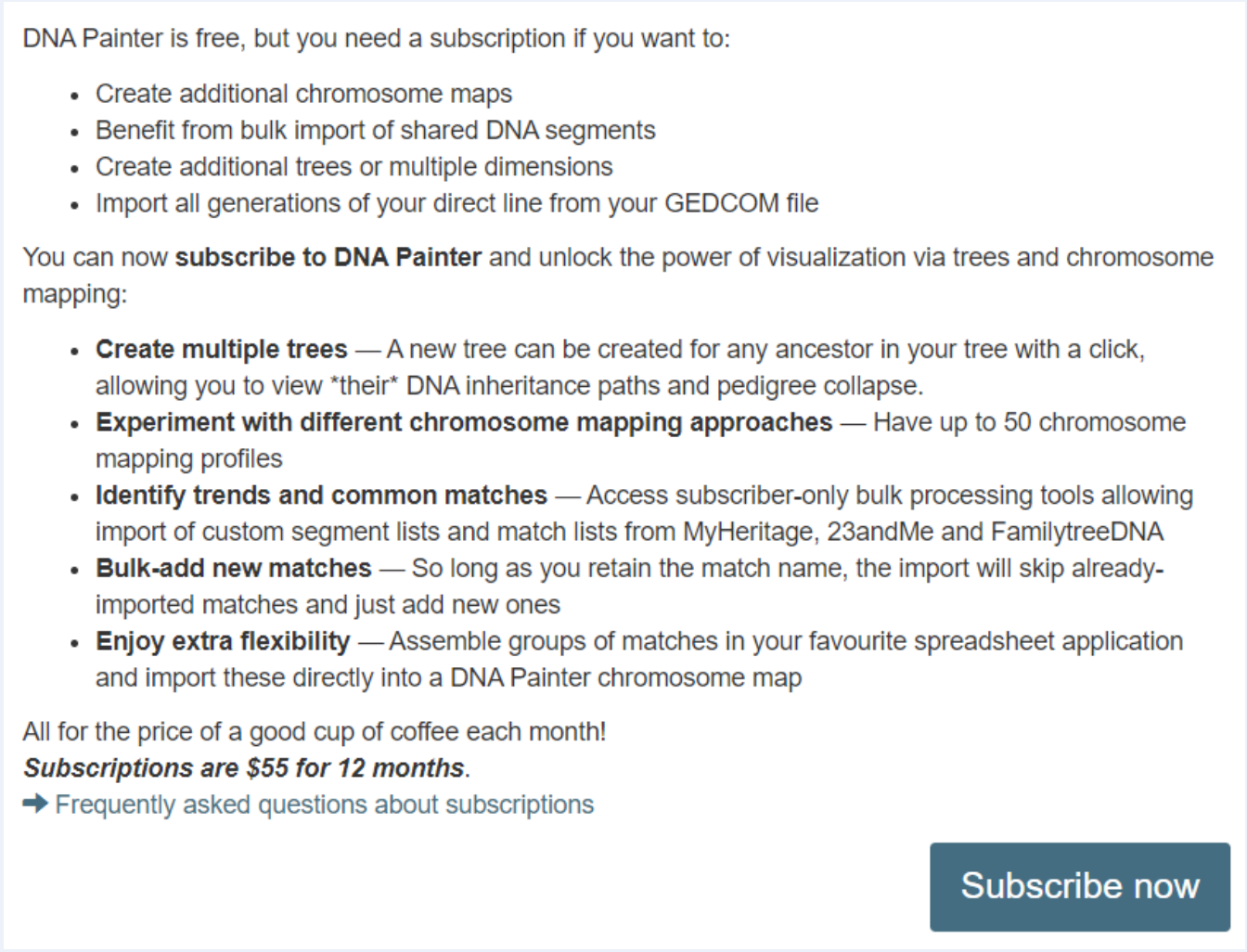
First, register for a new free account

- https://dnapainter.com/



Optional Subscription

- Try it first for free but subscription may be useful as you learn more ways to use the service
- $55/year



DNA Painter is free, but you need a subscription if you want to:

- Create additional chromosome maps
- Benefit from bulk import of shared DNA segments
- Create additional trees or multiple dimensions
- Import all generations of your direct line from your GEDCOM file

You can now **subscribe to DNA Painter** and unlock the power of visualization via trees and chromosome mapping:

- **Create multiple trees** — A new tree can be created for any ancestor in your tree with a click, allowing you to view *their* DNA inheritance paths and pedigree collapse.
- **Experiment with different chromosome mapping approaches** — Have up to 50 chromosome mapping profiles
- **Identify trends and common matches** — Access subscriber-only bulk processing tools allowing import of custom segment lists and match lists from MyHeritage, 23andMe and FamilytreeDNA
- **Bulk-add new matches** — So long as you retain the match name, the import will skip already-imported matches and just add new ones
- **Enjoy extra flexibility** — Assemble groups of matches in your favourite spreadsheet application and import these directly into a DNA Painter chromosome map

All for the price of a good cup of coffee each month!
Subscriptions are $55 for 12 months.
➜ Frequently asked questions about subscriptions

Subscribe now

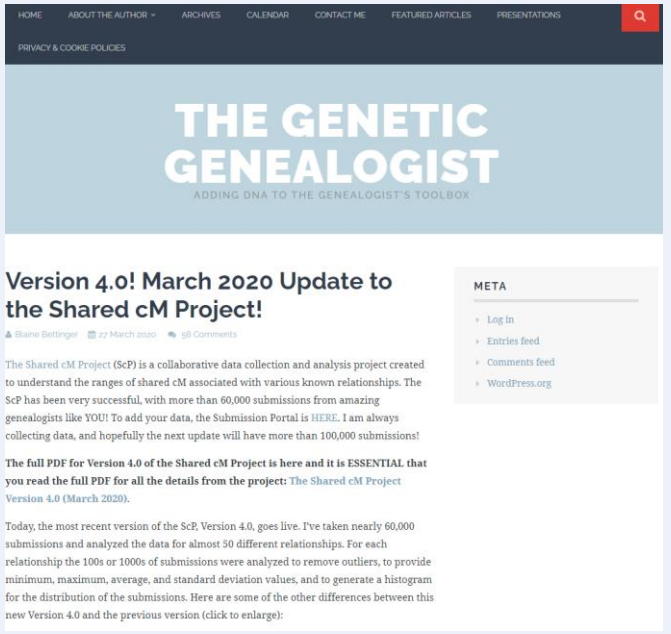
Shared centiMorgan Tool

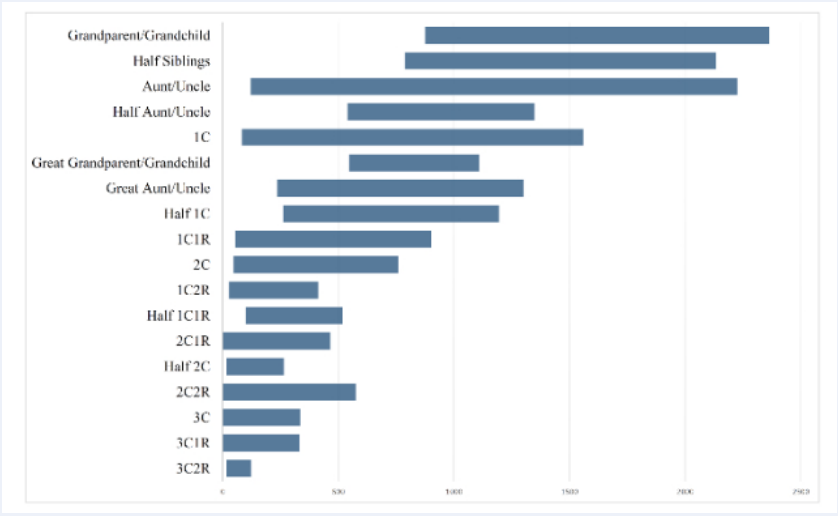
Shared centiMorgan Tool

- **My #1, most-used tool on DNAPainter**

- Derived from the Shared centiMorgan Project that was developed by Blaine Bettinger

- Crowd sourced values from DNA test takers matching centiMorgan match values with relationship



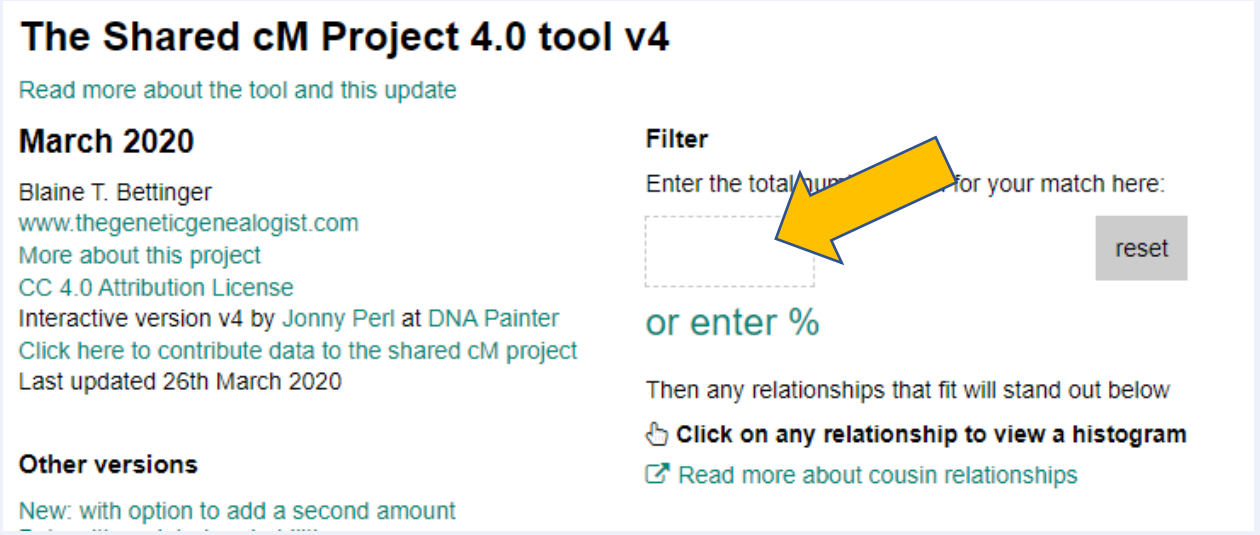


https://thegeneticgenealogist.com/2015/05/25/the-shared-cm-project-an-update/

DNA Painter Shared cMs Project

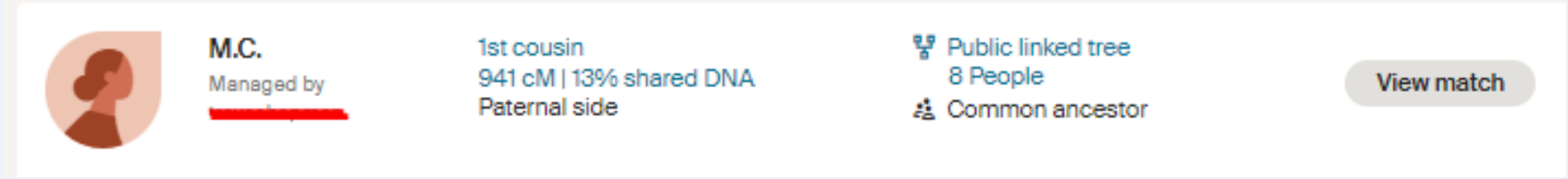
- Link: https://dnapainter.com/tools/sharedcmv4 (be sure to bookmark this as you'll use it over and over again!)

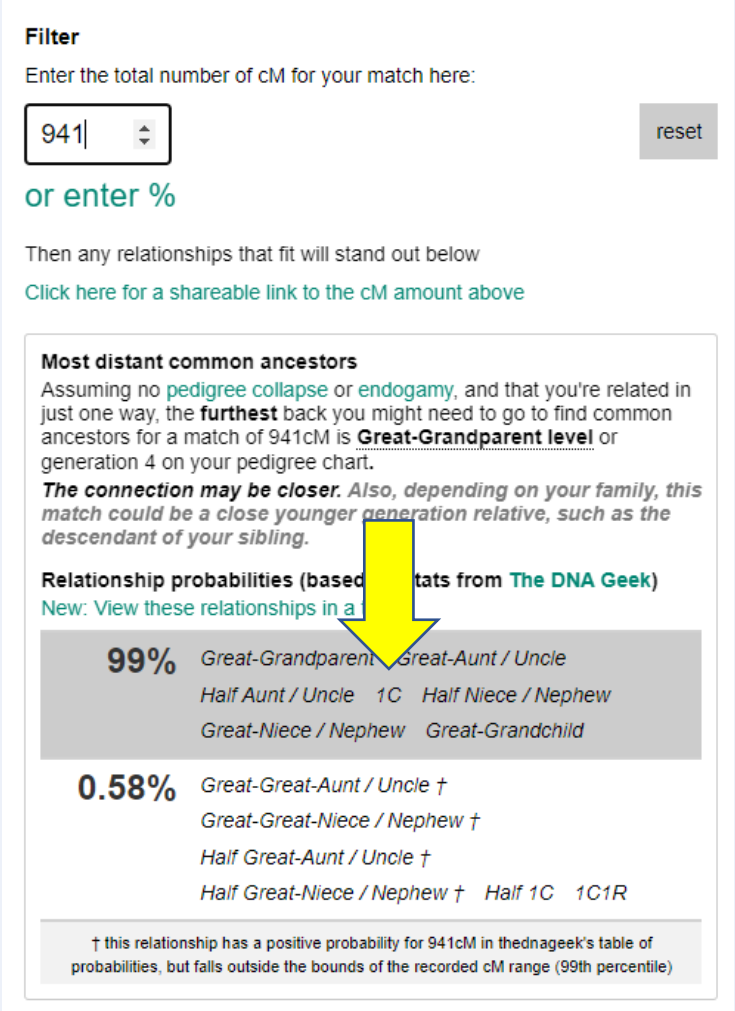
- Click in the "Filter" box and enter the cMs value that you want to investigate



Shared cM Project

- As an example from my DNA kit, I have a 941 cM match; this is a known 1st cousin
- Entering 941 cMs indicates a small number of possibilities
- If I click on the “1C” in the list I will get a histogram of possibilities

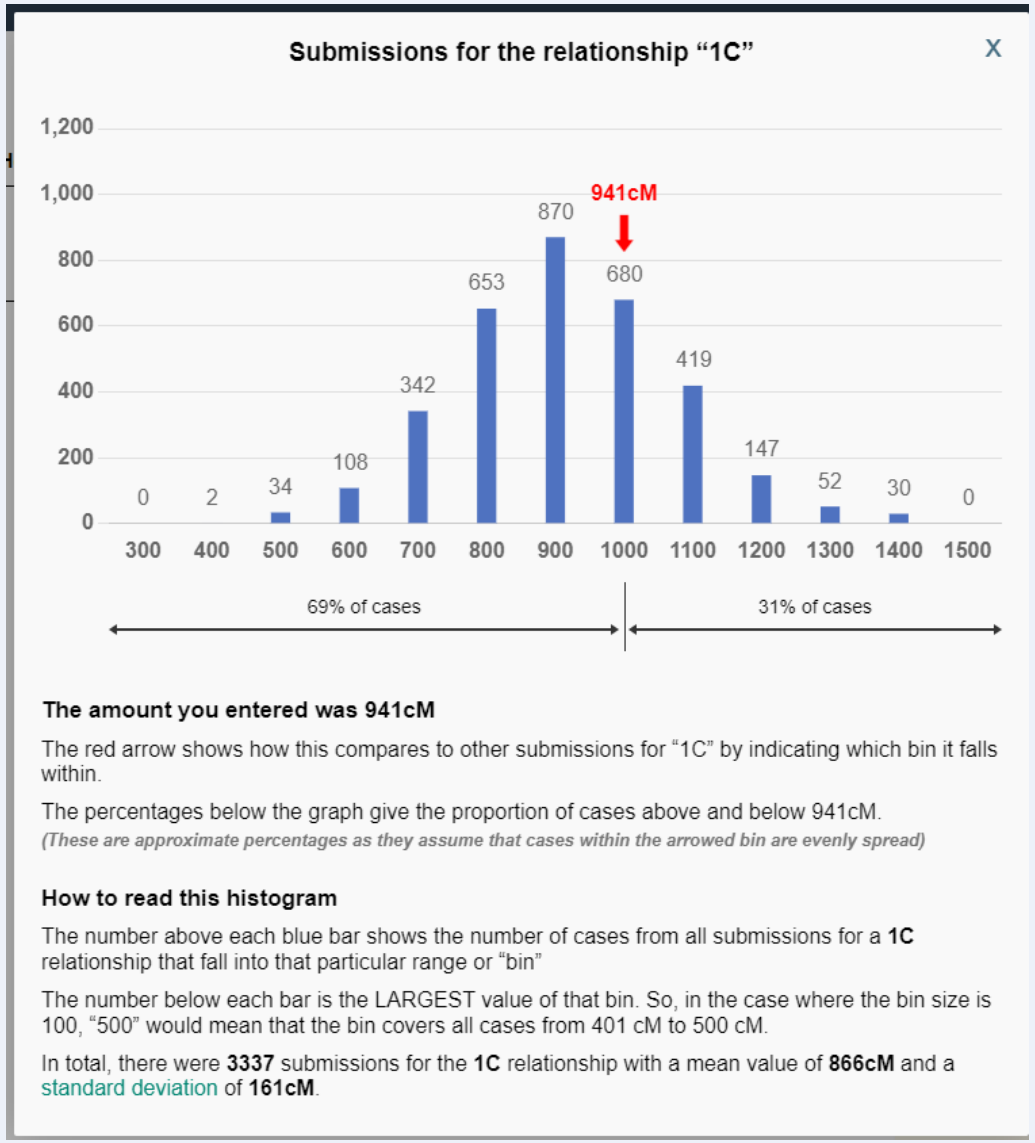




Shared cM Project

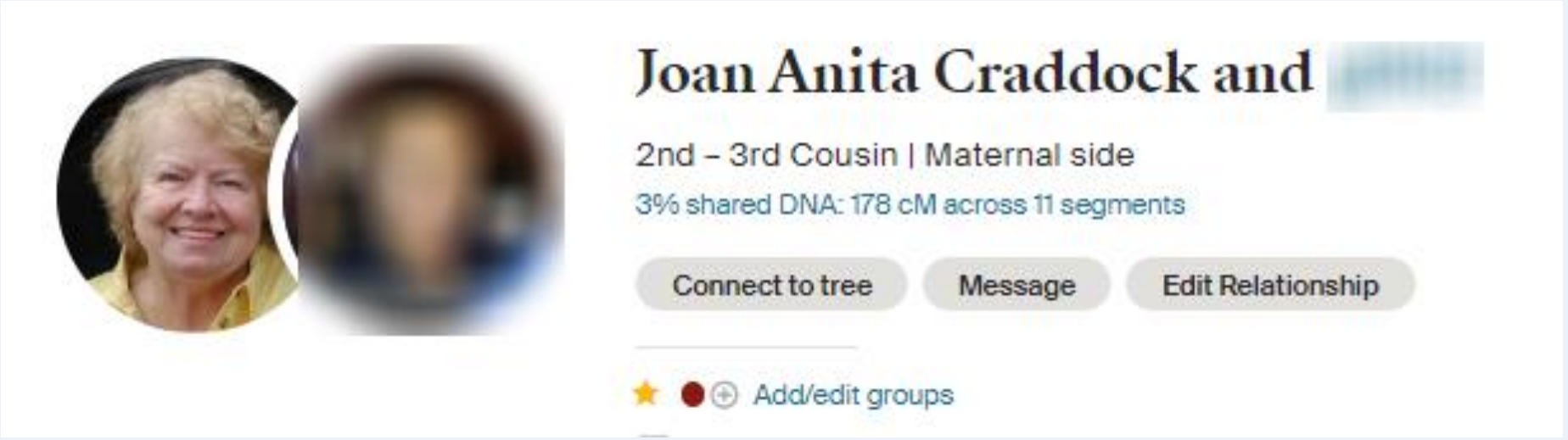
- Clicking on the “1C” label yields a useful histogram indicating where typical 1st cousins would be on the spectrum

- In this case, 941 cMs is clearly well near the center of the spectrum



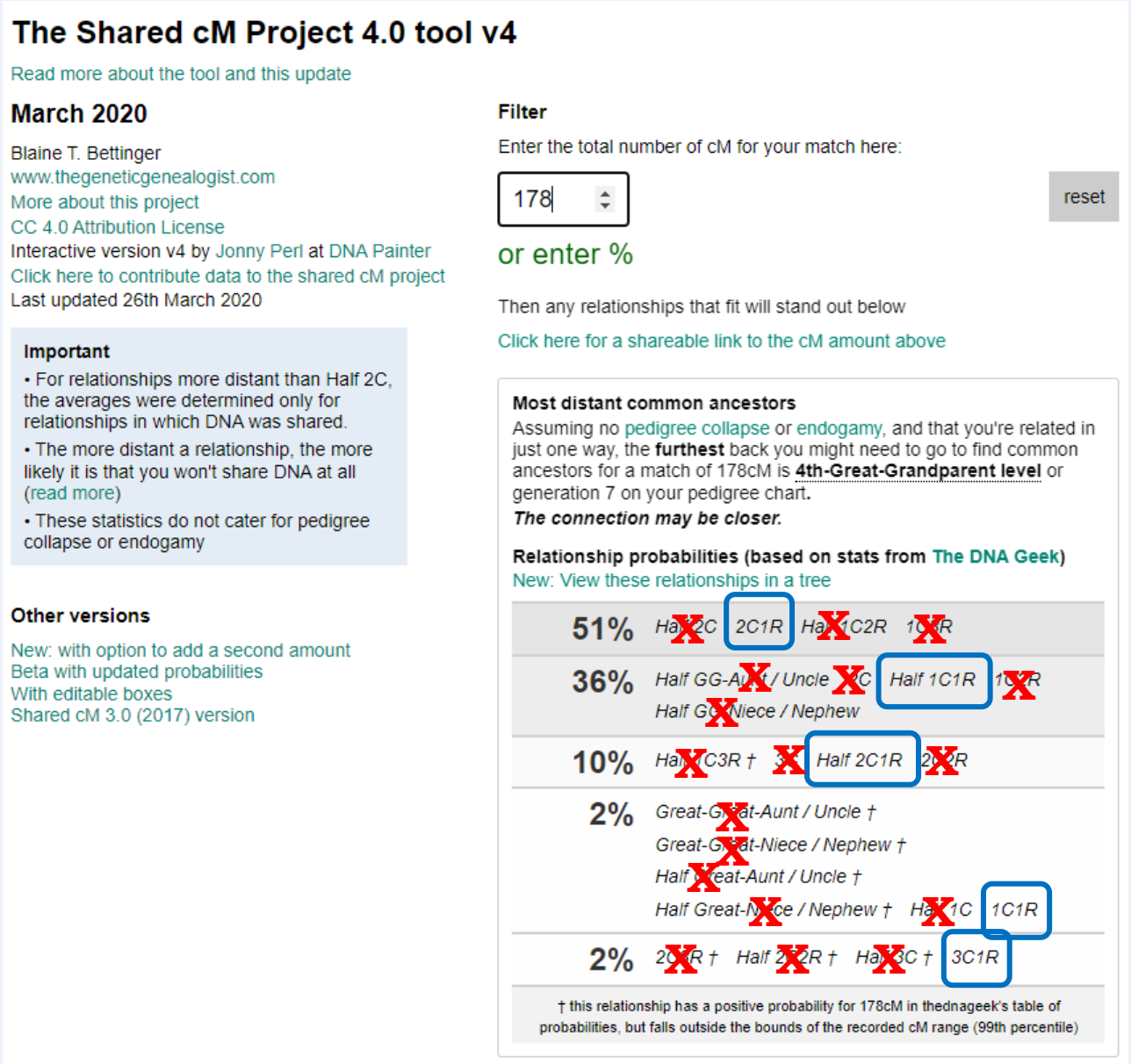
Shared cMs Project – Applied Example

- I have an unknown great-grandparent mystery that I've been working for years to solve
- My maternal grandmother has an unknown NPE father
- Looking at my mom's DNA test matches I see the strongest (closest) match on that unknown line at 178 cMs

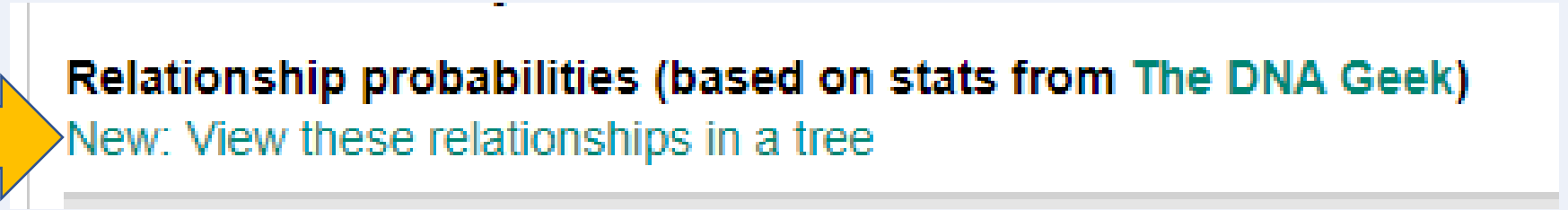


Shared cMs Project – Applied Example

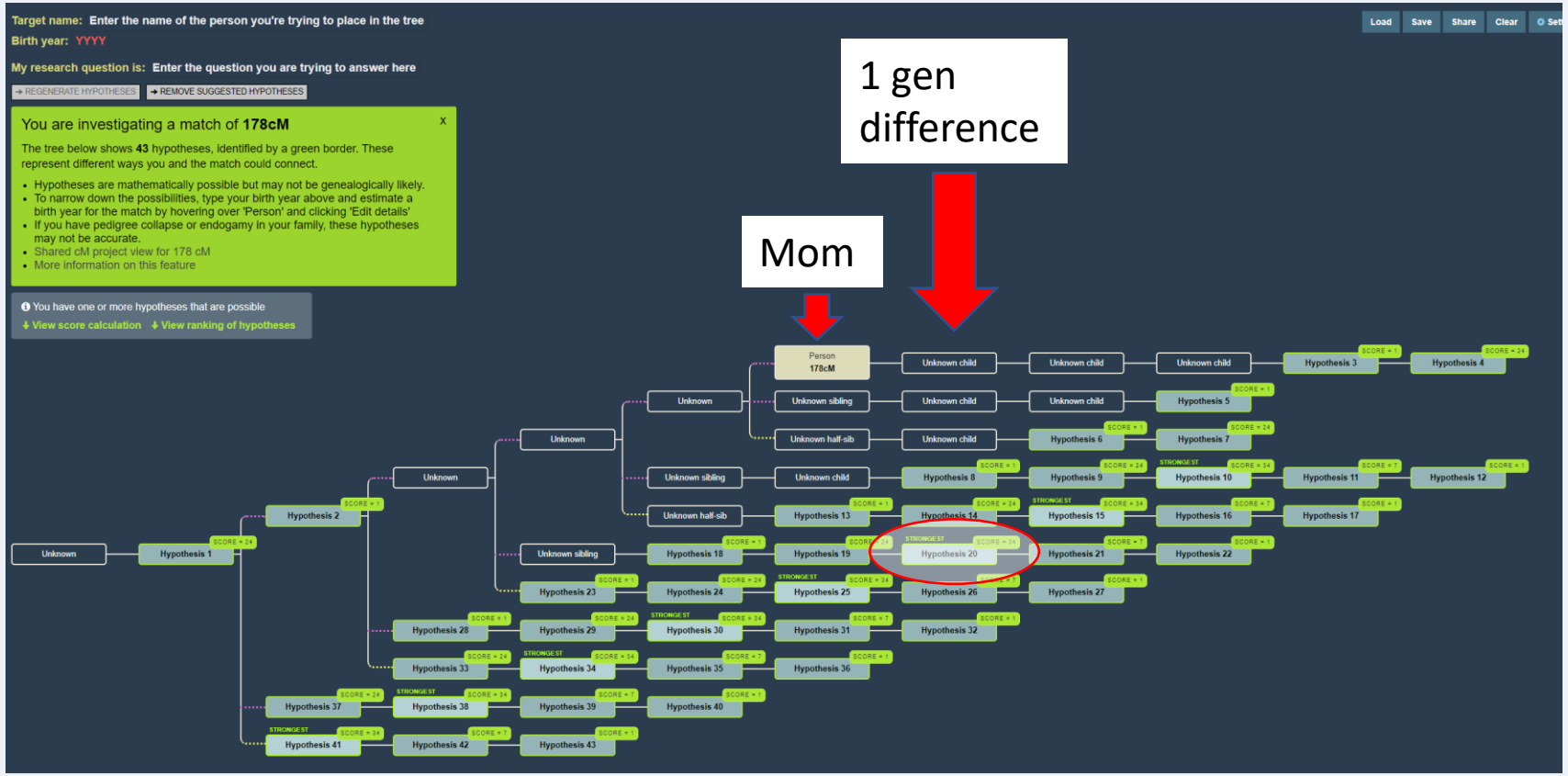
- Entering the cMs value of 178 cMs into the tool
- I see a probability chart that can help me identify the most likely relationship that a 178 cMs match would have
- When I eliminate certain options due to generation difference it can really narrow down the list
- In this case I believe this match is most likely one generation younger than Mom
  - I've reduced the number of possibilities from 23 down to 5!



Integration between the shared cM tool and WATO



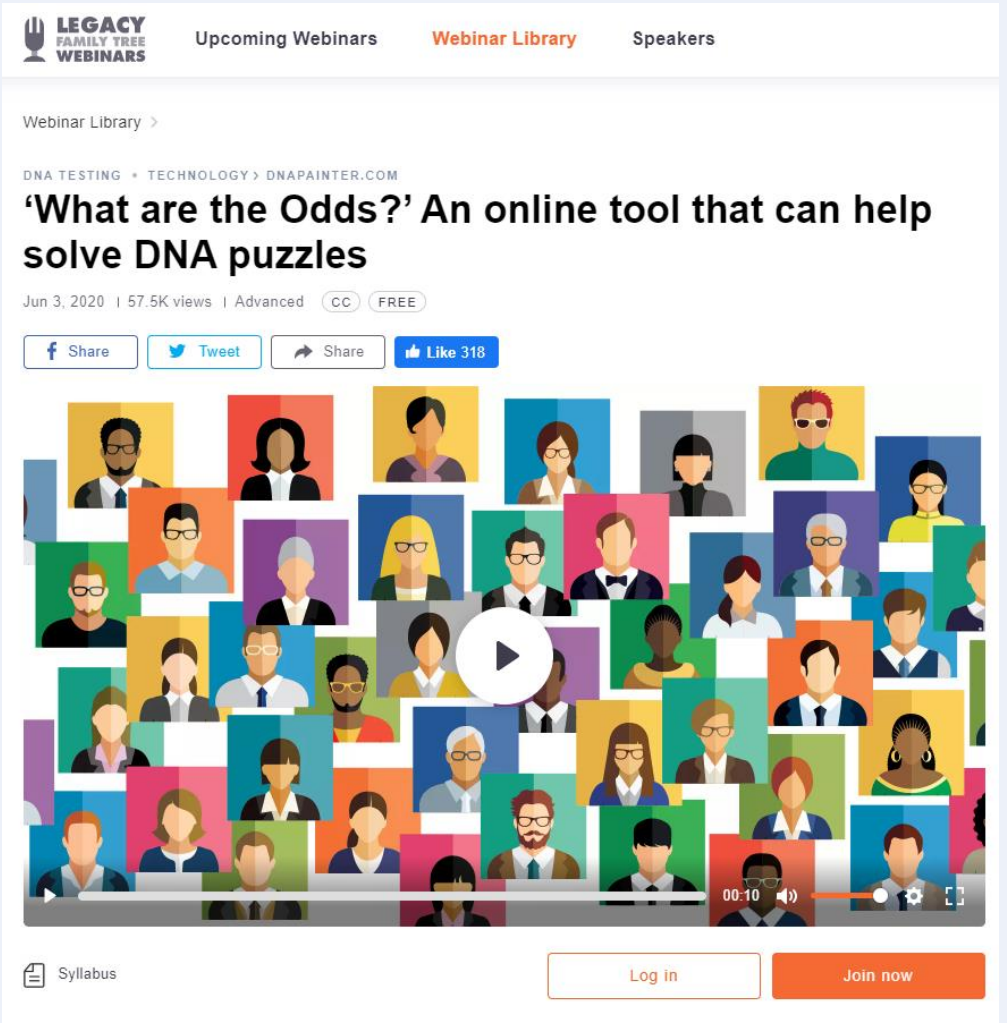
- If I click on view in tree I get a probabilities table
- Identifies 2C1R as most likely for one generation difference



WATO (What are the odds?)

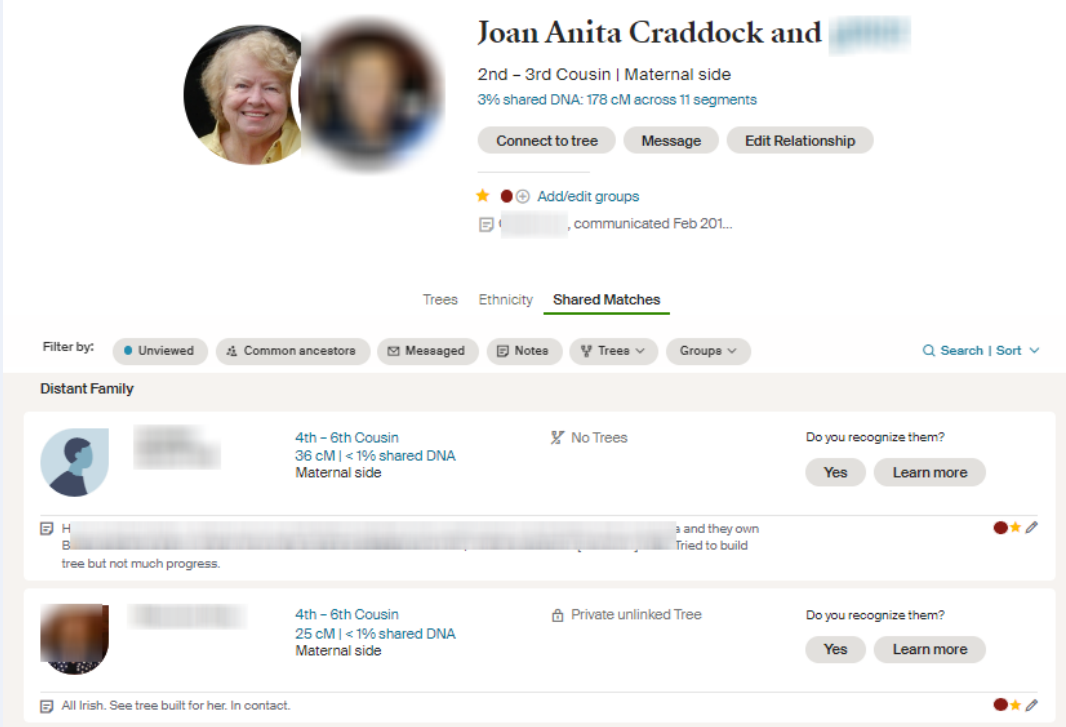
WATO (What are the odds?)

- This is an advanced tool that can't be covered fully in this presentation --- I strongly encourage you to watch one of Jonny Perl's videos to explain how to use it: https://familytreewebinars.com/webinar/what-are-the-odds-an-online-tool-that-can-help-solve-dna-puzzles/



My Example of WATO

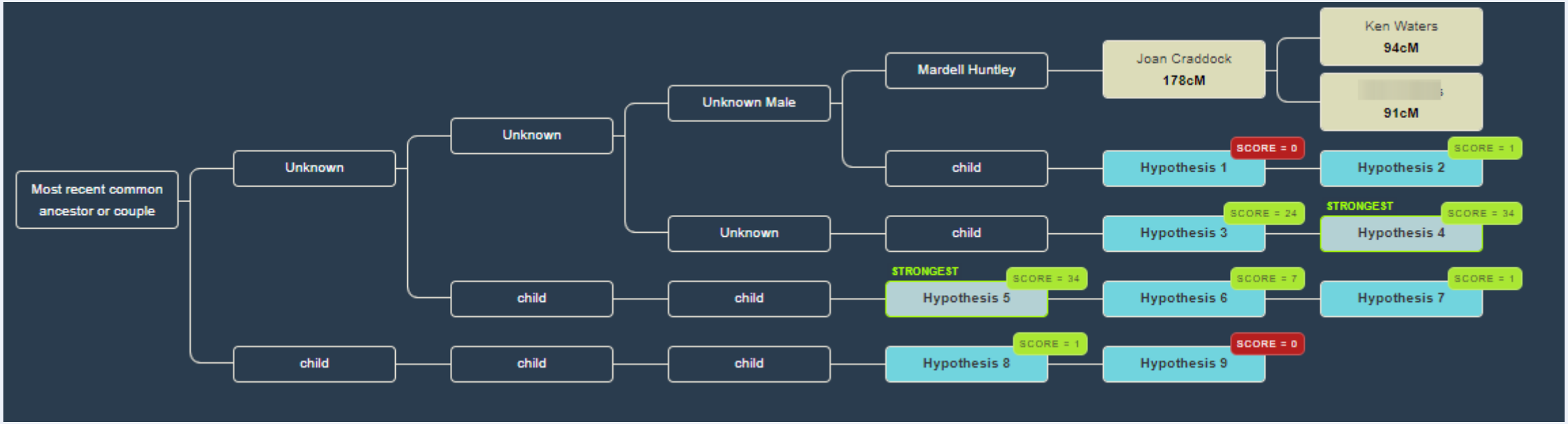
- Starting with:
- Using my unknown NPE great-grandfather
- My mom's top match in that line is a 178 cMs match (as noted before)



WATO

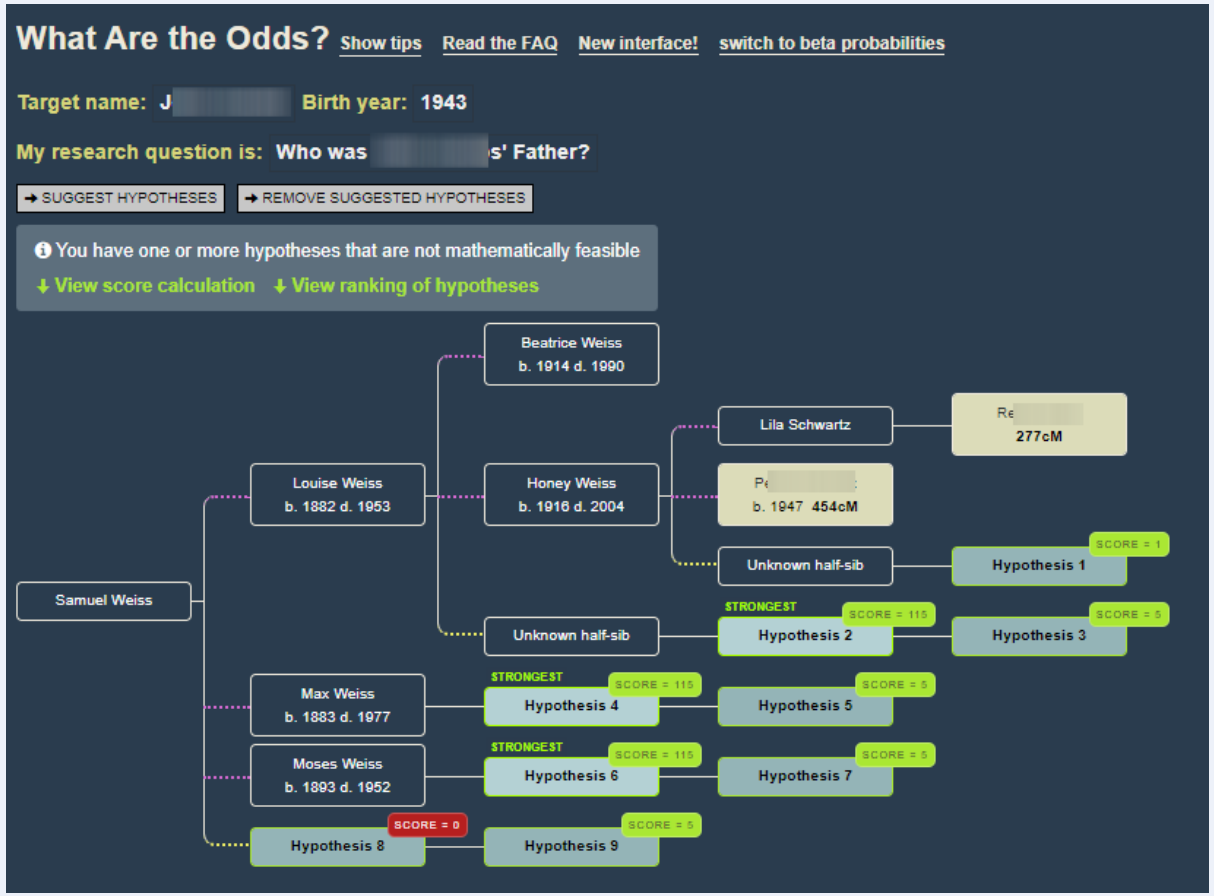
- This was a WATO to estimate where that 178 cM match fits into her tree

- Similar to the previous illustration it predicts that the greatest probability is for the unknown person to be a 2nd cousin once removed



WATO

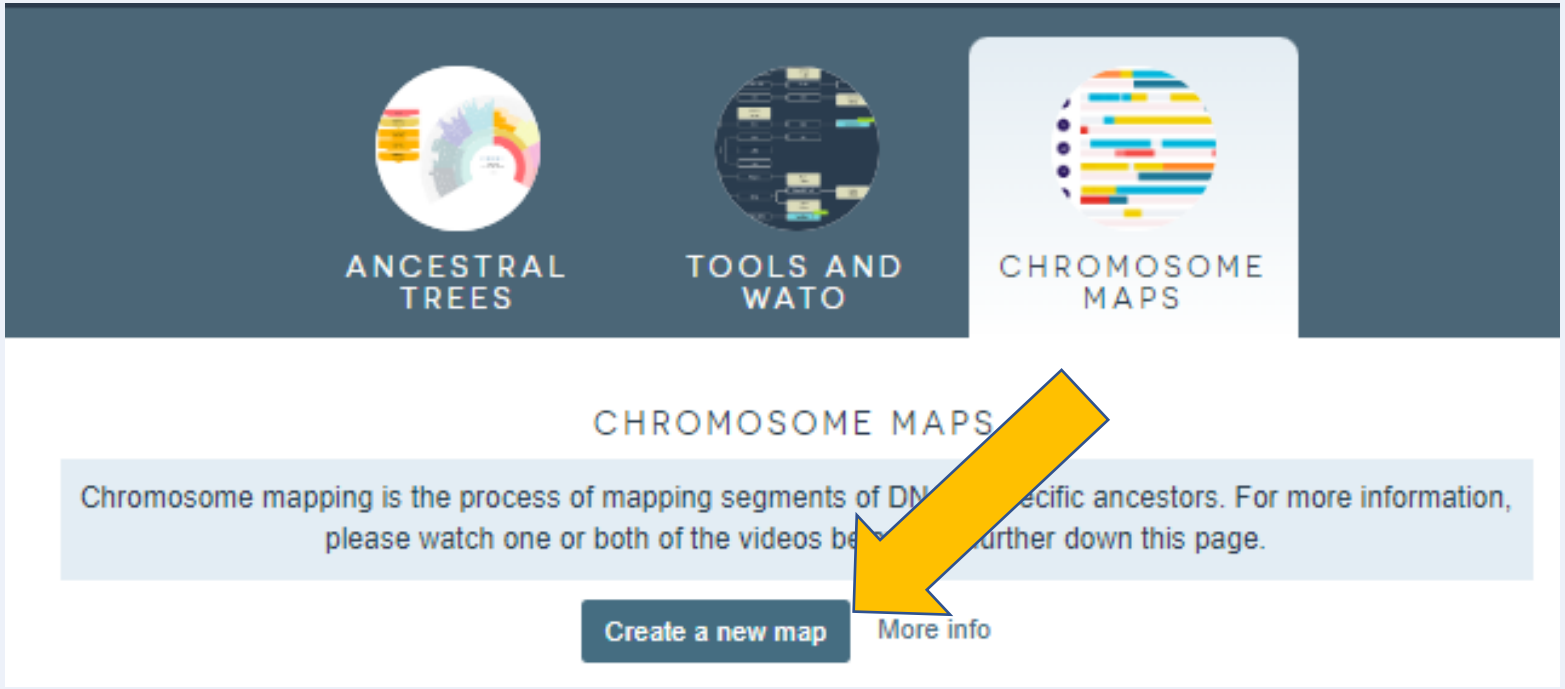
- Another example helping a client identify his birth father using two DNA matches



Chromosome Mapping

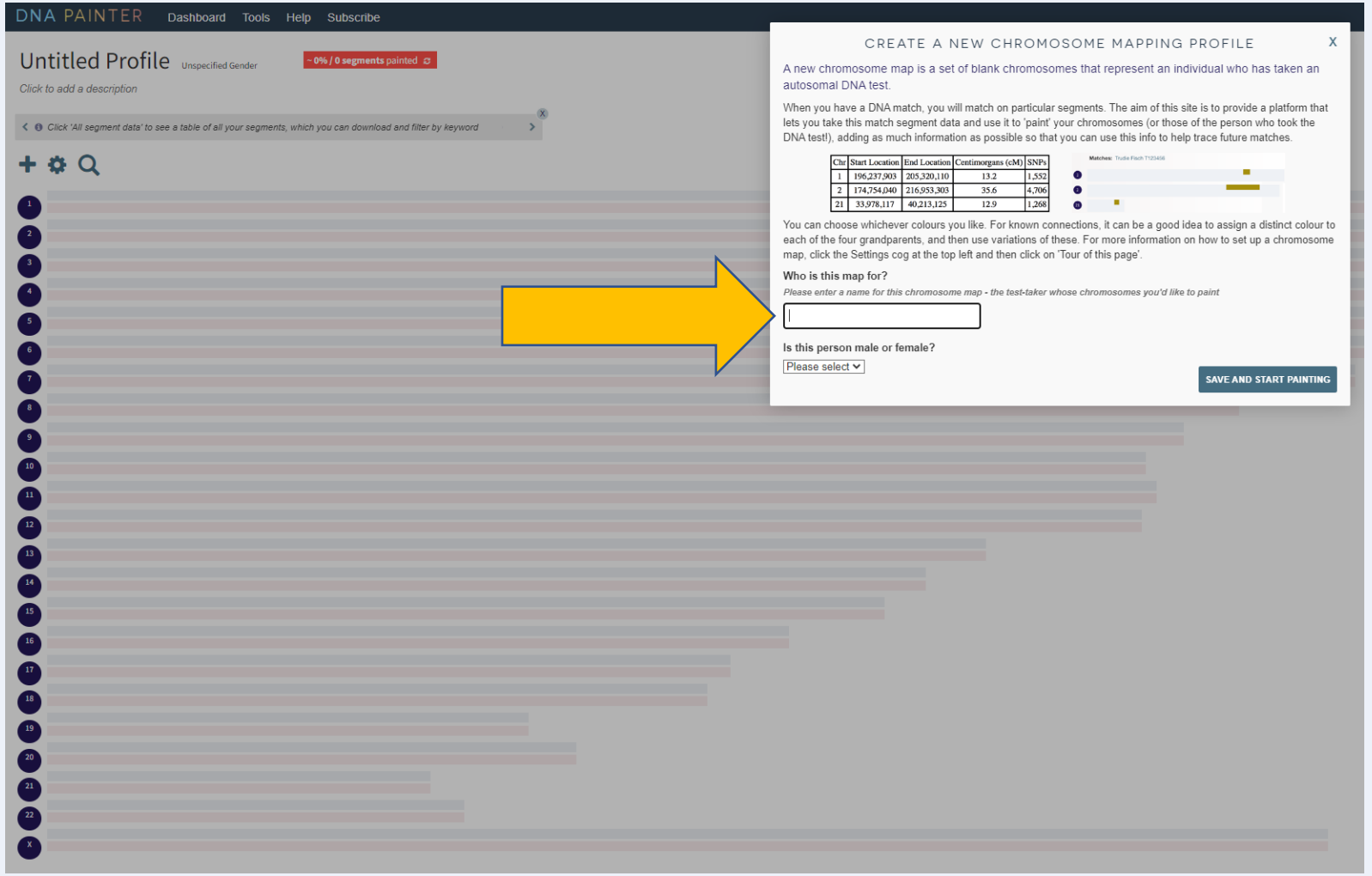
Chromosome Map

- Click on the Chromosome Maps tab and then “Create a new map”



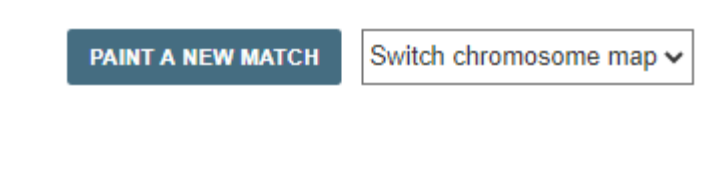
Chromosome Map

- It will first open to a “blank” chromosome map
- First step, identify the DNA test taker

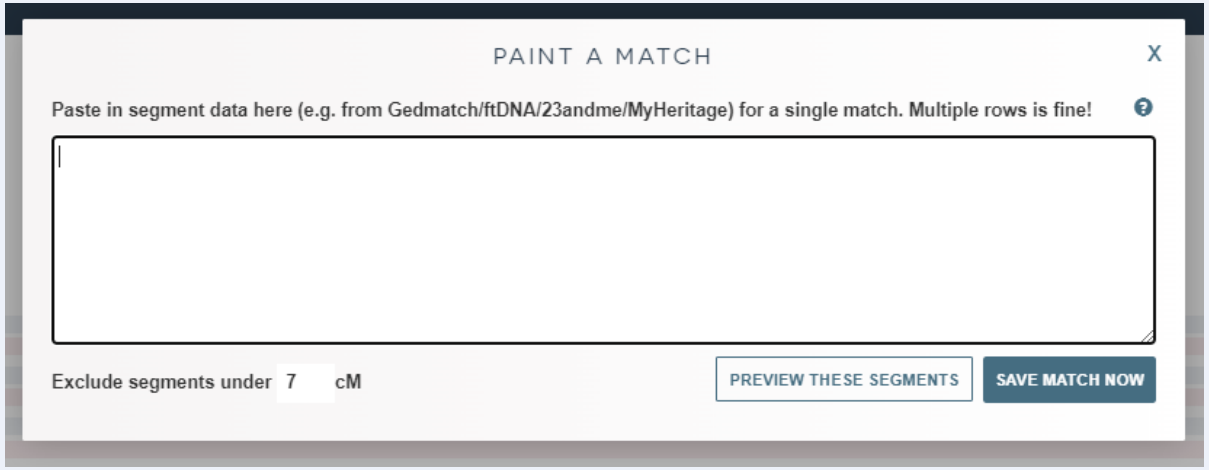


Chromosome Map

- Click “Paint a new match”



- By far the easiest way to do this is to copy in segment data for a match from either GEDMatch, FTDNA, 23andMe, or MyHeritage. (Sorry Ancestry fans….Ancestry does not provide segment data)



Chromosome Map

- For this example I am using my kit on MyHeritage and using my match to a 1st cousin once removed (my great-grandparents are her grandparents). 100% of her ancestral heritage was from the Azores

- 19 segments for a total of 476 cMs

Estimated relationships

Great-aunt, 1st cousin once removed - 2nd cousin

DNA Match quality

6.7% (476.3 cM) Shared DNA

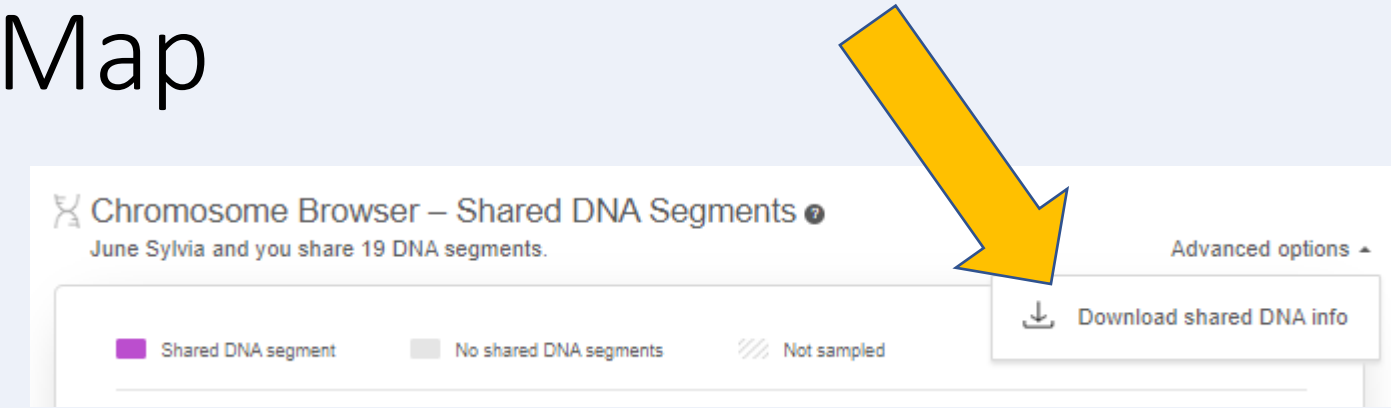
19 Shared segments

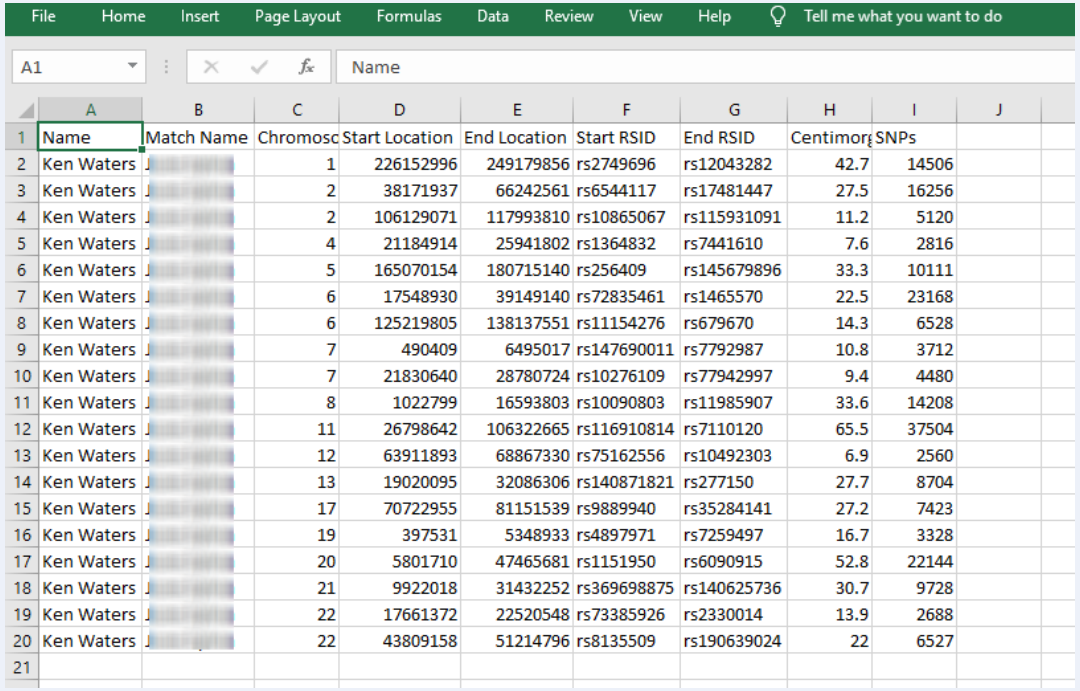
65.5 cM Largest segment

This is the chromosome depiction from My Heritage for this match

Chromosome Map

- On the chromosome browser panel click “Advanced options” and then “Download shared DNA info”
- This downloads a “CSV” spreadsheet file showing the start and stop points for each segment





File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do

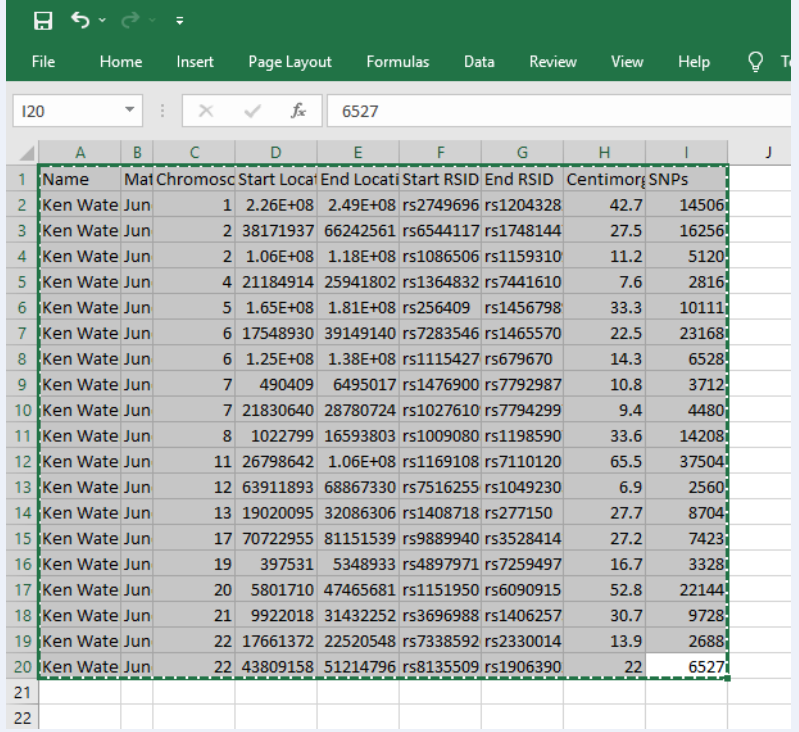
A1 Name

	A	B	C	D	E	F	G	H	I	J
1	Name	Match Name	Chromosc	Start Location	End Location	Start RSID	End RSID	Centimor	SNPs	
2	Ken Waters	J	1	226152996	249179856	rs2749696	rs12043282	42.7	14506	
3	Ken Waters	J	2	38171937	66242561	rs6544117	rs17481447	27.5	16256	
4	Ken Waters	J	2	106129071	117993810	rs10865067	rs115931091	11.2	5120	
5	Ken Waters	J	4	21184914	25941802	rs1364832	rs7441610	7.6	2816	
6	Ken Waters	J	5	165070154	180715140	rs256409	rs145679896	33.3	10111	
7	Ken Waters	J	6	17548930	39149140	rs72835461	rs1465570	22.5	23168	
8	Ken Waters	J	6	125219805	138137551	rs11154276	rs679670	14.3	6528	
9	Ken Waters	J	7	490409	6495017	rs147690011	rs7792987	10.8	3712	
10	Ken Waters	J	7	21830640	28780724	rs10276109	rs77942997	9.4	4480	
11	Ken Waters	J	8	1022799	16593803	rs10090803	rs11985907	33.6	14208	
12	Ken Waters	J	11	26798642	106322665	rs116910814	rs7110120	65.5	37504	
13	Ken Waters	J	12	63911893	68867330	rs75162556	rs10492303	6.9	2560	
14	Ken Waters	J	13	19020095	32086306	rs140871821	rs277150	27.7	8704	
15	Ken Waters	J	17	70722955	81151539	rs9889940	rs35284141	27.2	7423	
16	Ken Waters	J	19	397531	5348933	rs4897971	rs7259497	16.7	3328	
17	Ken Waters	J	20	5801710	47465681	rs1151950	rs6090915	52.8	22144	
18	Ken Waters	J	21	9922018	31432252	rs369698875	rs140625736	30.7	9728	
19	Ken Waters	J	22	17661372	22520548	rs73385926	rs2330014	13.9	2688	
20	Ken Waters	J	22	43809158	51214796	rs8135509	rs190639024	22	6527	
21										

Geek Note: CSV stands for comma-separated variables which is basically a spreadsheet in text format that’s easily imported into other applications

Chromosome Map

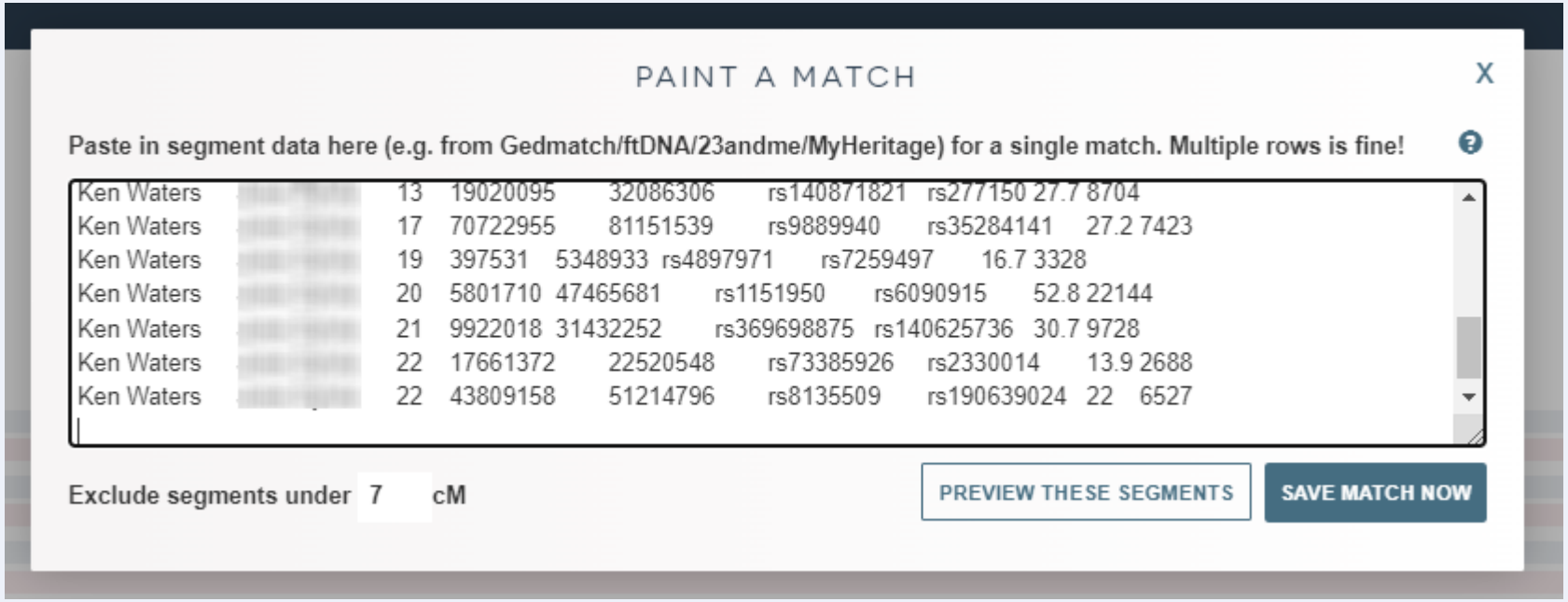
- Open the spreadsheet and select the rows and columns with the segment data and “copy” (ctrl-c) the data



	A	B	C	D	E	F	G	H	I	J
1	Name	Mat	Chromosc	Start Loca	End Locati	Start RSID	End RSID	Centimorg	SNPs	
2	Ken Wate	Jun	1	2.26E+08	2.49E+08	rs2749696	rs1204328	42.7	14506	
3	Ken Wate	Jun	2	38171937	66242561	rs6544117	rs1748144	27.5	16256	
4	Ken Wate	Jun	2	1.06E+08	1.18E+08	rs1086506	rs1159310	11.2	5120	
5	Ken Wate	Jun	4	21184914	25941802	rs1364832	rs7441610	7.6	2816	
6	Ken Wate	Jun	5	1.65E+08	1.81E+08	rs256409	rs1456798	33.3	10111	
7	Ken Wate	Jun	6	17548930	39149140	rs7283546	rs1465570	22.5	23168	
8	Ken Wate	Jun	6	1.25E+08	1.38E+08	rs1115427	rs679670	14.3	6528	
9	Ken Wate	Jun	7	490409	6495017	rs1476900	rs7792987	10.8	3712	
10	Ken Wate	Jun	7	21830640	28780724	rs1027610	rs7794299	9.4	4480	
11	Ken Wate	Jun	8	1022799	16593803	rs1009080	rs1198590	33.6	14208	
12	Ken Wate	Jun	11	26798642	1.06E+08	rs1169108	rs7110120	65.5	37504	
13	Ken Wate	Jun	12	63911893	68867330	rs7516255	rs1049230	6.9	2560	
14	Ken Wate	Jun	13	19020095	32086306	rs1408718	rs277150	27.7	8704	
15	Ken Wate	Jun	17	70722955	81151539	rs9889940	rs3528414	27.2	7423	
16	Ken Wate	Jun	19	397531	5348933	rs4897971	rs7259497	16.7	3328	
17	Ken Wate	Jun	20	5801710	47465681	rs1151950	rs6090915	52.8	22144	
18	Ken Wate	Jun	21	9922018	31432252	rs3696988	rs1406257	30.7	9728	
19	Ken Wate	Jun	22	17661372	22520548	rs7338592	rs2330014	13.9	2688	
20	Ken Wate	Jun	22	43809158	51214796	rs8135509	rs1906390	22	6527	
21										
22										

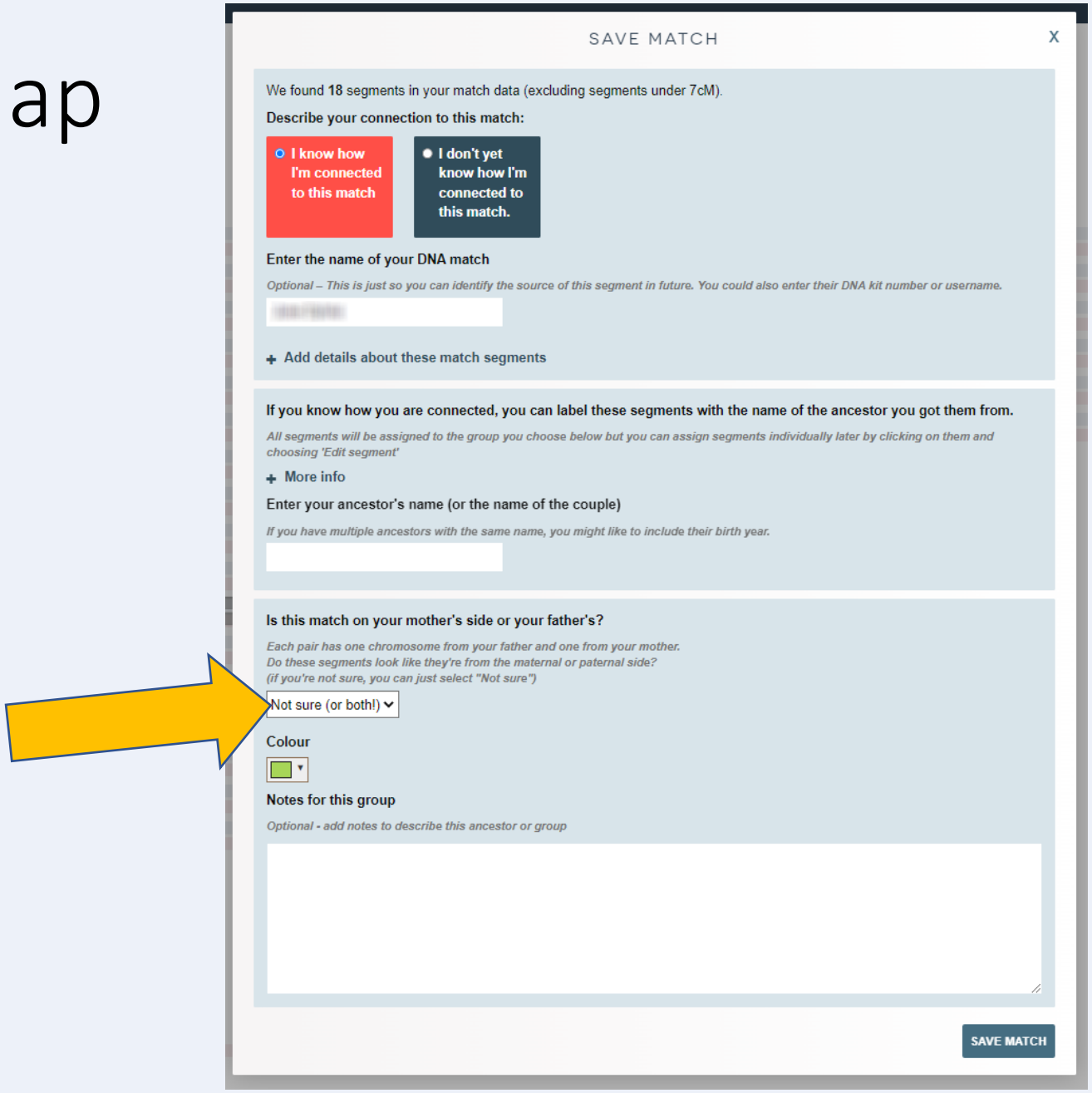
- In the DNA Painter window “paste” (ctrl-v) those data in and click “save match now”

- DNA Painter is smart enough to know how to recognize and parse the pasted information from several different sources!

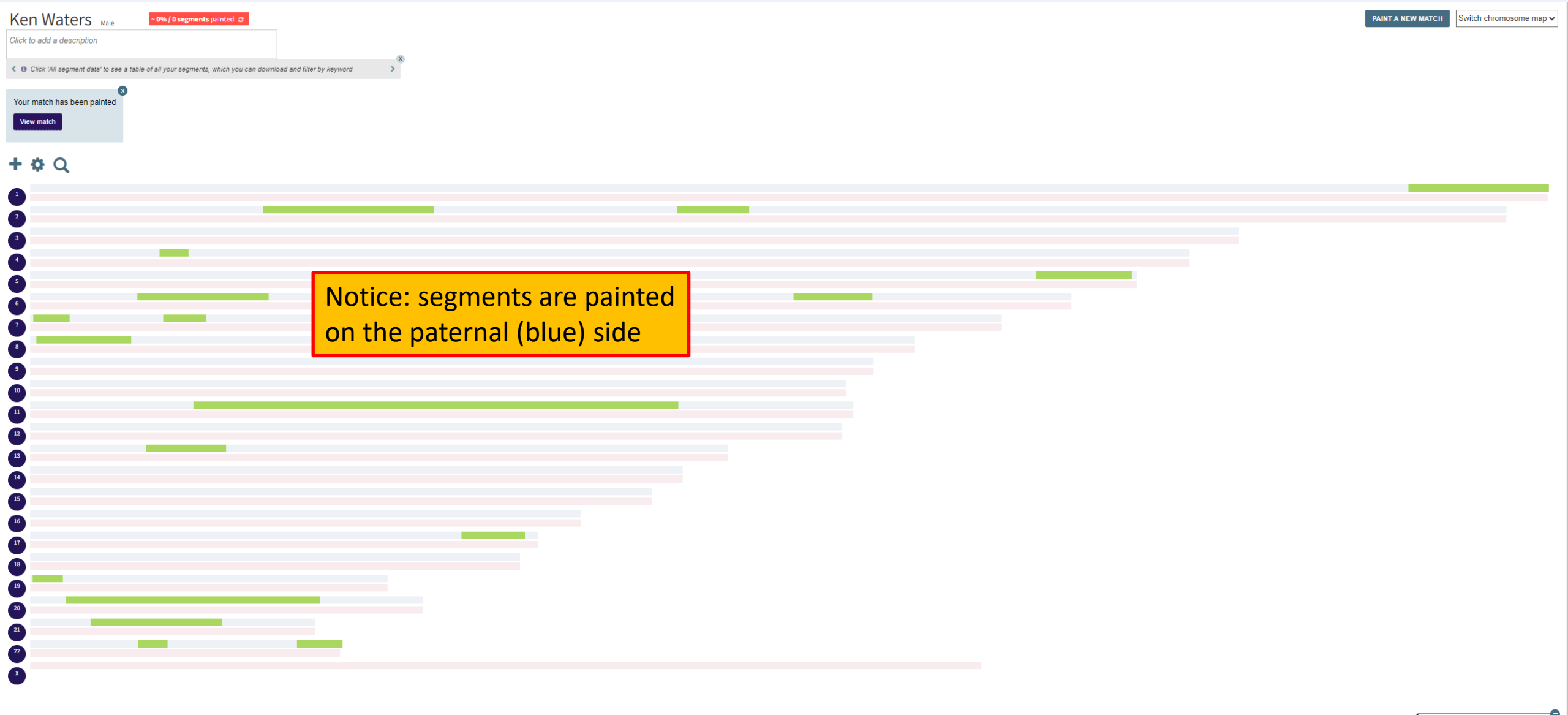


Chromosome Map

- Answer a few more questions
- Of course it's much better if you know how you are related to this person
- Very important: be sure to identify if this match is maternal or paternal (otherwise it will paint the segment on both sides)

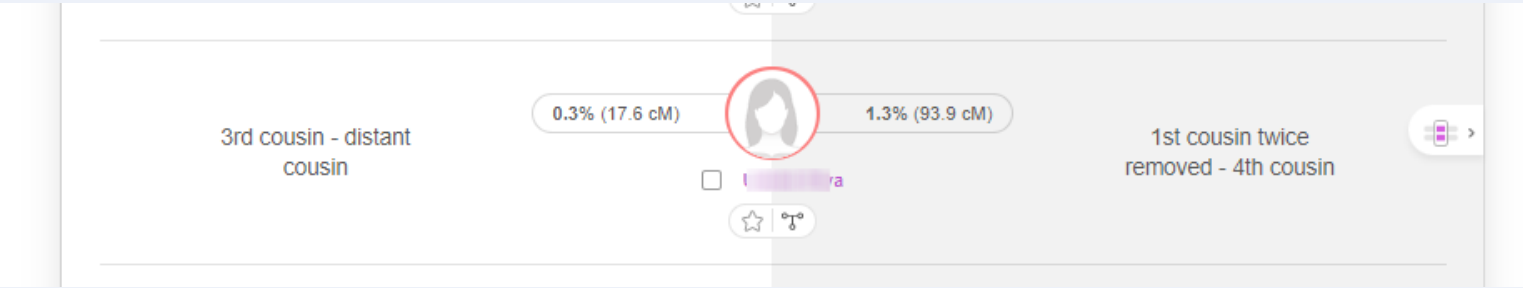


Chromosome Map



Chromosome Map

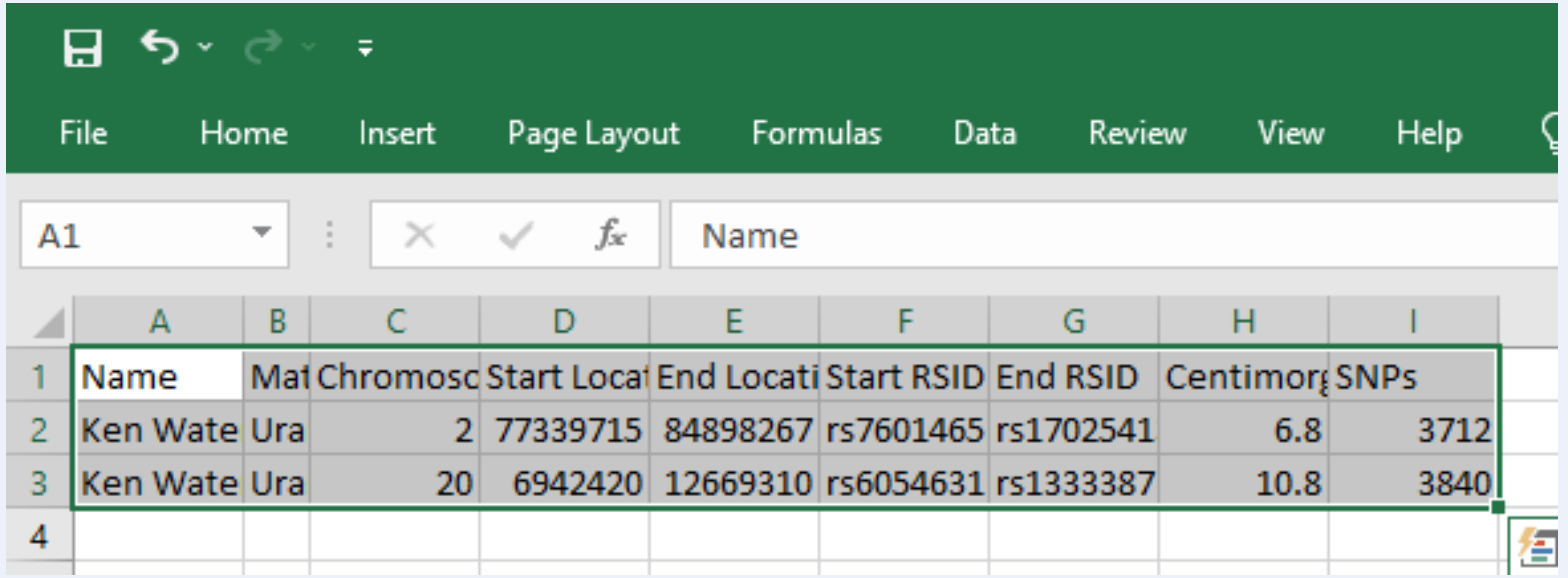
- Now, looking at the shared matches for my 1C1R I find another common match that I'd like to try painting in (note: I do not know how I am related to her)



- This is a 17.6 cM match to me and a 93.9 cM match to my 1C1R

Chromosome Map

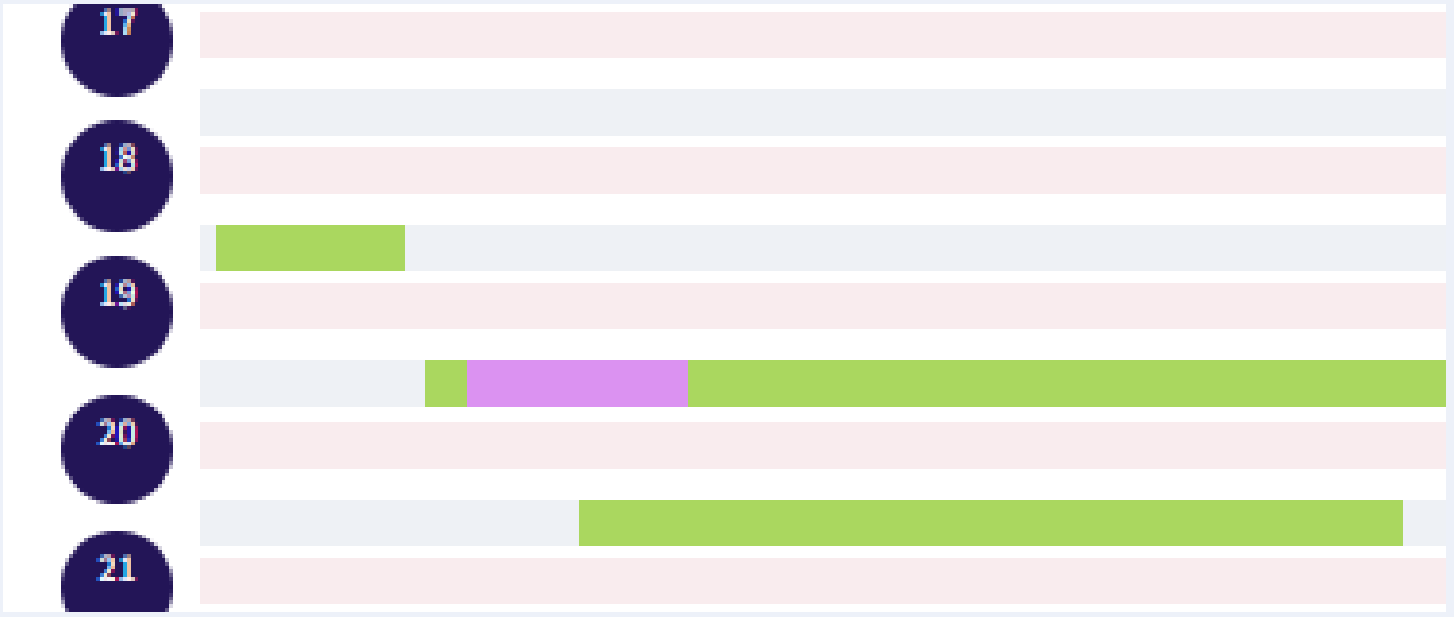
- I repeat the process of downloading the shared segments between me and her and then copy them back into my chromosome map



	A	B	C	D	E	F	G	H	I
1	Name	Mat	Chromosc	Start Locat	End Locati	Start RSID	End RSID	Centimorg	SNPs
2	Ken Wate	Ura	2	77339715	84898267	rs7601465	rs1702541	6.8	3712
3	Ken Wate	Ura	20	6942420	12669310	rs6054631	rs1333387	10.8	3840
4									

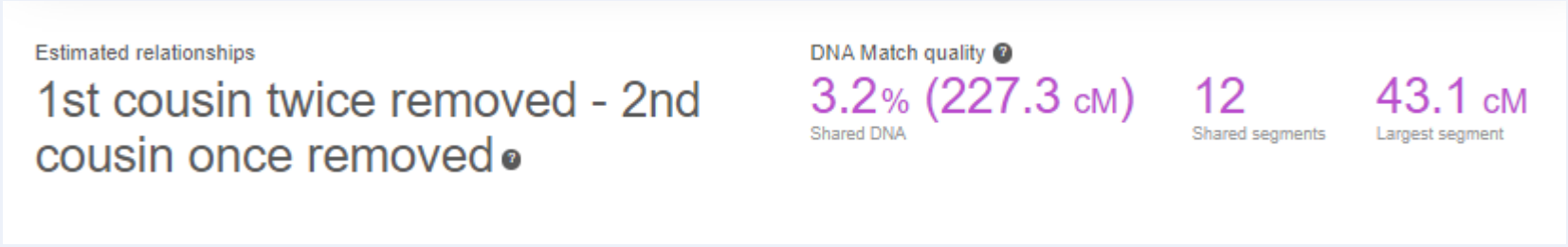
Chromosome Map

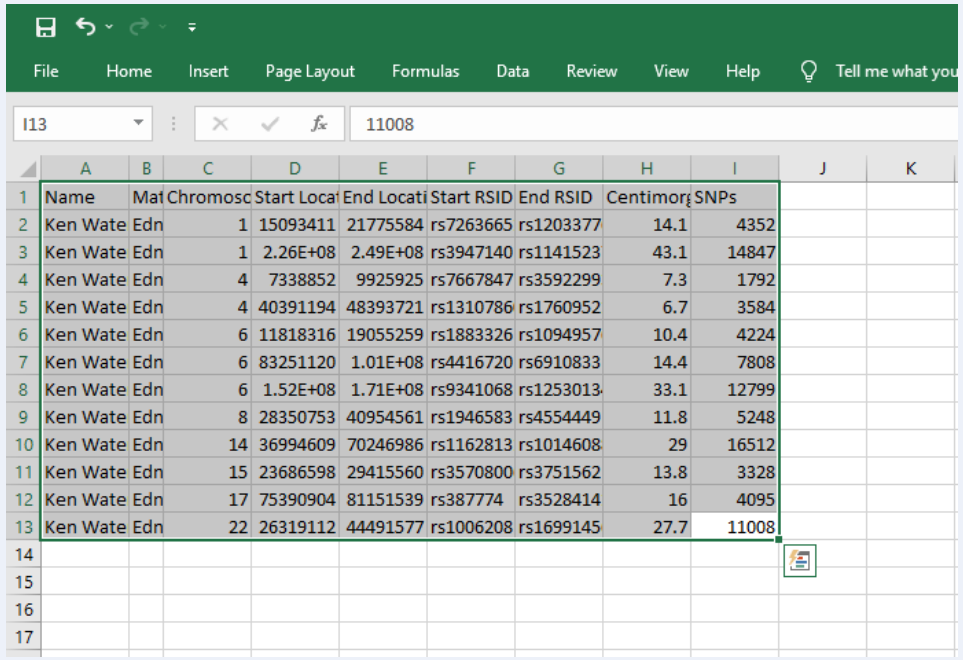
- Now this new match is painted in magenta color (you can choose what colors you want) and is overlayed on top of a segment on Chr 20 that I shared with my 1C1R
- True triangulation which infers common ancestors



Chromosome Map

- Now, I will add a known 2nd cousin, once removed (2C1R)
- I match her at 227 cMs





File Home Insert Page Layout Formulas Data Review View Help Tell me what you

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	A	B	C	D	E	F	G	H	I	J	K
1	Name	Mat	Chromosc	Start Locat	End Locati	Start RSID	End RSID	Centimorg	SNPs		
2	Ken Wate	Edn	1	15093411	21775584	rs7263665	rs1203377	14.1	4352		
3	Ken Wate	Edn	1	2.26E+08	2.49E+08	rs3947140	rs1141523	43.1	14847		
4	Ken Wate	Edn	4	7338852	9925925	rs7667847	rs3592299	7.3	1792		
5	Ken Wate	Edn	4	40391194	48393721	rs1310786	rs1760952	6.7	3584		
6	Ken Wate	Edn	6	11818316	19055259	rs1883326	rs1094957	10.4	4224		
7	Ken Wate	Edn	6	83251120	1.01E+08	rs4416720	rs6910833	14.4	7808		
8	Ken Wate	Edn	6	1.52E+08	1.71E+08	rs9341068	rs1253013	33.1	12799		
9	Ken Wate	Edn	8	28350753	40954561	rs1946583	rs4554449	11.8	5248		
10	Ken Wate	Edn	14	36994609	70246986	rs1162813	rs1014608	29	16512		
11	Ken Wate	Edn	15	23686598	29415560	rs3570800	rs3751562	13.8	3328		
12	Ken Wate	Edn	17	75390904	81151539	rs387774	rs3528414	16	4095		
13	Ken Wate	Edn	22	26319112	44491577	rs1006208	rs1699145	27.7	11008		
14											
15											
16											
17											

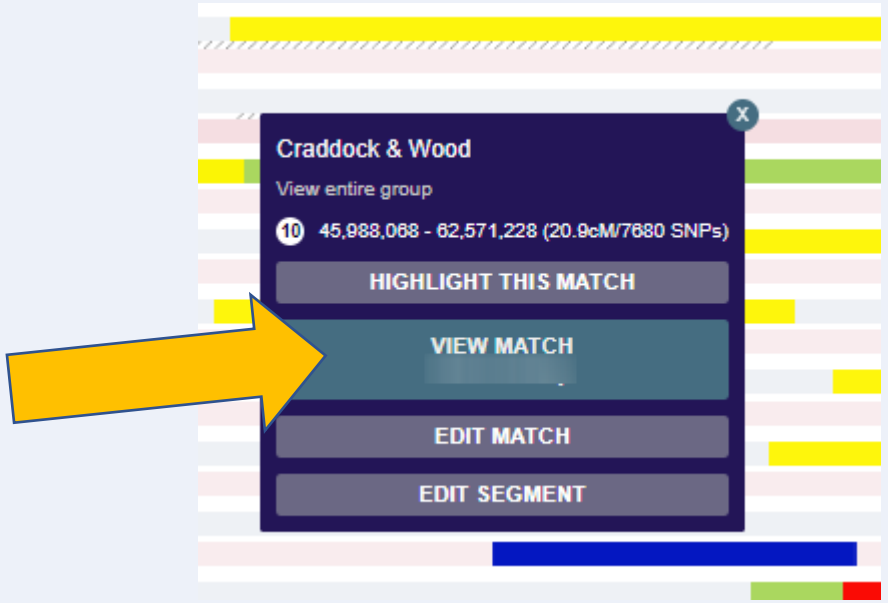
Chromosome Map

- Resulting map

- Green=my 1C1R, magenta=unknown cousin, red=my 2C1R

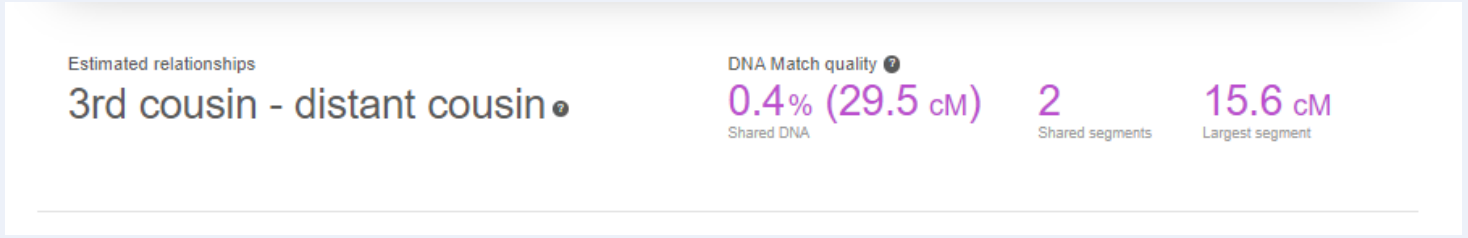
Chromosome Map

- By clicking on one segment and selecting “view match” I can easily see the overlapping segments which is confirmation of what we call “triangulation”



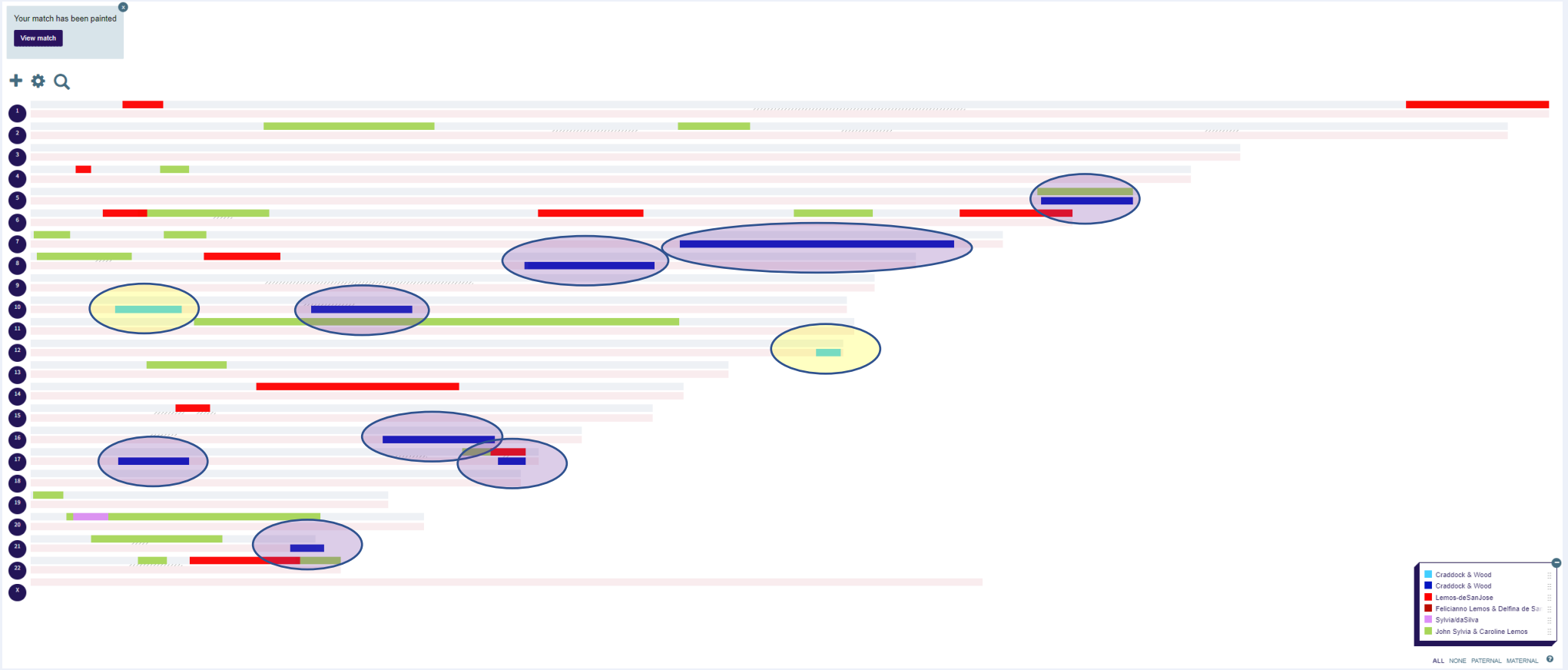
Chromosome Map

- Now, some maternal matches
  - A 2C and
  - an unknown cousin, likely a 3C or 3C1R



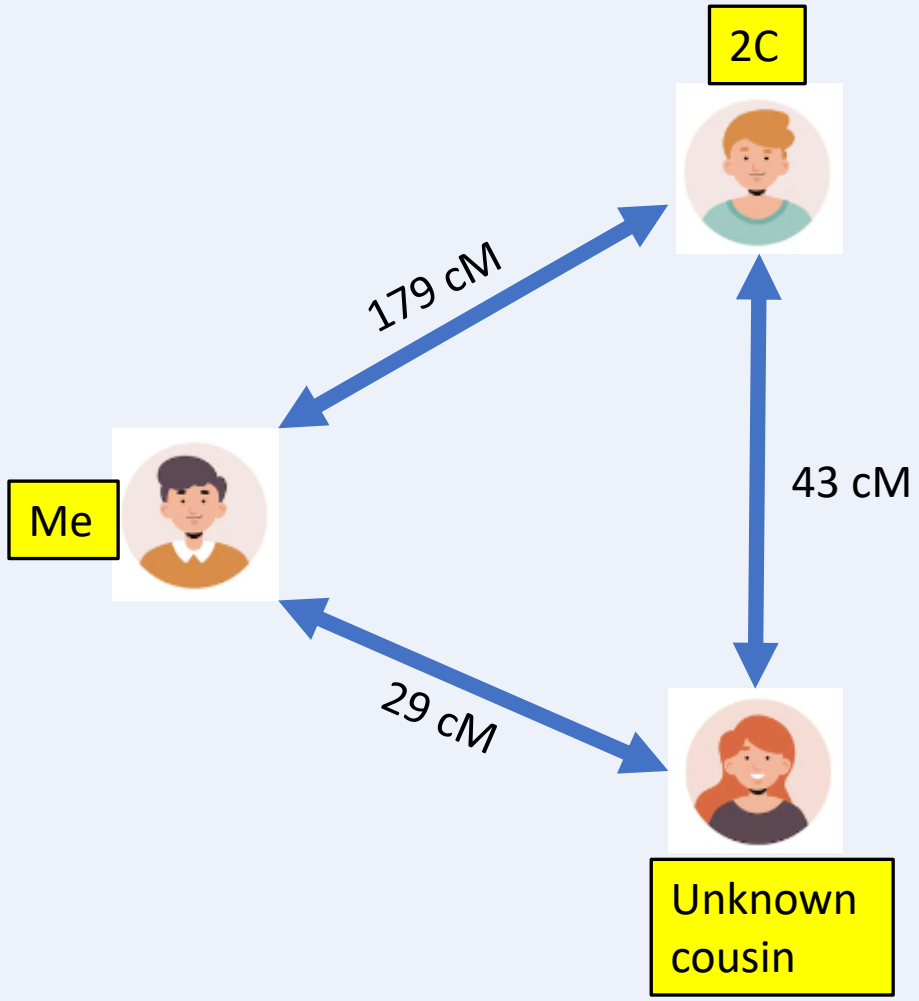
Chromosome Map

- NOTICE: the unknown cousin segments (light blue) do *NOT* line up with any segments from my 2C
- What does this mean?



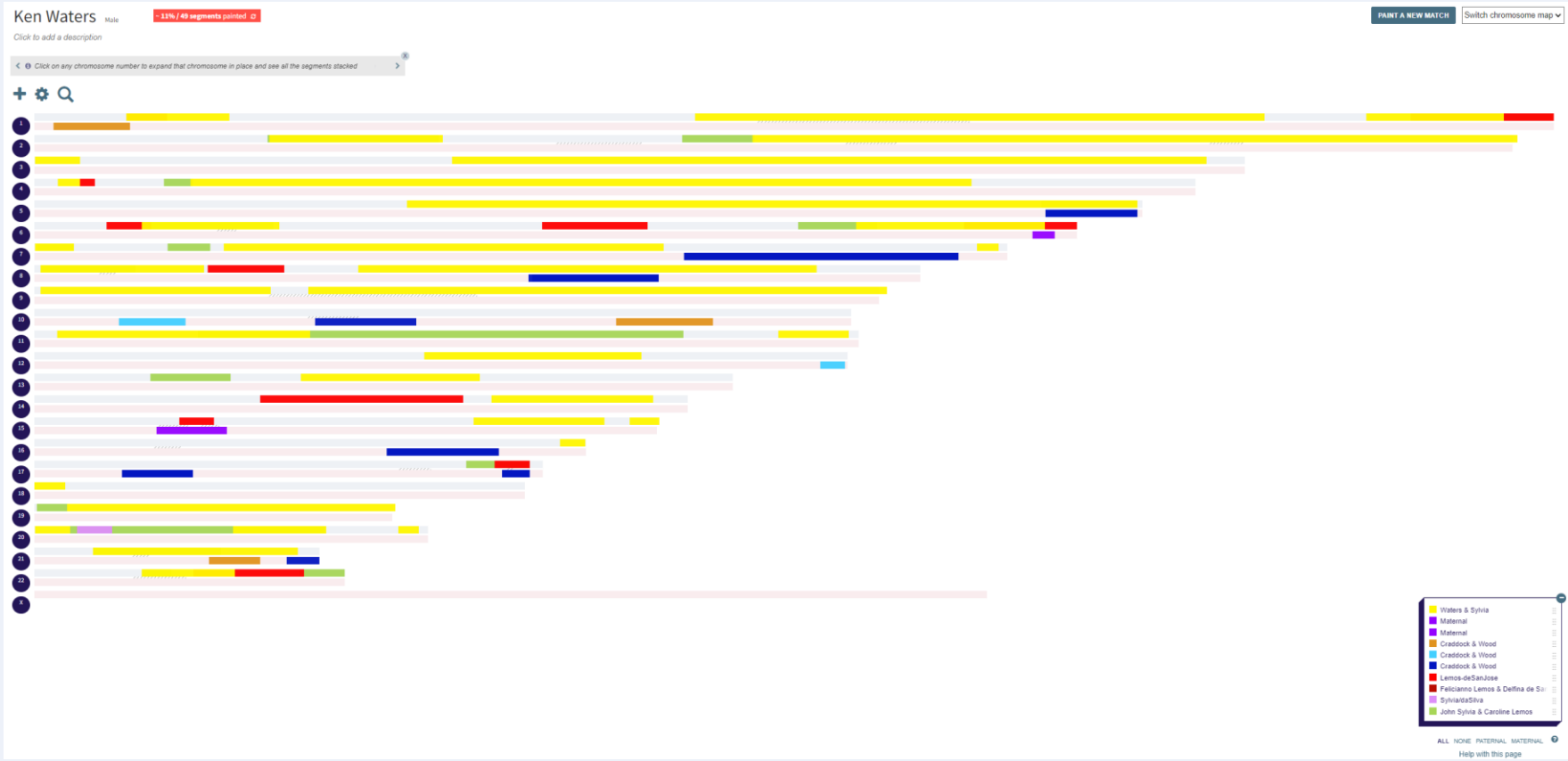
Chromosome Map

- The three match each other but the segments between me and the unknown person do not share any of the same segments I share with the 2C
- My belief is that means the connection from me to this unknown person is actually at least one generation above the common ancestors I share with the 2C
- Would need to examine more segments to know for sure



Chromosome Map

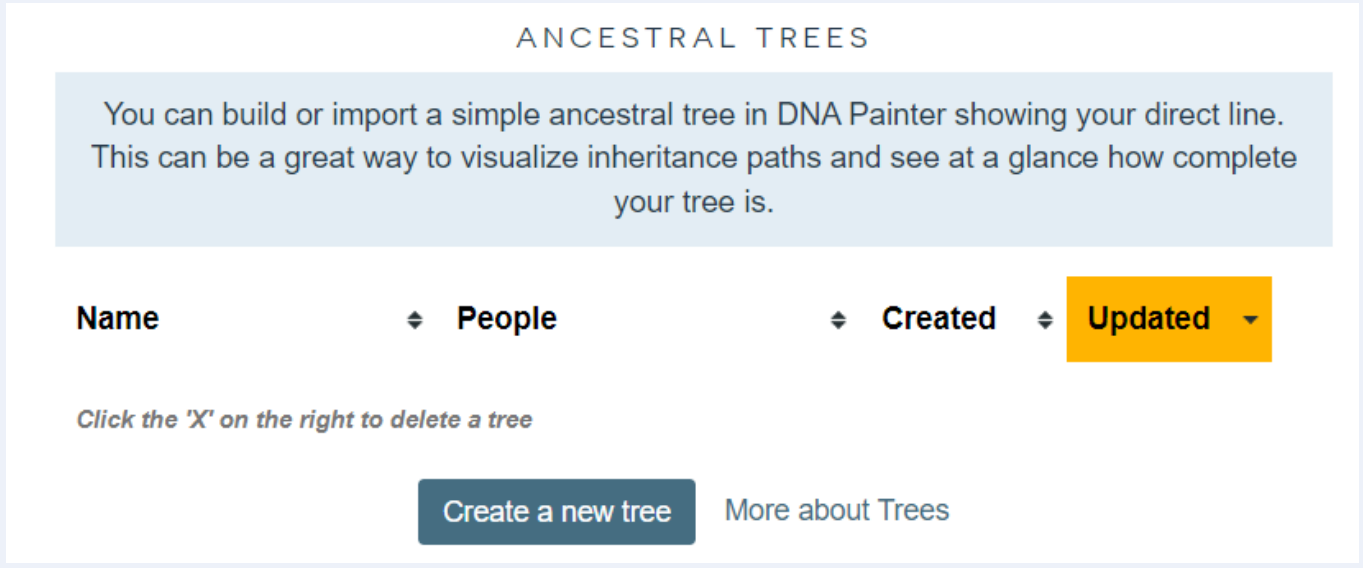
- Some final comments:
  - Build a strategy keeping in mind what you are trying to accomplish
  - If you want to build multiple chromosome maps then you may need to pay for a subscription

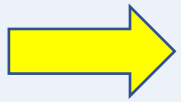


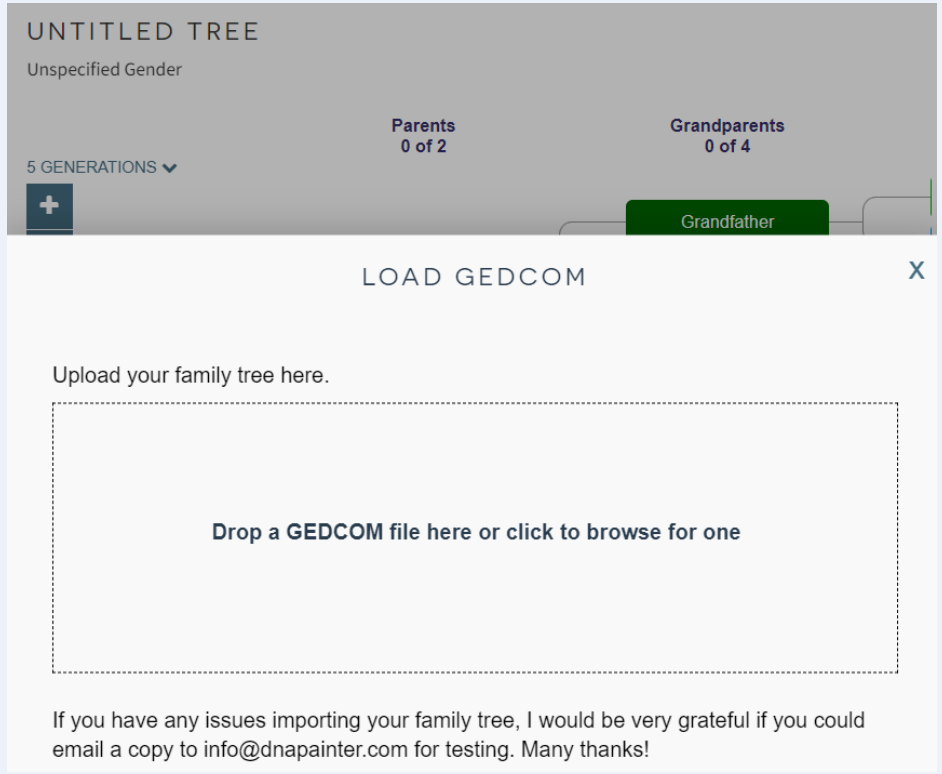
Ancestral Trees

Ancestral Trees

- Easiest way to get started is to upload a GEDCOM file
  - You can get a GEDCOM file from your desktop family tree program or download from an existing family tree online such as from Ancestry.com

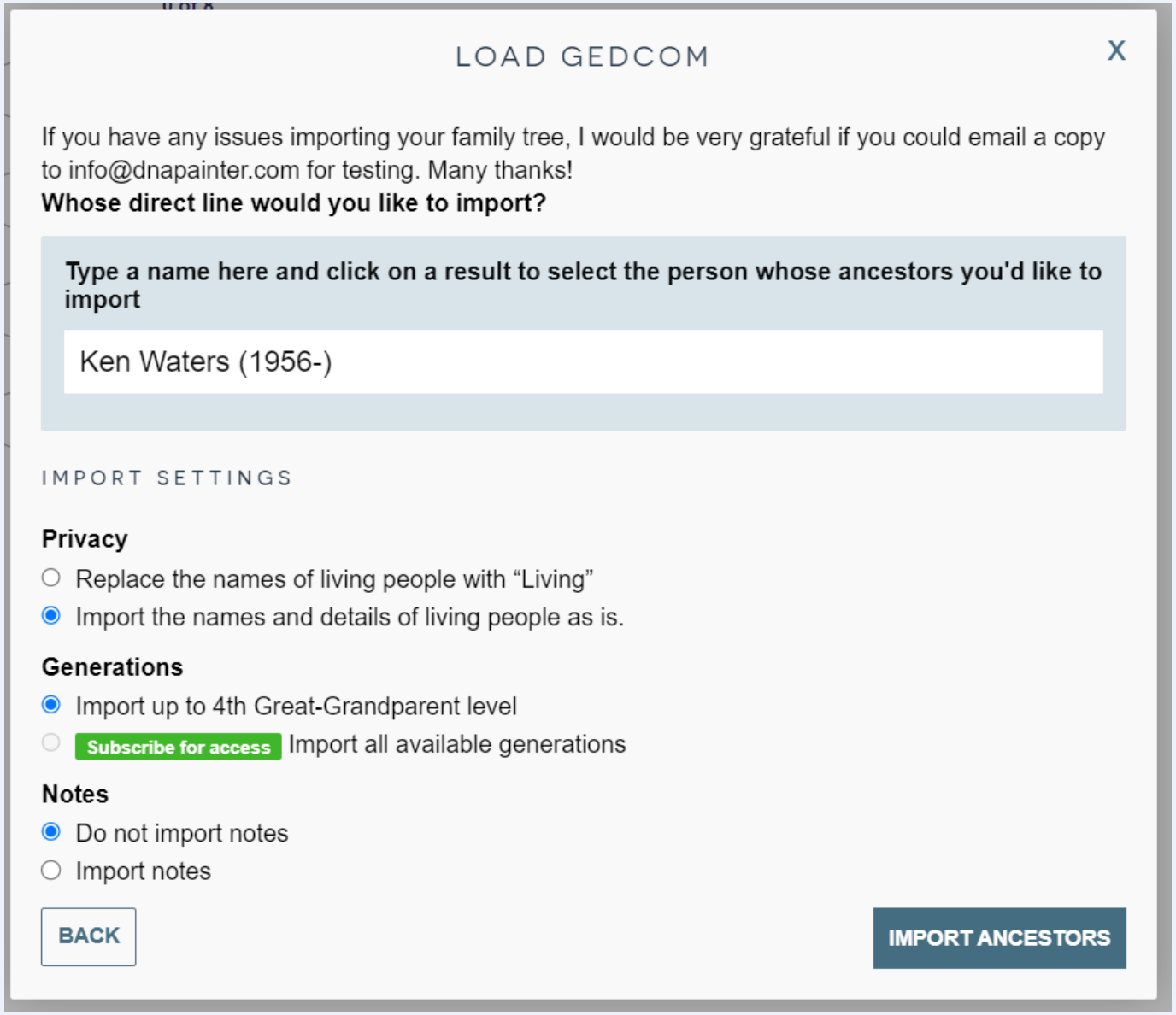






Ancestral Trees

- Select a few settings here
- For a free account you can import up to 4th Great-grandparent level
- NOTE: you can select someone else in your tree as the primary person to work a different line in your tree

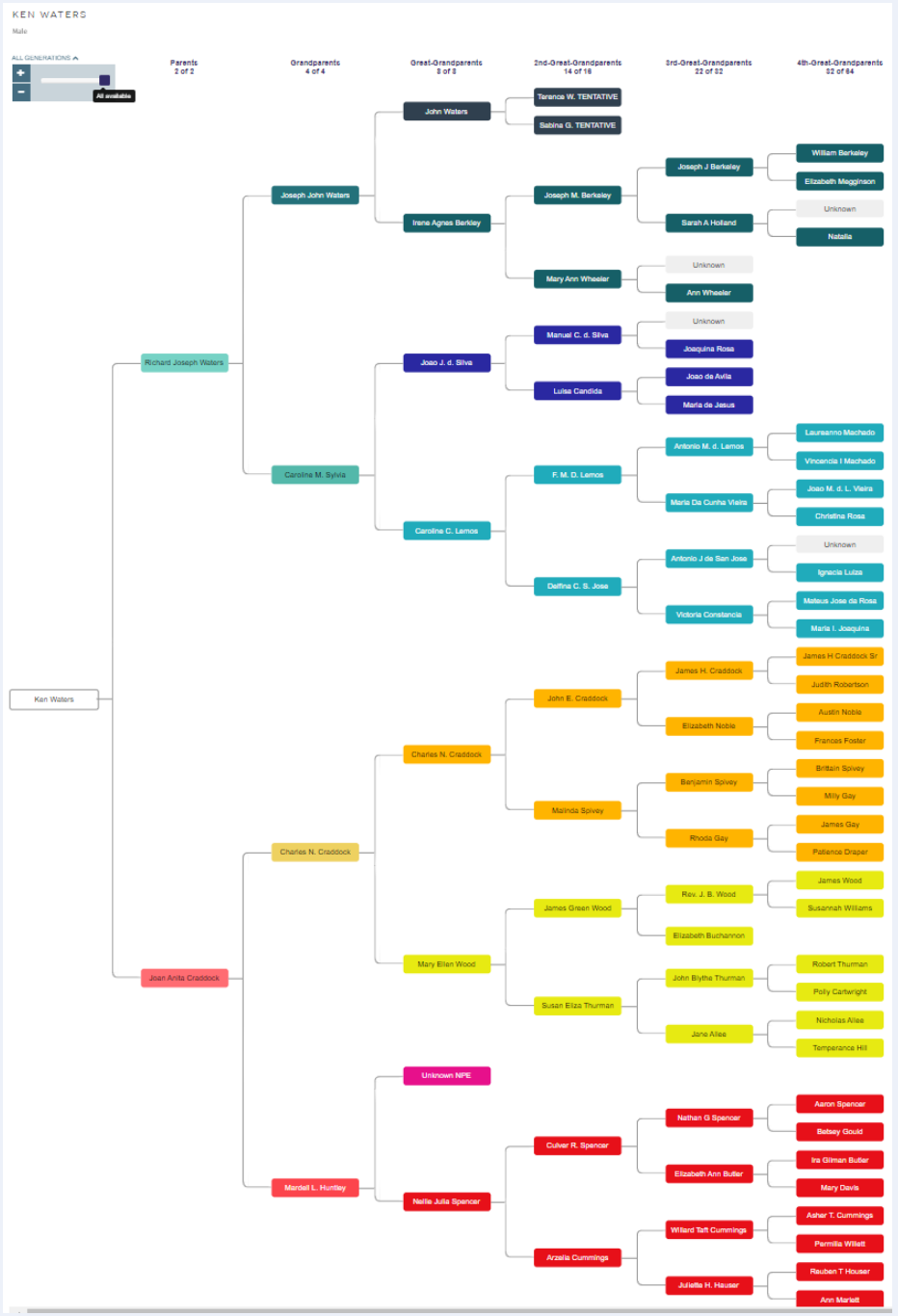


Ancestral Trees

- This is my primary Ancestry tree used to link to my DNA kits for family
- Default is for 5 generations
- You can go up to 7 generations back to 4th great grandparents by selecting the dropdown arrow

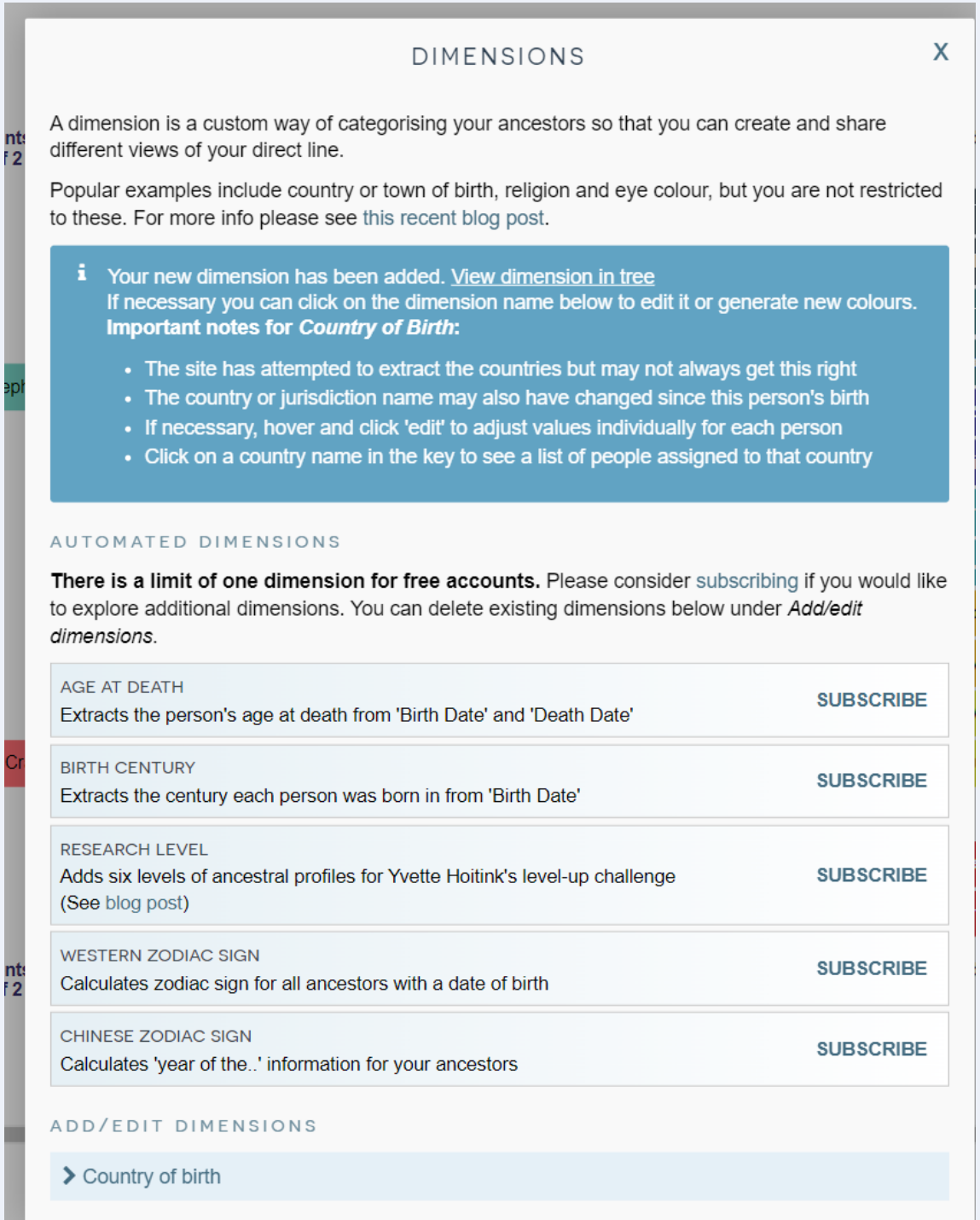
Ancestral Trees

- My 7-generation chart
  - As you would expect it doesn't render well to display the entire tree on the screen all at once



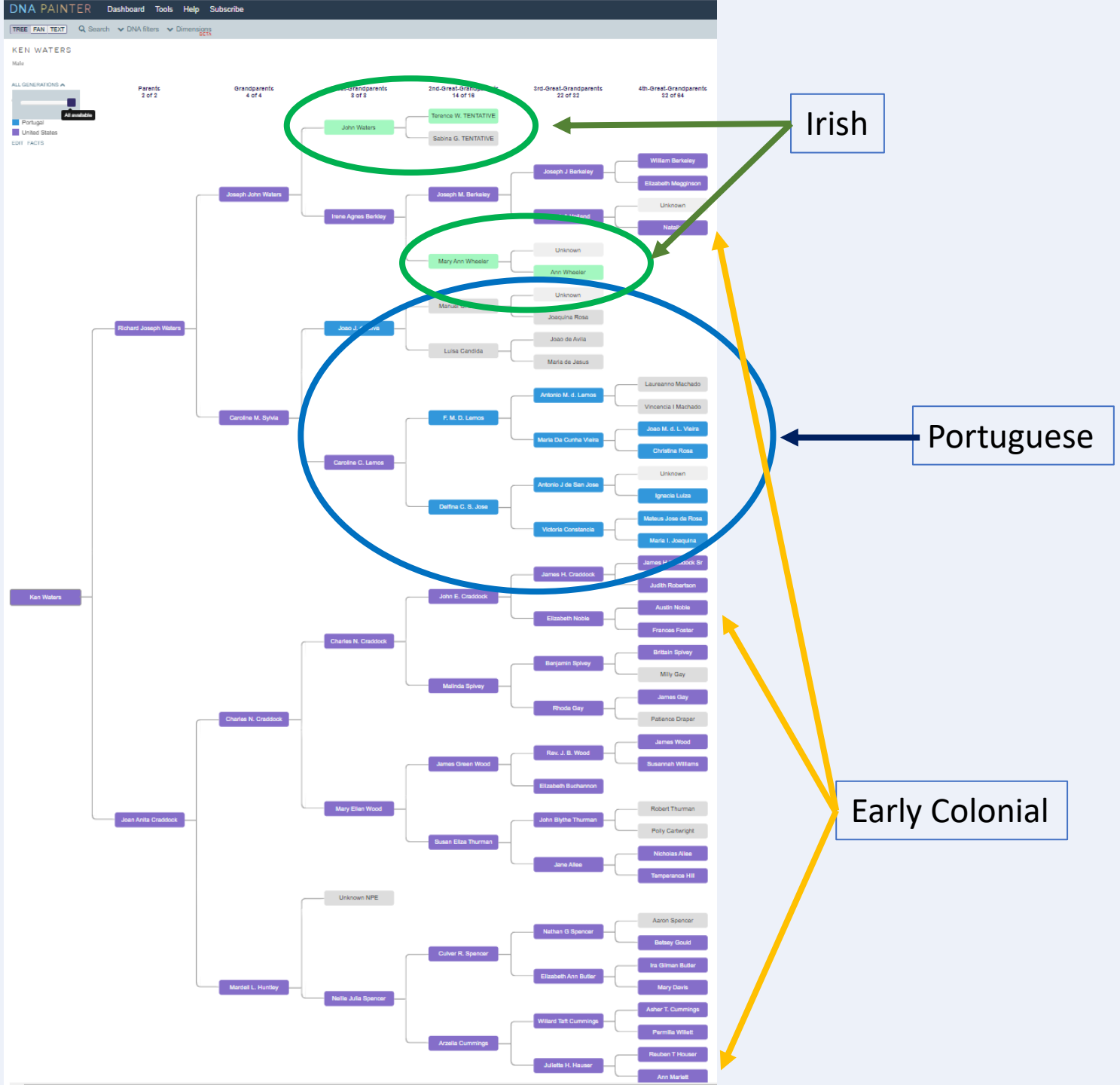
Ancestral Trees

- Dimensions [NEW]
- Only one allowed for a free account
- Here I selected birth locations



Ancestral Trees

- Dimensions
  - Nice quick way to highlight birth origin countries
  - In my case:
    - Green is Ireland
    - Blue is Portugal/Azores
    - and purple shows USA [mostly my colonial roots]

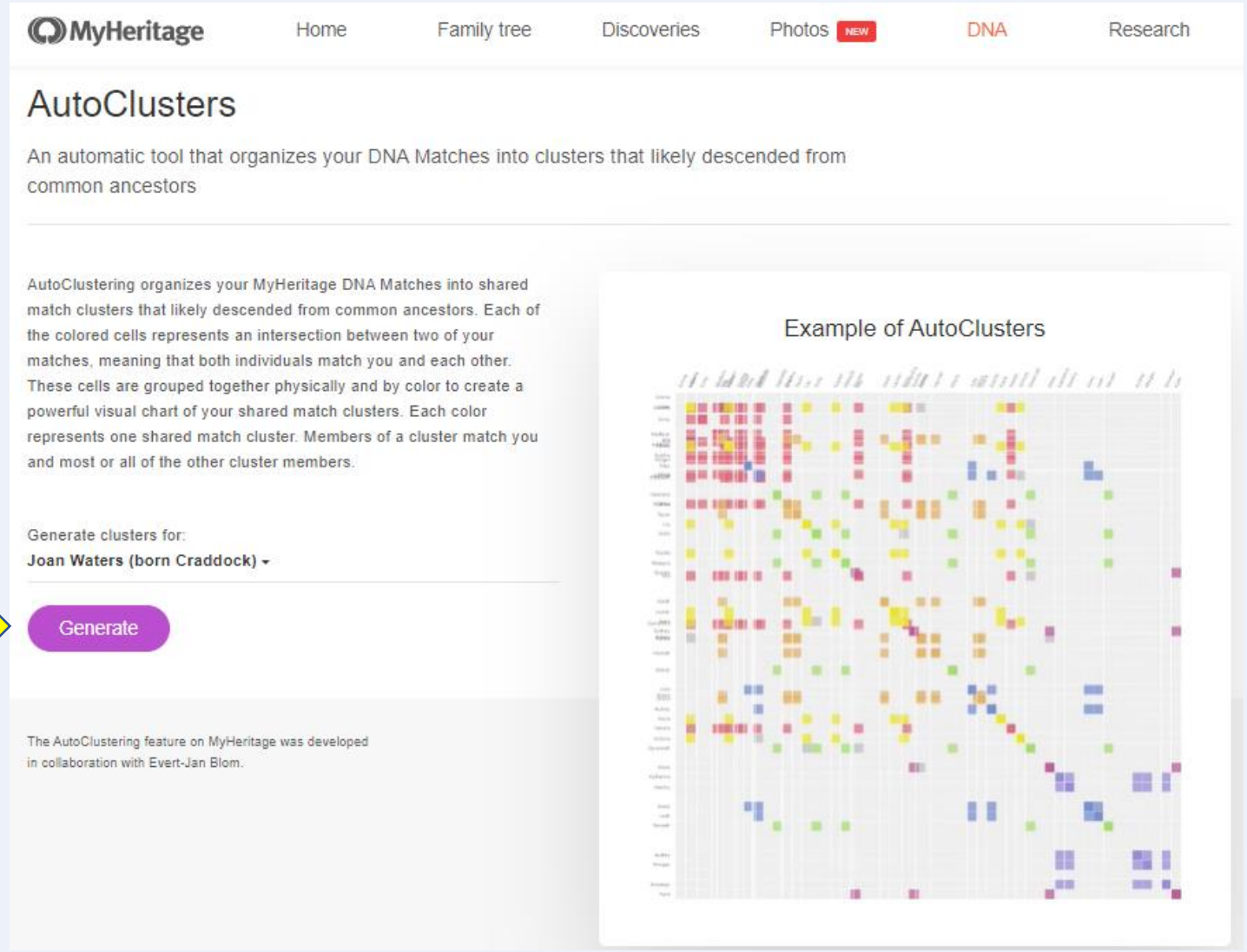


Cluster Auto-Painter

Cluster Auto Painter

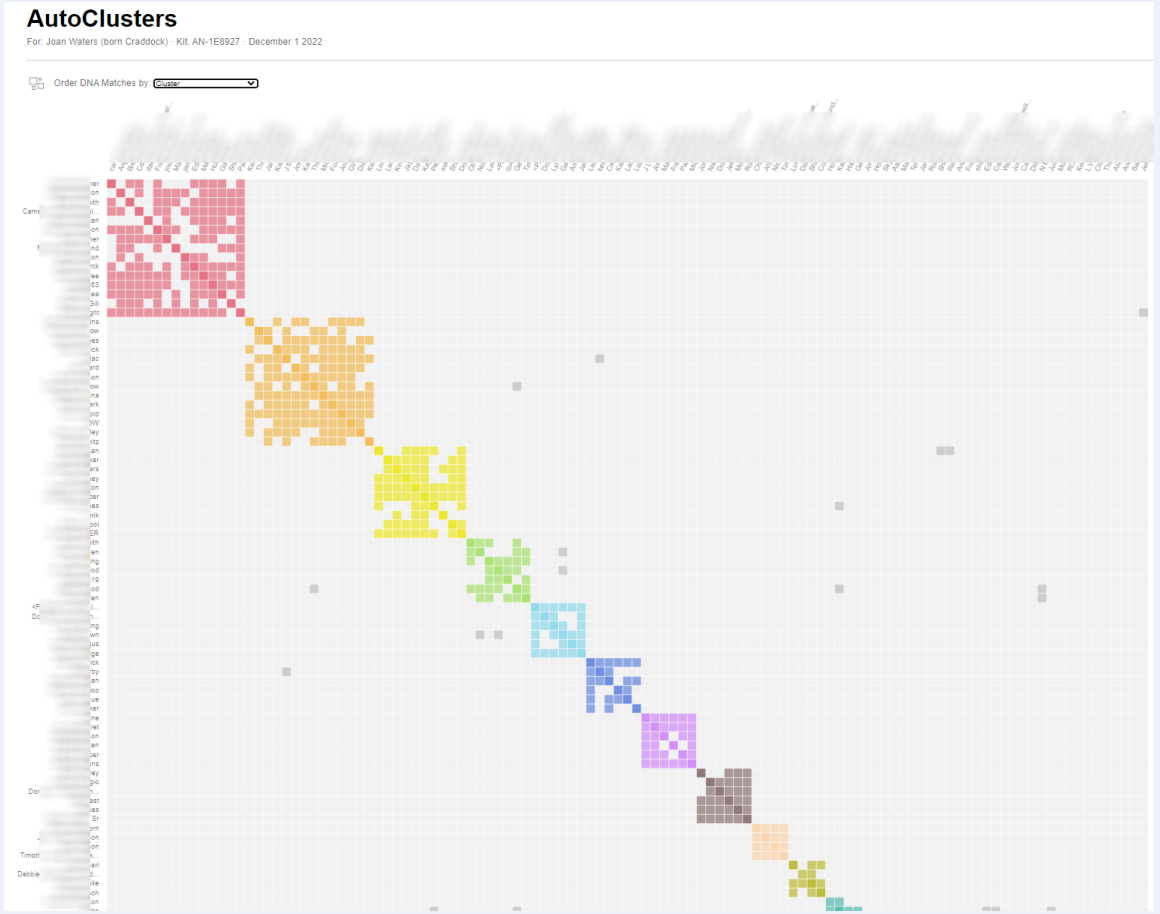
- Start with an auto-cluster file
  - I'm using my mom's kit on My Heritage

Special note: you may have to upgrade your kit on My Heritage to be able to generate an autocluster file



Cluster Auto Painter

- Resulting autocluster display from my mom's kit at MyHeritage looks like this
- You will use the HTML file that was sent from My Heritage as one of two input files



Cluster Auto Painter

- Result will be an HTML file for your auto-cluster analysis
- You also need a shared segment file from MyHeritage

Cluster Auto Painter

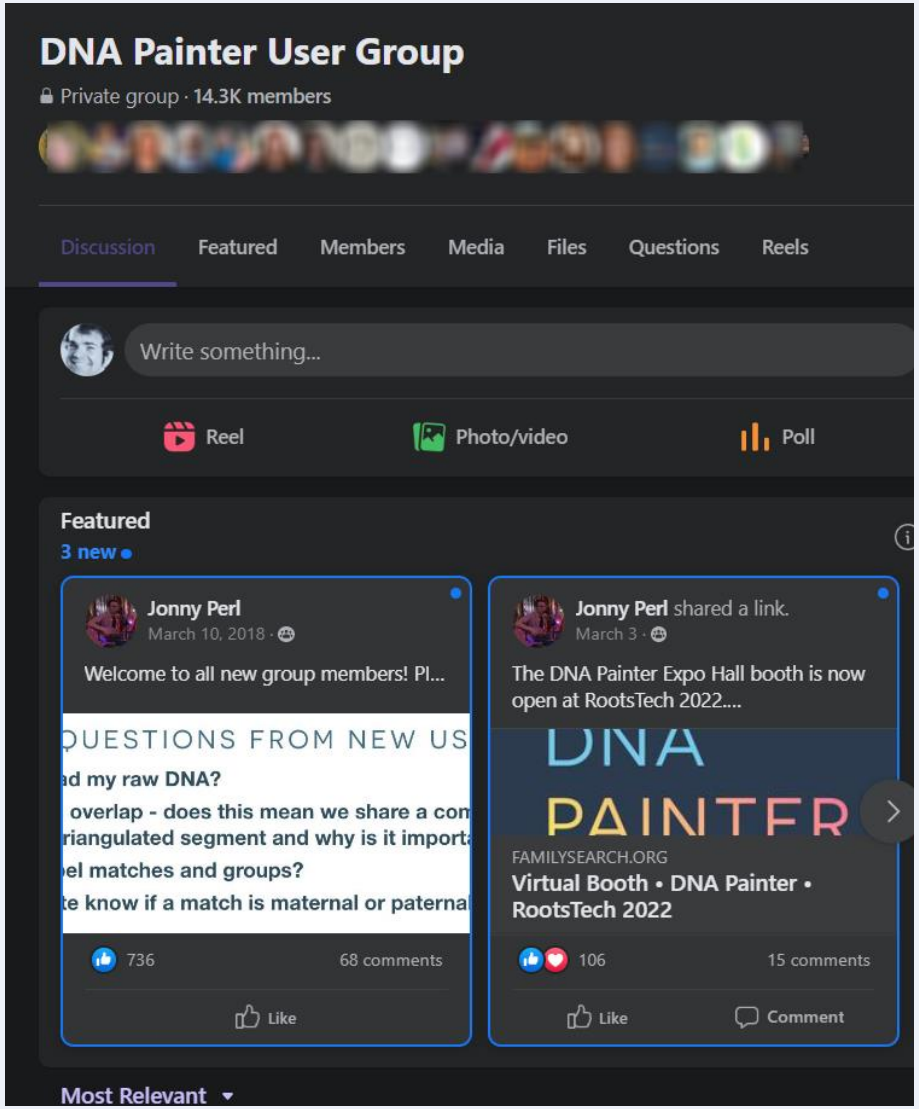
- Final result (note: only 1 chromosome diagram allowed for free acct)
- This basically merges clusters and segments that could be useful for segment analysis – determining what part of each chromosome came from which cluster (or, genetic network)

Wrap-Up

- DNAPainter is a wonderful collection of useful tools for genetic genealogists
- Some of the tools are easy to understand but others require more study to comprehend and fully use
- Take advantage of Jonny Perl's videos to gain understanding

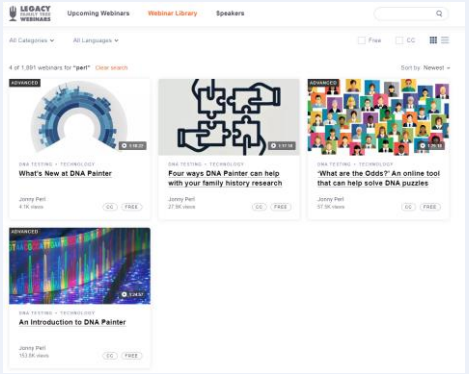
Facebook Group

- If you're on Facebook be sure to join this group so you can post questions and read what others are posting

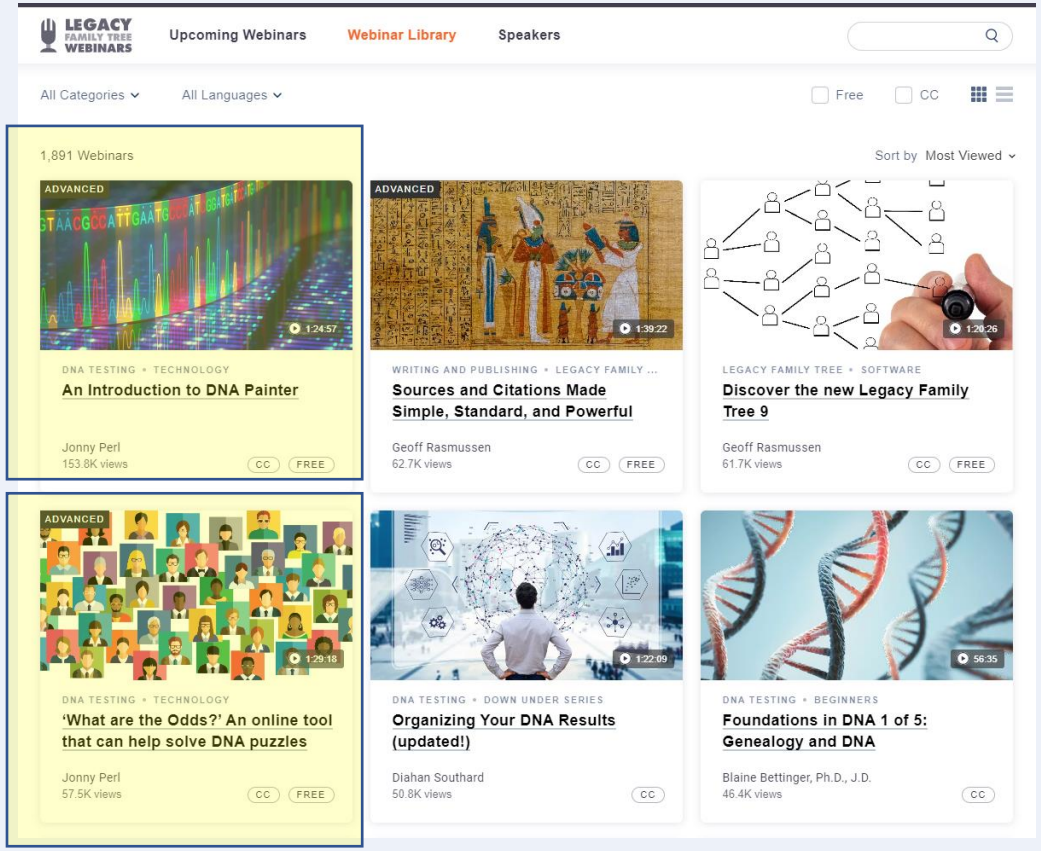


Legacy Family Tree Webinars

- Also, be sure to catch Jonny's excellent webinars on Legacy Family Tree Webinars



- As of 12/5/2022 he owns the #1 and #4 most watched webinars in their database!



Quote of the Day

"DNA doesn't lie. But it sure can be misinterpreted."

– Ken Waters

Upcoming Classes/Presentations

Sat, Dec 10, 1 pm – 2 pm
Title: A Unified Process for Working with Ancestry DNA Matches
Description: We will discuss a useful methodology for working your DNA matches starting with the basics and then digging deeper into ways to improve your Ancestry DNA efforts. This will include using Tag Groups, shared matches, and identifying those matches in order to add to your family tree.

Sat, Jan 14, 2 pm
Topic: Identifying Your DNA Matches
Description: One of the primary steps in working with your DNA match list is identifying the matches so that you can work them into your family tree. Sometimes it's easy or you can communicate with the match. But, more often, that is not the case and so a series of steps may be required in order to identify them

Wed, Feb 1, 7 pm (Private Group—contact Ken for information)
Topic: Working with DNA Matches

All library classes (highlighted blue) are free to attend and require no registration. Classes are held at the Red Mountain Mesa Public Library at 635 N Power Rd in Mesa (unless otherwise noted above).

FamilyTreeAZ.com

Presentations:
http://familytreeaz.com/Presentations

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Google Voice Phone: (480) 331-5889