

Chromosome Mapping

Blaine T. Bettinger, Ph.D., J.D.

www.DNA-Central.com

blainebettinger@gmail.com

Chromosome Mapping

Chromosome mapping is an autosomal DNA technique used to assign segments of DNA to an ancestor or ancestral couple based on sharing those segments of DNA with a known relative. In the case of tested ancestors (parents, grandparents, etc.), segments shared with the ancestor are easily mapped as having come from that ancestor. In the case of tested relatives who are not ancestors, segments are mapped to the ancestor or ancestral couple shared with that tested relative. Generally, the closer the relative the greater the number of shared segments.

Chromosome mapping can be complicated by factors such as endogamy, pedigree collapse, and other issues. It can be challenging to map segments for genetic matches that share several different family lines. Small segments (smaller than 7 cM) can also be an issue when chromosome mapping, as small segments may be false.

Testing Relatives

Almost any relative can be used for chromosome mapping. Siblings and children are generally not useful for chromosome mapping, as a full sibling shares both parents, a half-sibling shares one parent, and children inherited your DNA. Beyond that, however, other relatives sharing DNA with you can help you map your segments. For example, segments shared with the following cousins can be mapped as described:

- Aunt/uncle – segments mapped to your grandparents;
- Full first cousins – segments mapped to shared set of grandparents;
- Half cousins – segments mapped to a set of shared great-grandparents;
- Full second cousins – segments mapped to a set of shared great-grandparents
- And so on...

Segment Data

Chromosome Mapping relies on **segment data**, which is information about the piece(s) of DNA that two people share. Typically, segment data includes a chromosome number, start location, stop location, segment size, and perhaps the number of tested SNPs in the segment.

Name	Chromosome	Start	End	Size	SNP
Julio G.	Chr3	14,409,980	25,297,332	12 cM	1,437

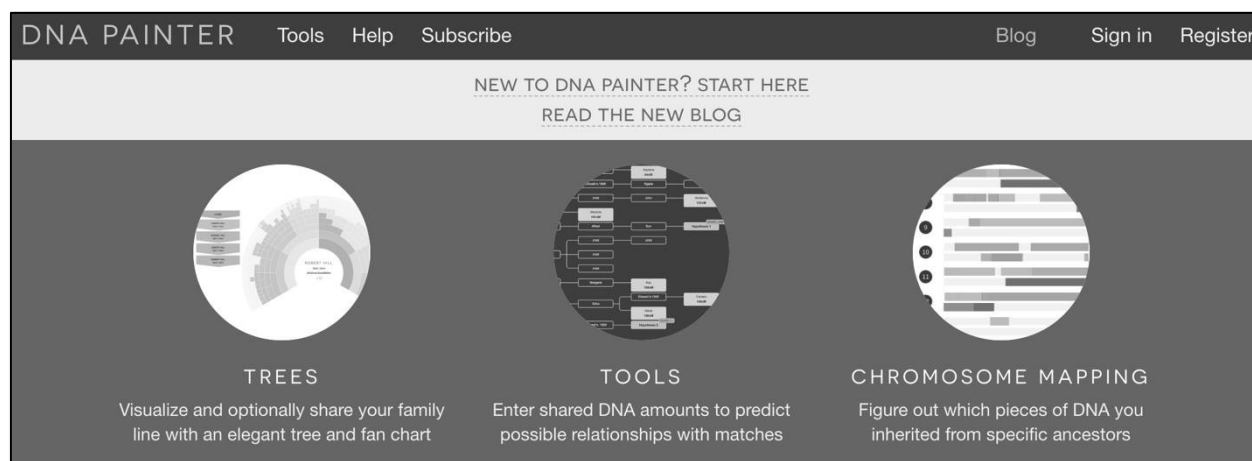
The main sources of segment data from the following companies or third-party tools:

- 23andMe, Family Tree DNA, MyHeritage, and GEDmatch

AncestryDNA does not provide segment data to test-takers. If both matches transfer to GEDmatch or another testing company, they can obtain that segment data. Living DNA also does *currently* provide matching or segment data, but the company does plan to offer matching later in 2018. It's possible that they might provide segment data at that time.

DNA Painter (<https://dnainter.com/>)

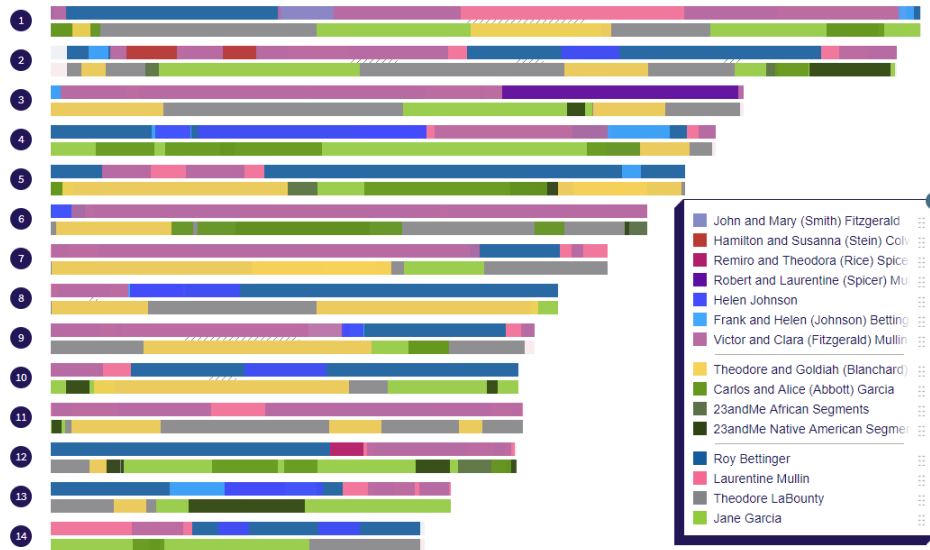
DNA Painter is a website that allows you to map shared segments of DNA to your chromosomes. The site also offers powerful tools to estimate your relationships to unknown matches.



The site is created and managed by Jonny Perl of London, a programmer and active member of the genetic genealogy community.

The image shows a screenshot of the "PAINT A MATCH" form on the DNA Painter website. The form has a title "PAINT A MATCH" and a close button "X" in the top right corner. Below the title is a text input field with the placeholder text "Paste in segment data here (e.g. from Gedmatch/ftDNA/23andme/MyHeritage) for a single match. Multiple rows is fine!". Below the input field is a large empty text area for pasting data. At the bottom of the form, there is a label "Exclude segments under 7 cM" with a dropdown menu showing "7". To the right of this label are two buttons: "OVERLAY THESE SEGMENTS" and "SAVE MATCH NOW".

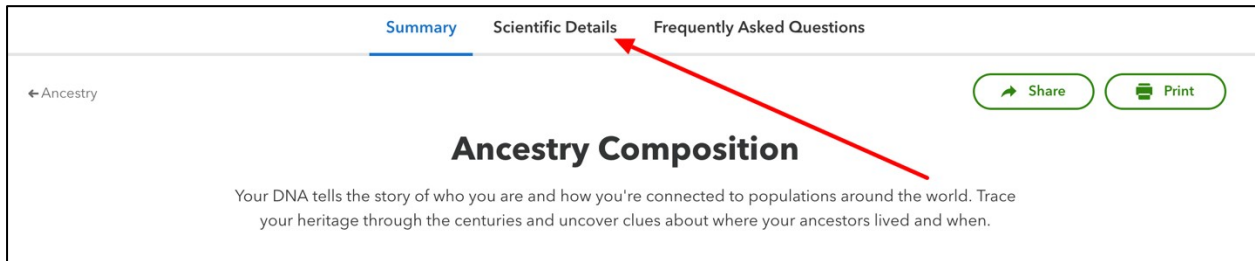
An example of a chromosome painting project:



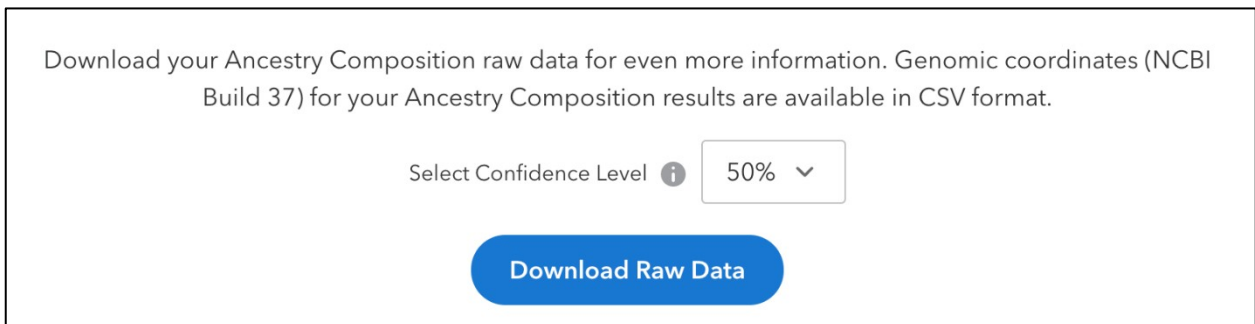
Mapping Your Ethnicity

23andMe is currently the only testing company that provides segment data for ethnicity estimates. The segment data found in the “Ancestry Composition Chromosome Painting” at 23andMe can be downloaded as a CSV file.

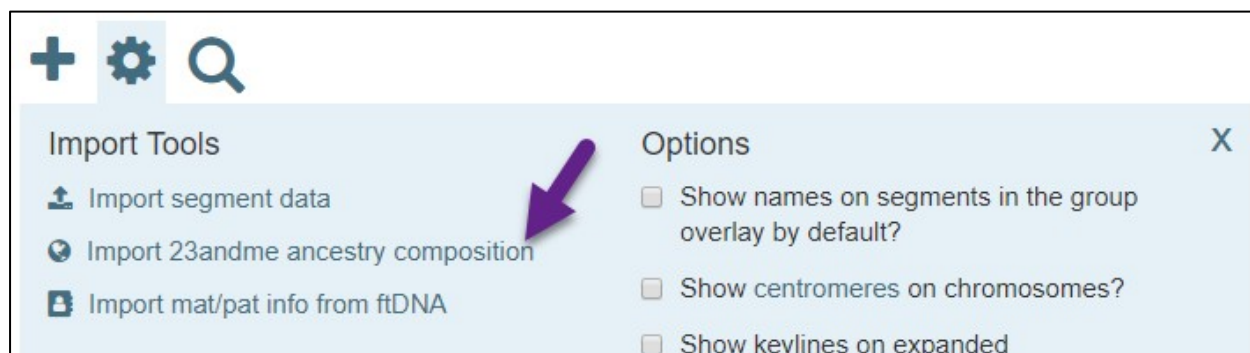
First, go to your Ancestry Composition page and click on “Scientific Details”:



Then chose a confidence level and download the CSV file:



At DNA Painter, you can upload the file using the tools/settings (the GEAR ICON):



DNA Painter Resources:

- Blaine Bettinger, “DNA Painter,” *YouTube*, October 20, 2017 (<https://youtu.be/wyjcJxywTZI>).
- “DNA Painter User Group,” *Facebook* (<https://www.facebook.com/groups/dnapainter/>).
- DNA Painter, “Painting your DNA with inferred matches,” *Medium*, October 27, 2017 (<https://medium.com/@dnapainter/painting-your-dna-with-inferred-matches-28718a3da44c>).
- Mercedes. “How to Download Your Ethnicity Data from 23 and Me,” *Who Are You Made Of?*, August 29, 2018 (<https://whoareyoumadeof.com/blog/2018/08/29/how-to-download-your-ethnicity-data-from-23-and-me/>).
- Perl, Jonny. “Examining Your DNA Matches with DNA Painter,” *RootsTech*, February 2017 (<https://www.rootstech.org/video/examining-your-dna-matches-with-dna-painter-jonny-perl>).
- Perl, Jonny. “Help,” *DNA Painter* (<https://dnapainter.com/help/articles>).

