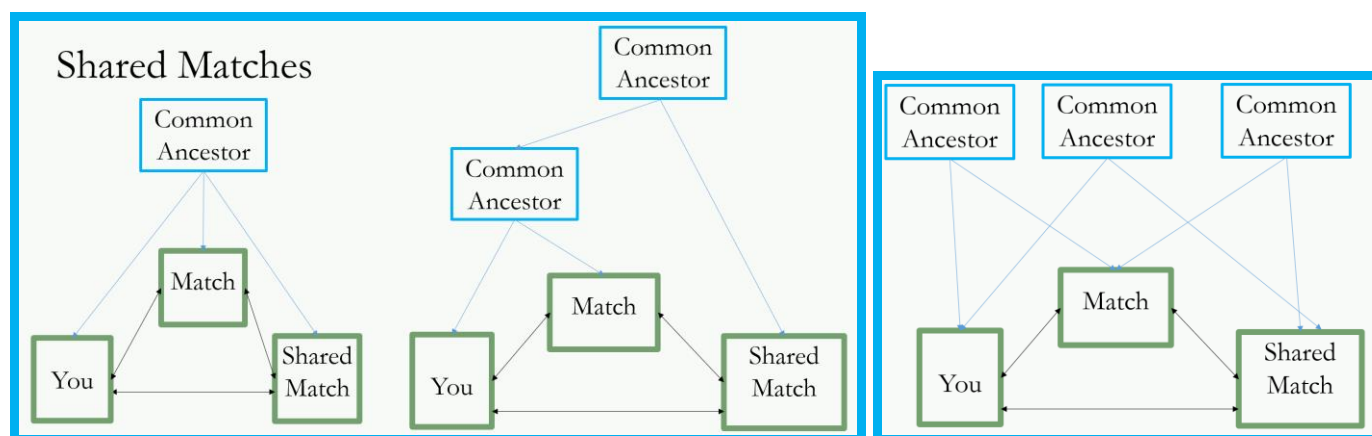


Moving DNA to the Next Level – Handout

This handout supports the *‘Moving DNA to the Next Level’* talk presented online for Scottish Indexes on 13 January 2024.

Shared Matches

Each DNA company identifies for each match (e.g. person you share DNA with) all the other matches that also share DNA with that first match. This gives a list of people that share DNA with both yourself and your match (whose Match Page you are on). At Ancestry, to appear on the list, they must share greater than 20cM with both you and your match. Having a shared match indicates that it is very likely that you all three share a common ancestor (first scenario below) (noting that two of you may share a more recent common ancestor (second scenario)). There is a chance (although a lot less likely) that you each share a different common ancestor (third scenario). These diagrams show the three scenarios.



Finding Shared Matches

- AncestryDNA – see ‘Shared Matches’ tab on Match page. To appear on the list, the Shared Match must share greater than 20cM with you and share greater than 20cM with your match.
- MyHeritageDNA – scroll down to ‘Shared DNA Matches’ on Match page – click on ‘Show more DNA matches’ at bottom of list to show more
- FTDNA – click on the people symbol on right hand side of match list and choose ‘In Common With’
- 23andMe¹ – scroll down to ‘Find Relatives in Common’ and click button to show shared matches

MyHeritageDNA and 23andMe¹ also give the amount of DNA the shared match shares with your match.

Grouping/Clustering Matches

Groups of matches that share DNA will be connected within the same family lines.

Use groups to find connections between matches to identify their family lines.

- Known groups (e.g. you know the family line)
- Unknown groups (use these to solve brickwalls/unknown parentage cases)

To carry out grouping/clustering:

- Identify starting match (usually second cousin or more distant) – the most recent common ancestor with the starting match indicates the family line for the group
- Identify their shared matches (and add them to group)
- Identify the shared matches of the shared matches (and add them to the group)
- Only include matches that are at the same or more distant relationship than the starting match
- Identify next match down the list not in a group and use as starting match for next group
- Continue until all matches (down to a chosen level) are in groups
- Use ‘No shared matches’ identifier for matches without any shared matches

Methods for Grouping:

- Leeds Method – instructions at: <https://www.danaleeds.com/dna-color-clustering-the-leeds-method-for-easily-visualizing-matches/> - aims to group into your four grandparent lines. Do not include matches with less than

¹ Currently (January 2024), 23andMe have temporarily removed access to the Relatives in Common feature while they investigate the recent security issues.

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400cM if they are related via two of your grandparents (e.g. first cousin twice removed). Extend below 90cM to get enough matches (noting you may get more groups linked to great-grandparent or great-great grandparent lines).

- AncestryDNA Coloured Dots – <https://support.ancestry.com/s/article/Grouping-and-Filtering-AncestryDNA-Matches> - give chosen starting match a colour (named e.g. *Group 1* or *Group 9 – Bull Family*) then add all shared matches (excluding any closer than the starting match) and the shared matches' shared matches. Then go to next match without a group and start again. First check if any of their shared matches already belong to a group. If so, then add them to that group rather than starting a new group. Use the SideView technology (which splits your matches into Parent 1 and Parent 2 where possible) to help identify which side the group belongs to. Note Parent 1 can be either paternal or maternal; Parent 2 will be the opposite of Parent 1. More information at <https://support.ancestry.co.uk/s/article/DNA-Matches-Split-Up-By-Parent>
- MyHeritageDNA Labels – this is a similar approach to AncestryDNA Coloured Dots however be wary of shared matches that are less than 15cM with either you or your match (do not include in grouping) - <https://blog.myheritage.com/2021/12/labels-for-dna-matches-now-improved/>
- Auto-clustering - MyHeritageDNA inbuilt tool or use Genetic Affairs (<https://www.geneticaffairs.com/>) for 23andMe² and FamilyTreeDNA. Visual (.html) and tabular (.csv and .html) results are provided.

Use the groups formed to research the trees of the matches to find the common line. Further sub-cluster the group (by using a more distant match within the group) to find more distant family lines.

Overlapping groups – this could be due to:

- Two groups are actually one and can be merged
- One match being related to a shared match by an unrelated line
- Multiple paths (endogamy (<https://isogg.org/wiki/Endogamy>), pedigree collapse (e.g. due to cousins marrying) or double cousins (e.g. two sisters marrying two brothers))

Chromosome Browsers

A chromosome browser provides a visual representation of the locations on your chromosomes that you share with a DNA match. They depict the segments that you share.

A segment is the collection of base pairs (locations on the DNA helix) where you have the same code. The start and end locations of the shared DNA are recorded as the base pair location. However, the cM recorded for that is not directly proportionate to the number of base pairs as it also takes into account how likely those base pairs are to change between two people. Therefore, the cM gives a prediction of how closely related the two people are based on number of shared base pairs and how likely they are to be different.

The information provided visually in the chromosome browser is also available in raw format³ either via downloading or in tables on the website. This is particularly useful to upload into DNA Painter for chromosome mapping where you allocate segments to specific ancestors.

The benefits of chromosome browsers is to identify where on your chromosomes you inherit the same DNA and to identify which ancestor you have inherited that DNA from. The information in chromosome browsers can be used to 'map' your chromosome. See Chromosome Mapping below.

Chromosome browsers are available at 23andMe⁴, MyHeritageDNA, FamilyTreeDNA and Living DNA. AncestryDNA do not provide a chromosome browser but by uploading to one of the companies that provide a chromosome browser you can get access. It is also possible to upload to GEDmatch (www.gedmatch.com) however ensure you are happy with their Terms and Conditions of use before uploading.

² At this time (January 2024), temporarily it is not possible to download your raw DNA from 23andMe due to the recent security issues.

³ Some companies have temporarily removed this facility due to the recent security issues (January 2024).

⁴ At this time (January 2024), temporarily 23andMe are not providing a chromosome browser due to the recent security issues.

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The chromosome browsers can be found at:

- 23andMe⁴ – go to ‘Advanced DNA Comparison’ on the ‘Family & Friends’ drop down. Choose the match you want to review the segments for. Scroll below the chromosome browser to the table of data below which can then be copied.
- MyHeritage – scroll to the bottom of the match page to see the chromosome browser. Click on ‘Advanced options’ then choose ‘Download shared DNA info’.
- FamilyTreeDNA – click on the match which will create a pop-up banner at the bottom of the page. Click on ‘Compare Relationship’ which will launch the chromosome browser. Click on ‘Download Segments’ to get the data⁵.
- LivingDNA – on the match page, go to the ‘Shared DNA’ tab for the chromosome browser. If you have created any ‘Matchbox groups’, you can view all of the matches in a group via the ‘Multiview browser’.

Chromosome Mapping

Chromosome mapping is a technique of placing the segments of DNA you received from specific ancestors onto a visual display of your 23 chromosomes. One of the key tools for doing chromosome mapping is DNA Painter. For further information on how to do chromosome mapping using DNA Painter, there is lots of information at the DNA Painter website (www.dnainter.com) as well as a very useful free webinar and accompanying syllabus at Legacy Family Tree Webinars (https://familytreewebinars.com/download.php?webinar_id=955) about DNA Painter.

Downloading Raw Data & Uploading

For MyHeritageDNA, FamilyTreeDNA and Living DNA, you can take your autosomal results output from any of the other companies and upload them to add your autosomal DNA into those databases for free. Payment is required to enable more detailed information (including the chromosome browser) and tools to be used at these companies following upload however this is not essential to get some useful information. This does mean that if you want to be in the Ancestry or 23andMe database the only way is to take a test at that company.

Downloading data at each of the companies is described below:

- Ancestry – on your DNA home page, go to the Settings button in the top right corner. Scroll down to the ‘Actions’ section at bottom. Click on the ‘Download’ dropdown arrow. You will be asked to accept the conditions of downloading and then to validate your account. You then click ‘Confirm’ and you will get an email with a link to confirm the request to download. Once confirmed from email, you can begin the download and you will get a zip file to save.
- 23andMe⁶ – on your name drop down in the top right corner of the task bar, choose Browse Raw Data. Then click on the Download tab (or blue download link). At the bottom of the page you can ‘Request your raw data download’. You need to accept the limitations and risk and ‘Submit request’. You will receive an email when the download is ready.
- MyHeritageDNA⁶ – on the DNA dropdown on the taskbar, choose ‘Manage DNA kits’. Click on the three dots on the right-hand side and choose download raw data. This is only possible if you have taken a test at MyHeritageDNA. If you have uploaded to MyHeritageDNA, you cannot re-download it however you should therefore have the raw data from another location. Information is provided at: <https://www.myheritage.com/help-center/en/article/how-do-i-download-my-raw-dna-data-file-from-myheritage>.
- FamilyTreeDNA – on the front panel under Autosomal DNA, click on ‘See More’ and choose ‘Data Download’. Choose ‘Build 37 Concatenated Raw Data’ as this includes your autosomal and X-DNA information. You are then asked to save the file to your computer.
- Living DNA – using the dropdown from your name at the top right, choose ‘Profiles’. Click on the arrow at the end of the profile you want to download. Scroll to the bottom of the screen and choose ‘Retrieve raw DNA data file’ Download link. Read down and give consent. Then choose ‘Download autosomal (family ancestry) raw marker data’ and save the file to your computer.

X-DNA

The sex chromosome pair is made up of an X and Y chromosome for men and two X chromosomes for women. Men inherit one X chromosome from their mother (either the whole of one of hers or a recombination of both); women inherit one X chromosome from each parent (the one from her father will be whole but the one from her mother may be the

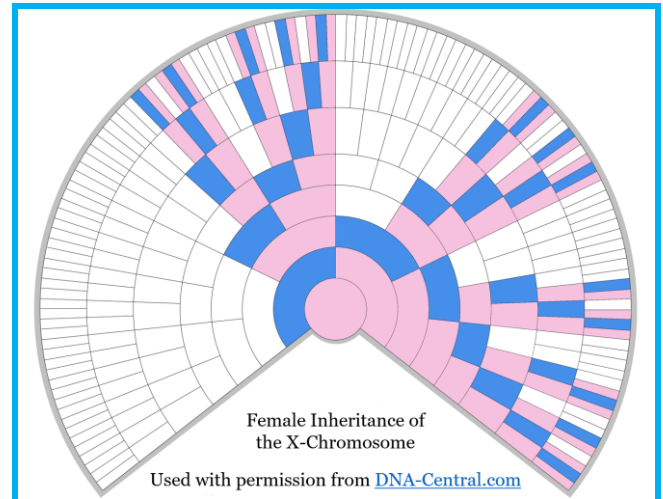
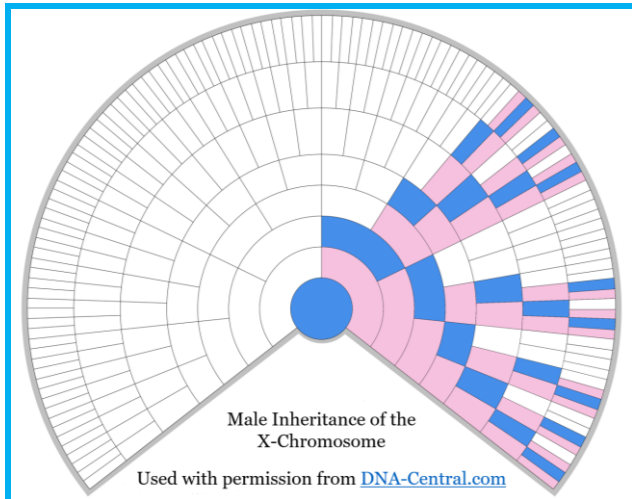
⁵ At this time (January 2024), this facility is temporarily suspended due to the recent security issues.

⁶ At this time (January 2024), it is not possible to download your raw DNA due to the recent security issues.

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whole of one of them or a recombination of both). Recombination of the mother's X chromosomes is similar to the autosomal chromosomes however it does not happen as often. A full X chromosome is often handed down. As a consequence, the X chromosome(s) do not get diluted as quickly as autosomal chromosomes. Therefore a segment on the X chromosome needs to be bigger than about 15cM to be meaningful. It is important to check the segment lengths (see instructions for viewing Chromosome Browsers above). If there is a significant amount of X-DNA shared between you and a match, that will help you eliminate some possible paths to a common ancestor due to the way it is passed down.

These diagrams show the pattern of X-DNA inheritance to men and women.



Further Reading

- Books
 - *The Family Tree Guide to DNA Testing and Genetic Genealogy*; Blaine T Bettinger; Family Tree Books, USA; 2nd Edition, August 2019.
 - *Tracing Your Ancestors Using DNA: A Guide for Family Historians*; Edited by Graham S Holton, contributed by John Cleary, Michelle Leonard, Iain McDonald & Alasdair F MacDonald; Pen & Sword Family History, UK; 1st Edition, June 2019.
 - *Your DNA Guide - The Book*; Diahn Southard; Your DNA Guide, USA; 1st Edition, February 2020.
 - *Advanced Genetic Genealogy Techniques and Case Studies*; Editor Debbie Parker Wayne; Wayne Research, Cushing, Texas, USA; 1st Edition, 2019.
- ISOGG wiki - https://isogg.org/wiki/Wiki_Welcome_Page
- Websites/'How to' pages
 - <https://www.familysearch.org/blog/en/genealogy-dna-test/>
 - <https://www.whodoyouthinkyouaremagazine.com/tutorials/dna/>
 - <https://www.family-tree.co.uk/dna-testing>
- Blogs
 - Memories in Time – Fiona Brooker - <https://memoriesintime.co.nz/blogs/news>
 - The DNA Geek – Leah Larkin - <http://thednageek.com/blog/>
 - Your DNA Guide – Diahn Southard - <https://www.yourdnaguide.com/ydgblog>
 - Crewys News – Debbie Kennett - <https://cruwys.blogspot.co.uk/>
 - The Genetic Genealogist – Blaine T Bettinger - <https://thegeneticgenealogist.com/>
- Facebook groups
 - DNA Help for Genealogy (UK) - <https://www.facebook.com/groups/AncestryUKDNA>
 - Genetic Genealogy Tips and Techniques - <https://www.facebook.com/groups/geneticgenealogytipsandtechniques>
 - The DNA Roundtable - <https://www.facebook.com/groups/1587685288089570>

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