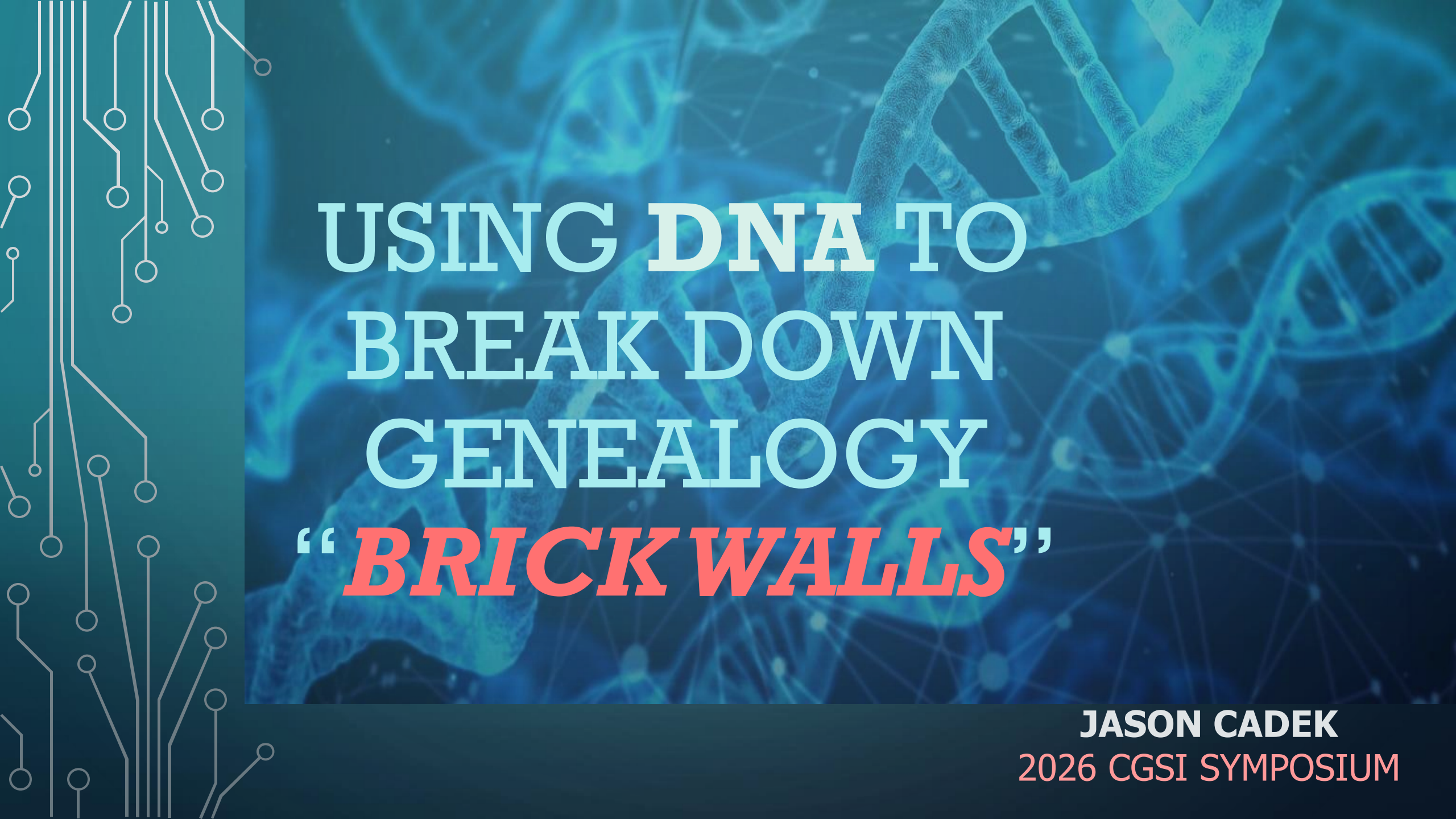




USING DNA TO BREAK DOWN GENEALOGY “*BRICK WALLS*”

JASON CADEK
2026 CGSI SYMPOSIUM

AGENDA

- **DNA Basics**
- What **results** come with a DNA test?
 - Ethnicity Estimates and Match Lists
- What **tools** are available to leverage your results?
 - Within testing companies and third-party tools
- **Case Study** using clusters, DNA painter and other tools



THE DNA PROMISE:

Traditional genealogy relies heavily on **records** like birth certificates, census logs, and church registers.

But records can be destroyed, falsified, or filled with spelling variations.

DNA is the one record that **cannot be altered** or lost to history*.



DNA BASICS

The Math of **Inheritance**: You inherit exactly **half of your DNA** from each parent. Because this biological package halves with every generation backward, genetic reach naturally dilutes over time.

Shared DNA blocks are measured in units called **Centimorgans (cM)**. High shared cM values indicate an immediate, undeniable biological connection.

The Objective: By grouping matches who share mutual DNA segments, you can isolate specific family branches and reverse-engineer your way back to a common ancestral couple.

The Rule of 50%

- Parents: **~50%**
- Grandparents: **~25%**
- Great-Grandparents: **~12.5%**
- 2xG-Grandparents: **~7.5%**

DNA TESTING TYPES

1. Autosomal DNA (atDNA)
2. Y-DNA
3. Mitochondrial DNA (mtDNA)

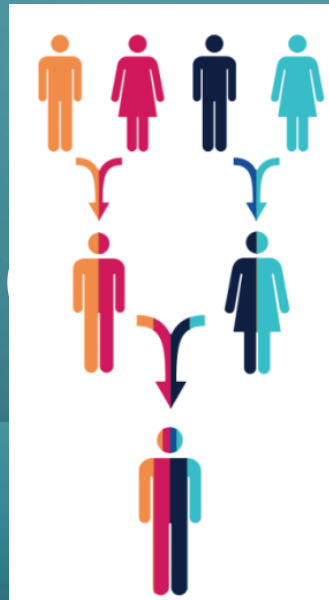


DNA TESTING TYPES

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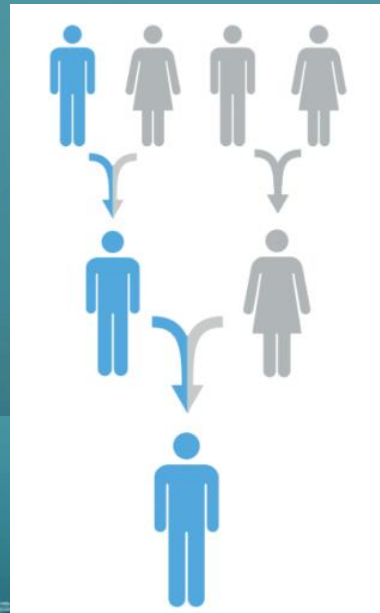
- **What it tests:** Chromosomes 1 through 22, which are inherited from both your mother and father.
- **Reach:** Excellent for finding matches in recent generations (parents down to 5th cousins).
- **Best Use Case:** This is the default test for general genealogy. It helps expand your entire tree and confirm your modern branches.

DNA TESTING TYPES

1. Autosomal DNA (atDNA)

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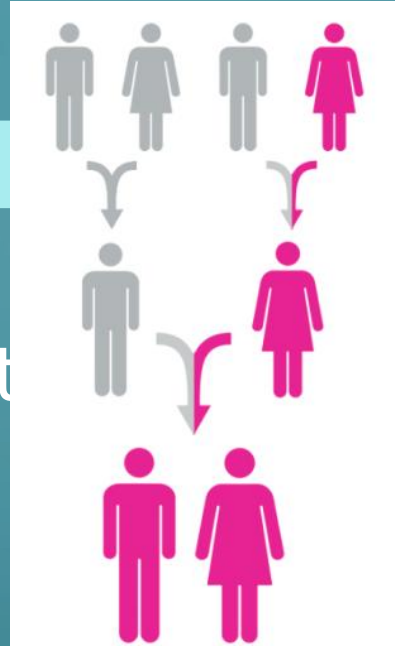
- **What it tests:** The Y-chromosome, passed down strictly from father to son, unchanged through generations.
- **Reach:** Deep historical reach along the direct paternal line.
- **Best Use Case:** Breaking through surname brick walls and tracking single-name family lineages. (Note: Only biological males carry a Y-chromosome, so females must test a brother, father, or paternal uncle).

DNA TESTING TYPES

1. Autosomal DNA (atDNA)

2. Y-DNA

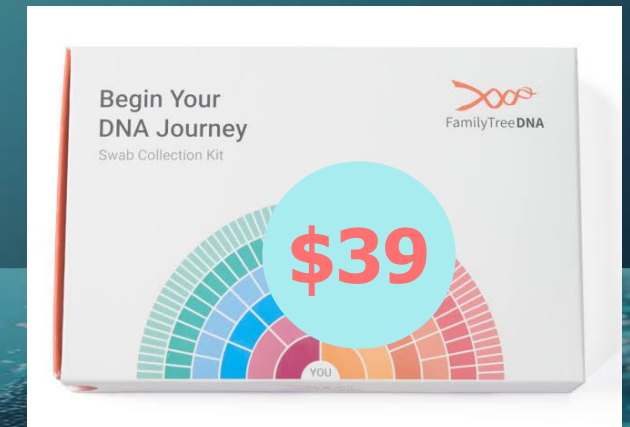
3. Mitochondrial DNA (mtDNA)



- **What it tests:** Mitochondria passed down from a mother to all of her children. Only daughters pass it on.
- **Reach:** Deep historical reach along the direct maternal line.
- **Best Use Case:** Verifying maternal links or determining the deep geographic origins of your mother's maternal lineage.

WHERE TO TEST

1. Ancestry
2. MyHeritage
3. 23andMe
4. FamilyTree DNA
5. Living DNA



HOW THEY STACK UP

DNA Company	Database & Population Strengths	Key Unique Features & Tools
Ancestry	Largest overall database; excellent for U.S., UK, and broad international matches.	ThruLines (tree connections) and advanced Shared Matches of Matches (SMoMs) features.
MyHeritage	Strongest representation for European, Middle Eastern, Jewish, and Scandinavian lines.	Theory of Family Relativity and auto-clustering.
23andMe	Second-largest database; reaches non-genealogy testers (health/ethnicity seekers).	Includes a chromosome browser for advanced matching.
FamilyTree DNA	Smaller database, but attracts highly dedicated genealogists.	Only major provider of Y-DNA* (paternal line) and mtDNA (maternal line) testing. Accepts raw data transfers.
Living DNA	Smallest database, but uniquely UK-based.	Provides highly detailed regional breakdowns for British Isles ancestry. Accepts raw data transfers.

ancestryDNA
DNA Activation Kit



MyHeritageDNA



23andMe

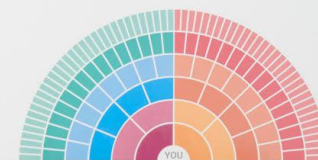
HEALTH
ANCESTRY

Welcome to you

saliva collection kit

Begin Your
DNA Journey
Swab Collection Kit

FamilyTreeDNA



LivingDNA
YOUR DNA PRACTICE



Your DNA adventure
begins today.

Sampling Kit

LivingDNA

SELECTING YOUR DNA TEST

- **Ancestry** and **MyHeritage** are the top recommended DNA tests for genealogy because they provide the best combination of database size, family-tree building tools, and advanced features.
- An effective genetic genealogy company must deliver **three key elements**.

1. **People** (DNA matches),
2. **Trees** (family history records),
3. **Tools** (features to map connections).



STANDARD DNA RESULTS

- Ethnicity Estimates & Geographic Breakdown
- DNA Matches & Relative Finder



- Pinpoints origins across a massive network of over **2,600+ geographic regions**.
- Its signature feature is "DNA by Parent," which dynamically splits your ethnicity results into maternal and paternal sides without requiring your parents to take a test.



- Features a highly localized breakdown encompassing **over 2,100 geographic areas**.
- It is widely celebrated for its presentation, delivering a fun, animated reveal accompanied by regional music tailored to your cultural roots.
- MyHeritage also offers premium **Y-DNA results** for biological males to trace deep paternal migration paths.



Central & Eastern Europe

North Central Europe	40%	>
Northeastern Poland	21%	>
Eastern Czechia	8%	>
Slovakia	8%	>
Lithuania	5%	>

Western Europe

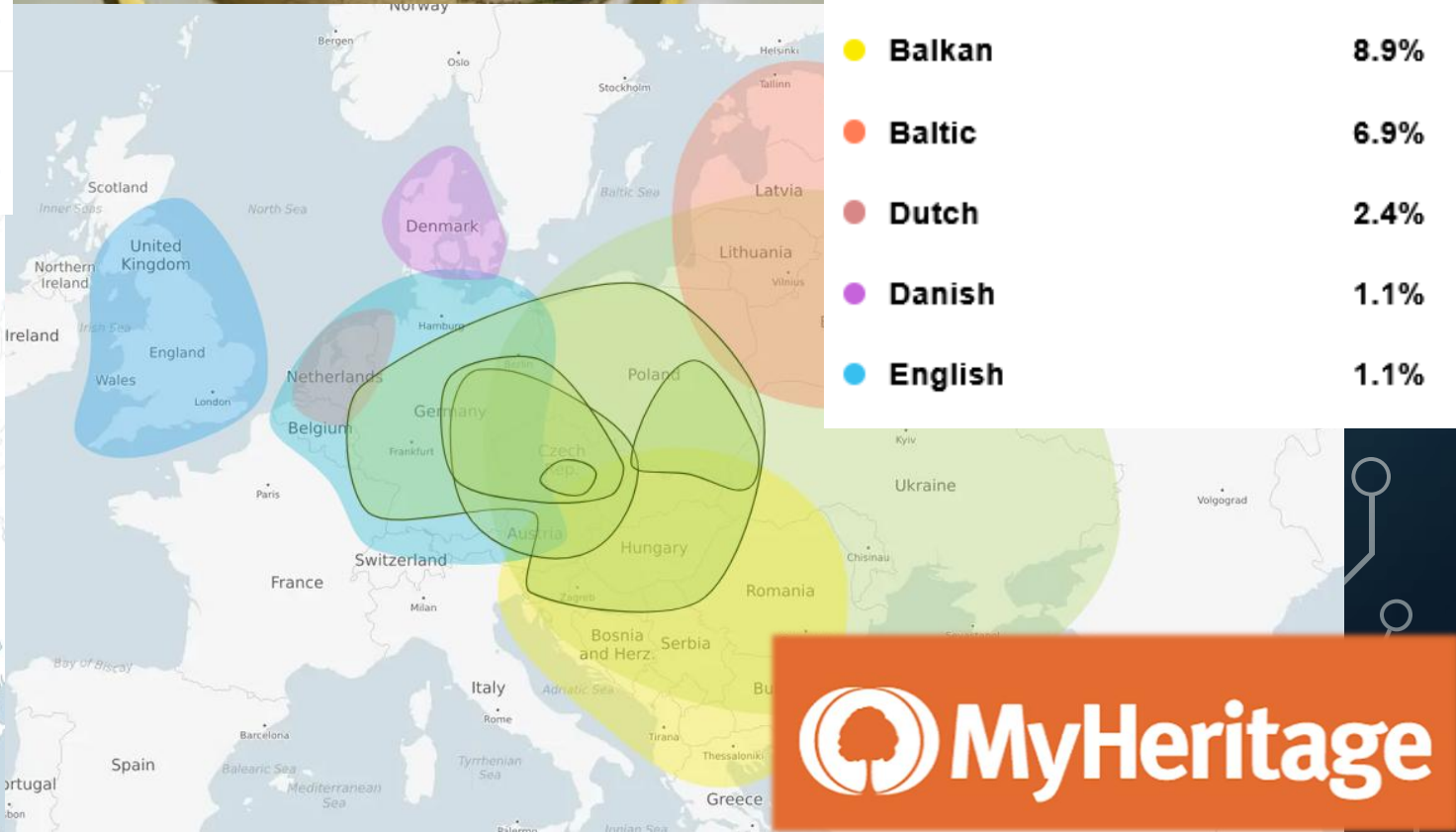
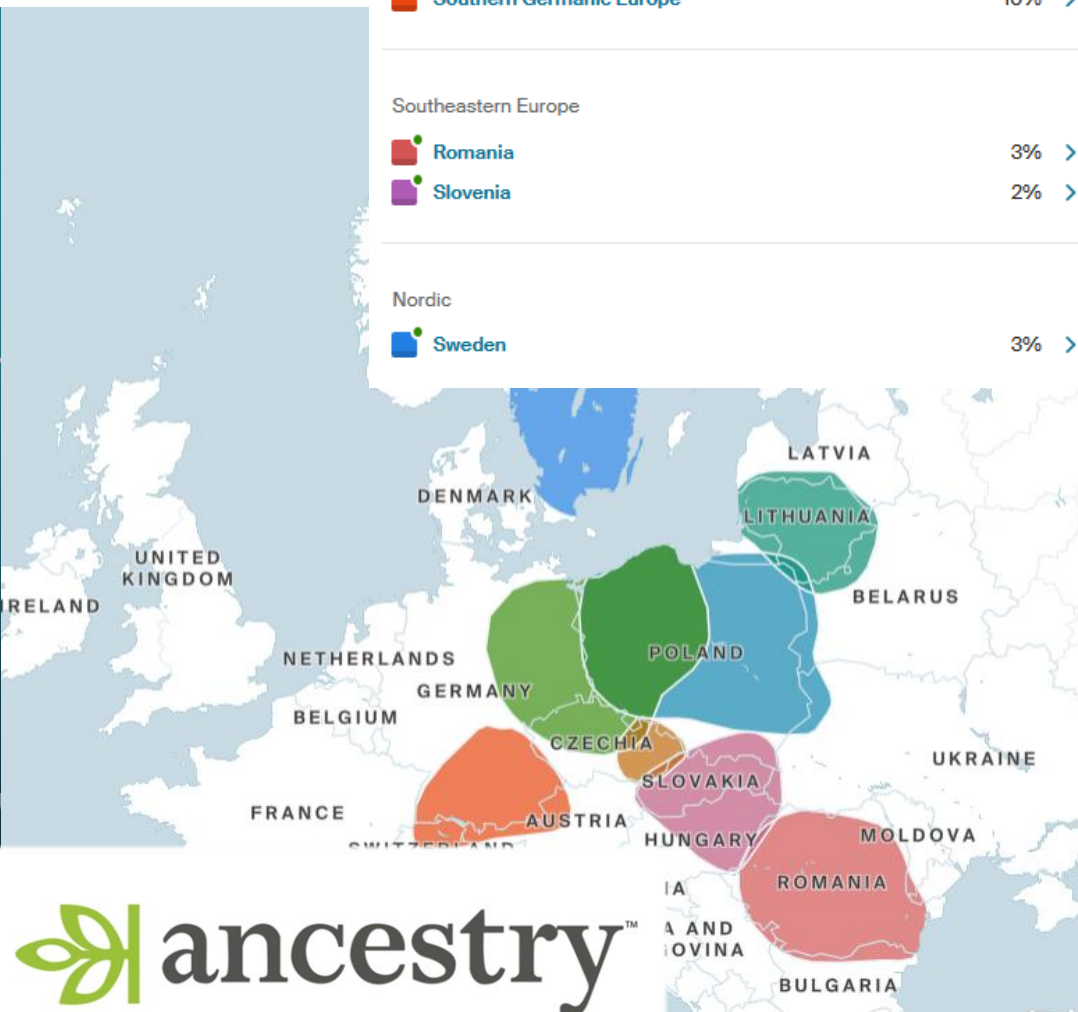
Southern Germanic Europe	10%	>
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Southeastern Europe

Romania	3%	>
Slovenia	2%	>

Nordic

Sweden	3%	>
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EUROPE

East European	58.5%
Poland, Hungary, Germany, Slovakia and Czechia	
Czechia and Southeastern Germany	
Poland (Podkarpackie)	
Czechia (South Bohemia and Vysocina)	
Germany (Saxony and Bavaria), Czechia and Austria	
Germanic	21.1%
Balkan	8.9%
Baltic	6.9%
Dutch	2.4%
Danish	1.1%
English	1.1%

STANDARD DNA RESULTS

- Ethnicity Estimates & Geographic Breakdown
- **DNA Matches & Relative Finder**



- Houses the largest overall customer database in the industry. It is highly optimal for North American and British Isles research, maximizing your chances of finding immediate and distant cousins.



- Possesses the **strongest international database**, making it the premier option for finding living relatives located in Europe, Australia, and South America.

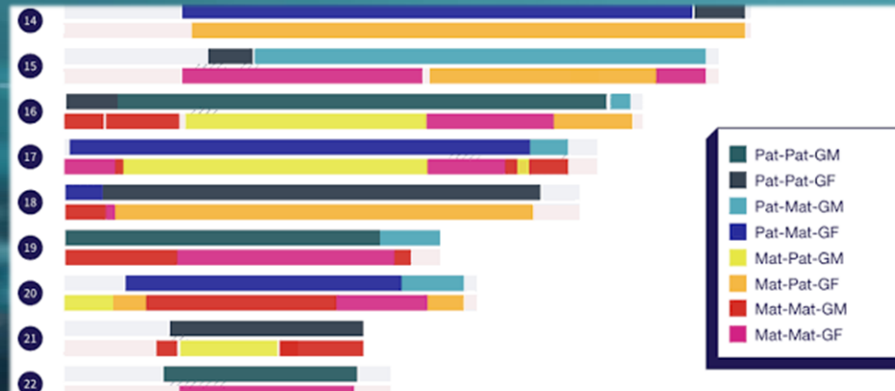
Both kits continuously scan their databases to find people who share segments of DNA with you, reporting relationships using centimorgans (cM) or percentages.

TOOLS

Feature / Tool	 ancestry™	 MyHeritage
Tree Integration	Excellent; connects seamlessly to the largest repository of historical records.	Strong; links matches directly to user-generated global family trees.
Chromosome Browser	No longer offered natively for privacy reasons.	Included; allows you to visually map and compare shared DNA segments.
Automated Matching	ThruLines: Uses public family trees to suggest exactly how you connect to a match.	Theory of Family Relativity: Automatically maps out the missing links between your tree and a match.
Visual Clustering	Manual color coding and grouping tools.	AutoClusters: Automatically groups your matches into visual clusters that share a common ancestor.
Traits & Lifestyle	Explores physical and sensory traits (often an add-on).	DNA Traits: Partnership with SelfDecode exploring wellness, physical traits, and behavior.

DNA PAINTER

- **DNA Painter** is a specialized web-based application designed to help genealogists organize, visualize, and analyze their **DNA matches**.
- Instead of looking at raw text or numbers, it converts your genetic data into interactive visual tools.



DNA PAINTER

USEFUL VISUALIZATIONS FOR GENEALOGISTS



1. Chromosome Mapping & Visualization
2. Relationship Probability Tools
3. Scenario Testing (What Are The Odds? - WATO)
4. Reference Tree Building

DNA PAINTER

The Shared cM Tool: Based on Blaine Bettinger's *Shared cM Project*, you simply type in the amount of shared DNA (in cM or percentages). The tool instantly outputs a list of every possible relationship (e.g., second cousin, great-aunt) ranked by statistical probability.

The Shared cM Project 4.0 tool v4

[Read more about the tool and this update](#)

March 2020

Blaine T. Bettinger
www.thegeneticgenealogist.com
More about this project
CC 4.0 Attribution License
Interactive version v4 by Jonny Perl at DNA Painter
[Click here to contribute data to the shared cM project](#)
Last updated 26th March 2020

Other versions

Shared cM 3.0 (2017) version
With editable boxes

Filter

Enter the total number of cM for your match here:

reset

or enter %

Then any relationships that fit will stand out below

New Click on any relationship to view a histogram

How to read this chart

Relationship
Average
Range
(low to high;
99th percentile)

Other versions

Shared cM 3.0 (2017) version

With editable boxes

New

Click on any relationship to view a histogram

Great-Great-Great-Grandparent

GGGG Aunt / Uncle

Great-Great-Grandparent

GGG Aunt / Uncle

Half GG-Aunt / Uncle
208
103 – 284

Great-Grandparent
887
485 – 1486

Great-Great-Aunt / Uncle
420
186 – 713

1C3R
117
25 – 238

2C3R
51
0 – 154

Other Relationships

Half 1C2R
125
16 – 269

Half Great-Aunt / Uncle
431
184 – 668

Grandparent
1754
984 – 2462

Great-Aunt / Uncle
850
330 – 1467

1C2R
221
33 – 471

2C2R
71
0 – 244

3C2R
36
0 – 166

6C
18
0 – 71

Half 2C1R
66
0 – 190

Half 1C1R
224
62 – 469

Half Aunt / Uncle
871
492 – 1315

Parent
3485
2376 – 3720

Aunt / Uncle
1741
1201 – 2282

1C1R
433
102 – 980

2C1R
122
14 – 353

3C1R
48
0 – 192

4C1R
28
0 – 126

6C1R
15
0 – 56

Half 3C
48
0 – 168

Half 2C
120
10 – 325

Half 1C
449
156 – 979

Half Sibling
1759
1160 – 2436

Sibling
2613
1613 – 3488

SELF

1C
866
396 – 1397

2C
229
41 – 592

3C
73
0 – 234

4C
35
0 – 139

5C
25
0 – 117

6C2R
13
0 – 45

Half 3C1R
37
0 – 139

Half 2C1R
66
0 – 190

Half 1C1R
224
62 – 469

Half Niece / Nephew
871
492 – 1315

Niece / Nephew
1740
1201 – 2282

Child
3487
3330 – 3720

1C1R
433
102 – 980

2C1R
122
14 – 353

3C1R
48
0 – 192

4C1R
28
0 – 126

5C1R
21
0 – 80

7C
14
0 – 57

Half 3C2R
27
0 – 78

Half 2C2R
48
0 – 144

Half 1C2R
125
16 – 269

Half Great-Niece / Nephew
431
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Great-Niece / Nephew
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1C2R
221
33 – 471

2C2R
71
0 – 244

3C2R
36
0 – 166

4C2R
22
0 – 93

5C2R
18
0 – 65

7C1R
12
0 – 50

Half 3C3R

Half 2C3R

Half 1C3R
60
0 – 120

Half GG-Niece / Nephew
208
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Great-Great-Niece / Nephew
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1C3R
117
25 – 238

2C3R
51
0 – 154

3C3R
27
0 – 98

4C3R
19
0 – 60

5C3R
13
0 – 30

8C
11
0 – 42

VIRTUAL TOUR

- **Ancestry DNA**
- **MyHeritage DNA**
- **DNA Painter**
- **Family Search Wiki**

