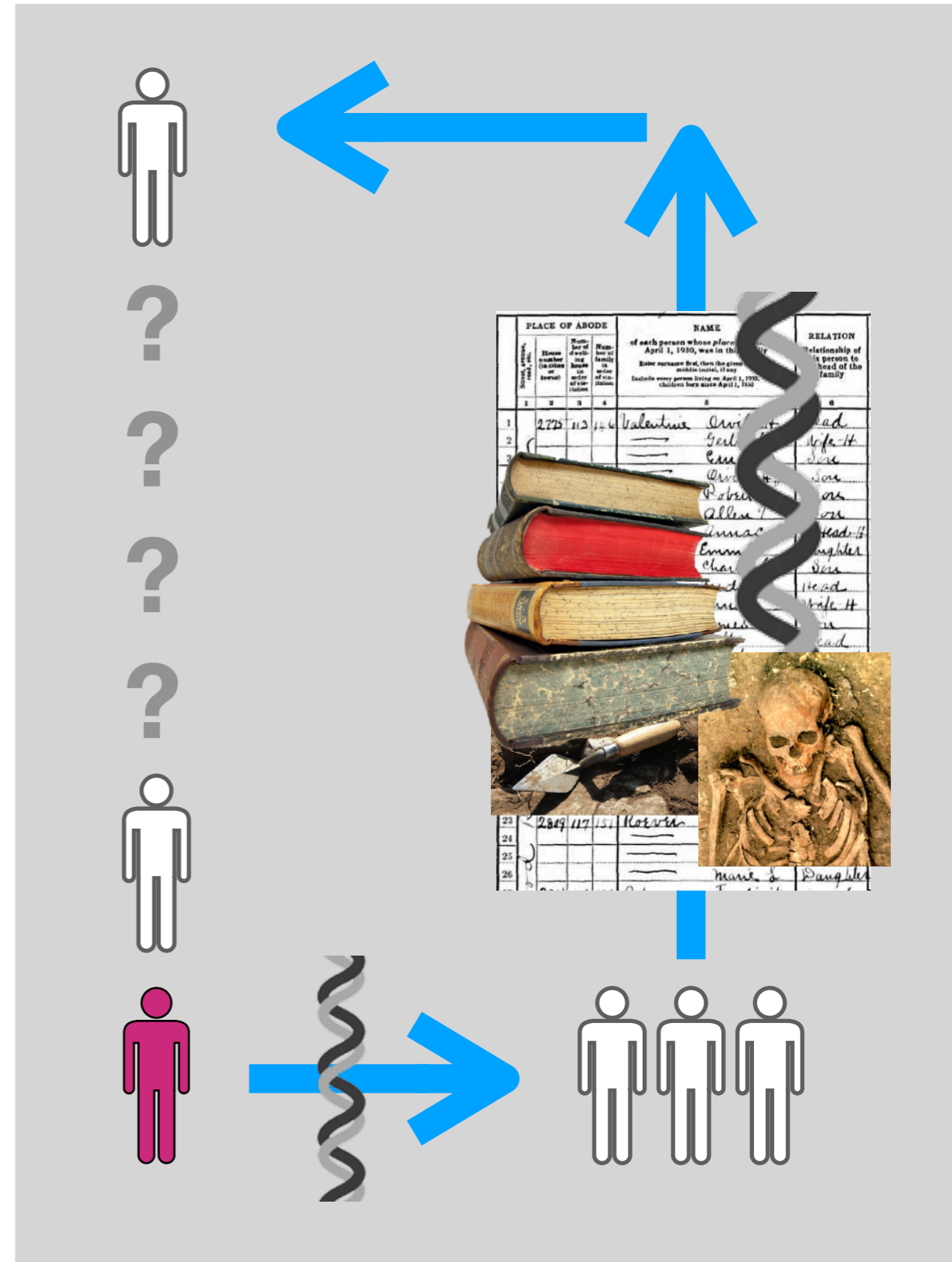


Extending Time Horizons with DNA

part one:
find ancestors back
300 years

Rob Spencer





Many Thanks

Rhett Dabling and RootsTech
for the opportunity to speak to you

Goran Runfeldt and FTDNA
for generous access to the public Y and mt haplotrees

David Langton and all at the England EIJ Project
for stimulating and entertaining discussions

Maurice Gleeson, Keith MacGregor, Iain McDonald
for stimulating discussions and ideas

Carlos Quiles and Shane Wilson
for access to ancient DNA and Griffith's Valuation data

Additional Information

Scan this code for
more information



or go to

<http://scaledinnovation.com/gg/ext/rt22/index.html>

Common Strategy

3000+
years
ago

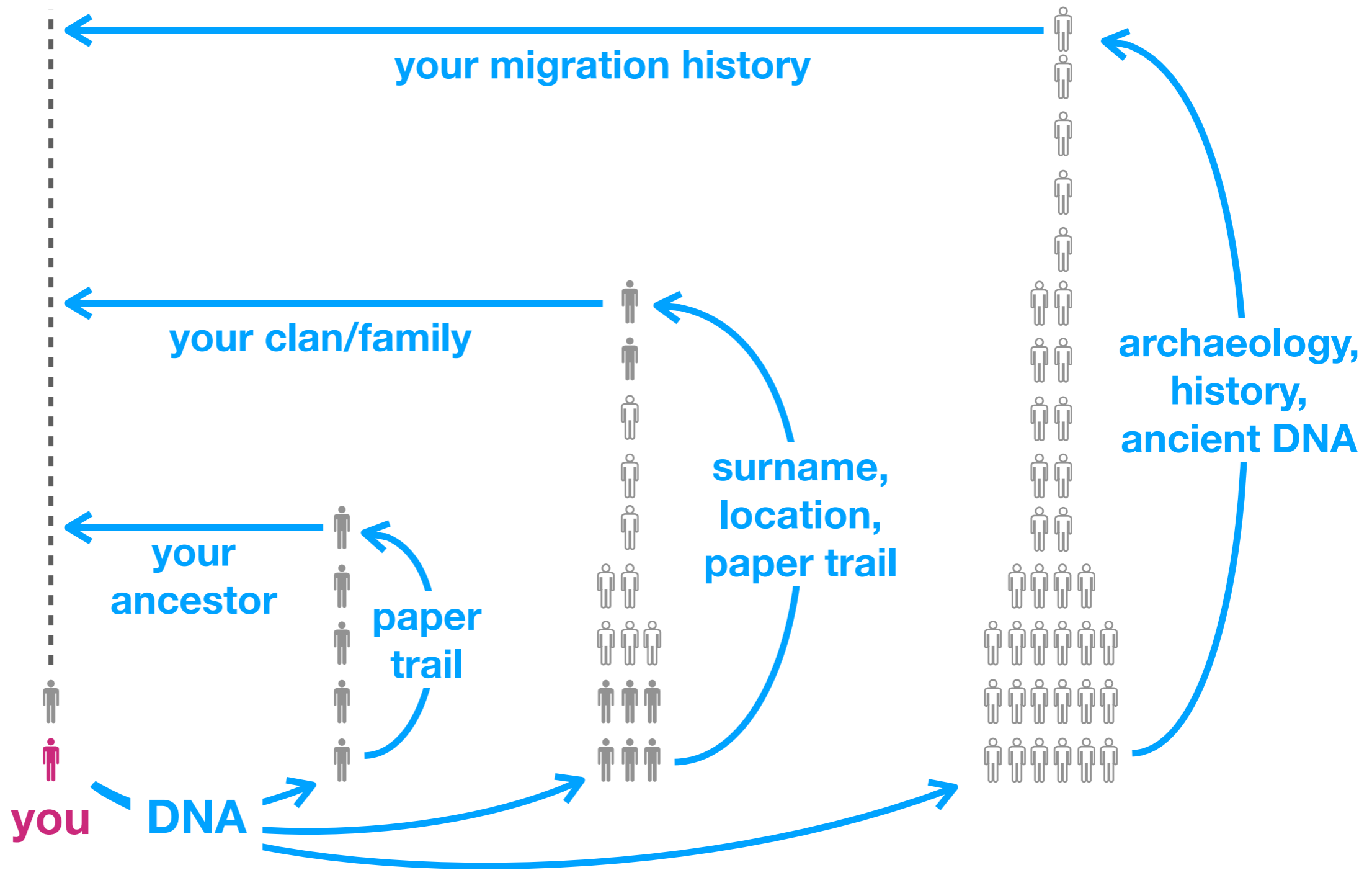
surnames

1000

paper
records

300

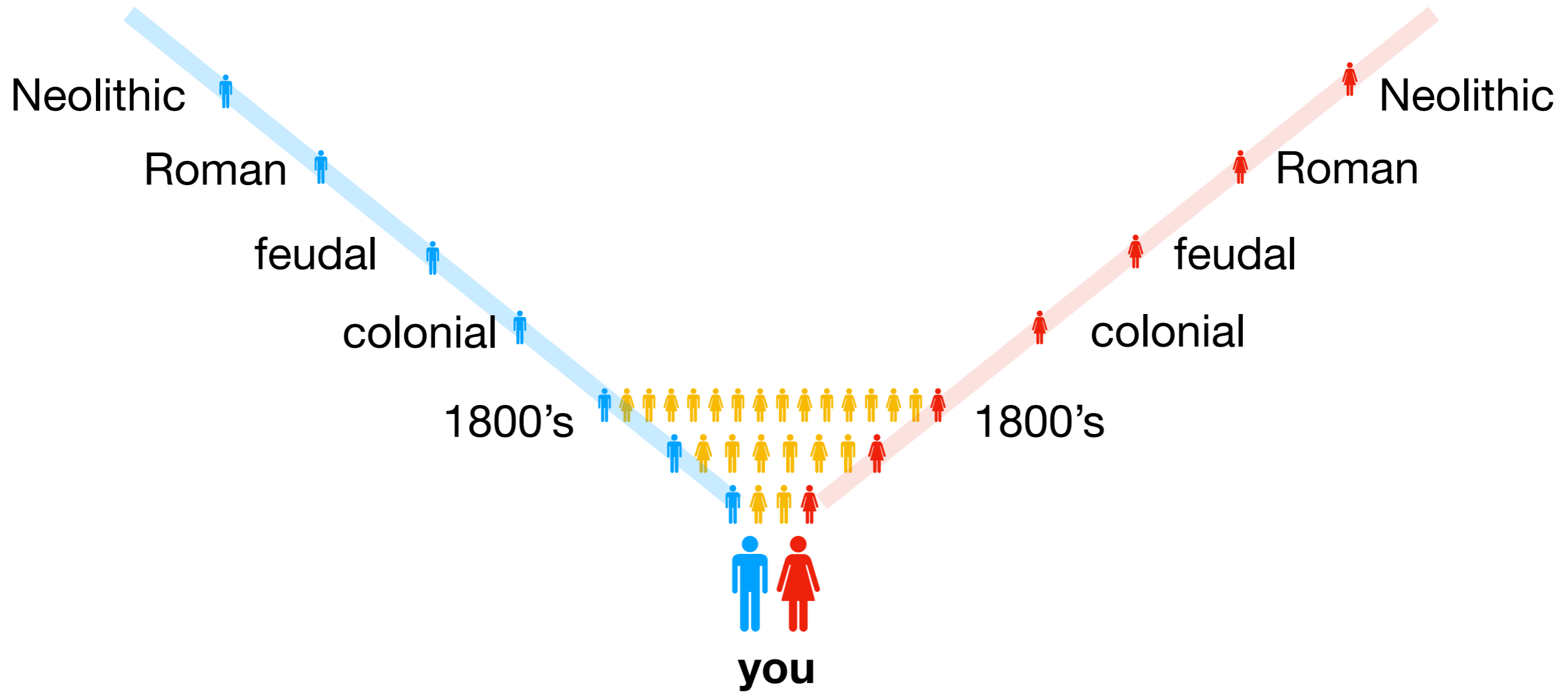
today


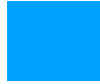





Background

Timescales of DNA

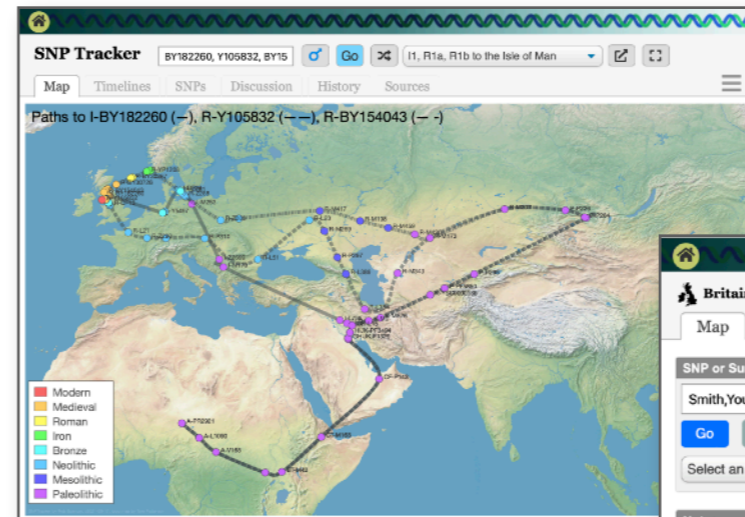


type	time range	resolution
 autosomal DNA	250 years, all lineages	30 years
 Y DNA	200,000 years, direct male line	100 - 1000 years
 mtDNA	200,000 years, direct female line	5000 - 10,000 years

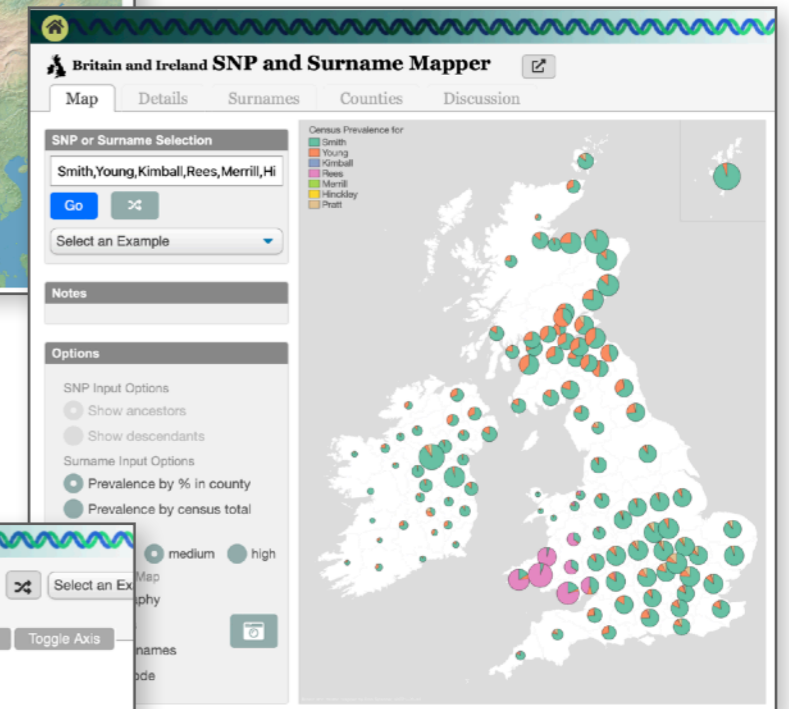
Do-it-Yourself Tools

<http://scaledinnovation.com/gg/gg.html?nm=tools>

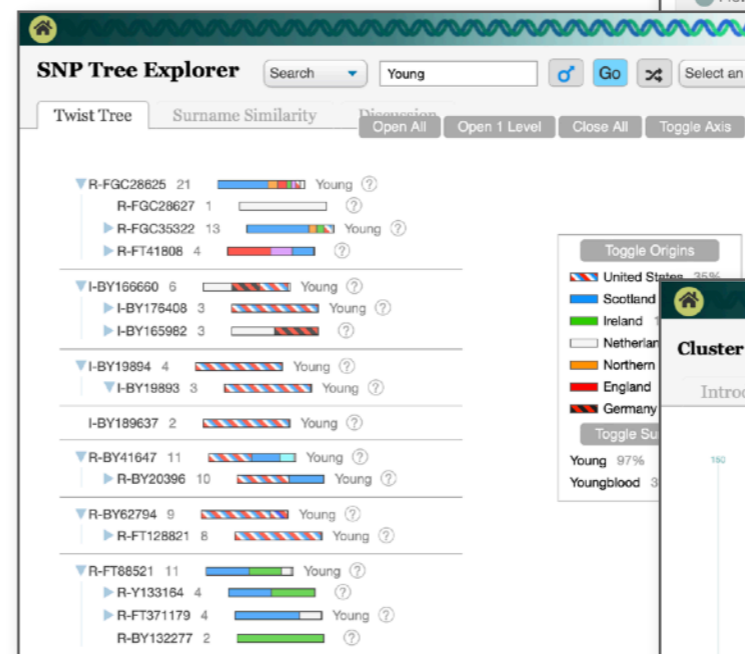
SNP Tracker



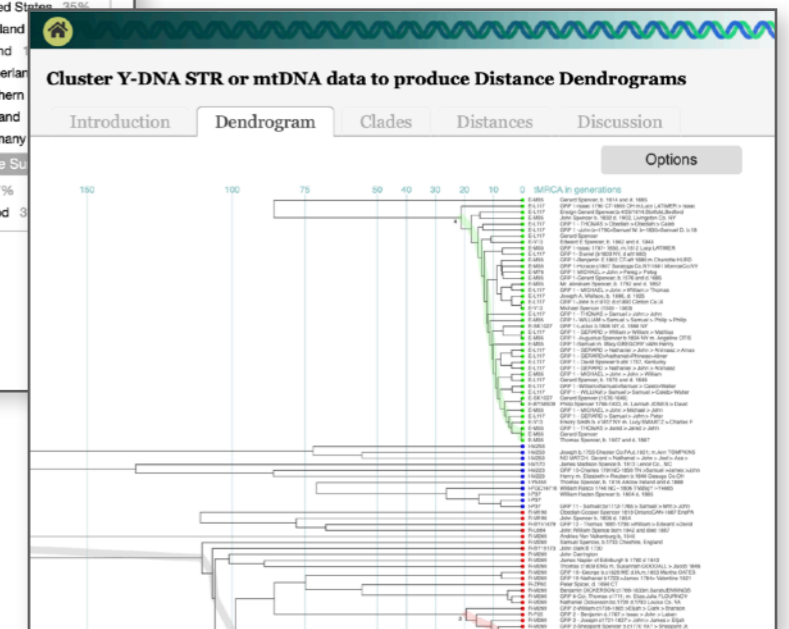
Britain and Ireland SNP and Surname Mapper



SNP Tree Explorer



Y STR Clustering





Finding Specific Ancestors

With DNA you can take advantage of others' findings to jump over gaps and identify common ancestors.

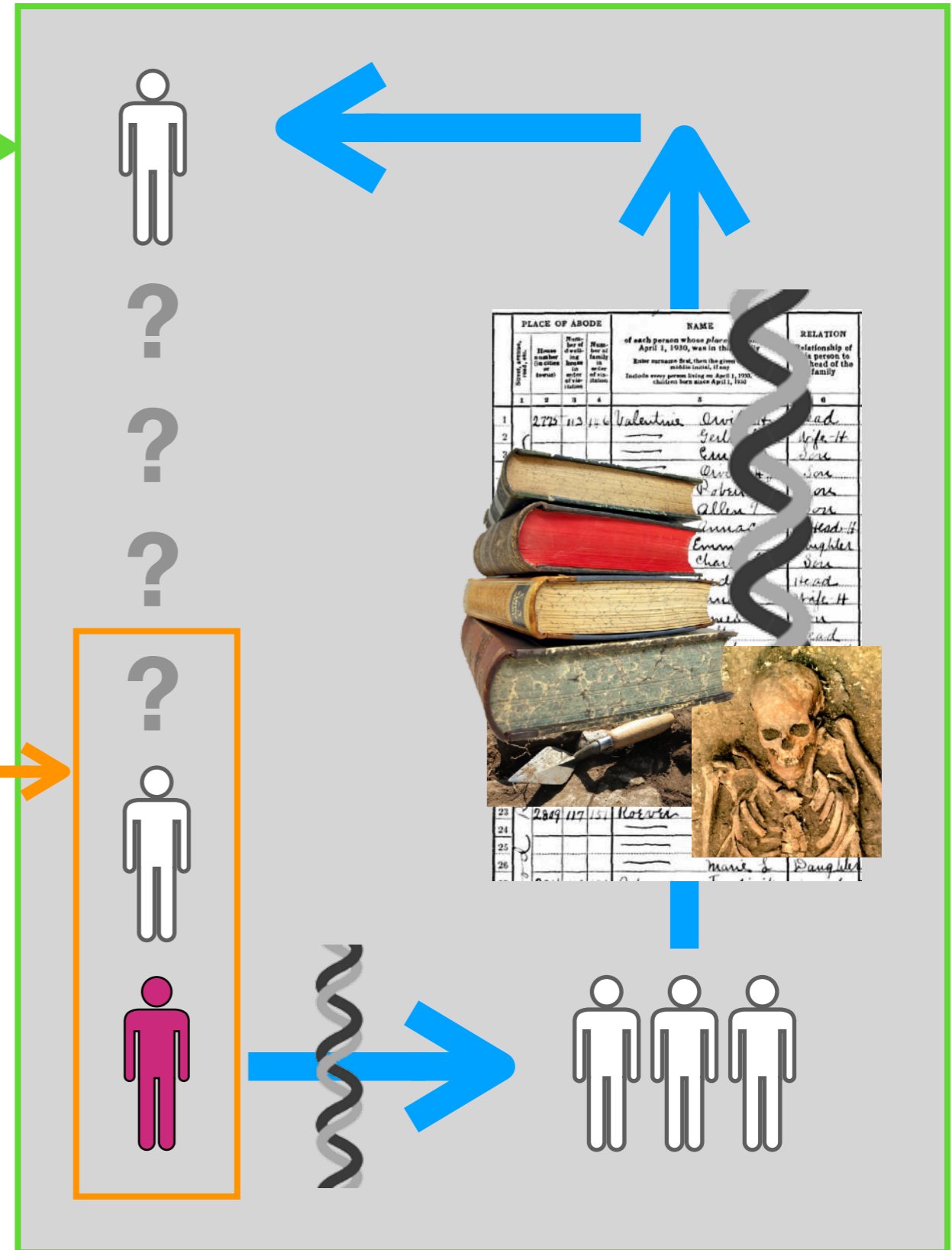
Micro vs Macro Genealogy

Macro Genealogy

combination of genetic
genealogy, demographics,
archaeology
top-down
jumps over gaps

Micro Genealogy

traditional paper genealogy
bottom-up
stalls at the first unknown



Common Strategy

3000+
years
ago

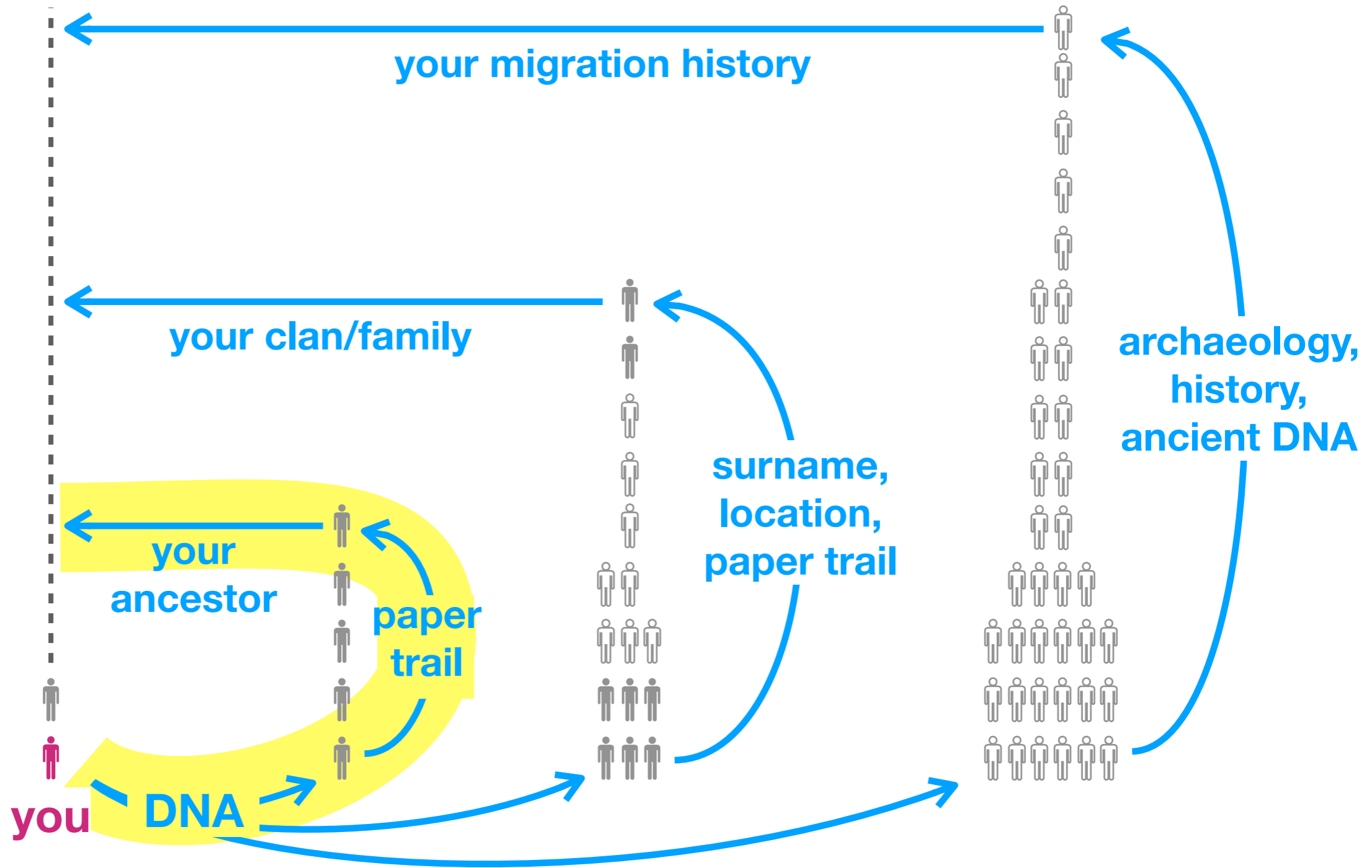
surnames

1000

paper
records

300

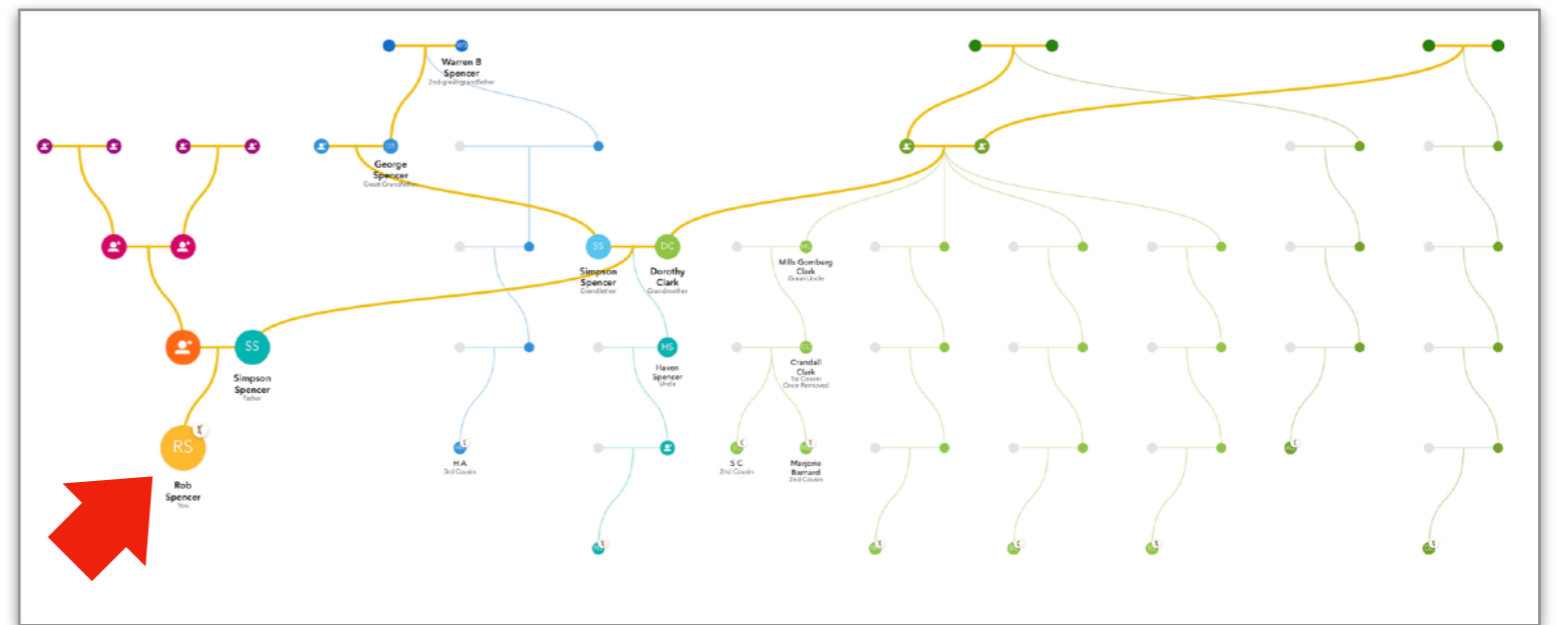
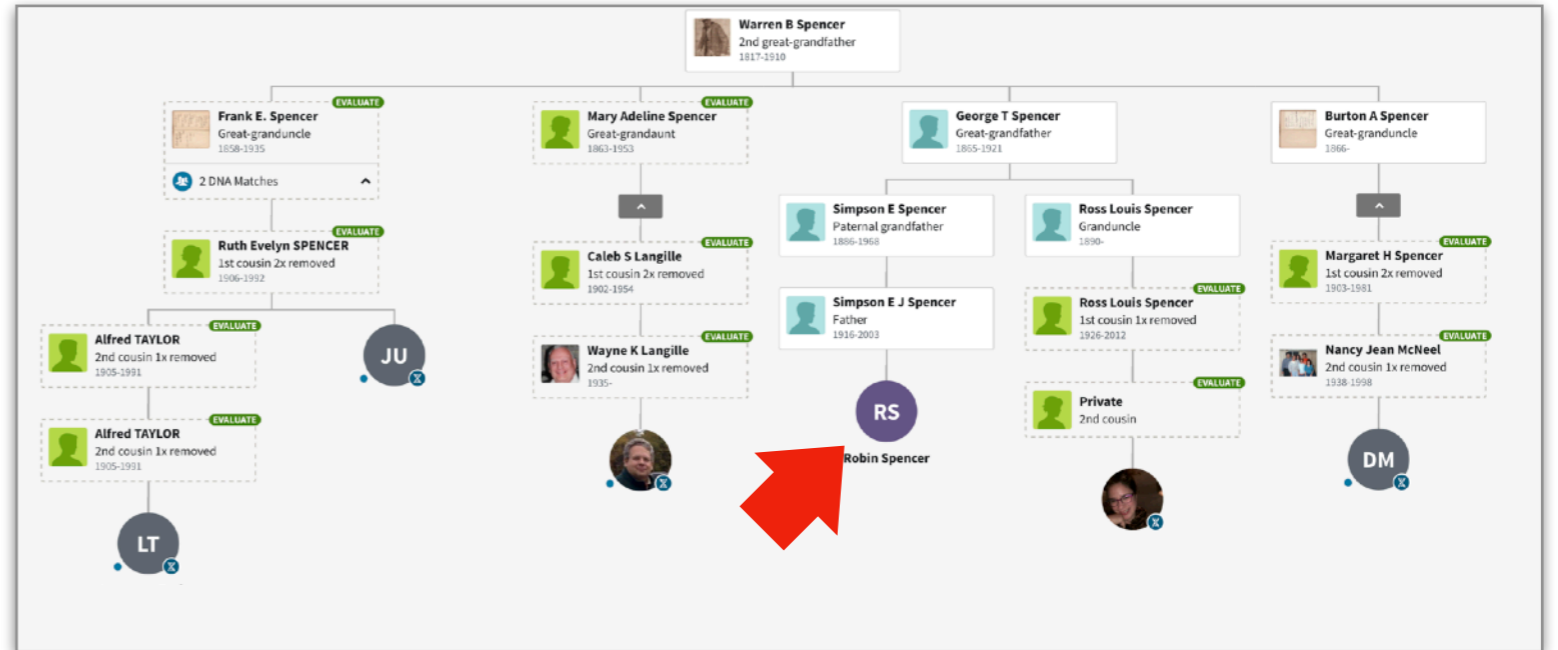
today



Autosomal Examples

35 million people have done autosomal DNA testing. Autosomal testing often reveals hundreds of 4th-6th cousins.

Vendor websites have tools to search and assemble likely family trees.



relationship	number found in AncestryDNA, 23andMe
2nd cousin	5, 7
3rd cousin	27, 27
4th cousin	1515, 1381

Y DNA: STR Example

A Y STR match is a man with whom you have a common ancestor within the past ~600 years.

Y STR testing immediately showed me a dozen close matches with my surname, several with a paper trail to a common ancestor.

Markers: Y-DNA111 Page Size: 500 Show All Columns

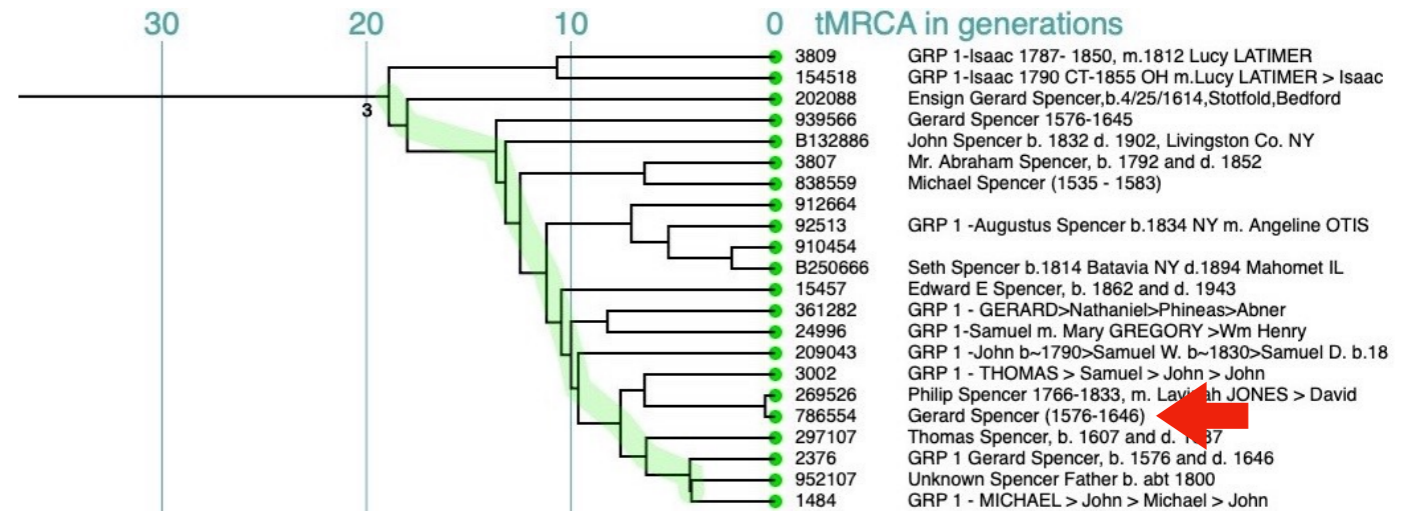
Kit Number	Paternal Ancestor Name	Country	Haplogroup	DYS393	DYS390	DYS19	DYS391	DYS385	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389ii	DYS458	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464	DYS460	Y-GATA-H4	YCAII	DYS456	DYS607	DYS576	DYS570	
01-The 4 Brothers																															
15457	Edward E Spencer, b. 1862 and d. 1943	Unknown Origin	E-SK1027	13	24	13	10	13-18	11	12	12	13	11	30	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	18	20	
952107	Unknown Spencer Father b. abt 1800	United States	E-M35	13	24	13	10	14-14	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
202088	Ensign Gerard Spencer, b.4/25/1614, Stotfold, Bedford	England	E-M35	13	24	13	10	14-17	11	12	12	14	11	30	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
910454		Unknown Origin	E-FT110257	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	20	
B250666	Seth Spencer b.1814 Batavia NY d.1894 Mahomet IL	United States	E-FT111977	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	20	
3809	GRP 1-Isaac 1787- 1850, m.1812 Lucy LATIMER	Unknown Origin	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	20	
154518	GRP 1-Isaac 1790 CT-1855 OH m.Lucy LATIMER > Isaac	Norway	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	20	
3807	Mr. Abraham Spencer, b. 1792 and d. 1852	England	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	15	12	17	20	
B132886	John Spencer b. 1832 d. 1902, Livingston Co. NY	England	E-SK1027	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	16	20	
838559	Michael Spencer (1535 - 1583)	England	E-BY56509	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
297107	Thomas Spencer, b. 1607 and d. 1687	England	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
361282	GRP 1 - GERARD>Nathaniel>Phineas>Abner	Unknown Origin	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
1484	GRP 1 - MICHAEL > John > Michael > John	Unknown Origin	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
3002	GRP 1 - THOMAS > Samuel > John > John	England	E-BY56509	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
24996	GRP 1-Samuel m. Mary GREGORY >Wm Henry	United Kingdom	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
209043	GRP 1 -John b~1790>Samuel W. b~1830>Samuel D. b.18	England	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	15	12	17	19	
2376	GRP 1 Gerard Spencer, b. 1576 and d. 1646	England	E-M35	13	24	13	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	35	15-15-16-17	9	9	19-21	16	12	17	20	
269526	Philip Spencer 1766-1833, m. Lavinah JONES > David	Unknown Origin	E-BY56509	13	24	13	10	14-18	11	12	13	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
786554	Gerard Spencer (1576-1646)	England	E-SK1027	13	24	13	10	14-18	11	12	13	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
939566	Gerard Spencer 1576-1645	England	E-BY56509	13	24	13	10	14-19	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-17	9	9	19-21	16	12	17	20	
92513	GRP 1 -Augustus Spencer b.1834 NY m. Angeline OTIS	Unknown Origin	E-M35	13	24	13	10	15-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	20	
912664		Unknown Origin	E-M35	13	24	14	10	14-18	11	12	12	13	11	29	15	9-9	11	11	26	14	20	34	15-15-16-16	9	9	19-21	16	12	17	21	

very close matches

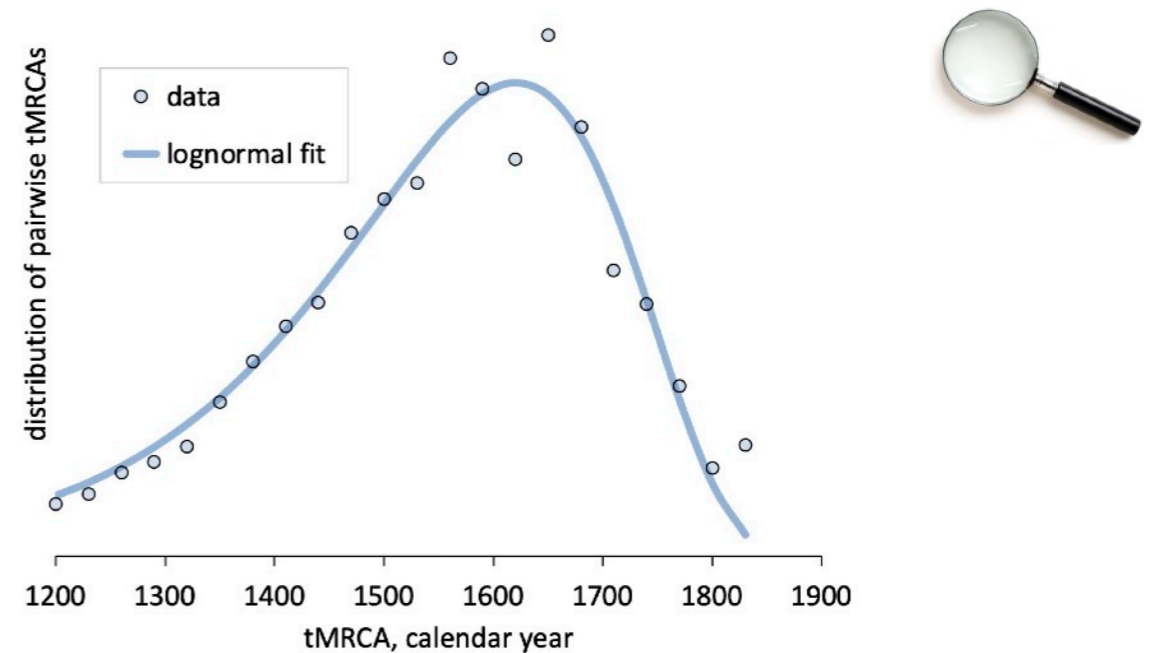


Y STR Example

Clustering these matches shows the characteristic pattern of descent from a single immigrant ancestor.



tMRCA analysis puts the birth of this ancestor 13 generations ago, about 1560 (95%CL 1510-1610).



This fits perfectly with Gerard Spencer of Stotfold, Bedfordshire, 1576-1646, who had four sons that emigrated to the colonies in 1630.



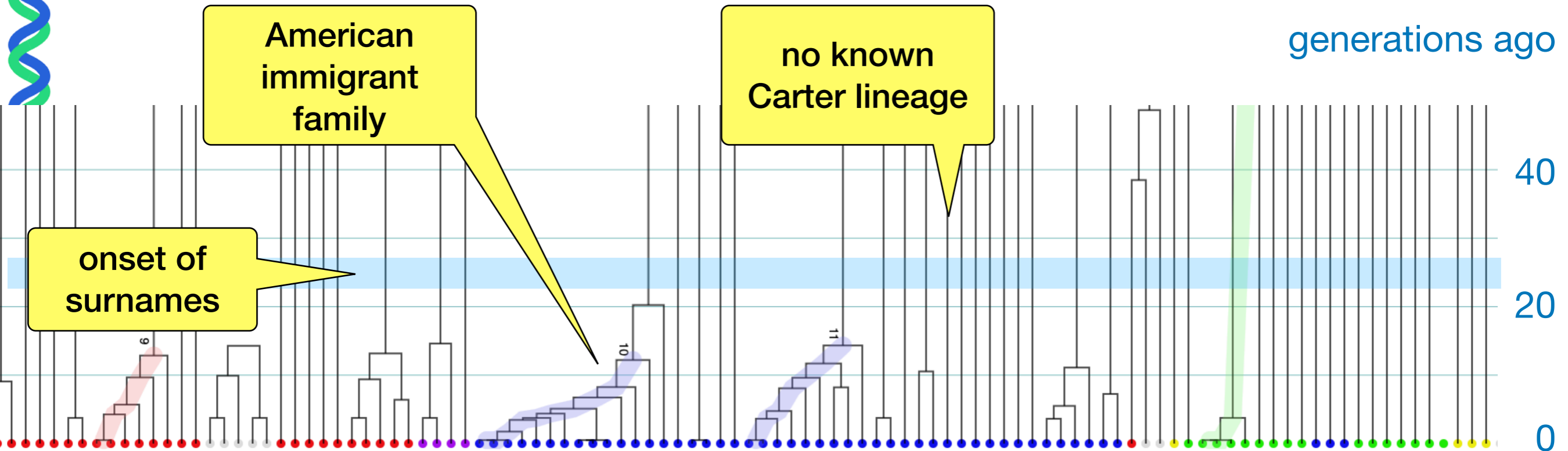
The onset of surnames

Surnames arose in Europe in the 11-13th centuries, which sets the early limit for traditional genealogy.

Y DNA can reveal far earlier paternal connections.

We must reconsider some of our assumptions based on surname genealogy.

One surname, many lineages



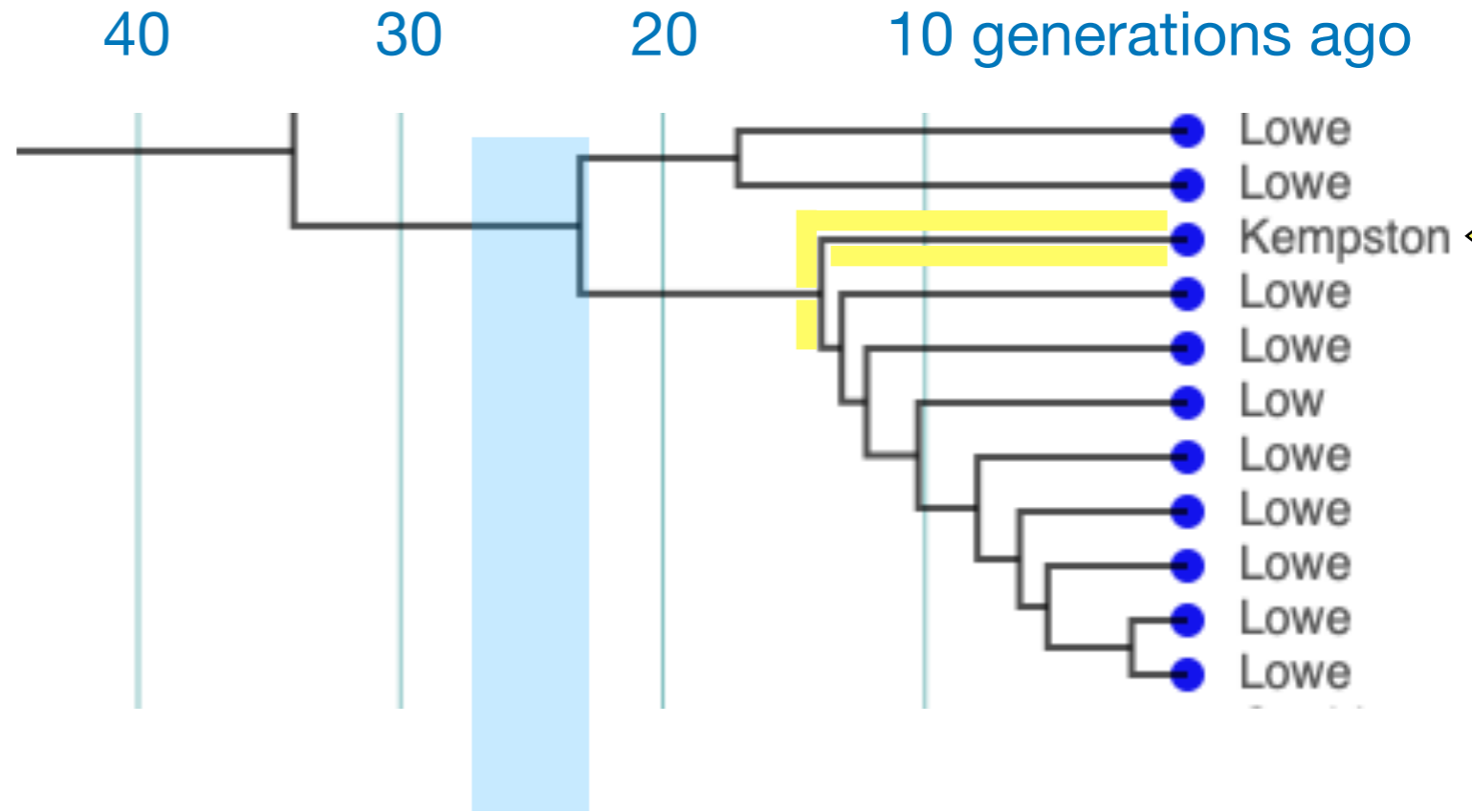
This small sample of men with surname Carter shows the typical pattern of American immigrant clades and many unconnected lineages.

Connections below the surname line indicate descent from a man named Carter. Connections above the line indicate unrelated men with a common skill — building carts.

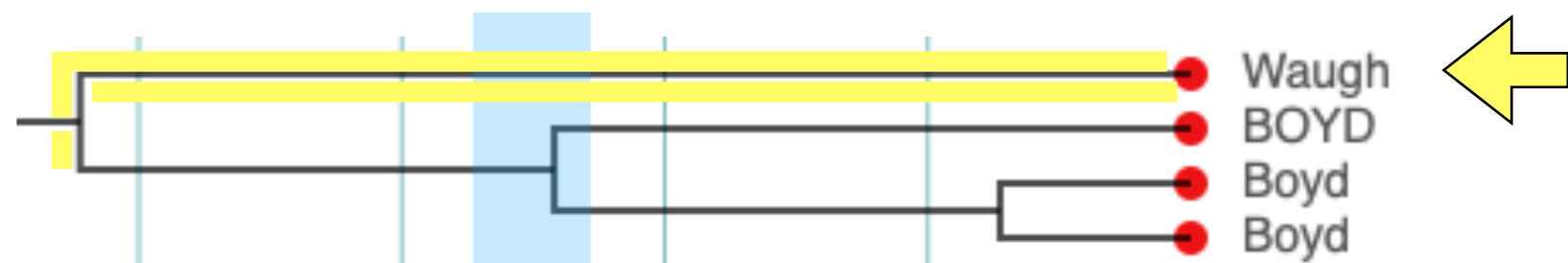
In any collection of N men you will find about $N/2$ distinct lineages.

One lineage, multiple surnames

A different surname connecting **less** than 25 generations ago may indicate an NPE.



A different name connecting **more** than 25 generations ago simply indicates common ancestry.

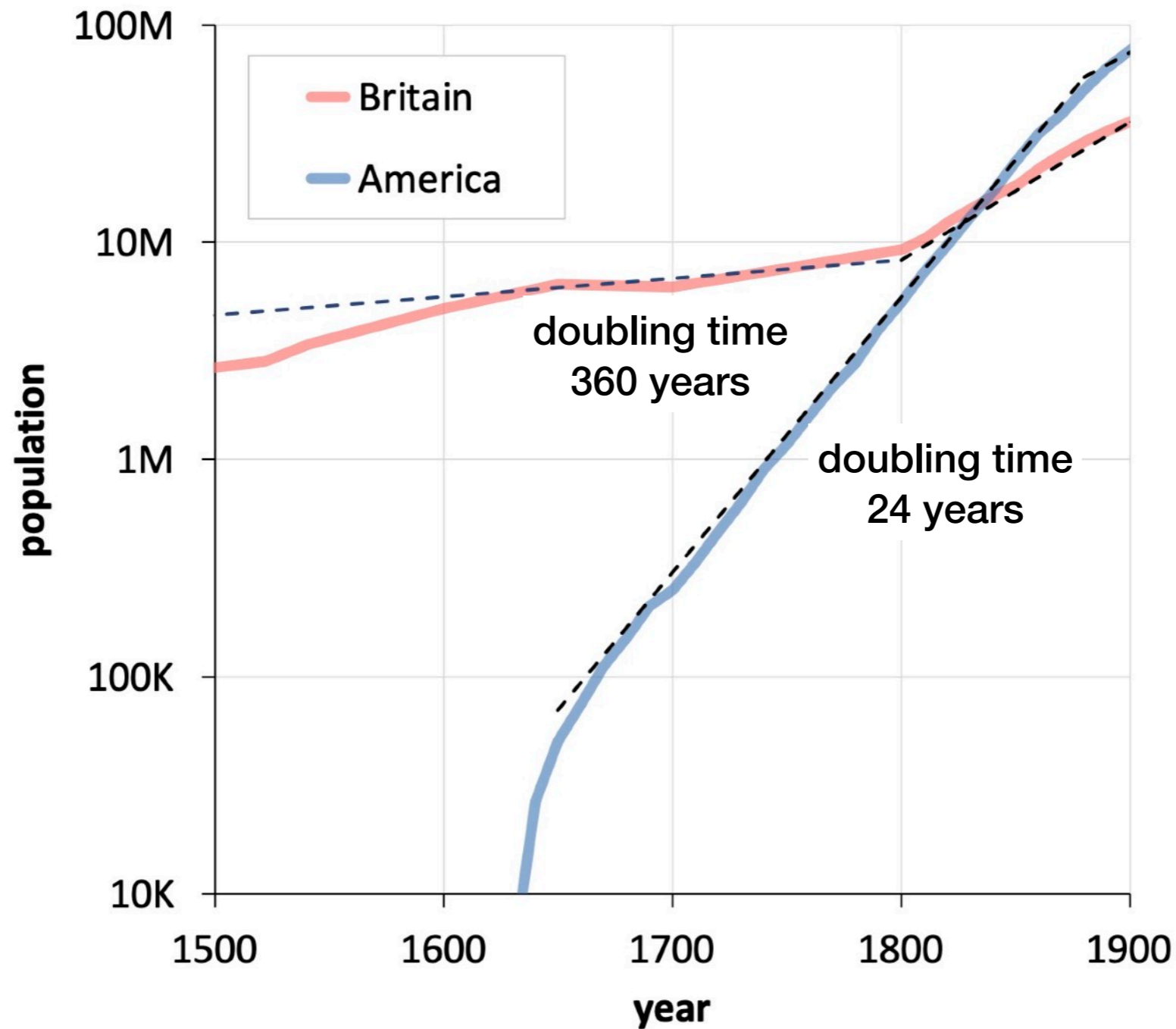




Why Can't I find my European Ancestors?

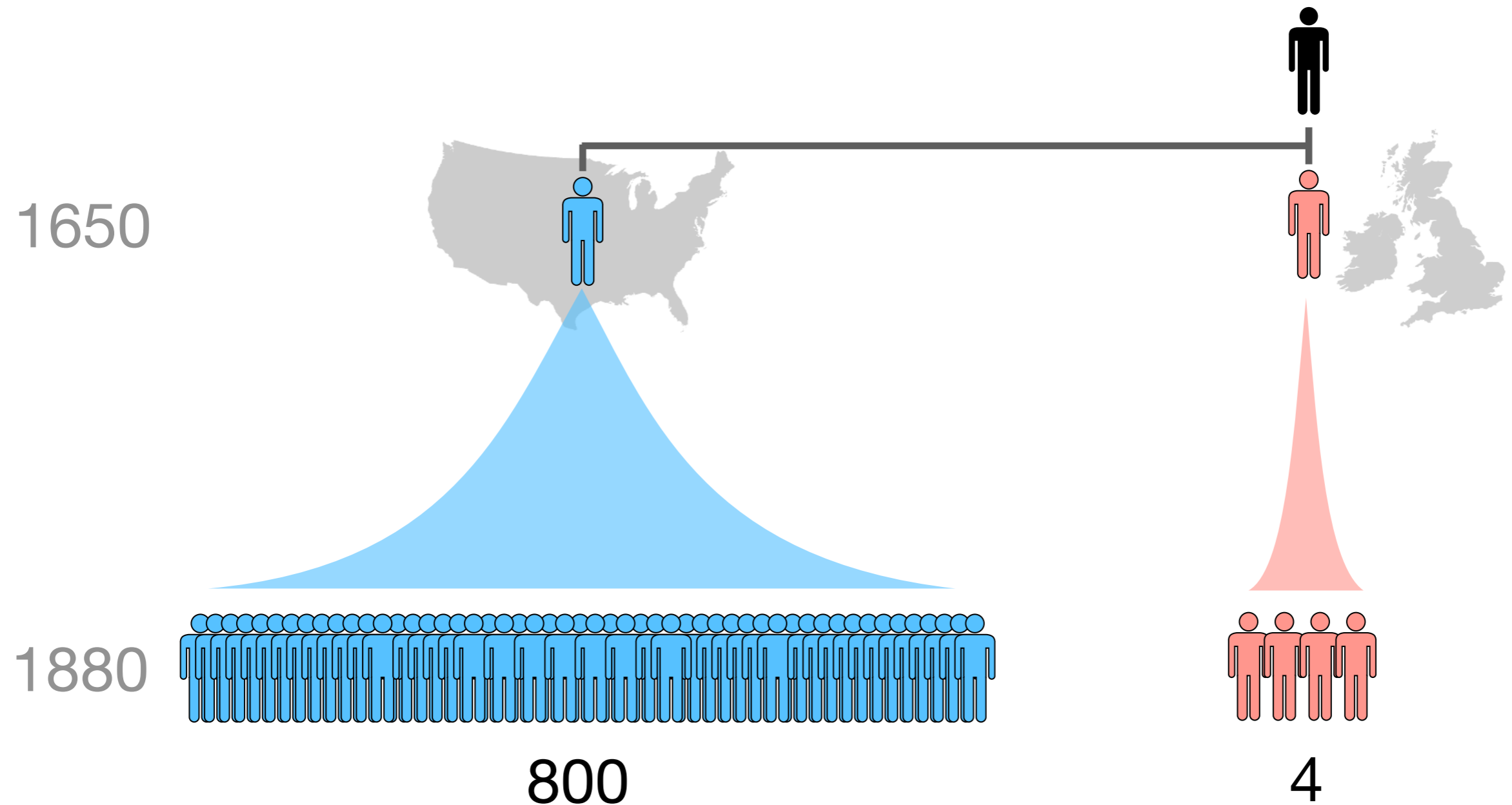
- Autosomal DNA reaches back only to about 1800.
- North American population growth 1650-1850 was far greater than anywhere else.

Population Growth



The leading causes of death in 16-19th century Britain were mostly urban diseases — plague, smallpox, syphilis, typhus, cholera — which were not as severe in the colonies.

Two Brothers' Descendants



A 1650 emigrant will have 200-fold more descendants than a sibling who stayed in Europe.

This, plus DNA testing bias, is why an American DNA tester will seldom find a European connection.

Do It Yourself

- Do autosomal DNA testing with one or more of the large vendors (AncestryDNA, 23andMe, MyHeritage, FamilyTree DNA).
- Add your own known family tree to the vendor's website. Use the vendor's tools to filter your matches by surname and relatedness. See if the automatically generated family tree answers your questions. Contact matches who may have paper details to help you.
- There are many resources for autosomal DNA testing: <https://www.familysearch.org/home/dna-testing/next-steps> , <https://dna-explained.com/>
- If your unknowns are male-line, or lived before 1800, consider Y DNA testing.

End of Session One
find ancestors back 300 years

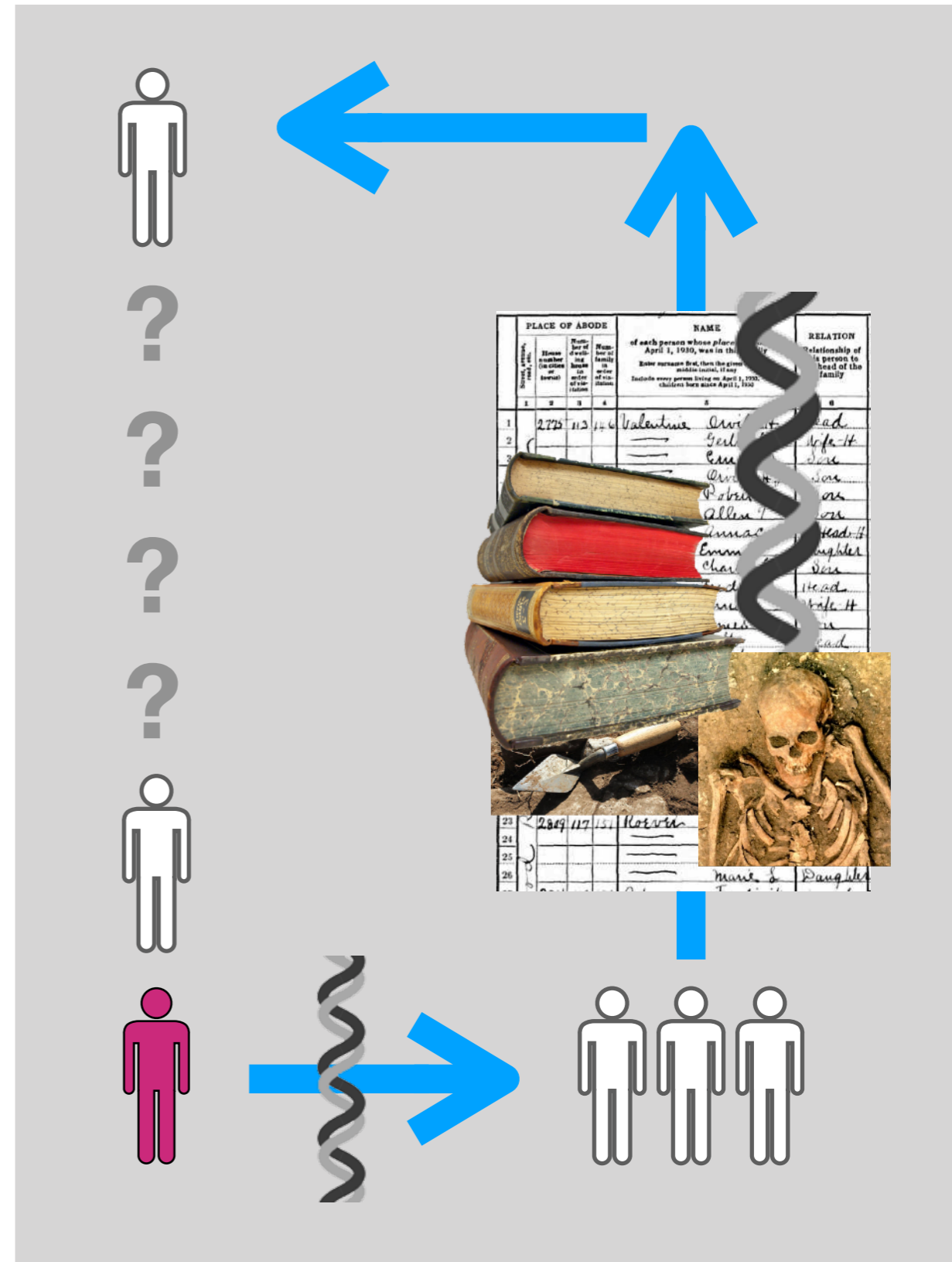
Session Two:
find clans & families back 1000 years



Extending Time Horizons with DNA

part two:
find clans & families
back 1000 years

Rob Spencer



Common Strategy

3000+
years
ago

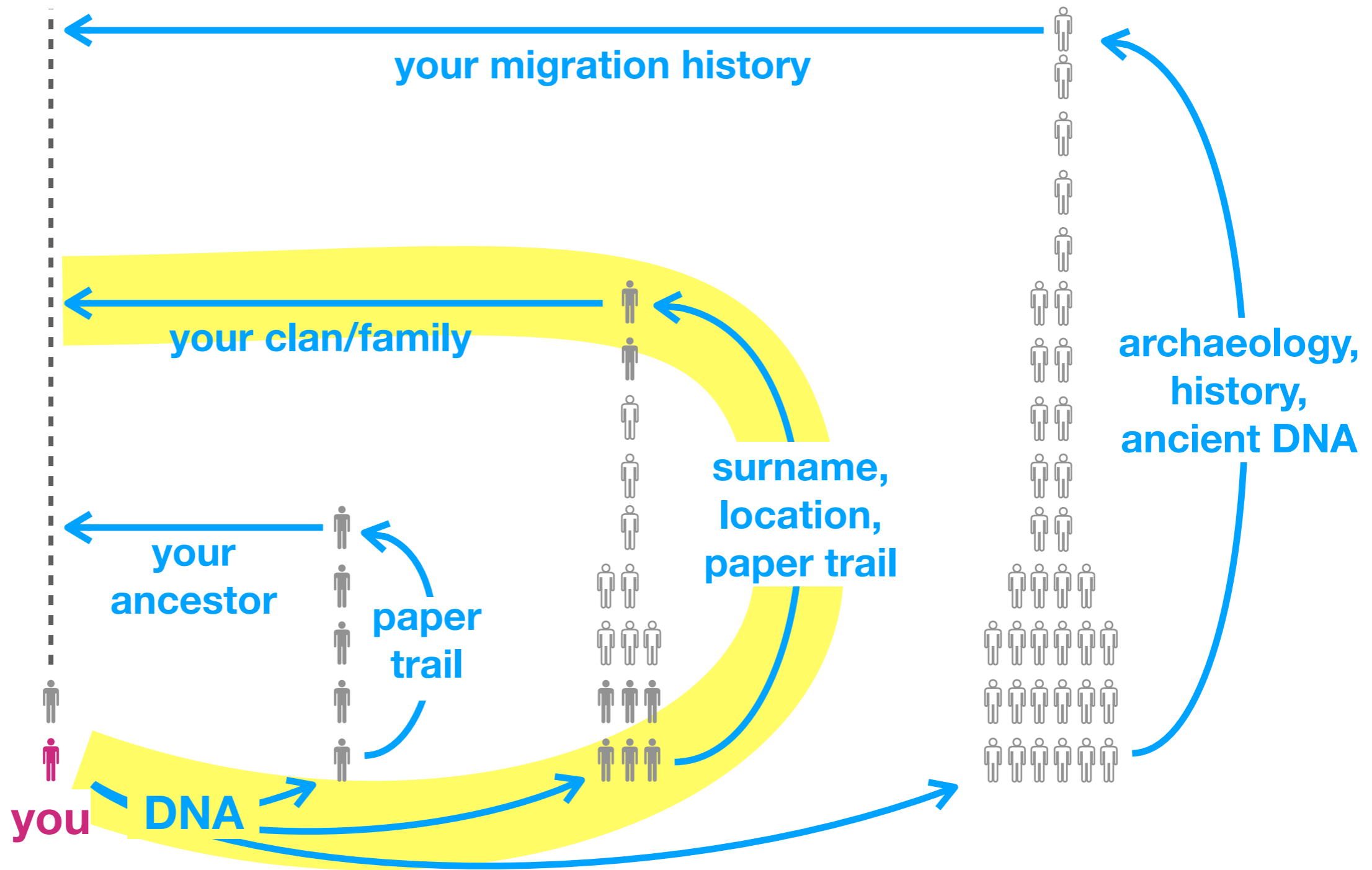
surnames

1000

paper
records

300

today





Finding Clans and Families

In these cases, the connections are often too distant for paper genealogy or autosomal DNA.

Our tools will be surnames, Y DNA, and census locations.

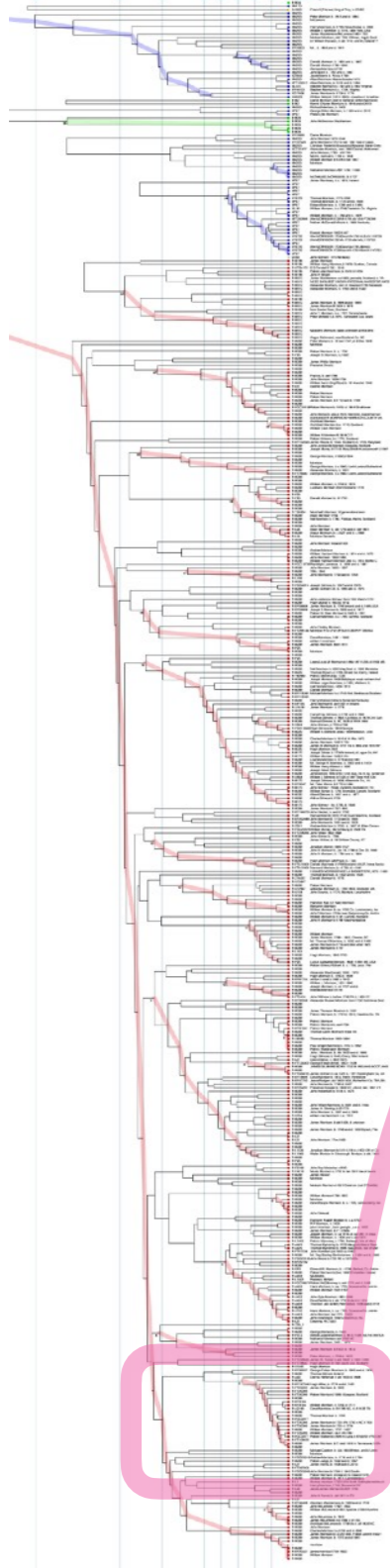


Two Surnames, Shared History

Two Surnames, Shared History

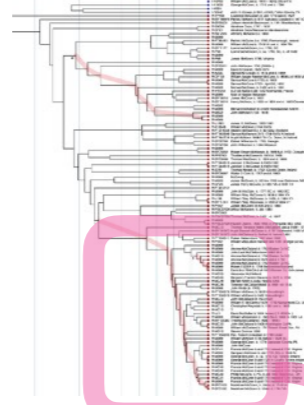
Morrison

>20 clades

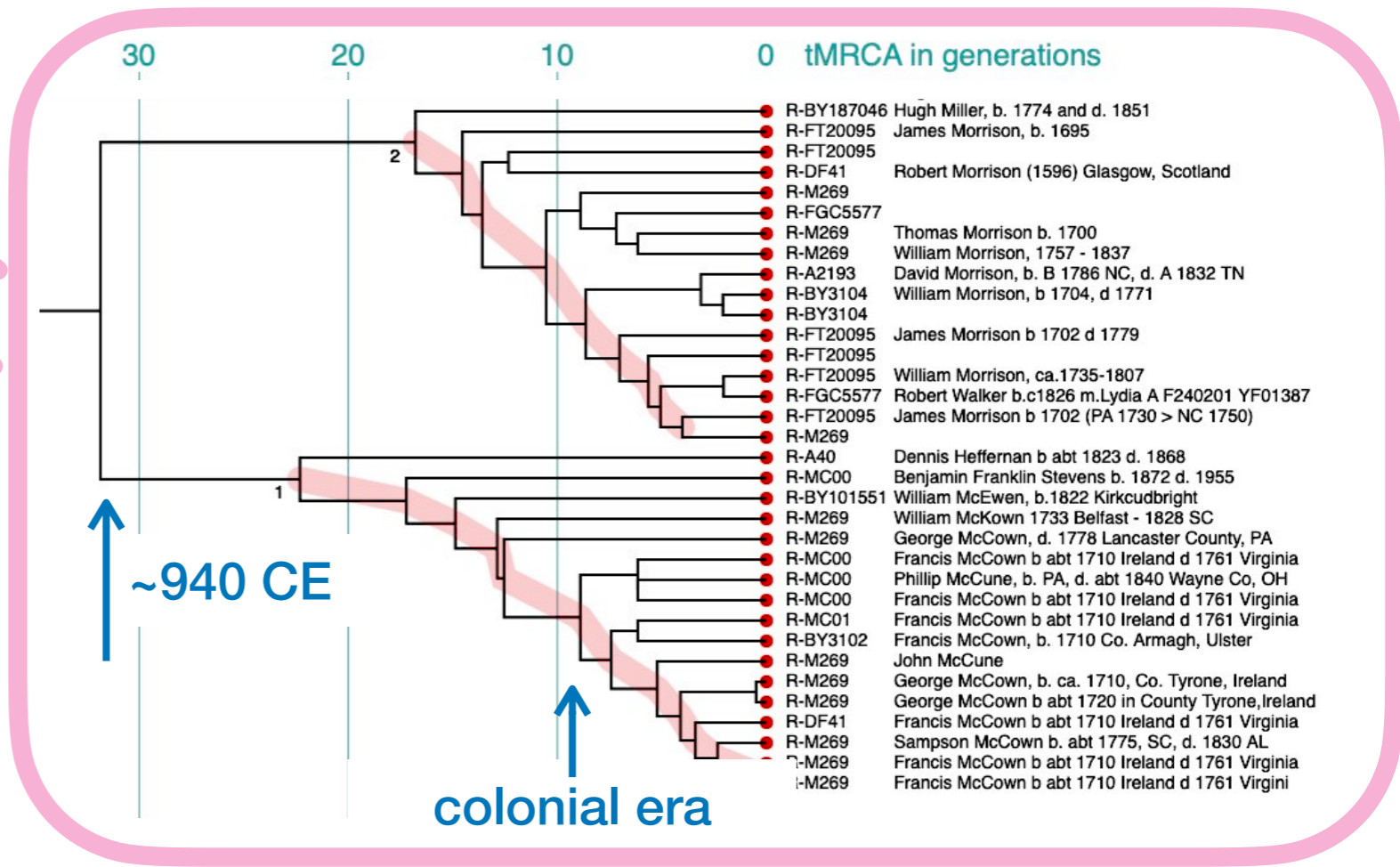


McCown

~3 clades



+

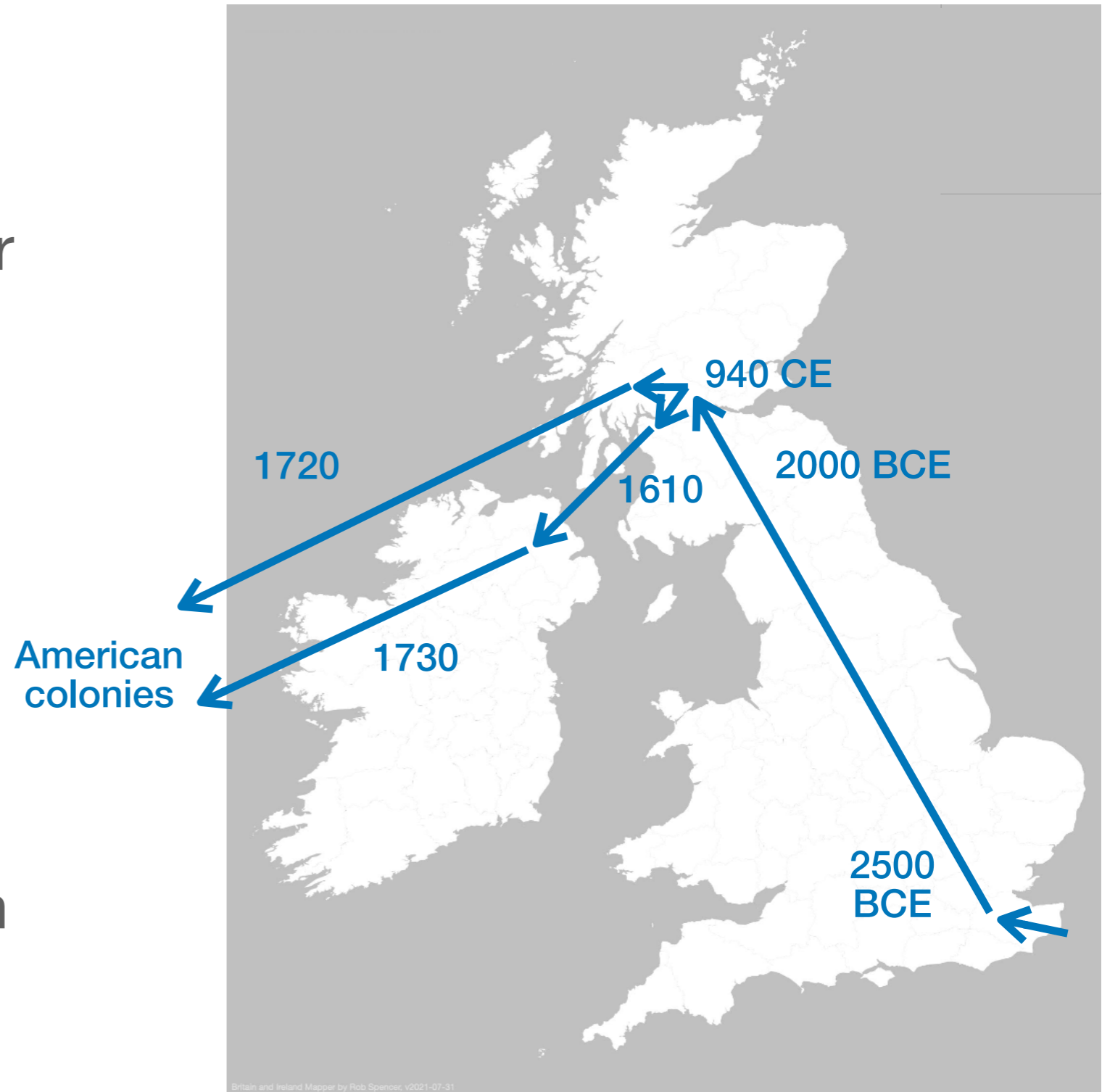


Two Surnames, Shared History

In southern Scotland about 940 CE, a man has two sons. One has descendants who will later take the surname Morrison.

The other's descendants take the surname McCown and move to Ireland.

Each clade has a descendant who emigrates to the American colonies and has many descendants there.





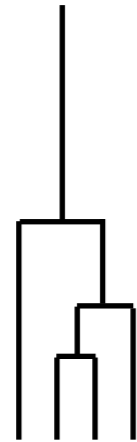
Five Surnames, Common Location

Five Surnames, Common Location

These testers' knowledge ends with the earliest-known-ancestors shown.

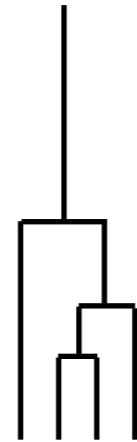
Most people don't look beyond their own surnames.

Robert
Dunbar
1634-1693



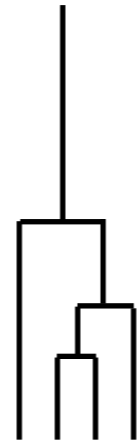
Dunbar

Alexander de
Cokburne
~1300



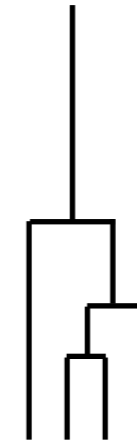
Cockburn,
Coburn

William
Preston
1790-1866



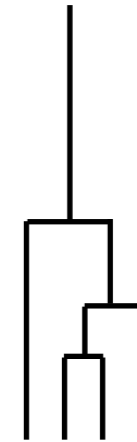
Preston

Walter de
Ridale
1137-1187



Riddle,
Riddell

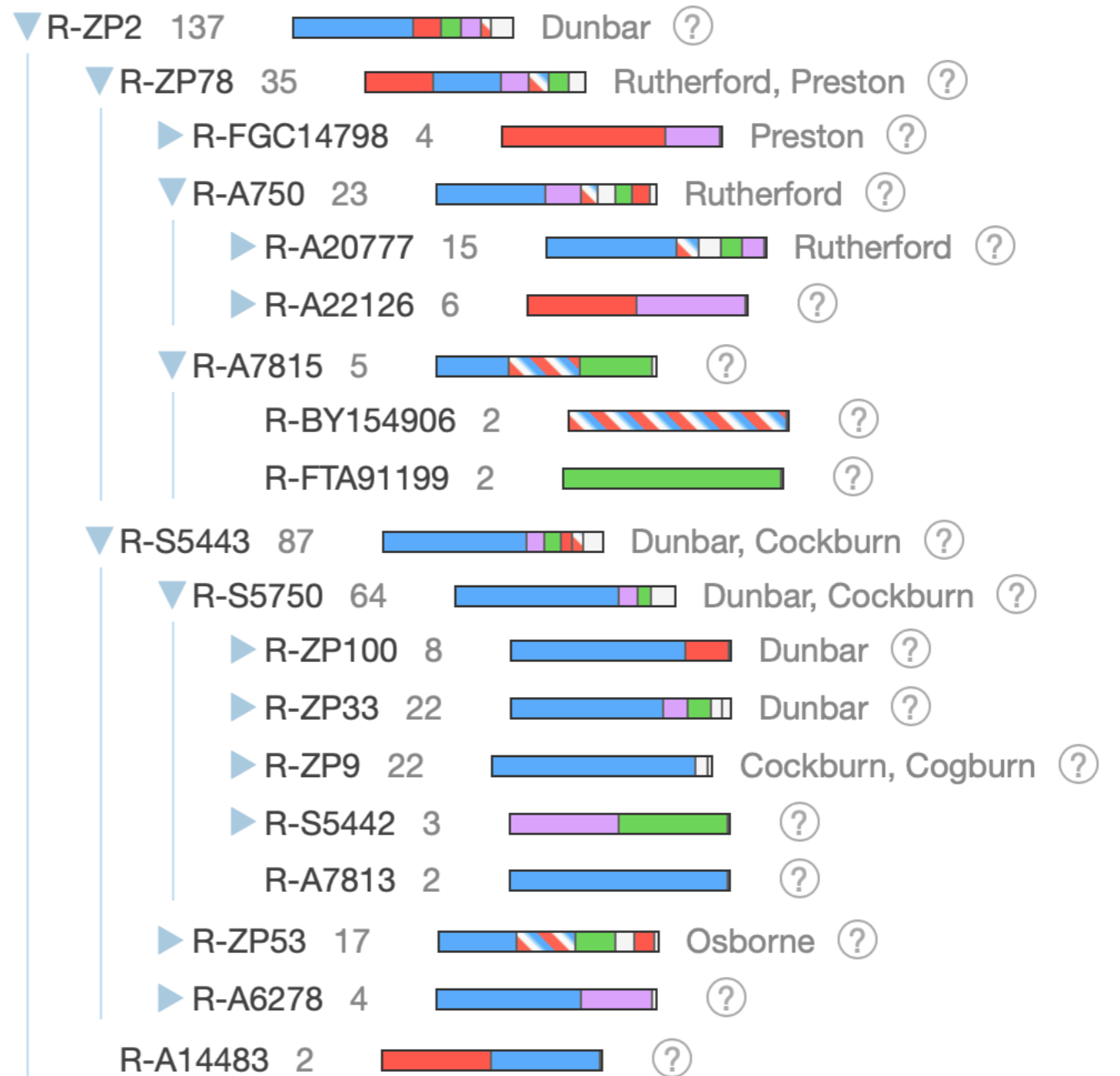
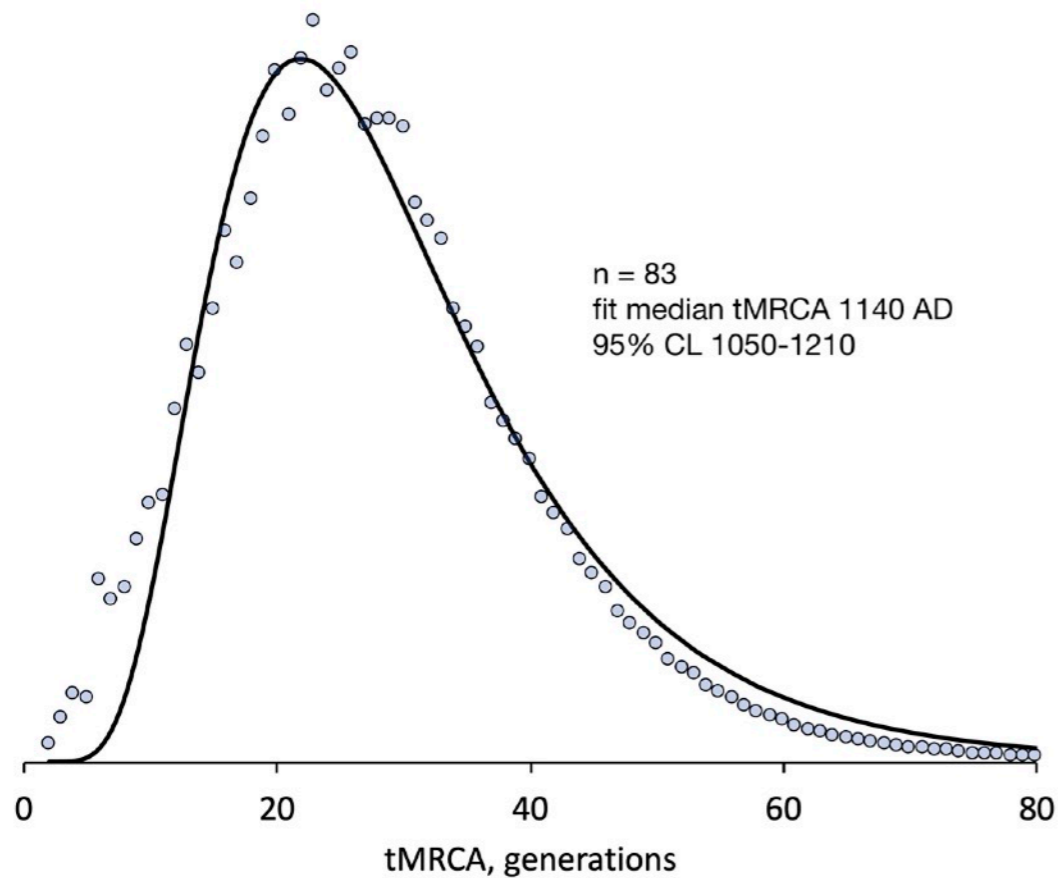
Thomas
Rutherford
1799-1834



Rutherford

Four Surnames, Common Location

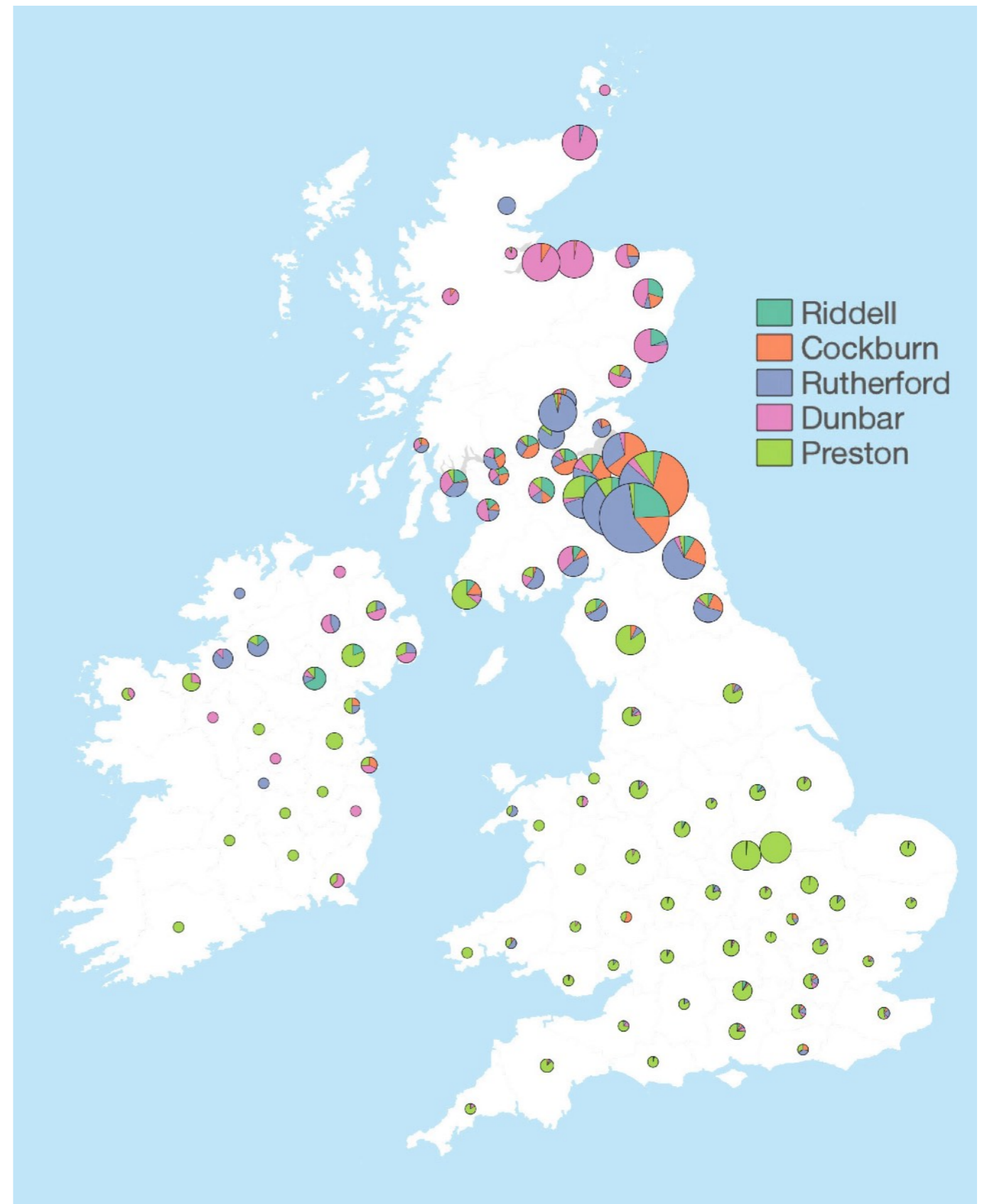
DNA shows a common ancestor born around 1140.



Four Surnames, Common Location

These surnames coincide in a limited area of the Scottish Border counties.

These five lines have a connected genetic and regional history. The paper trails could probably be combined to identify the common 12th century ancestor.





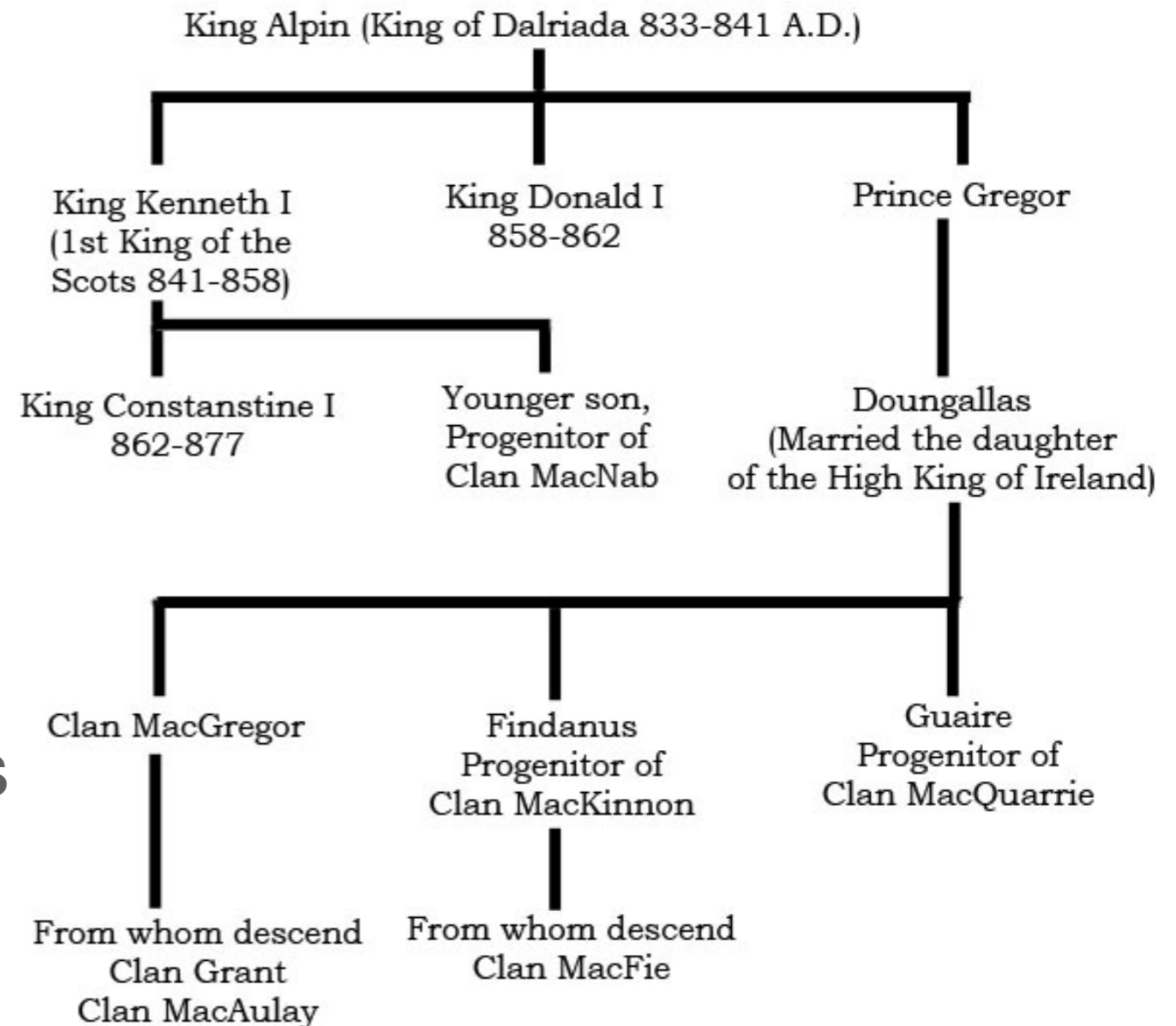
Descendants of a Legendary King

Descendants of a Legendary King

Siol Alpin is a family of seven Scottish clans traditionally claiming descent from Alpin, King of the Picts, ca 800 CE.

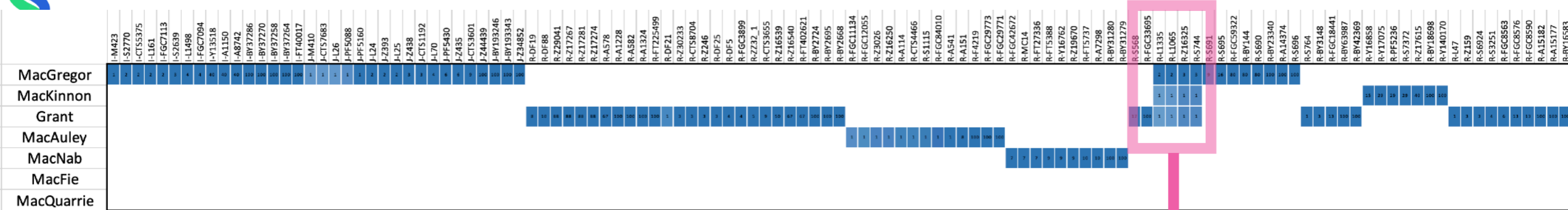
Can we identify modern descendants?

Our clue will be connections between the surnames **Grant, MacGregor, MacAulay, MacFie, MacKinnon, MacNab, and MacQuarrie.**

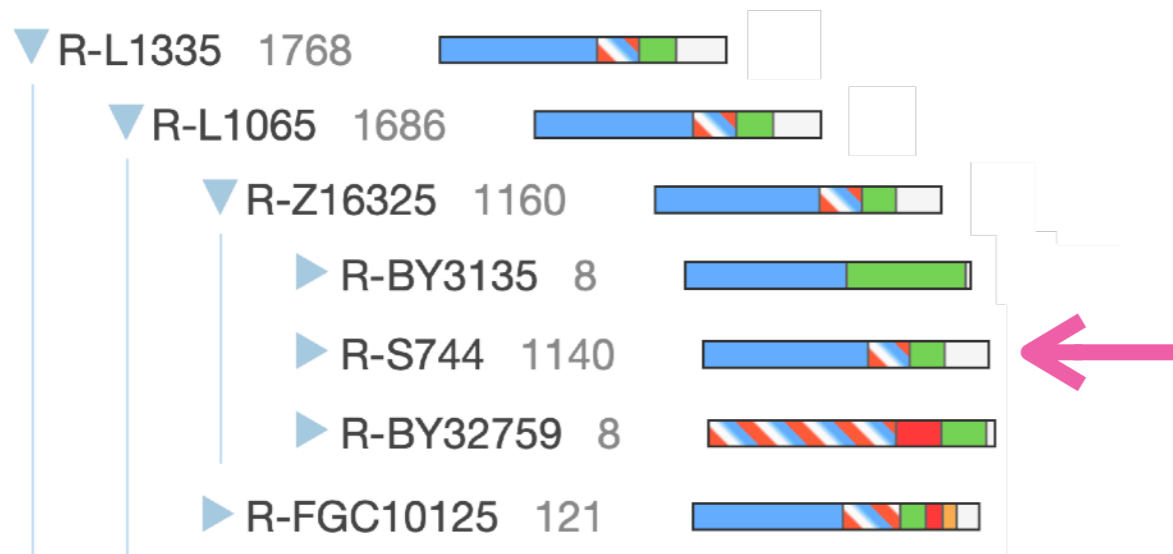


Descendants of a Legendary King

Method: Scan the entire Y haplotree for SNPs that contain these 7 names.
 Only 119 of 45,000 SNPs have *any* citation of the names.



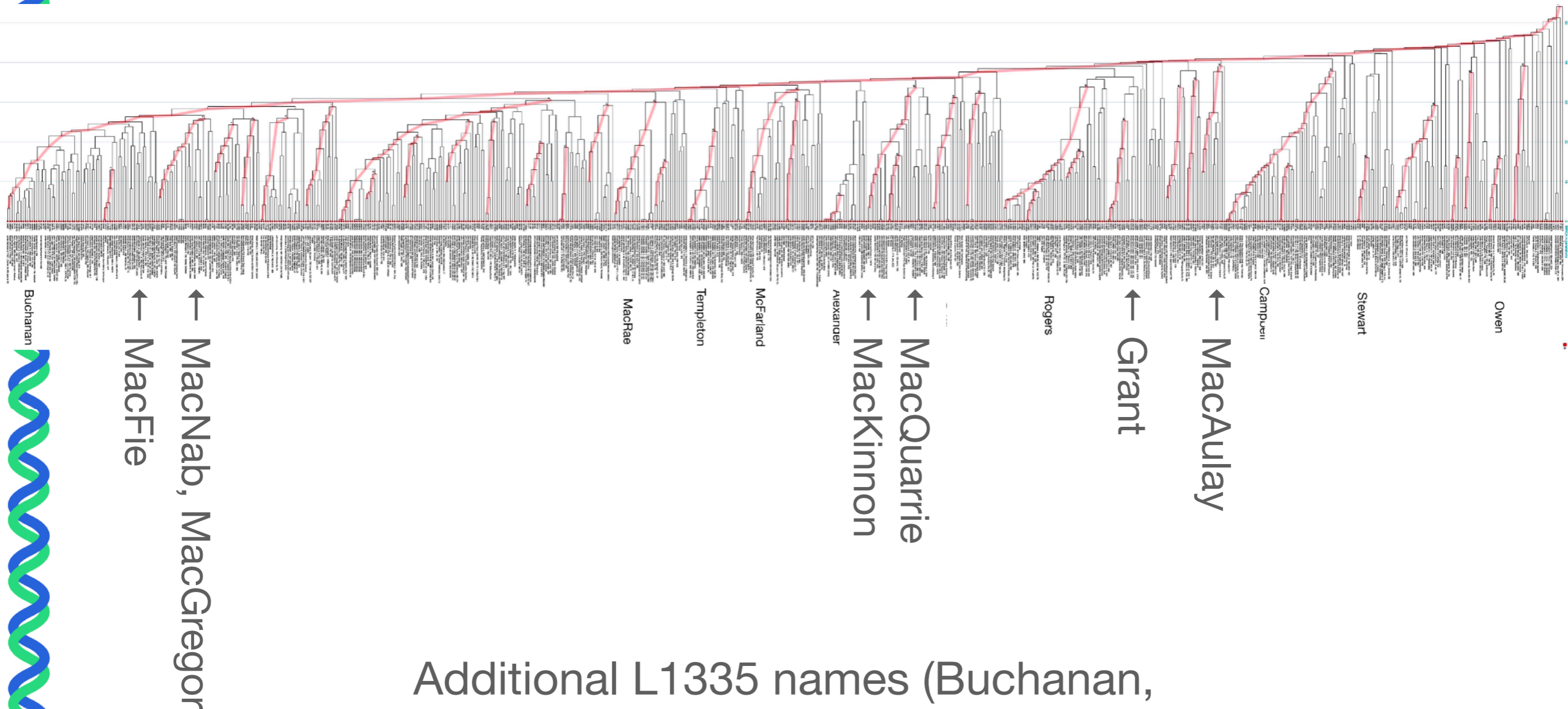
Only the R-L1335 > L1065 > Z16325 > S744 lineage contains *more than one* of the names.



	R-L1335	R-L1065	R-Z16325	R-S744
MacGregor	2	2	3	3
MacKinnon	1	1	1	1
Grant	1	1	1	1

Descendants of a Legendary King

All seven historic names are found in the larger set of STR DNA testers under R-L1335



Additional L1335 names (Buchanan, MacRae, Templeton, McFarland, Rogers, Campbell, Owen) speak to subsequent clan divisions and mergers.

Descendants of a Legendary King

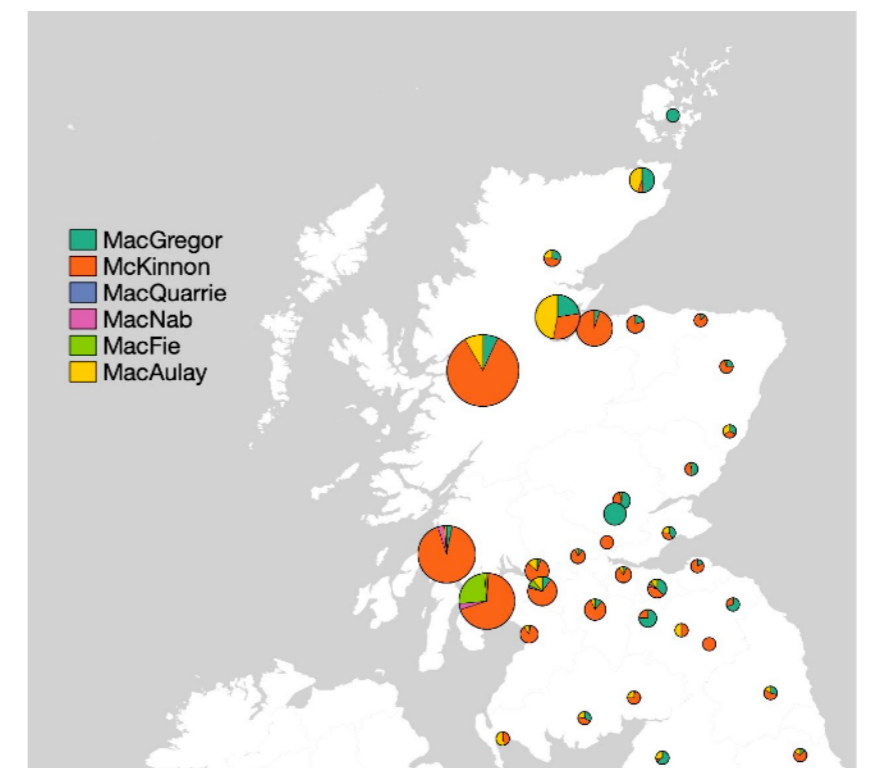
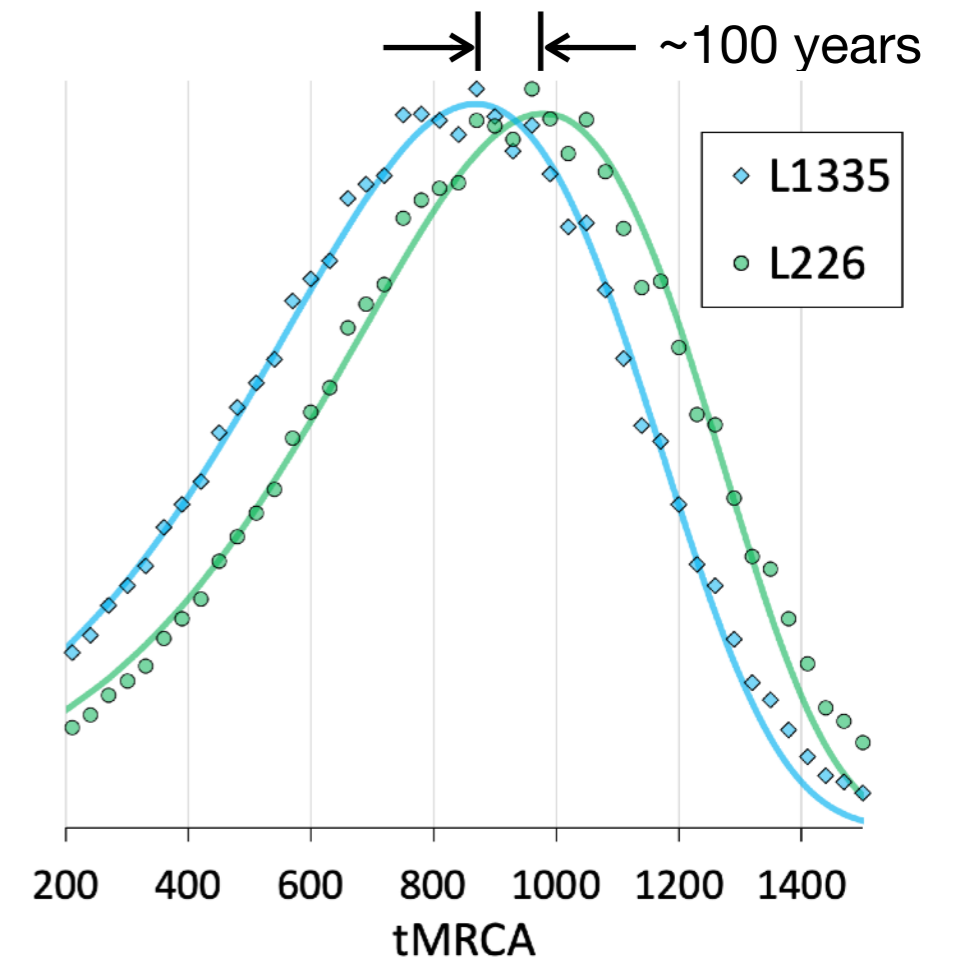
R-L226 has a paper trail to Brian Boru, 941-1014.

R-L1335 is 100 years older, thus ~840, within a generation of Alpin's lifetime.

Three lines of evidence — DNA-linked surnames, DNA date, surname location — all support R-L1335 as the Alpin lineage.

But note that this applies only to a minority of those with these surnames.

	% with R-L1335
MacGregor	30%
McKinnon	25%
Grant	15%
MacQuarrie	15%
MacNab	13%
MacFie	12%
MacAulay	3%





Do It Yourself

- Do Y DNA testing, at least to Y67; see <https://www.familytreedna.com/products/y-dna>
- Join the project for your surname. Use the DNA results to see which clade of all those with your surname applies to you. Ask questions in the project's online forum.
- If you have Anglo-Irish paternal ancestry, see if your SNP lineage is mapped at <http://scaledinnovation.com/gg/biMapper.html> .

End of Session Two

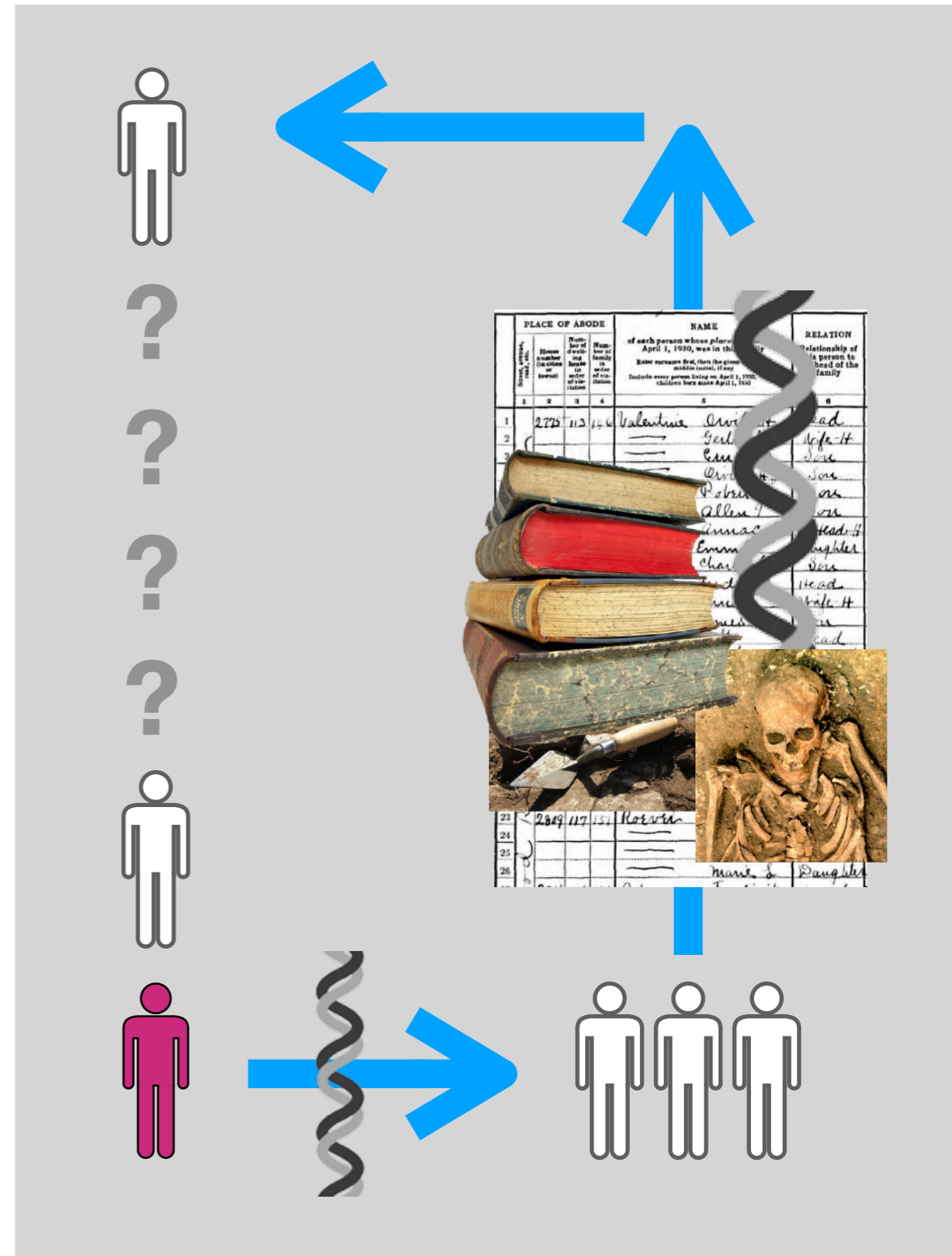
find clans & families back 1000 years

Session Three:
find migrations back 200,000 years

Extending Time Horizons with DNA

part three:
find migrations back
200,000 years

Rob Spencer



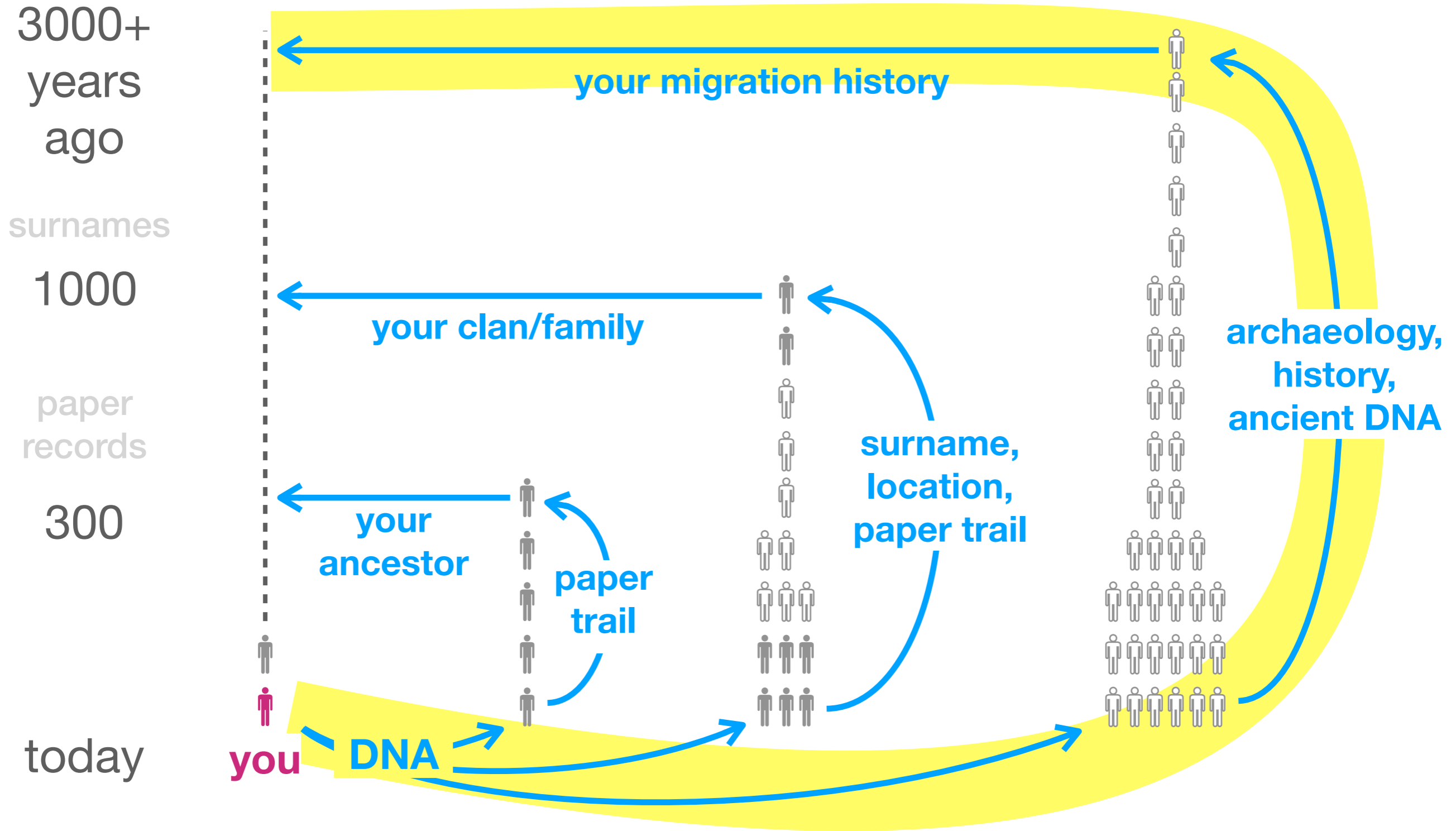


Finding Migrations

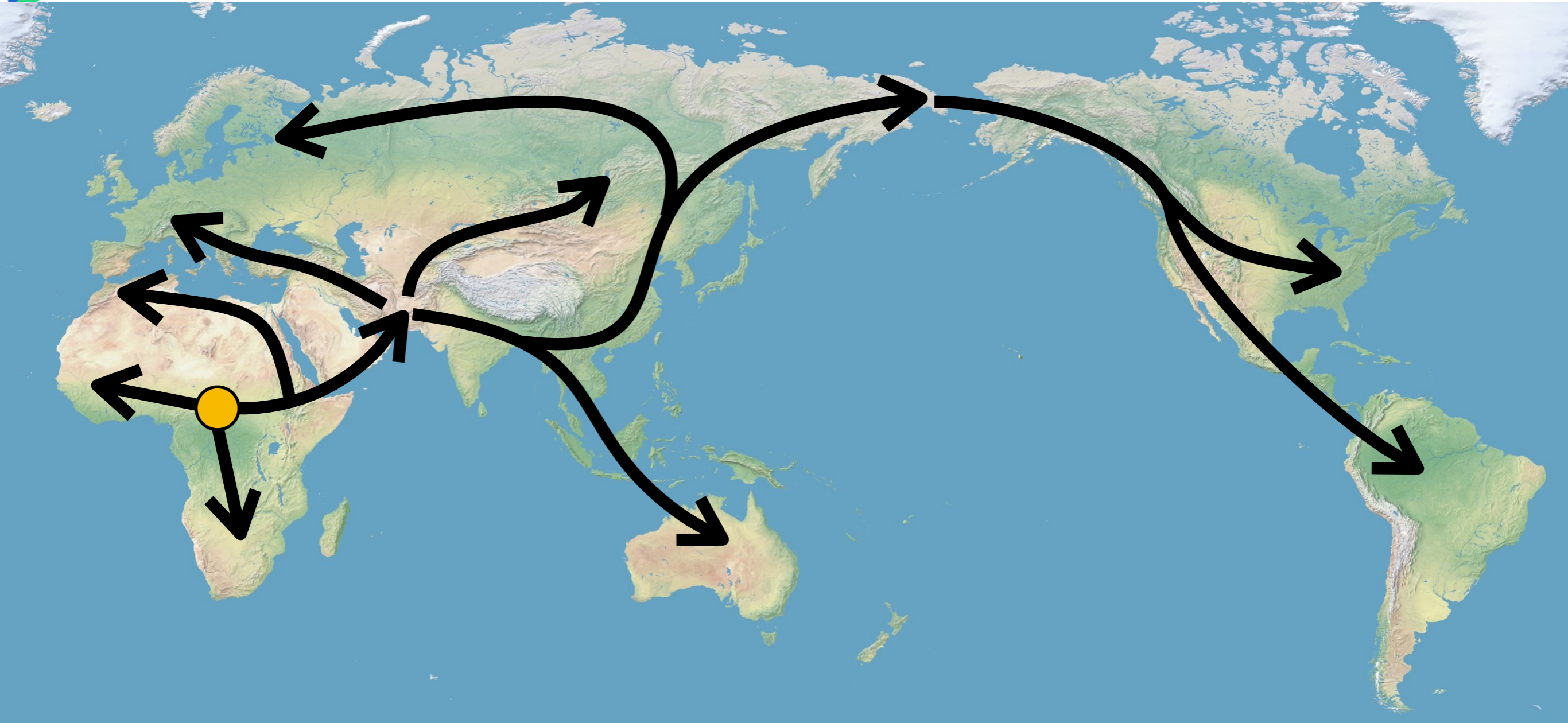
We are too far back in time for family records, surnames, or written history.

Our tools will be Y DNA (ancient and modern), archaeology, and geometry.

Common Strategy



The Great Migrations



The broad paths are well known.
The interesting thing is to make it personal.

Building the Tree

DNA markers (SNPs) encode a **tree** that shows their history.

What we measure

Adam **BY1, BY2**

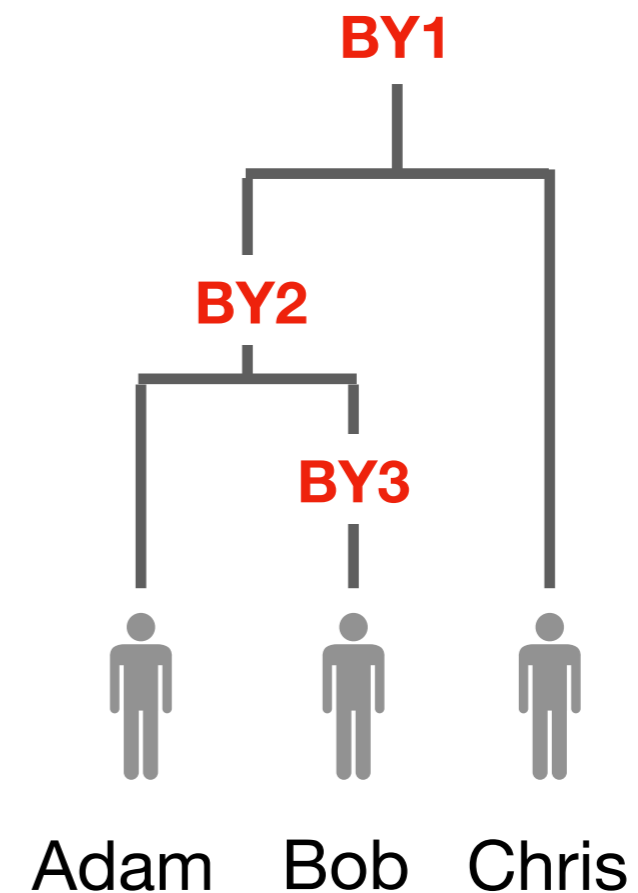
Bob **BY1, BY2, BY3**

Chris **BY1**

There is only one tree consistent with the results.

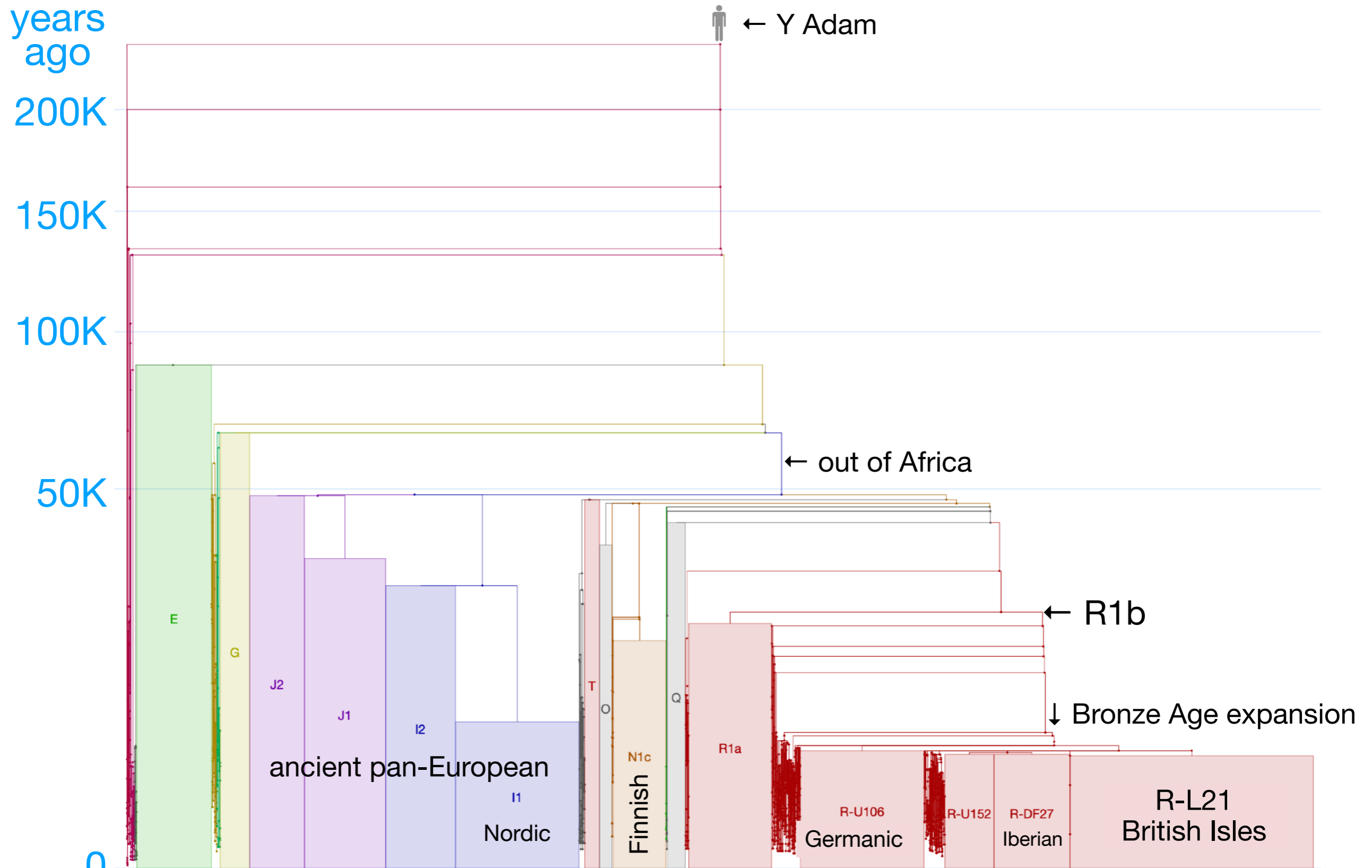


What we infer



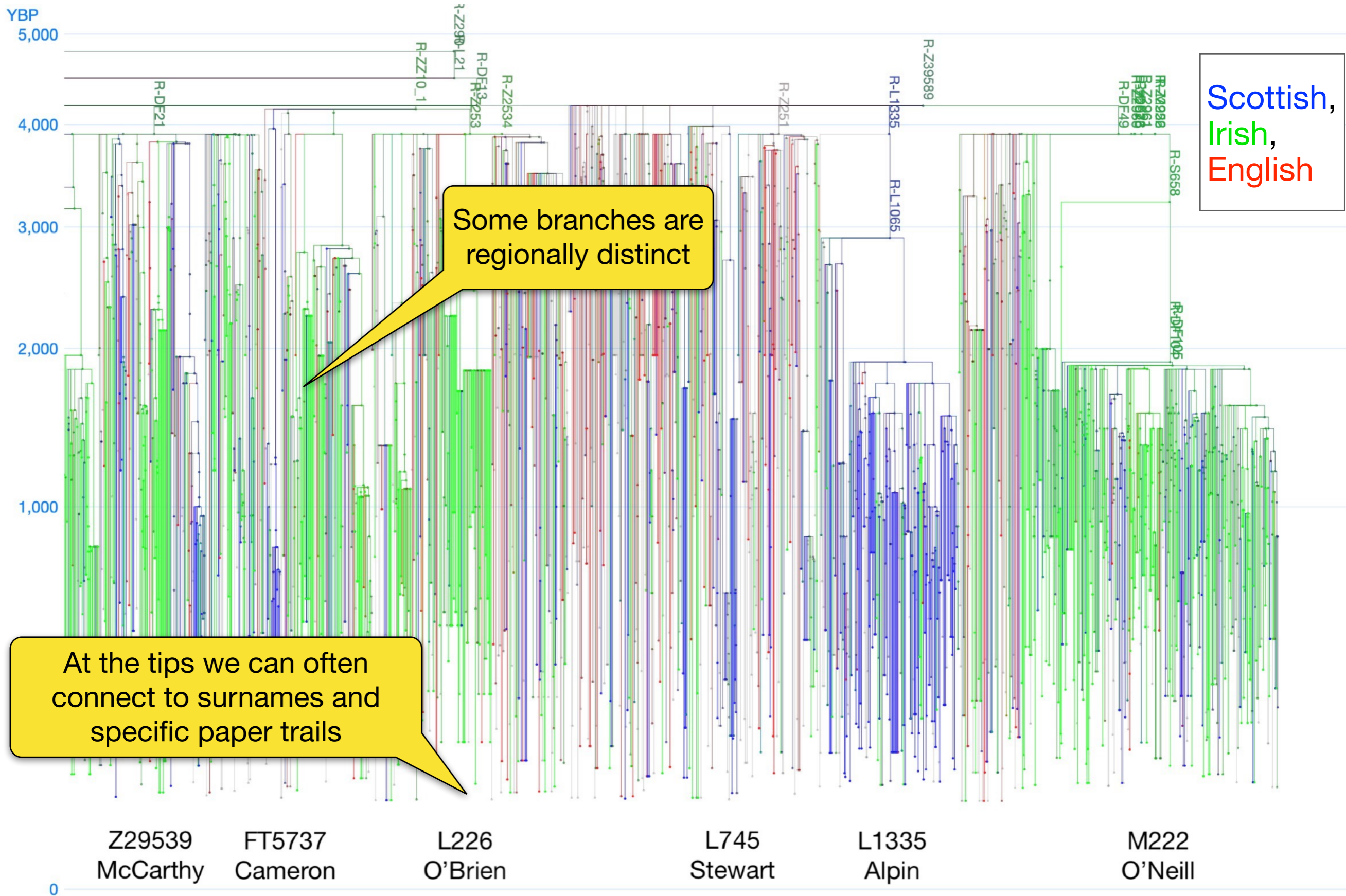
The Y Haplotype

214,000 contributors 29,000 branch points 21,000 terminal SNPs



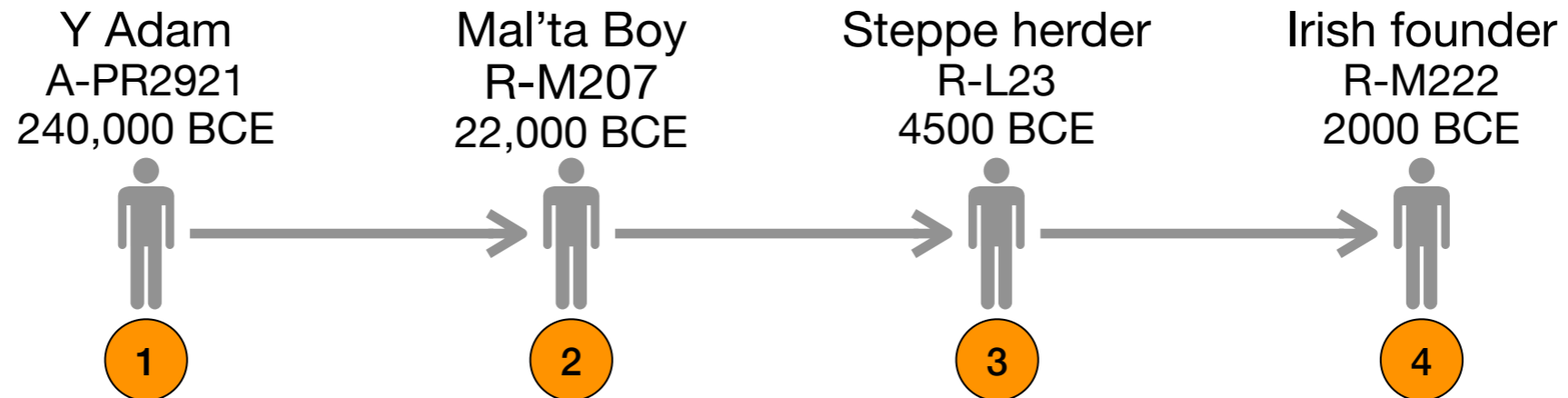
We see only men who DNA test; we're missing half of humanity: India, China, SE Asia, Africa

R-L21: the Beaker Invasion of Britain



SNPs can be mapped

A SNP mutation occurs to a specific man at a specific time and place.
Putting SNPs on the map traces the great migrations.

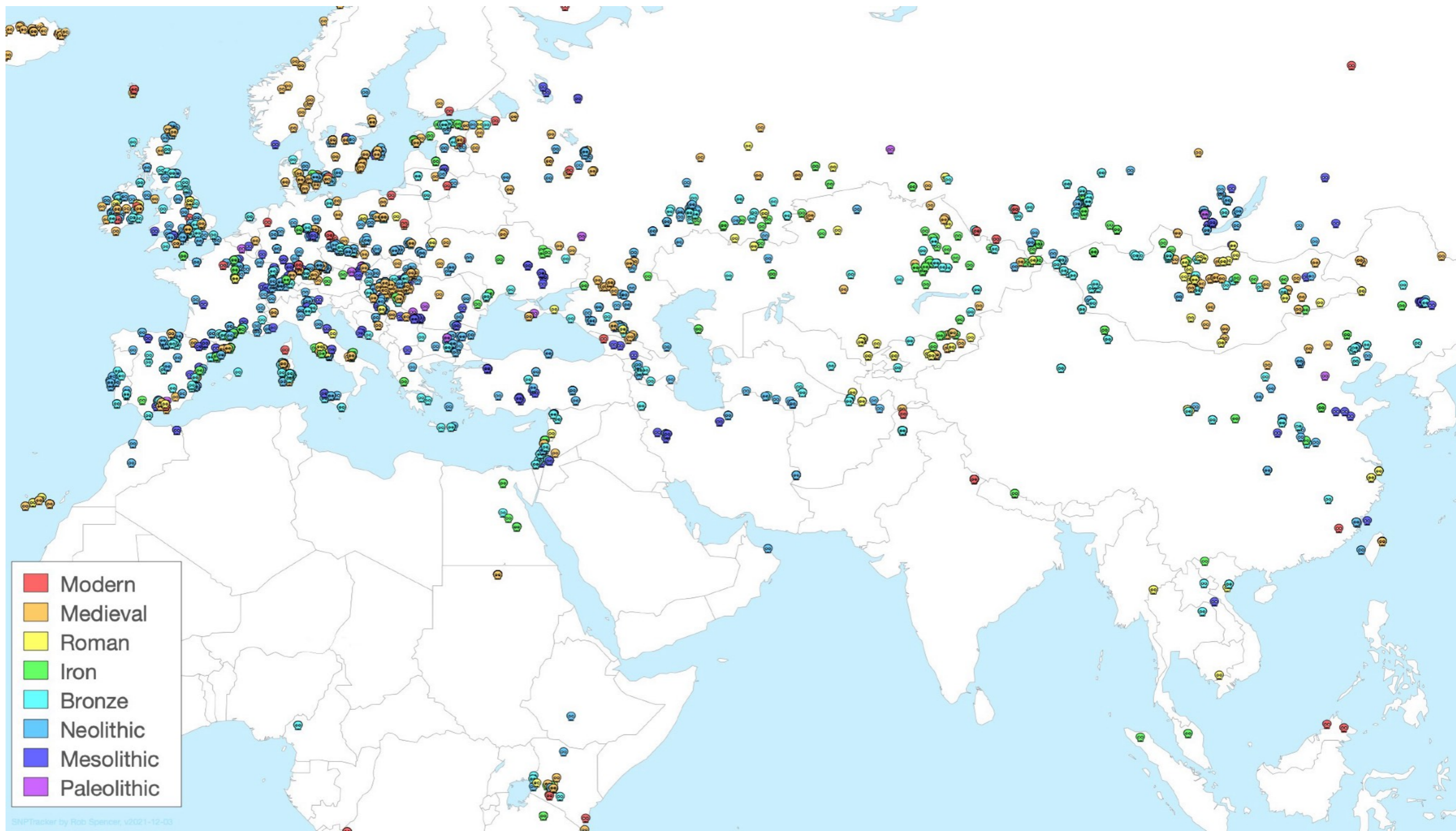


Data for Mapping

data source	era	average uncertainty
ancient skeletal DNA	Paleolithic to Neolithic	1200 km
user ancestry	Bronze Age to Feudal	400 km
surnames & census	Modern	125 km

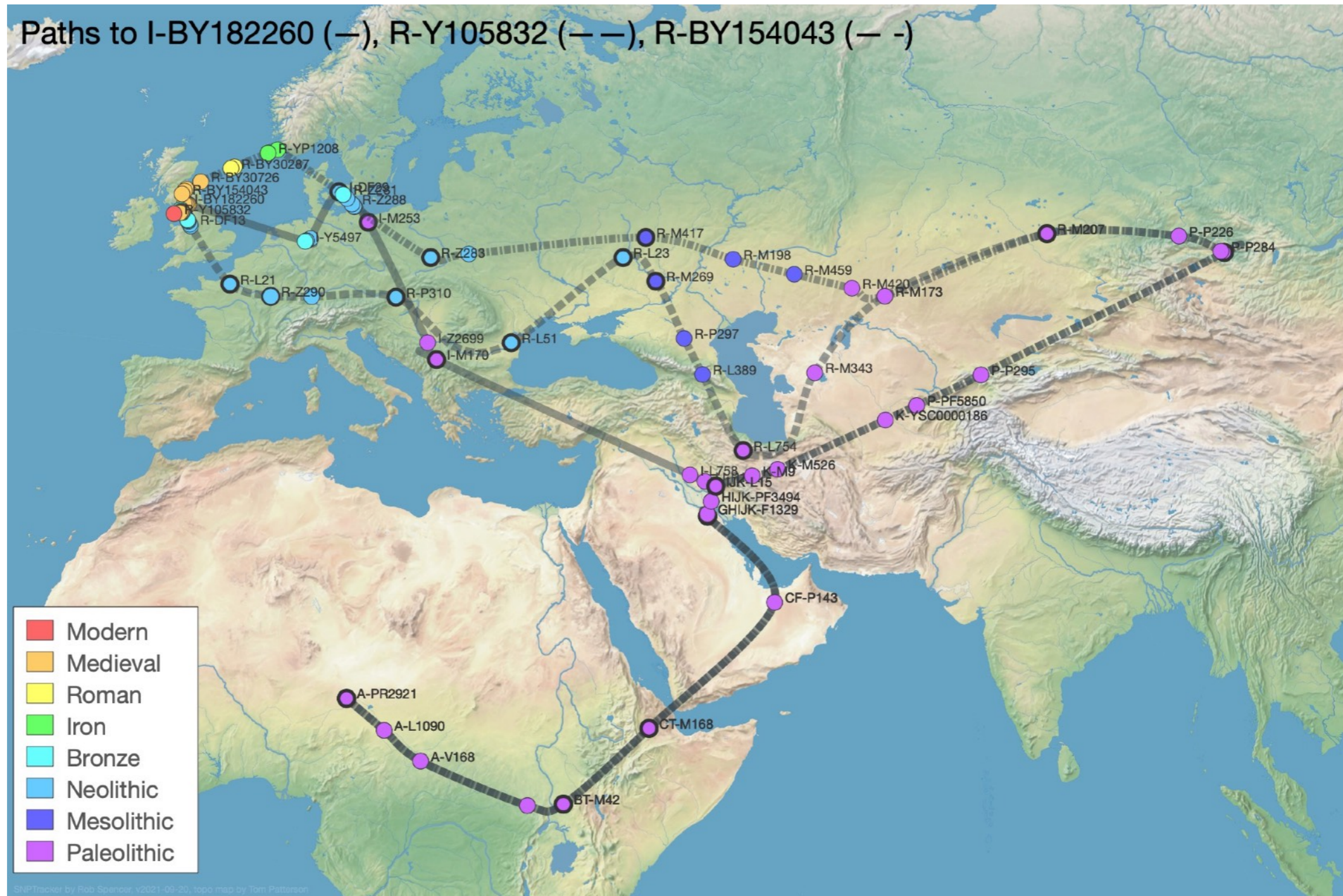


Ancient Remains with DNA



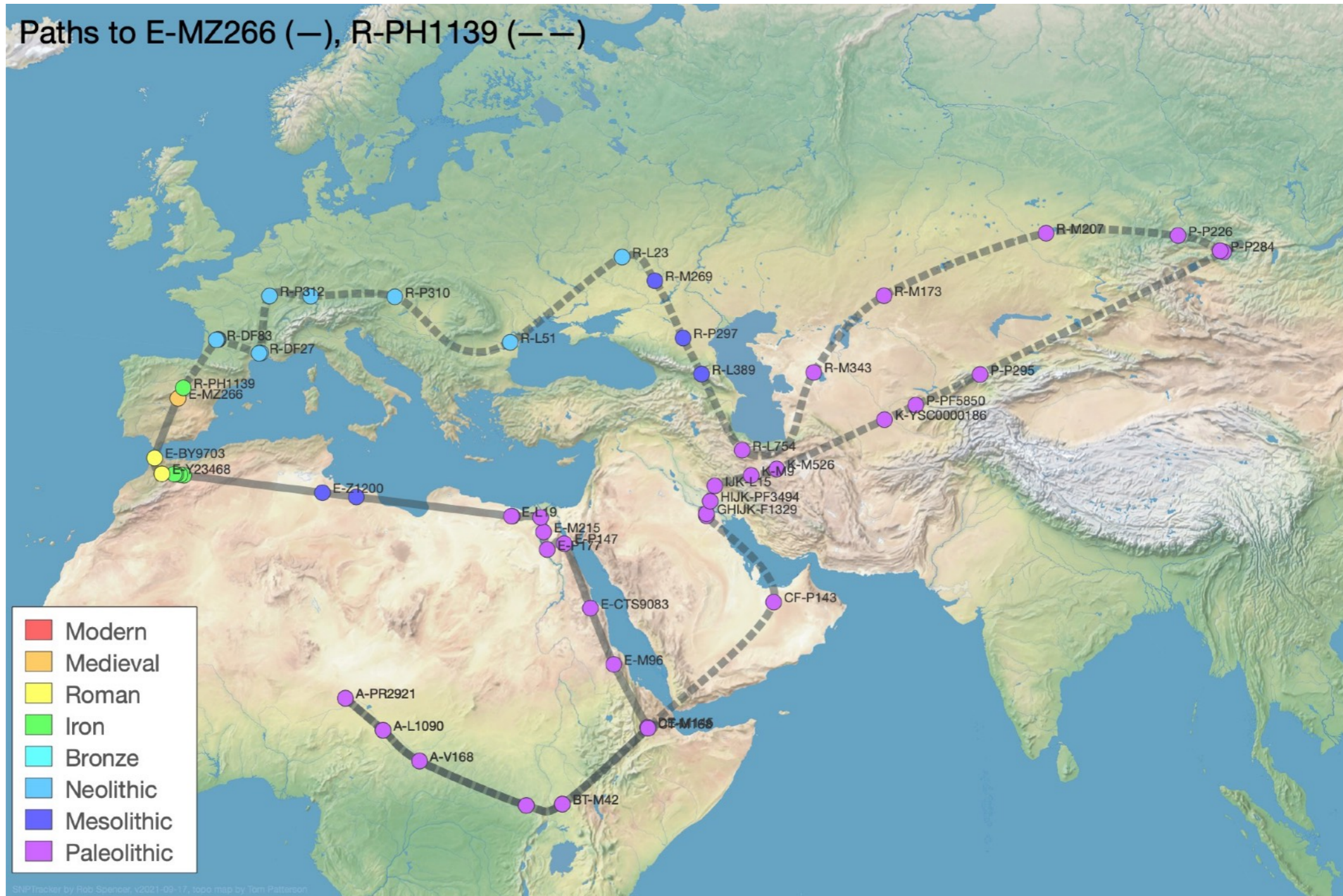
Many thanks to Dr. Carlos Quiles for making his database accessible.

Paths to the Isle of Man



Your neighbors' paths can differ by thousands of miles and thousands of years.

Paths to Spain

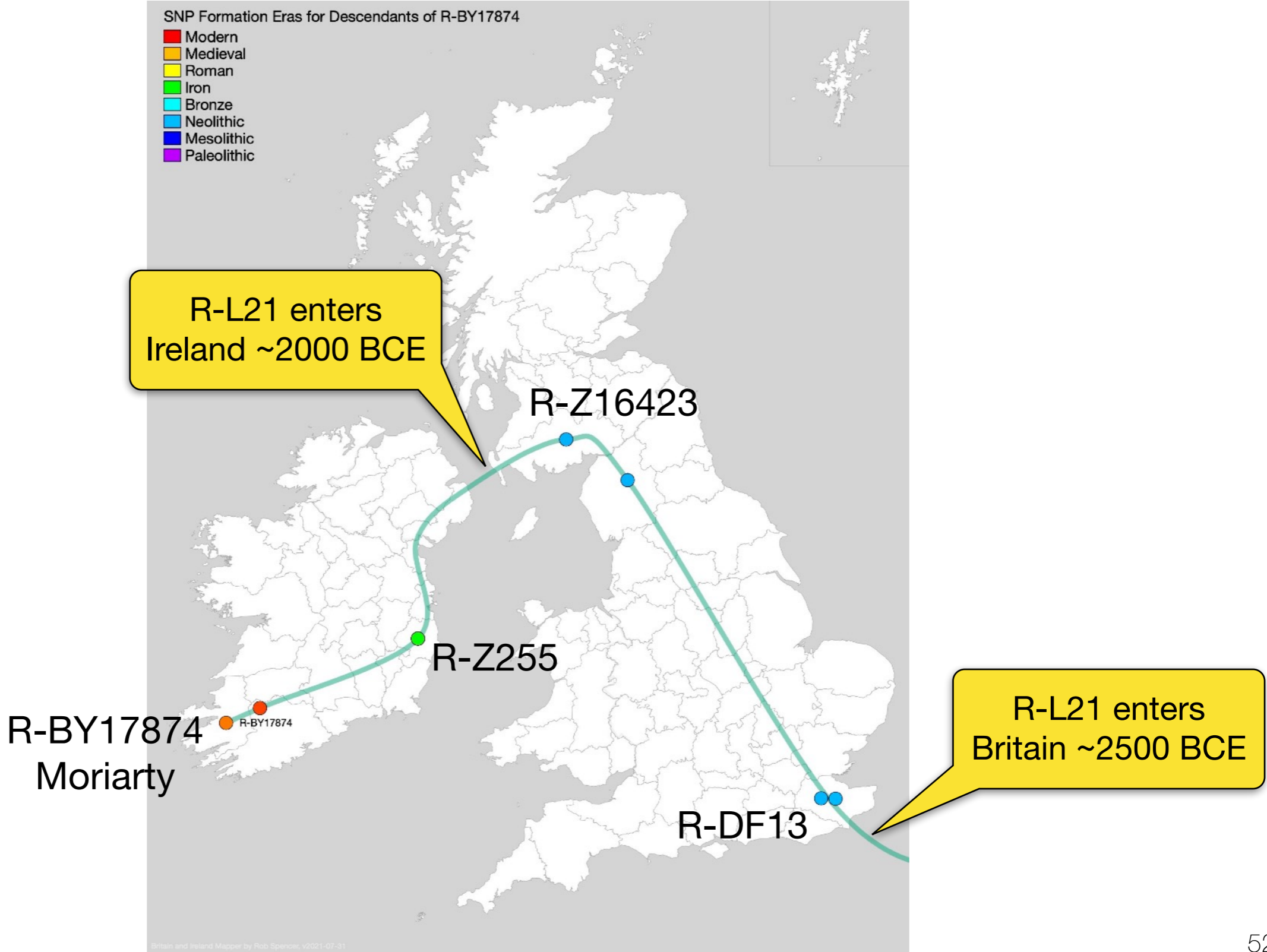


Paths to Finland



Details based on Census Data

DNA testers attach their surnames to their SNPs, and 19th century census data can localize surnames.





Do It Yourself

- Do yDNA or mtDNA testing — FTDNA's BigY700 if you want the most detail
- Enter your haplogroup at <http://scaledinnovation.com/gg/snpTracker.html>
- For British and Irish ancestry see <http://scaledinnovation.com/gg/biMapper.html>

End of Session Three

Thank You

<http://scaledinnovation.com/gg/ext/rt22/index.html>

