Introducing the Homeland Timeline Map

Prehistoric migrations in “real-time”

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Overview

- aims of the map
- letting the data speak – aDNA
- Basic genomics and a quick recap on some steppe migrations (with R1-lineages)
- introducing The Homeland Timeline Map
- strengths and weaknesses

Aims of the map

Accounting for prehistoric languages is impossible from language alone:

- late appearance of writing gives too many ”black spots” in our knowledge
- historical loanword research helps but often leaves several possible contact scenarios

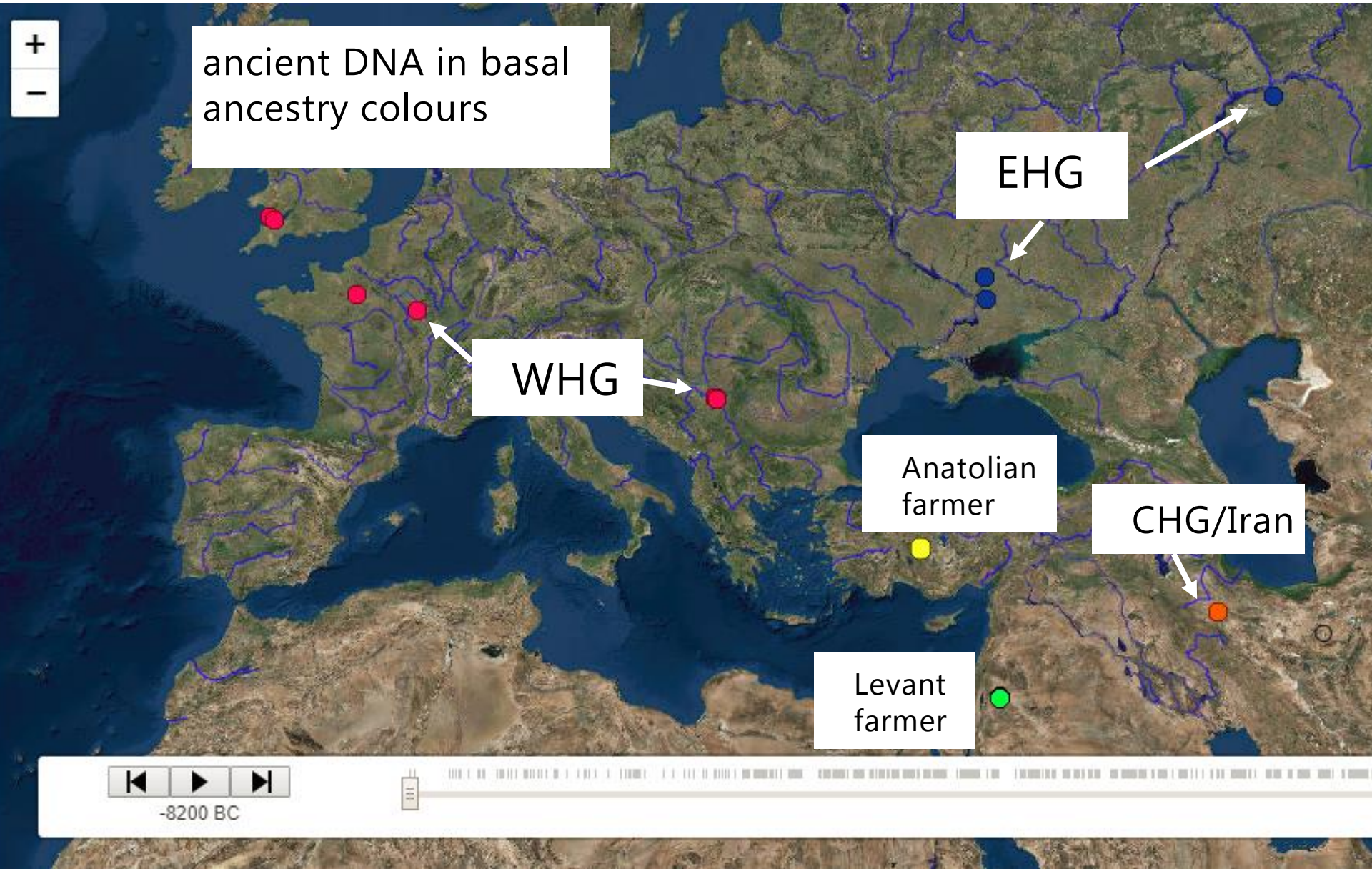
Using ancient DNA and archaeology to track migrations of different populations and culture groups

- gives a better backdrop of prehistoric contacts with absolute dates
- sorts out the origins of the populations and cultures in contact

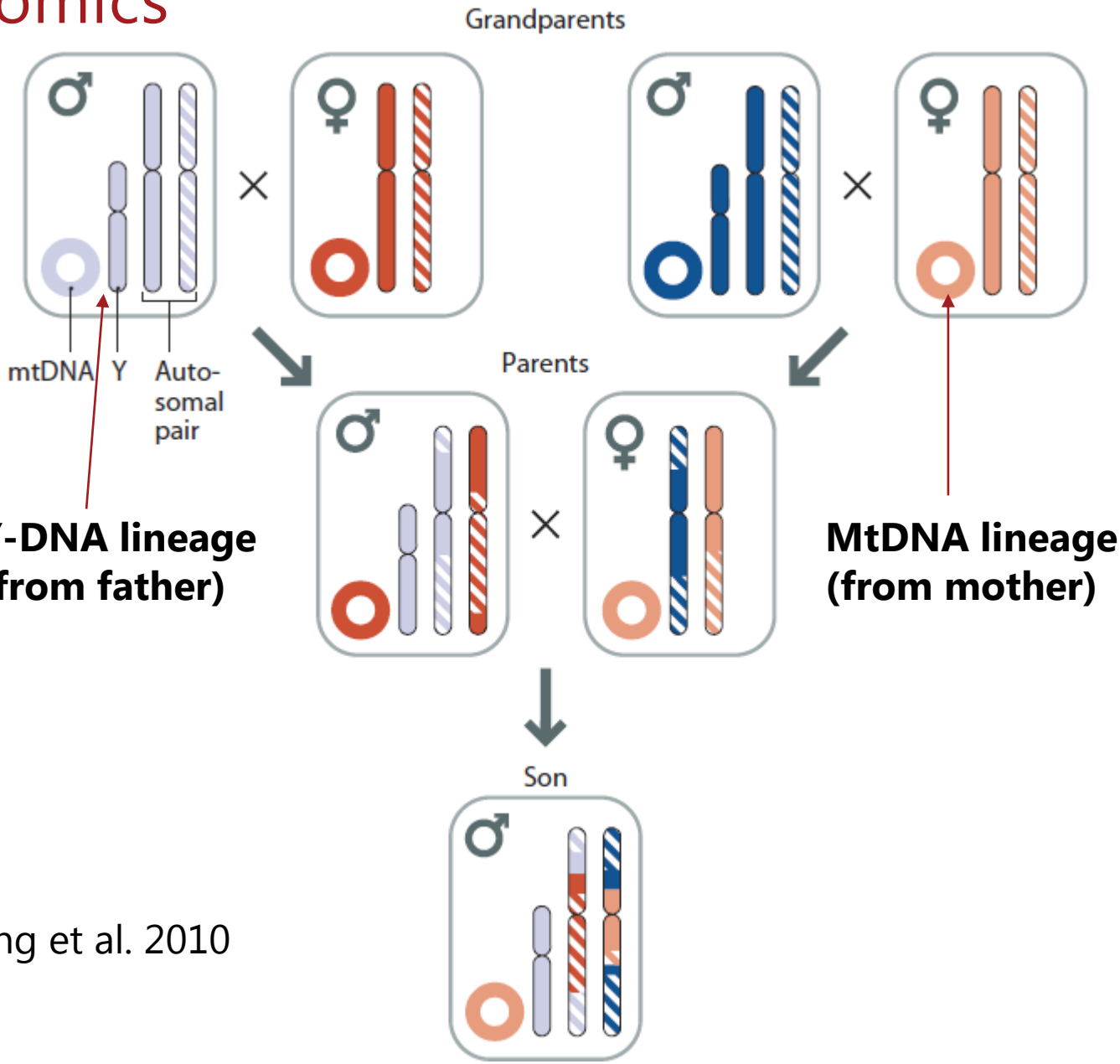
A tool for combining disciplines

- archaeology, genomics (DNA) and language
- overview of the present state of knowledge in ancient DNA
- visualising migrations makes it more relatable to people
- useful for both ”prehistorian” and layperson

Letting the data speak



Genomics

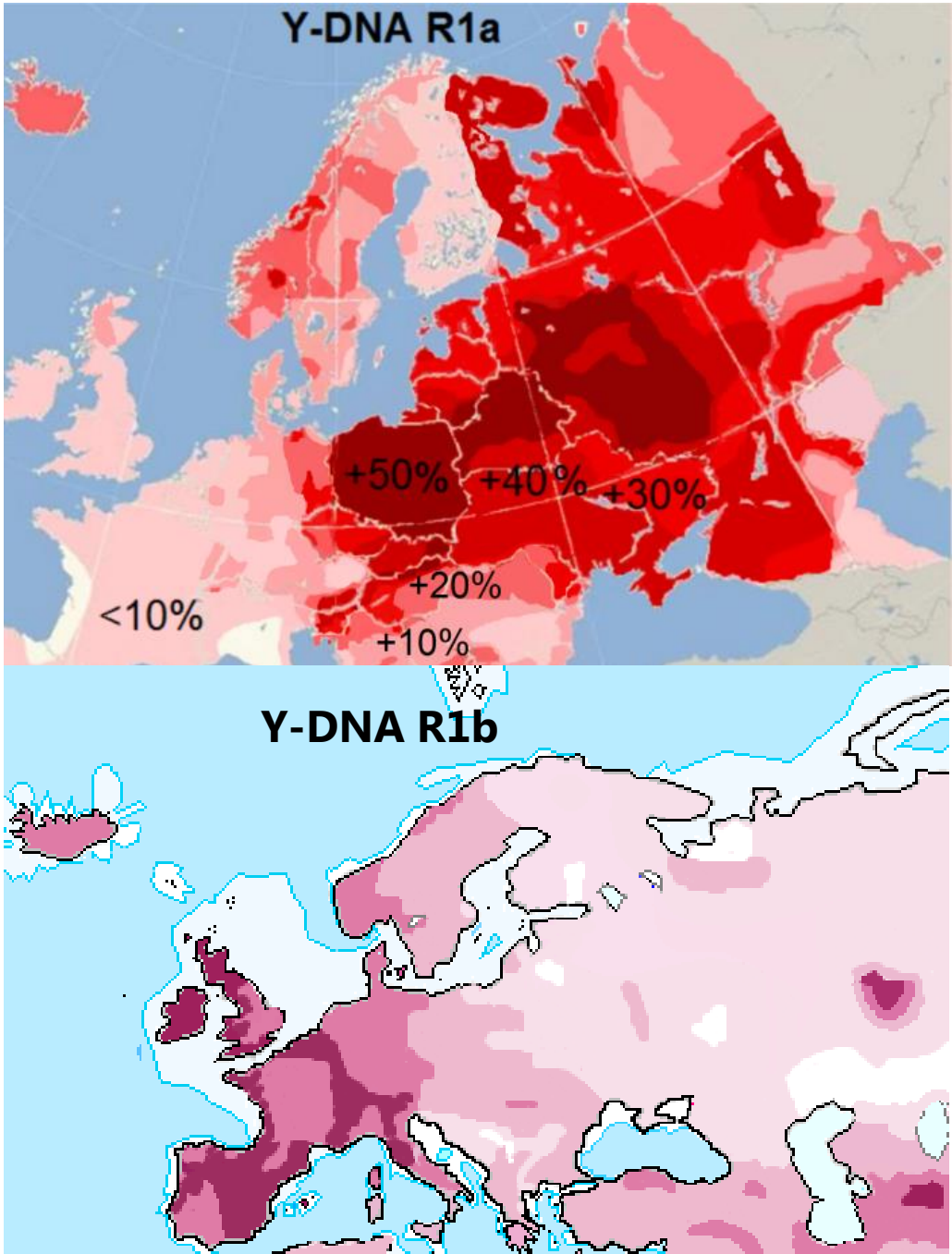


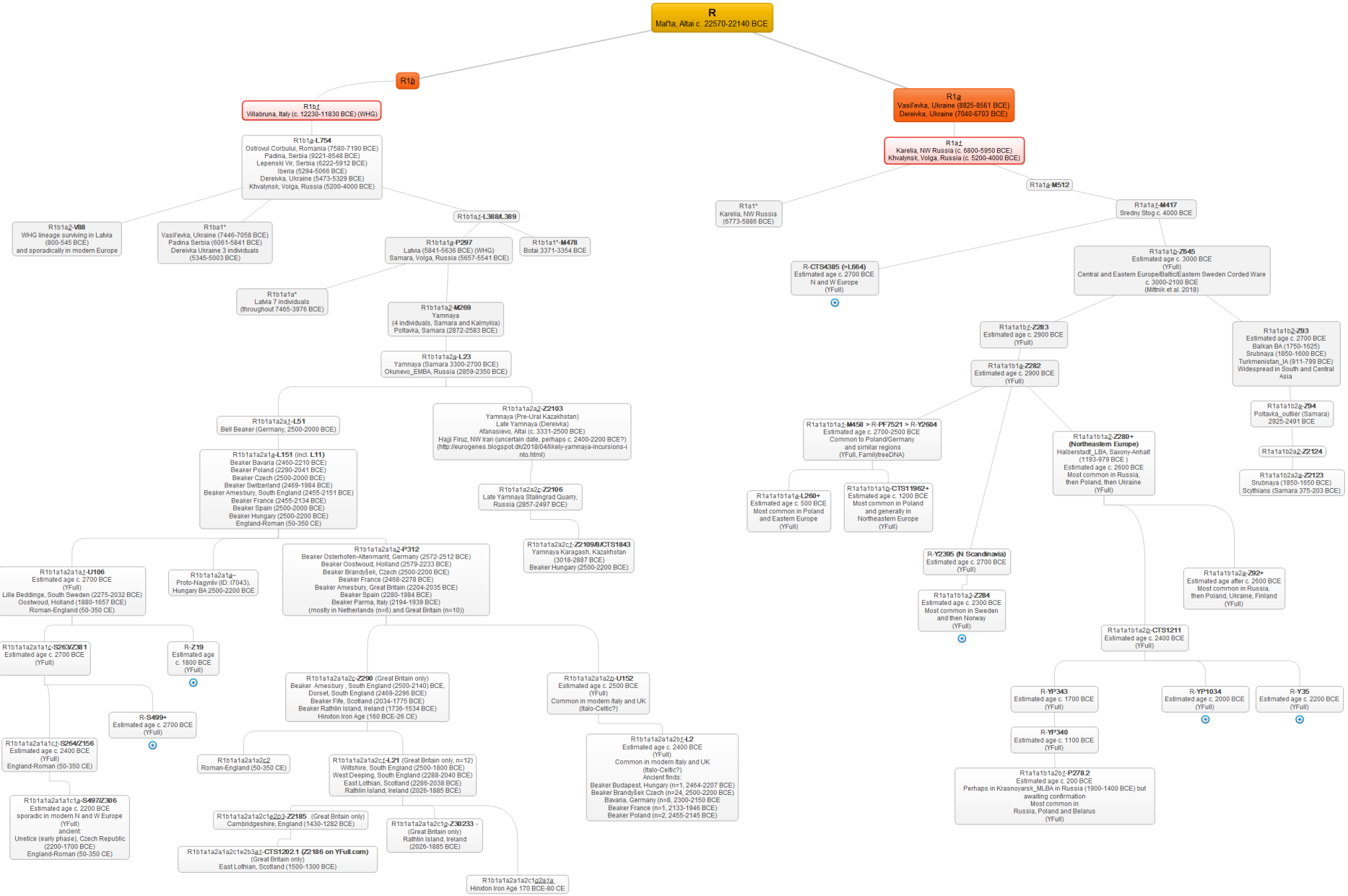
Jobling et al. 2010

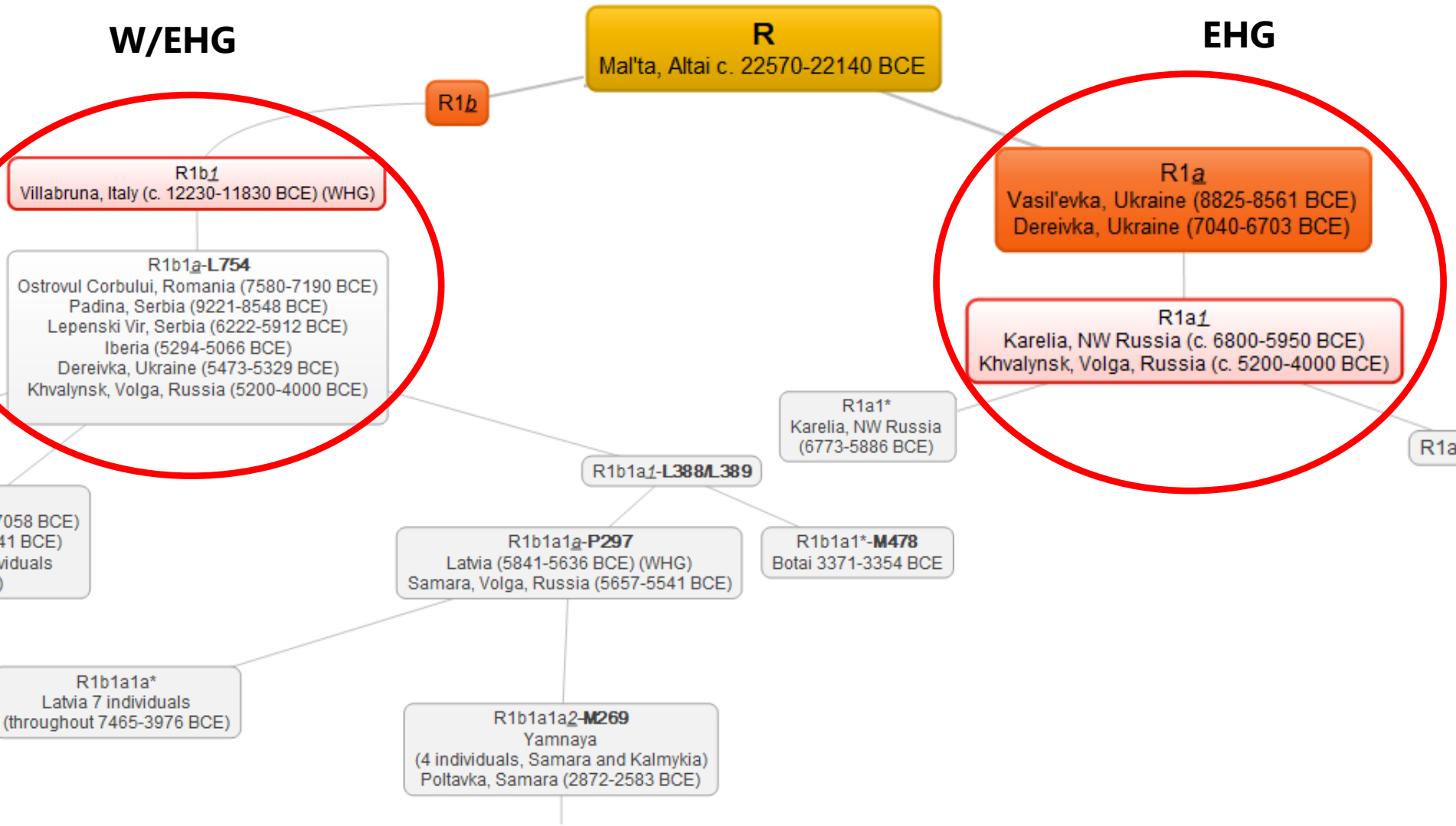
Genomics

Modern populations sampled around the world:

In Western Eurasia (and South Asia), **Y-haplogroups** **R1a** and **R1b** dominate.




R
Mal'ta, Altai c. 22570-22140 BCE
R1b
R1a
Vasil'evka, Ukraine (8825-8561 BCE)
Dereivka, Ukraine (7040-6703 BCE)
R1b1
Villabruna, Italy (c. 12230-11830 BCE) (WHG)
R1b1a-L754
Ostrovul Corbului, Romania (7580-7190 BCE)
Padina, Serbia (9221-8548 BCE)
Lepenski Vir, Serbia (6222-5912 BCE)
Iberia (5294-5066 BCE)
Dereivka, Ukraine (5473-5329 BCE)
Khvalynsk, Volga, Russia (5200-4000 BCE)
R1a1
Karelia, NW Russia (c. 6800-5950 BCE)
Khvalynsk, Volga, Russia (c. 5200-4000 BCE)
R1a1a-M512
R1b1a2-V88
WHG lineage surviving in Latvia (800-545 BCE)
and sporadically in modern Europe
R1ba1*
Vasil'evka, Ukraine (7446-7058 BCE)
Padina Serbia (6061-5841 BCE)
Dereivka Ukraine 3 individuals (5345-5003 BCE)
R1b1a1-L388/L389
R1a1*
Karelia, NW Russia (6773-5886 BCE)
R1a1a1-M417
Sredny Stog c. 4000 BCE
R1b1a1a-P297
Latvia (5841-5636 BCE) (WHG)
Samara, Volga, Russia (5657-5541 BCE)
R1b1a1*-M478
Botai 3371-3354 BCE
R-CTS4385 (>L664)
Estimated age c. 2700 BCE
N and W Europe
(YFull)
R1a1a1b-Z645
Estimated age c. 3000 BCE
(YFull)
Central and Eastern Europe/Baltic/Eastern Sweden Corded Ware
c. 3000-2100 BCE
(Mittnik et al. 2018)
R1b1a1a*
Latvia 7 individuals
(throughout 7465-3976 BCE)
R1b1a1a2-M269
Yamnaya
(4 individuals, Samara and Kalmykia)
Poltavka, Samara (2872-2583 BCE)
R1a1a1bf-Z283
Estimated age c. 2900 BCE
(YFull)
R1a1a1b2-Z93
Estimated age c. 2700 BCE
Balkan BA (1750-1625)
Srubnaya (1850-1600 BCE)
Turkmenistan_IA (911-799 BCE)
Widespread in South and Central Asia
R1b1a1a2a-L23
Yamnaya (Samara 3300-2700 BCE)
Okunevo_EMBA, Russia (2859-2350 BCE)
R1a1a1b1a-Z282
Estimated age c. 2900 BCE
(YFull)
R1a1a1b2a-Z94
Poltavka_outlier (Samara)
2925-2491 BCE
R1b1a1a2a1-L51
Bell Beaker (Germany, 2500-2000 BCE)
R1b1a1a2a2-Z2103
Yamnaya (Pre-Ural Kazakhstan)
Late Yamnaya (Dereivka)
Afanasievo, Altai (c. 3331-2500 BCE)
Hajji Firuz, NW Iran (uncertain date, perhaps c. 2400-2200 BCE?)
(http://eurogenes.blogspot.dk/2018/04/likely-yamnaya-incursions-into.html)
R1a1a1b1a1-M458 > R-PF7521 > R-Y2604
Estimated age c. 2700-2500 BCE
Common to Poland/Germany
and similar regions
(YFull, FamilyTreeDNA)
R1a1a1b1a2-Z280+
(Northeastern Europe)
Halberstadt_LBA, Saxony-Anhalt
(1193-979 BCE)
Estimated age c. 2600 BCE
Most common in Russia,
then Poland, then Ukraine
(YFull)
R1a1a1b2a-Z2124
R1a1a1b2a2a-Z2123
Srubnaya (1850-1650 BCE)
Scythians (Samara 375-203 BCE)
R1b1a1a2a1a-L151 (incl. L11)
Beaker Bavaria (2460-2210 BCE)
Beaker Poland (2290-2041 BCE)
Beaker Czech (2500-2000 BCE)
Beaker Switzerland (2469-1984 BCE)
Beaker Amesbury, South England (2455-2151 BCE)
Beaker France (2455-2134 BCE)
Beaker Spain (2500-2000 BCE)
Beaker Hungary (2500-2200 BCE)
England-Roman (50-350 CE)
R1b1a1a2a2c-Z2106
Late Yamnaya Stalingrad Quarry,
Russia (2857-2497 BCE)
R1a1a1b1a1a-L260+
Estimated age c. 500 BCE
Most common in Poland
and Eastern Europe
(YFull)
R1a1a1b1a1b-CTS11962+
Estimated age c. 1200 BCE
Most common in Poland
and generally in
Northeastern Europe
(YFull)
R1b1a1a2a1a1f-U106
Estimated age c. 2700 BCE
(YFull)
Lille Beddinge, South Sweden (2275-2032 BCE)
Oostwoud, Holland (1880-1657 BCE)
Roman-England (50-350 CE)
R1b1a1a2a1a~
Proto-Nagyrév (ID: I7043),
Hungary BA 2500-2200 BCE
R1b1a1a2a1a2-P312
Beaker Osterhofen-Altenmarkt, Germany (2572-2512 BCE)
Beaker Oostwoud, Holland (2579-2233 BCE)
Beaker Brandýšek, Czech (2500-2200 BCE)
Beaker France (2468-2278 BCE)
Beaker Amesbury, Great Britain (2204-2035 BCE)
Beaker Spain (2280-1984 BCE)
Beaker Parma, Italy (2194-1939 BCE)
(mostly in Netherlands (n=6) and Great Britain (n=10))
R1b1a1a2a1c-Z2103/Z2105/CTS1843
Yamnaya Karagash, Kazakhstan
(3018-2887 BCE)
Beaker Hungary (2500-2200 BCE)
R-Y2395 (N Scandinavia)
Estimated age c. 2700 BCE
(YFull)
R1a1a1b1a3-Z284
Estimated age c. 2300 BCE
Most common in Sweden
and then Norway
(YFull)
R1a1a1b1a2a-Z92+
Estimated age after c. 2600 BCE
Most common in Russia,
then Poland, Ukraine, Finland
(YFull)
R1b1a1a2a1a1c-S263/Z381
Estimated age c. 2700 BCE
(YFull)
R-Z19
Estimated age
c. 1800 BCE
(YFull)
R1a1a1b1a2b-CTS1211
Estimated age c. 2400 BCE
(YFull)
R1b1a1a2a1a2c-Z290 (Great Britain only)
Beaker Amesbury , South England (2500-2140) BCE,
Dorset, South England (2469-2296 BCE)
Beaker Fife, Scotland (2034-1775 BCE)
Beaker Rathlin Island, Ireland (1736-1534 BCE)
Hinxton Iron Age (160 BCE-26 CE)
R1b1a1a2a1a2b-U152
Estimated age c. 2500 BCE
(YFull)
Common in modern Italy and UK
(Italo-Celtic?)
R-S499+
Estimated age c. 2700 BCE
(YFull)
R-YP343
Estimated age c. 1700 BCE
(YFull)
R-YP1034
Estimated age c. 2000 BCE
(YFull)
R-Y35
Estimated age c. 2200 BCE
(YFull)
R-YP340
Estimated age c. 1100 BCE
(YFull)
R1b1a1a2a1a1c1f-S264/Z156
Estimated age c. 2400 BCE
(YFull)
England-Roman (50-350 CE)
R1b1a1a2a1a2b1-L2
Estimated age c. 2400 BCE
(YFull)
Common in modern Italy and UK
(Italo-Celtic?)
Ancient finds:
Beaker Budapest, Hungary (n=1, 2464-2207 BCE)
Beaker Brandýšek Czech (n=24, 2500-2200 BCE)
Bavaria, Germany (n=8, 2300-2150 BCE
Beaker France (n=1, 2133-1946 BCE)
Beaker Poland (n=2, 2455-2145 BCE)
R1b1a1a2a1a2c2
Roman-England (50-350 CE)
R1b1a1a2a1a2cf-L21 (Great Britain only, n=12)
Wiltshire, South England (2500-1800 BCE)
West Deeping, South England (2288-2040 BCE)
East Lothian, Scotland (2286-2038 BCE)
Rathlin Island, Ireland (2026-1885 BCE)
R1a1a1b1a2b1-P278.2
Estimated age c. 200 BCE
Perhaps in Krasnoyarsk_MLBA in Russia (1900-1400 BCE) but
awaiting confirmation
Most common in
Russia, Poland and Belarus
(YFull)
R1b1a1a2a1a1c1a-S497/Z306
Estimated age c. 2200 BCE
sporadic in modern N and W Europe
(YFull)
ancient:
Unetice (early phase), Czech Republic
(2200-1700 BCE)
England-Roman (50-350 CE)
R1b1a1a2a1a2c1e2b3-Z2185 (Great Britain only)
Cambridgeshire, England (1430-1282 BCE)
R1b1a1a2a1a2c1g-Z30233 -
(Great Britain only)
Rathlin Island, Ireland
(2026-1885 BCE)
R1b1a1a2a1a2c1e2b3a1-CTS1202.1 (Z2186 on YFull.com)
(Great Britain only)
East Lothian, Scotland (1500-1300 BCE)
R1b1a1a2a1a2c1g2a1a
Hinxton Iron Age 170 BCE-80 CE


W/EHG
EHG
R
Mal'ta, Altai c. 22570-22140 BCE
R1b
R1b1
Villabruna, Italy (c. 12230-11830 BCE) (WHG)
R1b1a-L754
Ostrovul Corbului, Romania (7580-7190 BCE)
Padina, Serbia (9221-8548 BCE)
Lepenski Vir, Serbia (6222-5912 BCE)
Iberia (5294-5066 BCE)
Dereivka, Ukraine (5473-5329 BCE)
Khvalynsk, Volga, Russia (5200-4000 BCE)
R1a
Vasil'evka, Ukraine (8825-8561 BCE)
Dereivka, Ukraine (7040-6703 BCE)
R1a1
Karelia, NW Russia (c. 6800-5950 BCE)
Khvalynsk, Volga, Russia (c. 5200-4000 BCE)
R1a1*
Karelia, NW Russia
(6773-5886 BCE)
R1b1a1-L388/L389
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Latvia (5841-5636 BCE) (WHG)
Samara, Volga, Russia (5657-5541 BCE)
R1b1a1*-M478
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R1b1a1a*
Latvia 7 individuals
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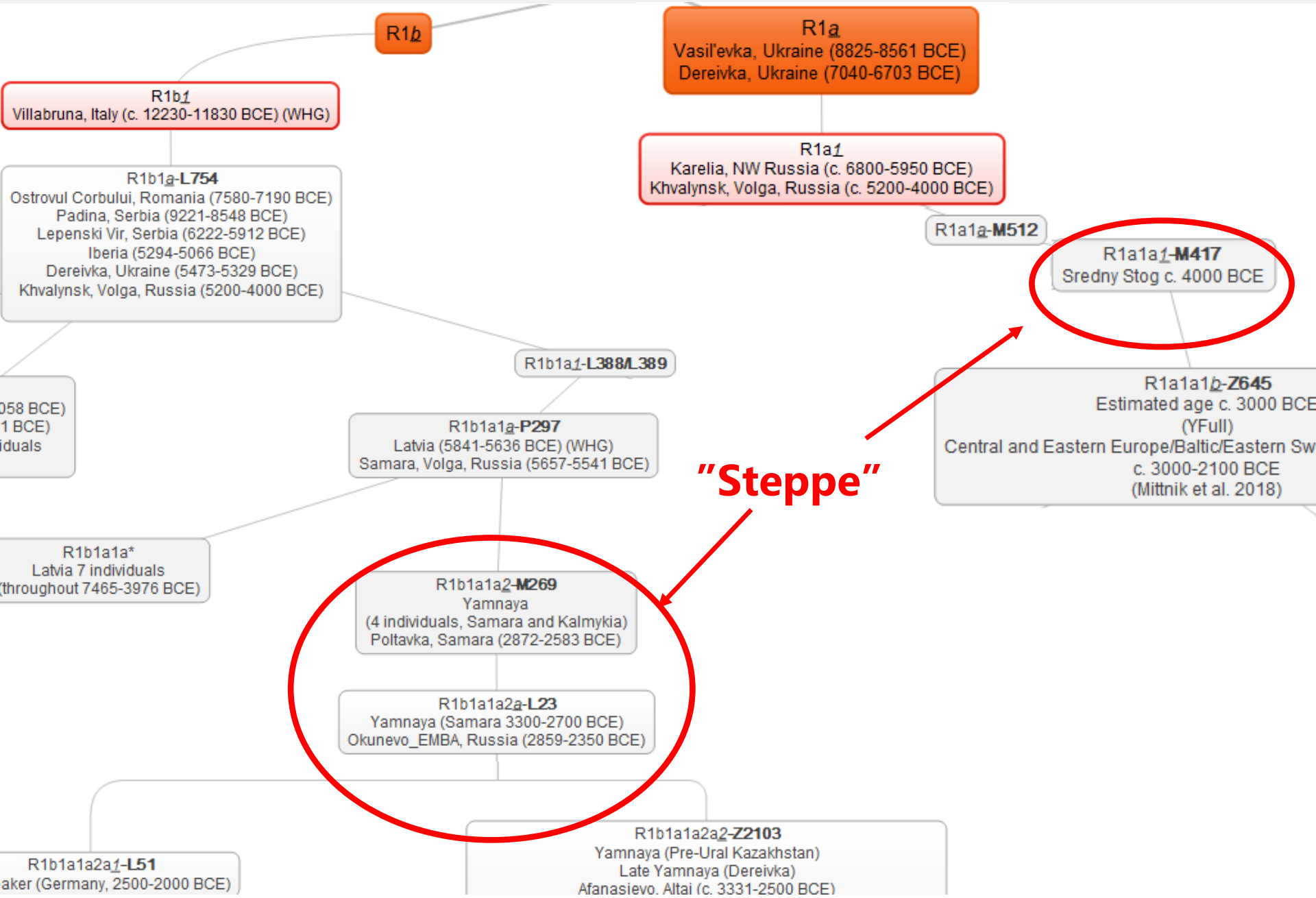
R1b1a1a2-M269
Yamnaya
(4 individuals, Samara and Kalmykia)
Poltavka, Samara (2872-2583 BCE)


R1b
R1a
Vasil'evka, Ukraine (8825-8561 BCE)
Dereivka, Ukraine (7040-6703 BCE)
R1b1
Villabruna, Italy (c. 12230-11830 BCE) (WHG)
R1a1
Karelia, NW Russia (c. 6800-5950 BCE)
Khvalynsk, Volga, Russia (c. 5200-4000 BCE)
R1b1a-L754
Ostrovul Corbului, Romania (7580-7190 BCE)
Padina, Serbia (9221-8548 BCE)
Lepenski Vir, Serbia (6222-5912 BCE)
Iberia (5294-5066 BCE)
Dereivka, Ukraine (5473-5329 BCE)
Khvalynsk, Volga, Russia (5200-4000 BCE)
R1a1a-M512
R1a1a1-M417
Sredny Stog c. 4000 BCE
R1b1a1-L388/L389
R1a1a1b-Z645
Estimated age c. 3000 BCE
(YFull)
Central and Eastern Europe/Baltic/Eastern Sw
c. 3000-2100 BCE
(Mittnik et al. 2018)
058 BCE)
1 BCE)
iduals
R1b1a1a-P297
Latvia (5841-5636 BCE) (WHG)
Samara, Volga, Russia (5657-5541 BCE)
"Steppe"
R1b1a1a*
Latvia 7 individuals
(throughout 7465-3976 BCE)
R1b1a1a2-M269
Yamnaya
(4 individuals, Samara and Kalmykia)
Poltavka, Samara (2872-2583 BCE)
R1b1a1a2a-L23
Yamnaya (Samara 3300-2700 BCE)
Okunevo_EMBA, Russia (2859-2350 BCE)
R1b1a1a2a2-Z2103
Yamnaya (Pre-Ural Kazakhstan)
Late Yamnaya (Dereivka)
Afanasievo, Altai (c. 3331-2500 BCE)
R1b1a1a2a1-L51
aker (Germany, 2500-2000 BCE)

The "Steppe"-lineages

Two Y-haplogroup markers in the steppes following migrations both east and west

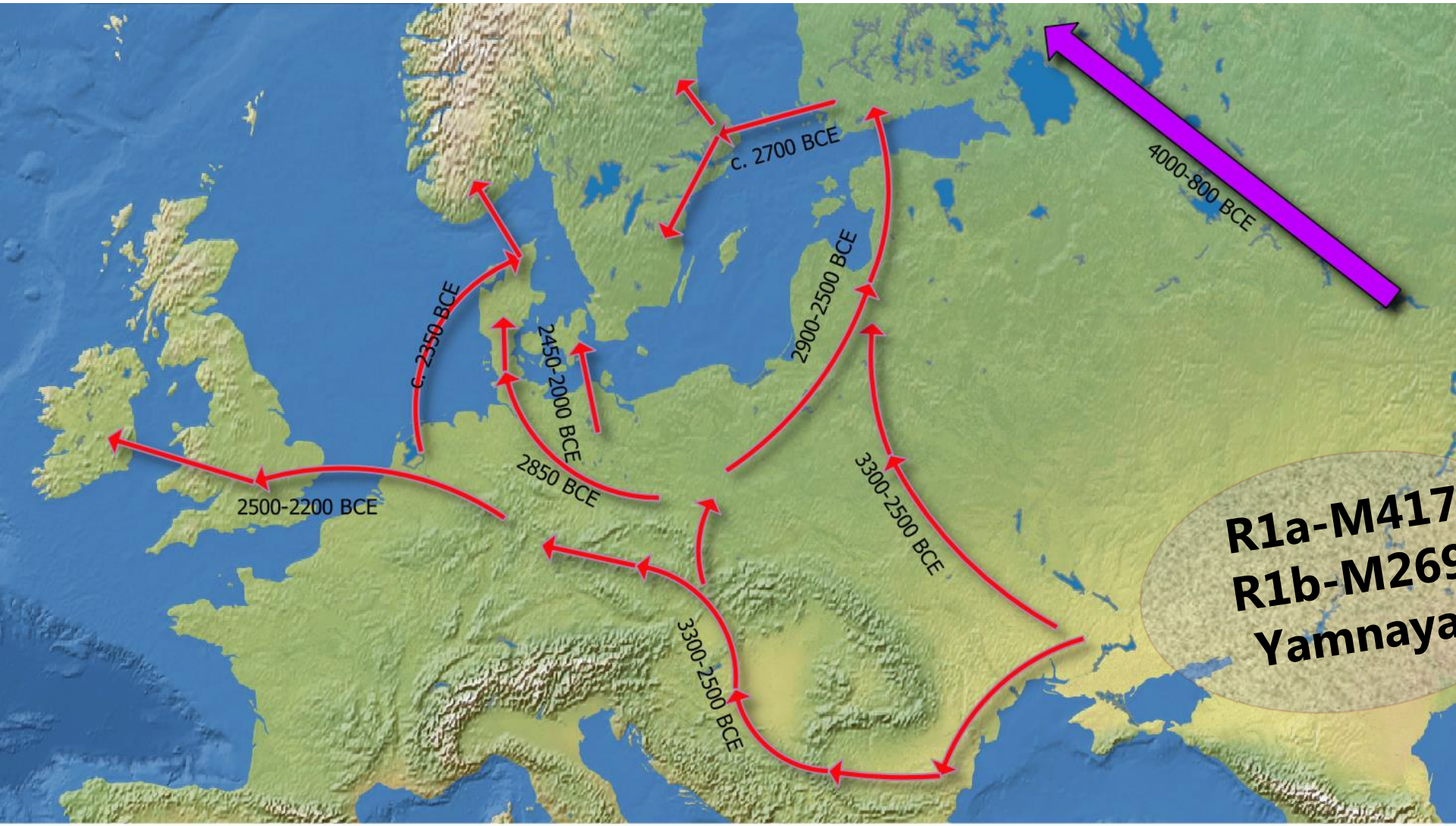
- R1b1a1a2 (**M269**)
- R1a1a1 (**M417**)
- both start in the steppes (so far)

R1b-M269:
Yamnaya
(**3300-2800 BCE**):
- Samara (North)
- Kalmykia (South)

R1a-M417:
Sredny Stog culture
(**pre-Yamnaya** c. **4000 BCE**)

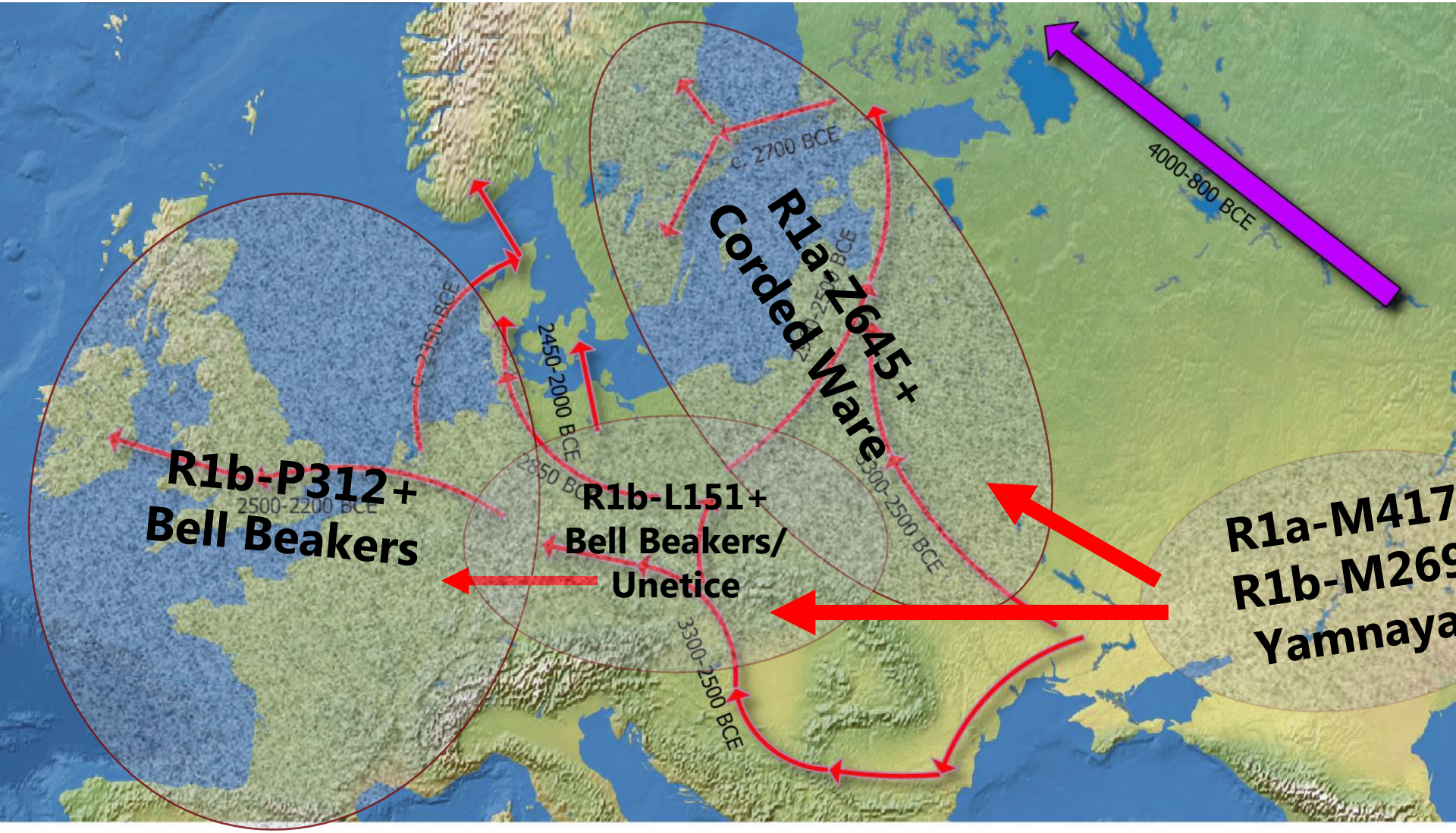
Genomics and dispersals – West

Farmer and Hunter-Gatherer ancestry + Steppe ancestry **3000-2500** BCE

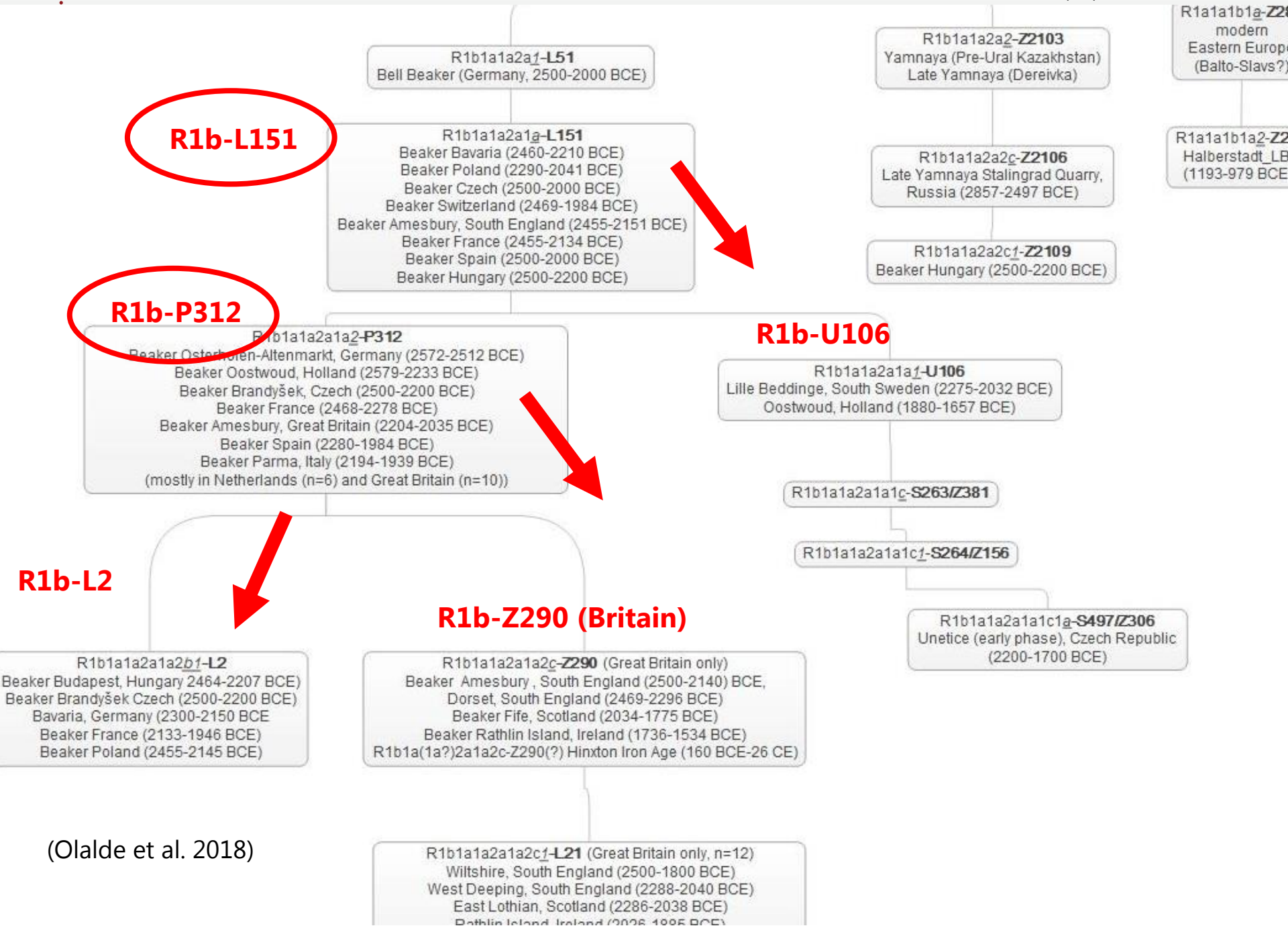


Genomics and dispersals – West

Farmer and Hunter-Gatherer ancestry + Steppe ancestry **2500-2000** BCE



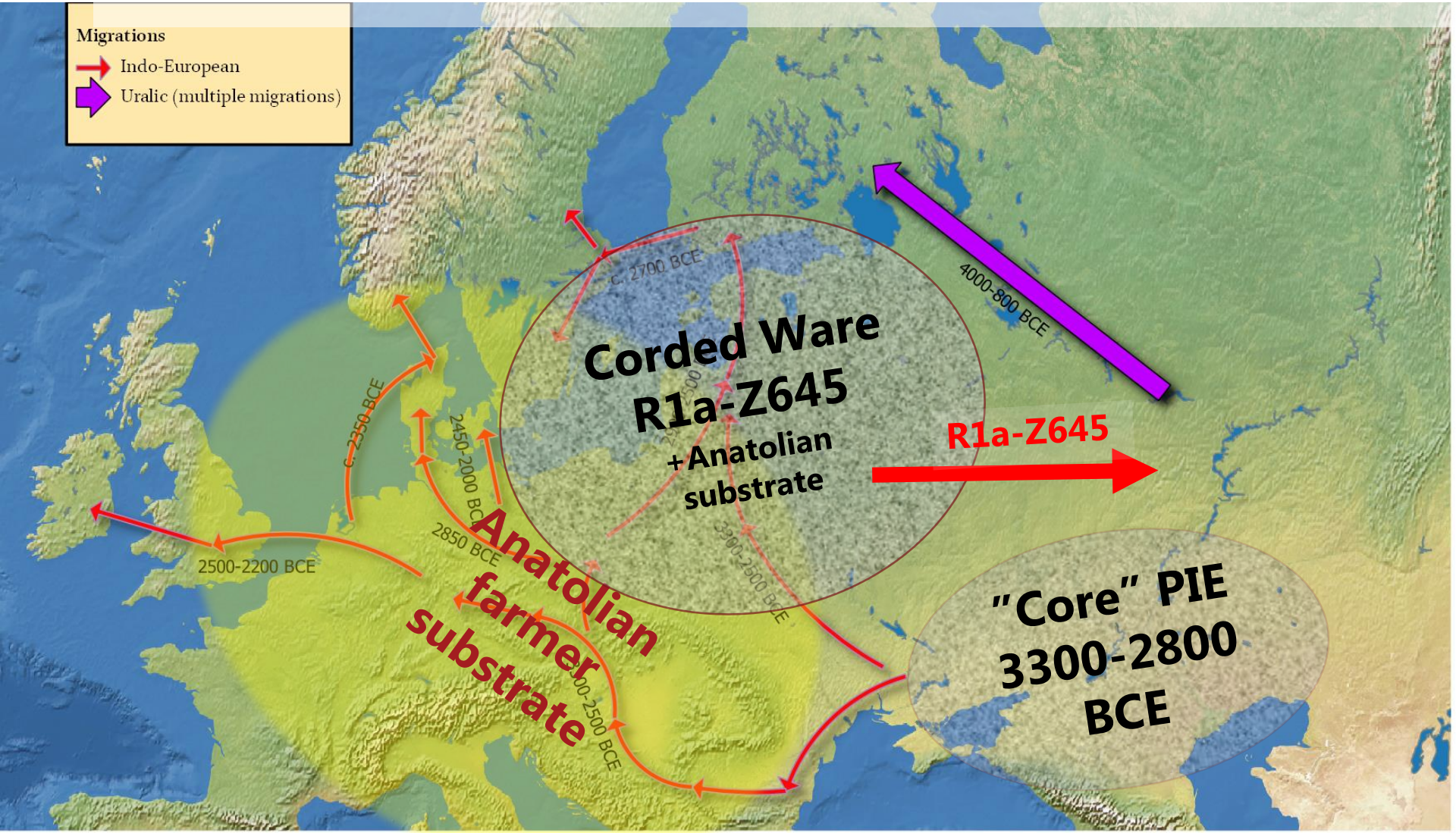
Mikkel Nørtoft 2018



(Olalde et al. 2018)

Dispersals from Europe – Corded Ware goes east!

Farmer and Hunter-Gatherer ancestry + (CW) Steppe ancestry **2800-2500** BCE



Mikkel Nørtoft 2018

Dispersals from Europe – East

Anthony 2007 and Parpola 2012:

2800-2200 BCE
The road to Sintashta (Indo-Iranian)
With European farmer substrate from Corded Ware

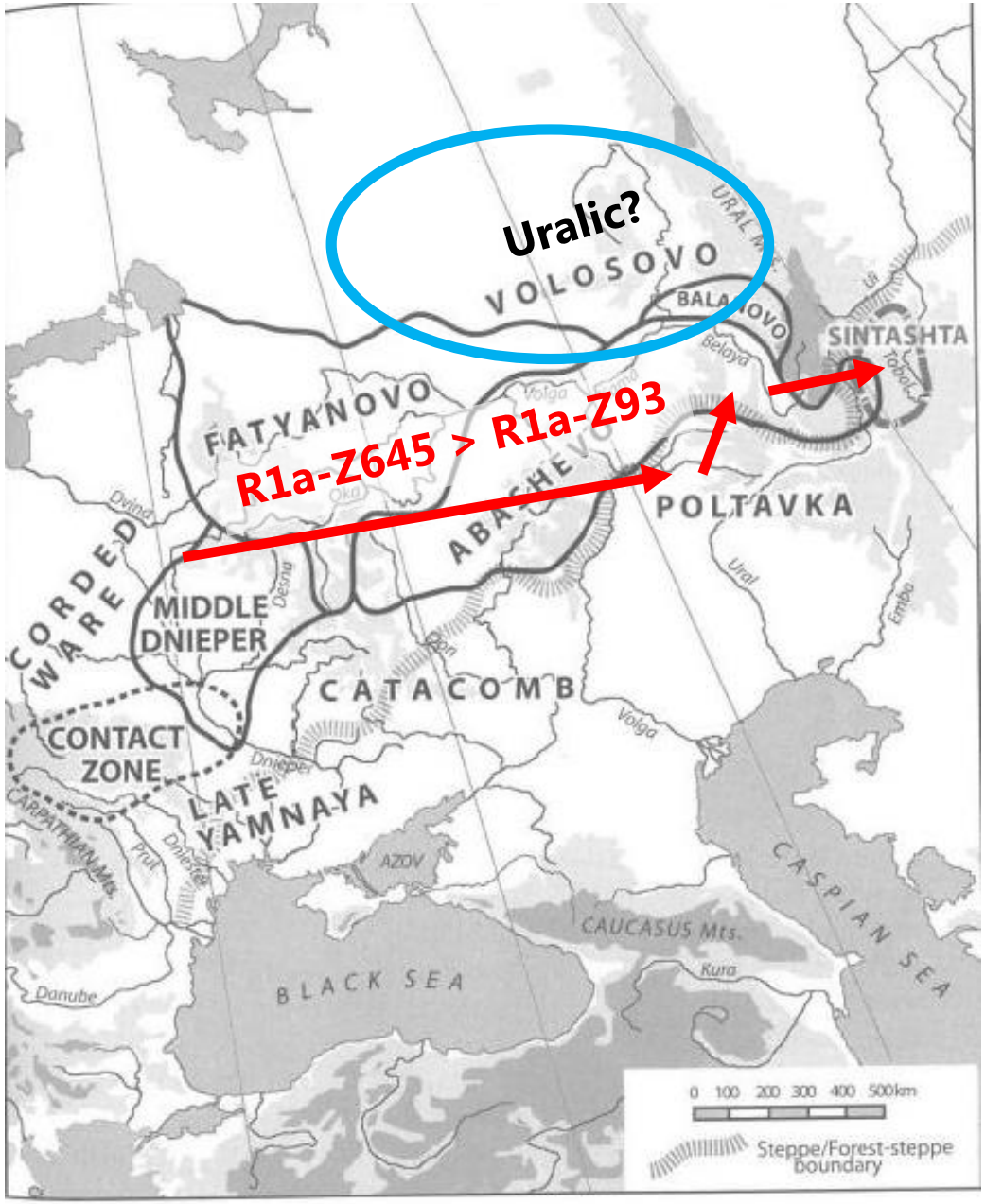
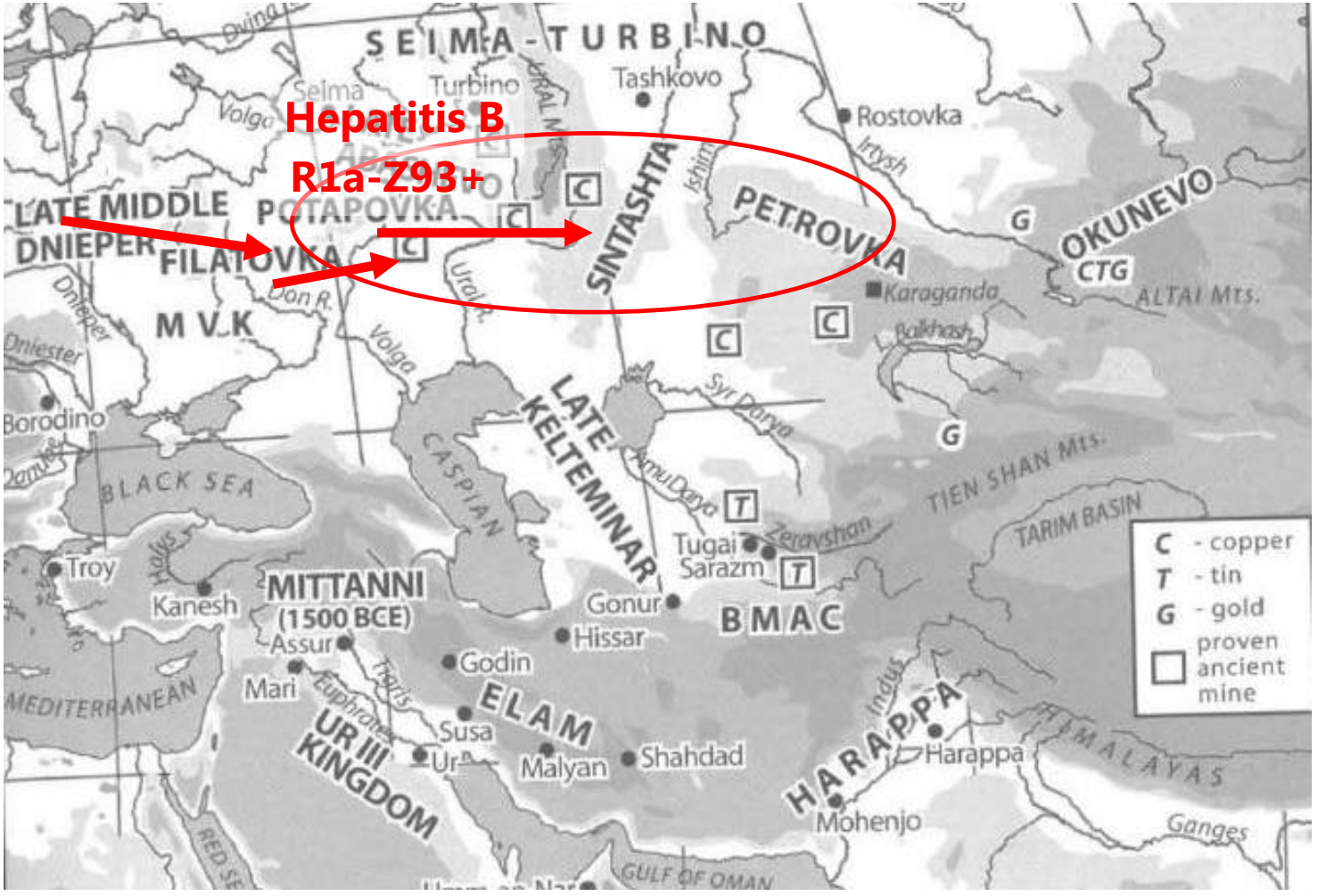


Figure 15.5 Culture groups of the Middle Bronze Age, 2800–2200 BCE.

Anthony 2007

Dispersals from Europe – East

Anthony 2007; Kuz'mina 1994 (2007) and Mallory 1989:
2200-1800 BCE (Indo-Iranian) **R1a-Z93**



Anthony 2007

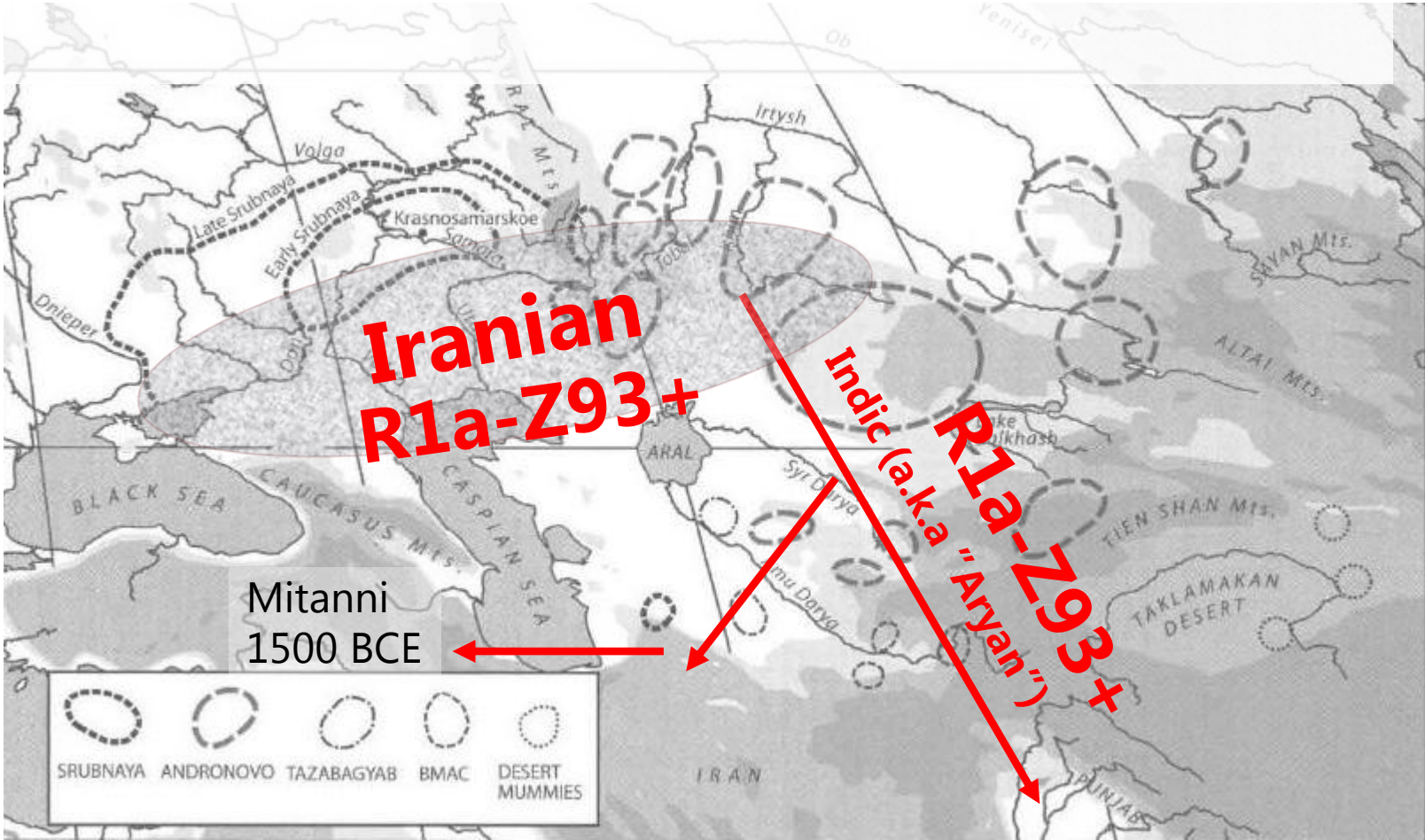
Dispersals from Europe – East

The road to India

From c. **1500 BCE** (**Indic**):

R1a-Z93+ is frequent in **North Indians** (especially **brahmin priestly class**)

Narasimhan et al. 2018



Anthony 2007

The Homeland Timeline Map

Features:

- everything interactive (zoomable and clickable)
- fluent time line: 8200-1 BCE
- 33 finds/indications of the earliest wheels
- 666 finds/indications of early wool
- 1768 ancient individuals sampled for aDNA (genome-wide) coloured by basal ancestry clusters (+ "Steppe")
- c. 120 archaeological cultures (mostly coloured according to DNA finds)
- 263 individuals with highlighted R1-lineages (shown by SNP-number) (+ R1 haplogroup tree)
- river and lake names (from "Natural Earth")
- 24 Indo-European language labels (shown as language branches)
- hundreds of links and references

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The Homeland Timeline Map

Strengths:

- more overview of complex data
- more accessible understanding of different disciplines to the public (and scholars)
- common ground for cross-disciplinary discussions on related topics (often neglected in the past)

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- more overview of complex data
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Weaknesses:

- simplification of complex data does not show "the whole truth" (e.g. the aDNA monocolours (but then read the individual pop-up comments and the cited publications)
- lack/abundance of data in different areas due to preservation or unstudied regions can skew the actual picture
  - e.g. lack of DNA in France, Italy, Scandinavia
  - abundance of wool in Denmark but few wool finds in the rest of Europe can be misunderstood as only Denmark producing wool (when it is probably opposite, cf. Frei et al. 2017)
- much important data (especially archaeological) missing
  (but the map is continuously updated)

The Homeland Timeline Map

We have tried to describe the pitfalls in the description below the map

Overall, we think the strengths of laying a common ground to help cross-disciplinary work outweighs the weaknesses of this kind of data visualisation

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Overall, we think the strengths of laying a common ground to help cross-disciplinary work outweighs the weaknesses of this kind of data visualisation

Thank you

☺

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