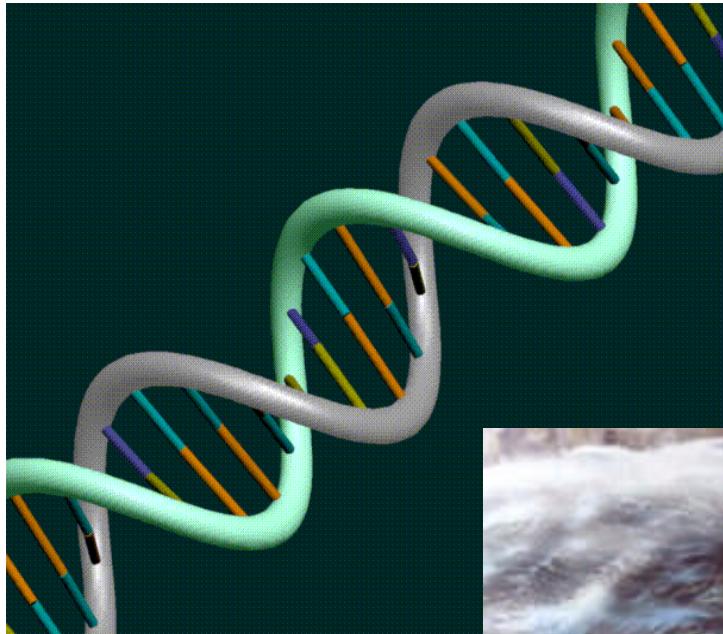
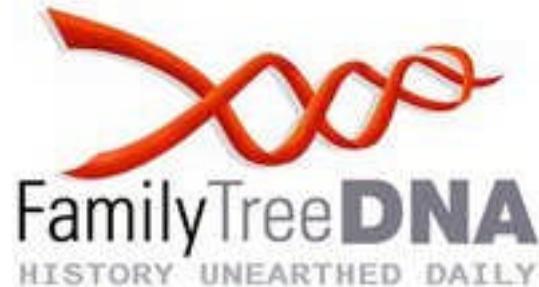


DNA Detectives

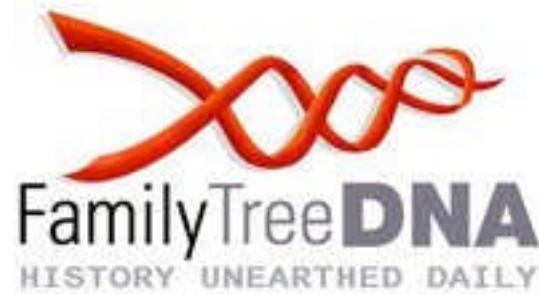


Prof. Steve Harding, University of Nottingham
U3A East Leake, 9 December 2013

Commercial DNA testers



Commercial DNA testers





08/06/2010 21:59



Mark Jobling
Turi King



08/06/2010 21:59

Haugesund, Norway

Mark Jobling
Turi King



08/06/2010 21:59

Scandinavian settlements in England & Wales

Grey shading means a high density of Scandinavian place-names

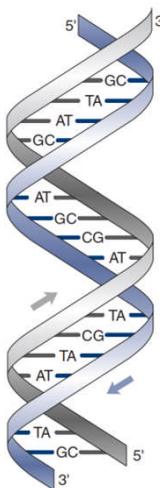


J.D. Richards, 2005

Viking genes in Northern England project

◆ Part 1 - Wirral and West Lancashire (2002-2008)

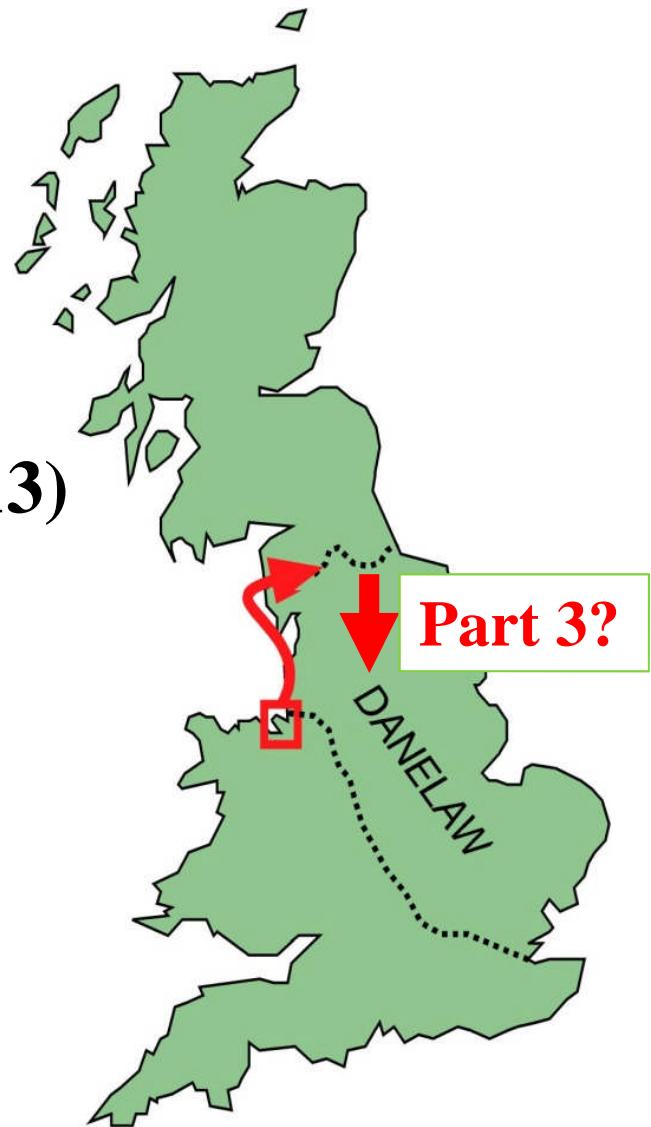
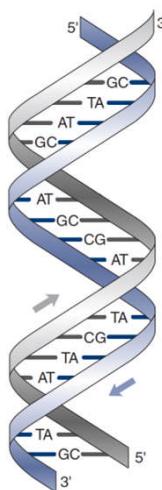
◆ Part 2 - North Lancashire, Cumbria and N. Yorks (2009-2013)



Viking genes in Northern England project

◆ Part 1 - Wirral and West Lancashire (2002-2008)

◆ Part 2 - North Lancashire, Cumbria and N. Yorks (2009-2013)



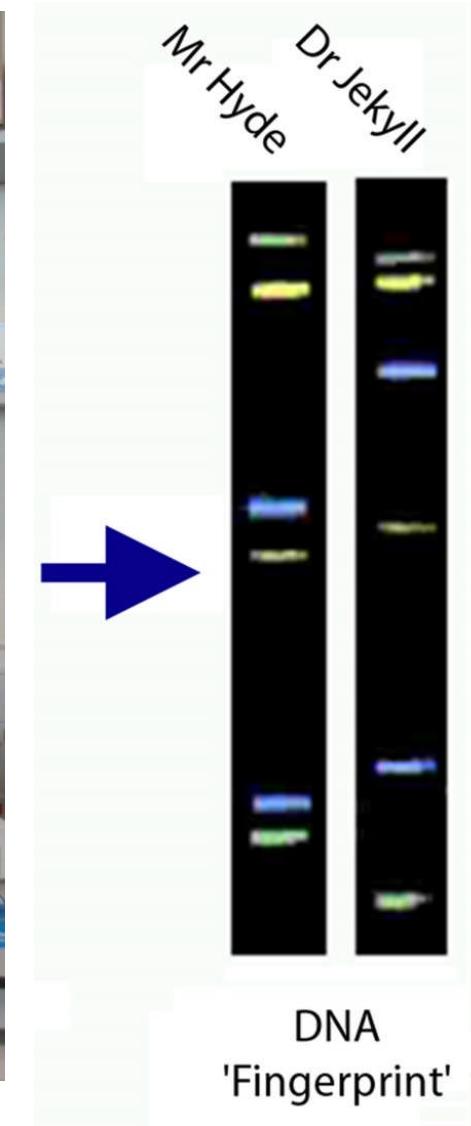
What happens to your sample?



What happens to your sample?

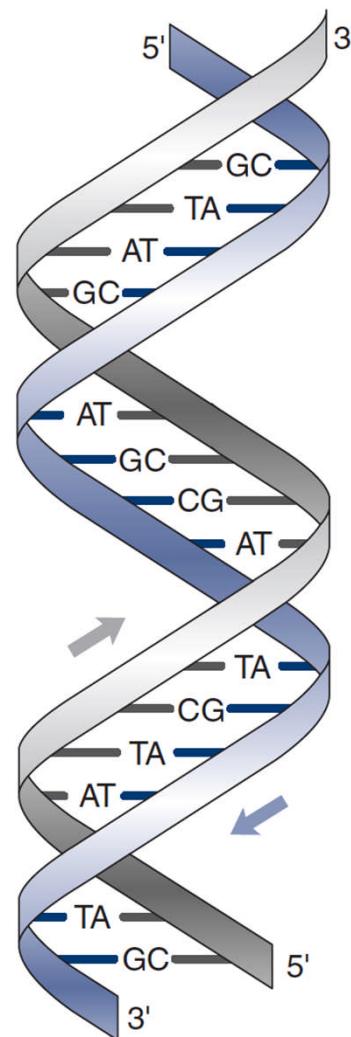


What happens to your sample?



DNA
'Fingerprint'

DNA – Message from our Ancestors



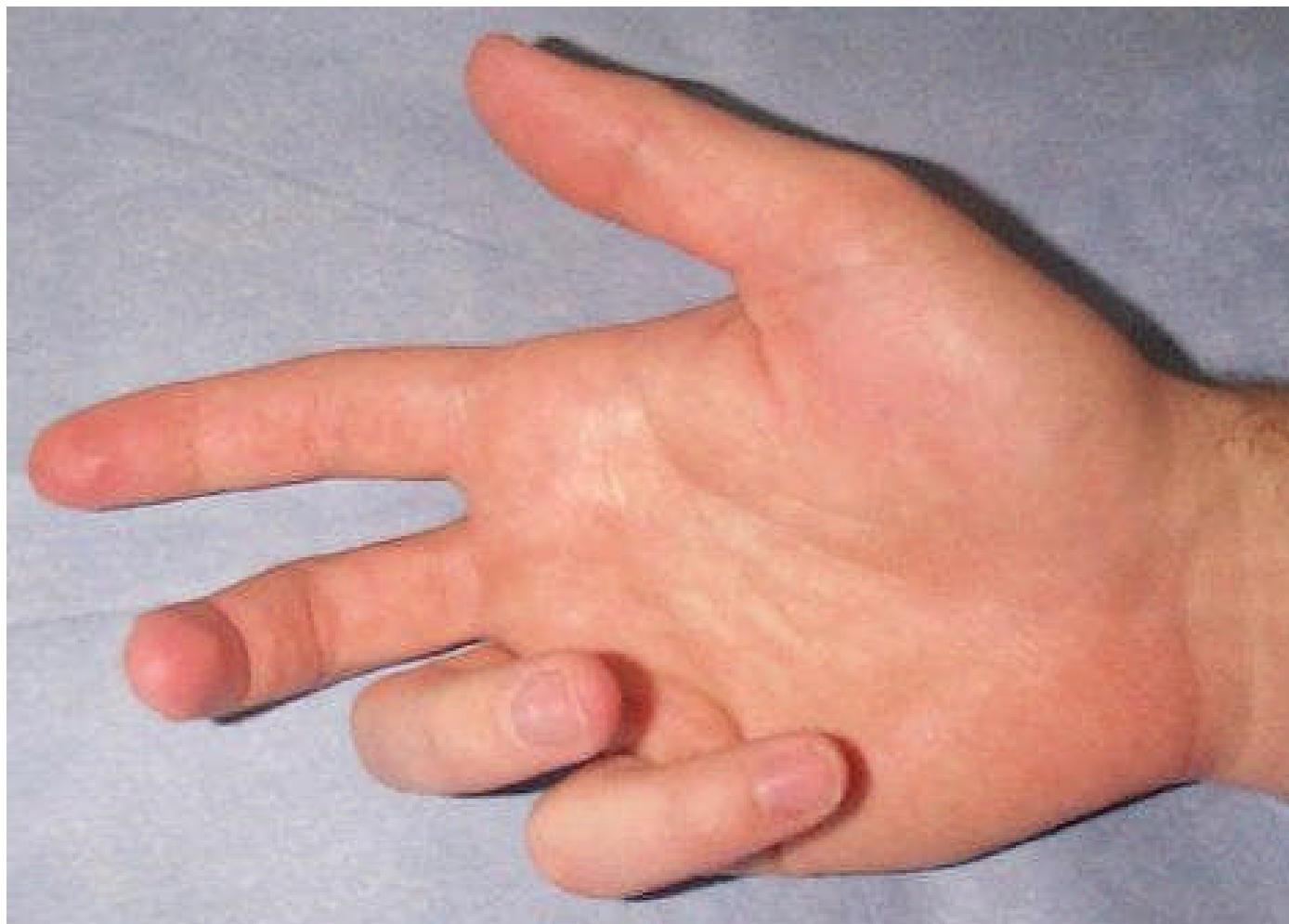
Genetics of Physical Characteristics



Genetics of Physical Characteristics



Dupuytren's contracture

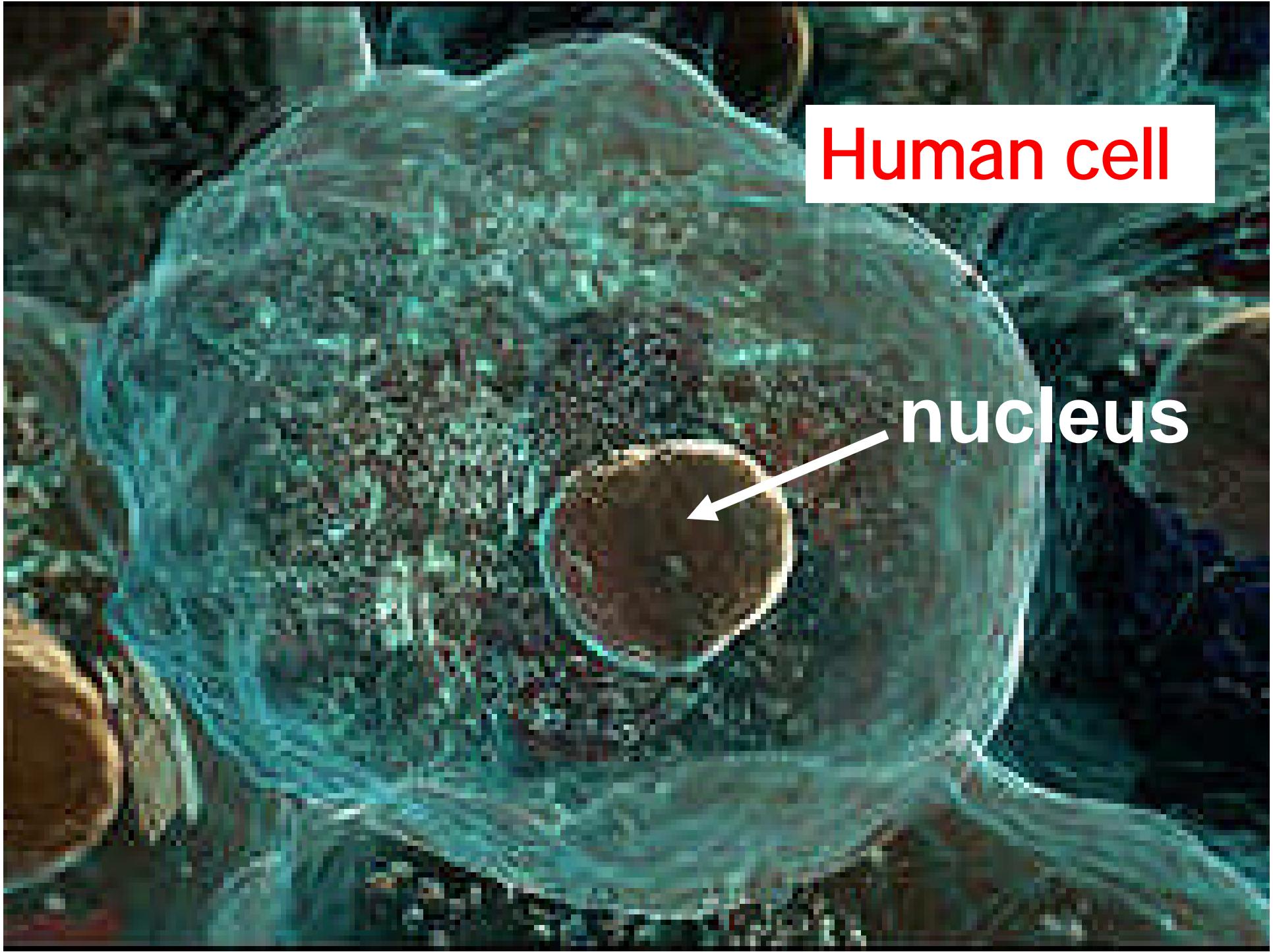


Or can we examine the DNA directly
on our chromosomes?



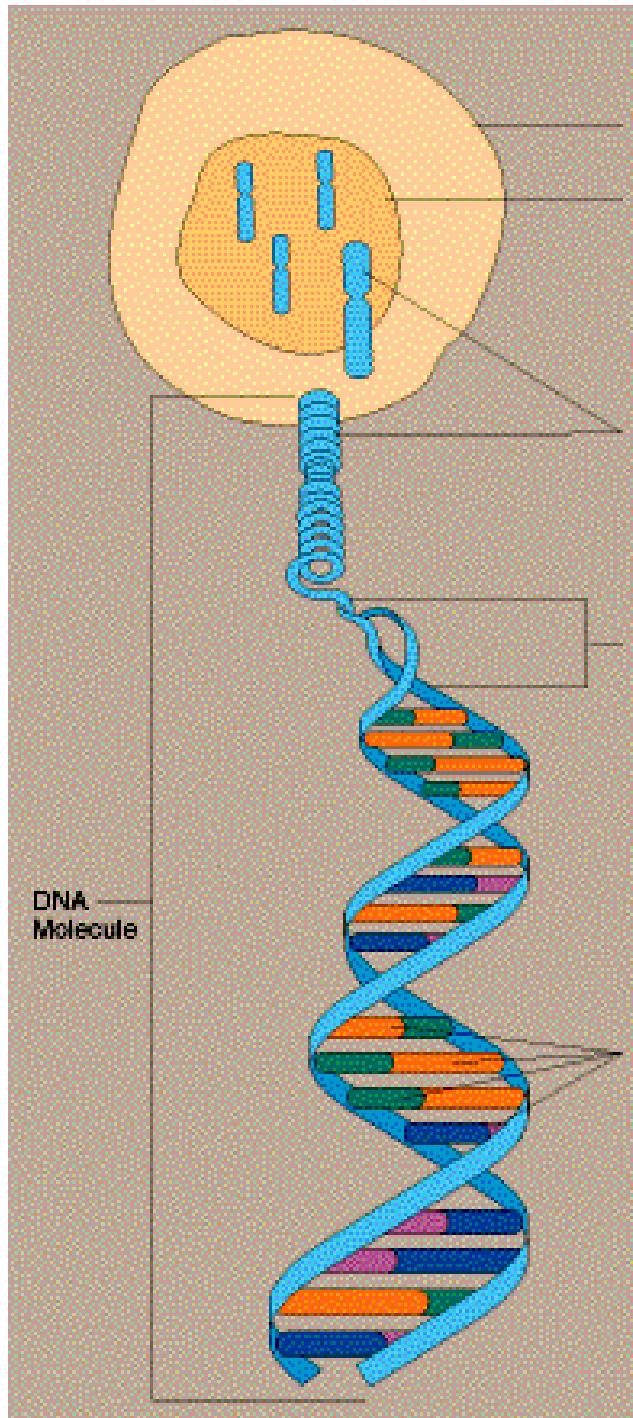
Or can we examine the DNA directly
on our chromosomes?





Human cell

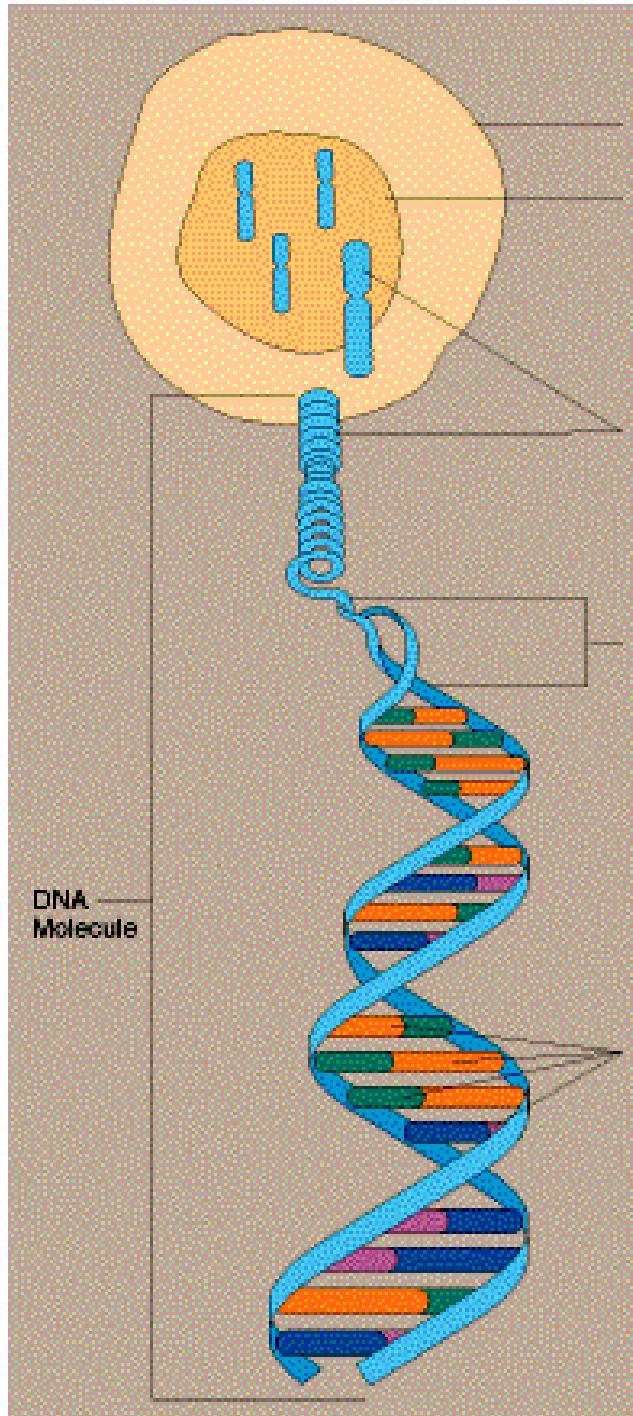
nucleus



Cell Nucleus

Chromosomes

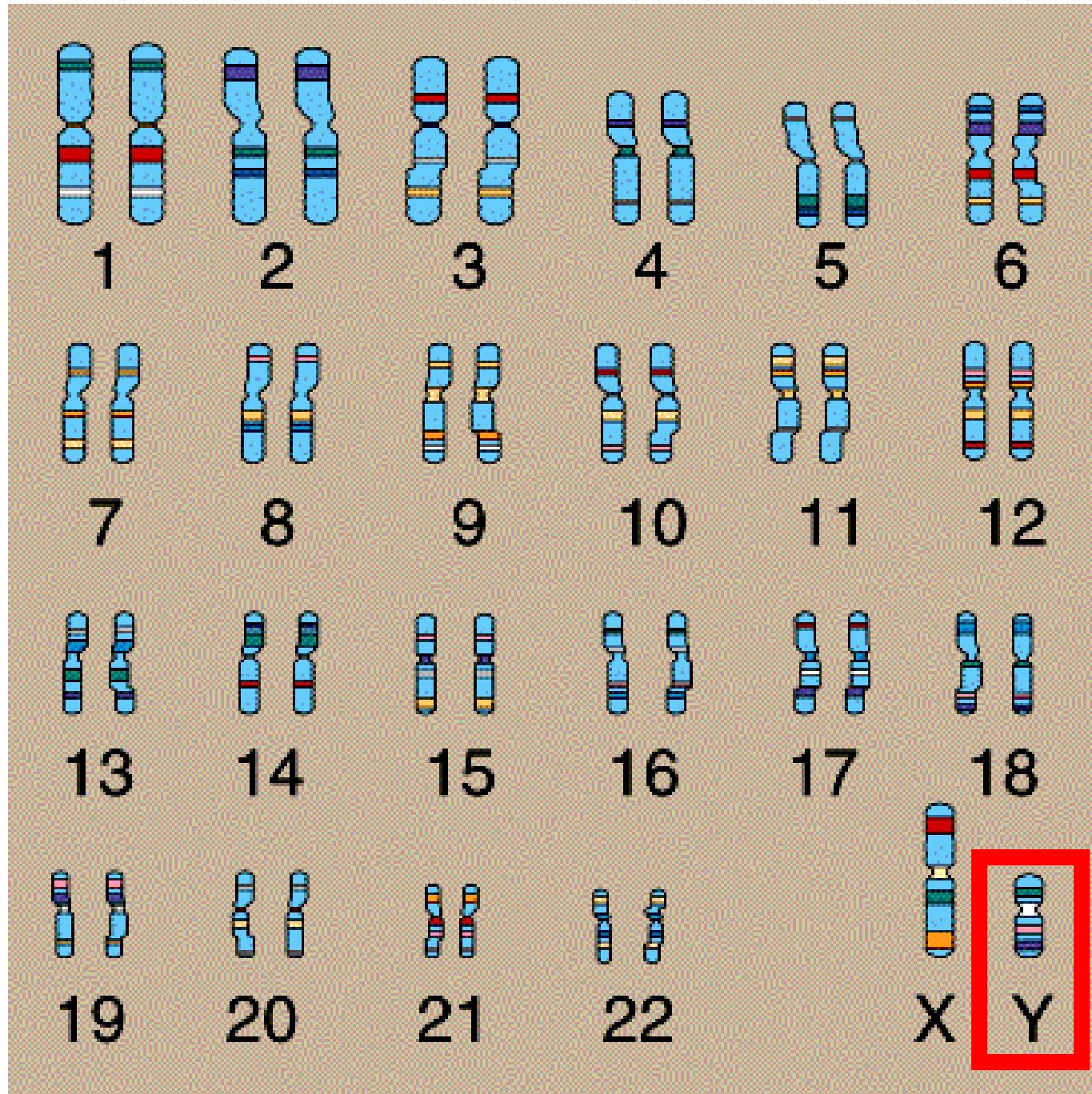
DNA



**Cell
Nucleus**

**Chromosomes
(23 pairs in humans)**

DNA



**Male Y-
chromosome**

Human cell

mitochondrion



nucleus



Human cell

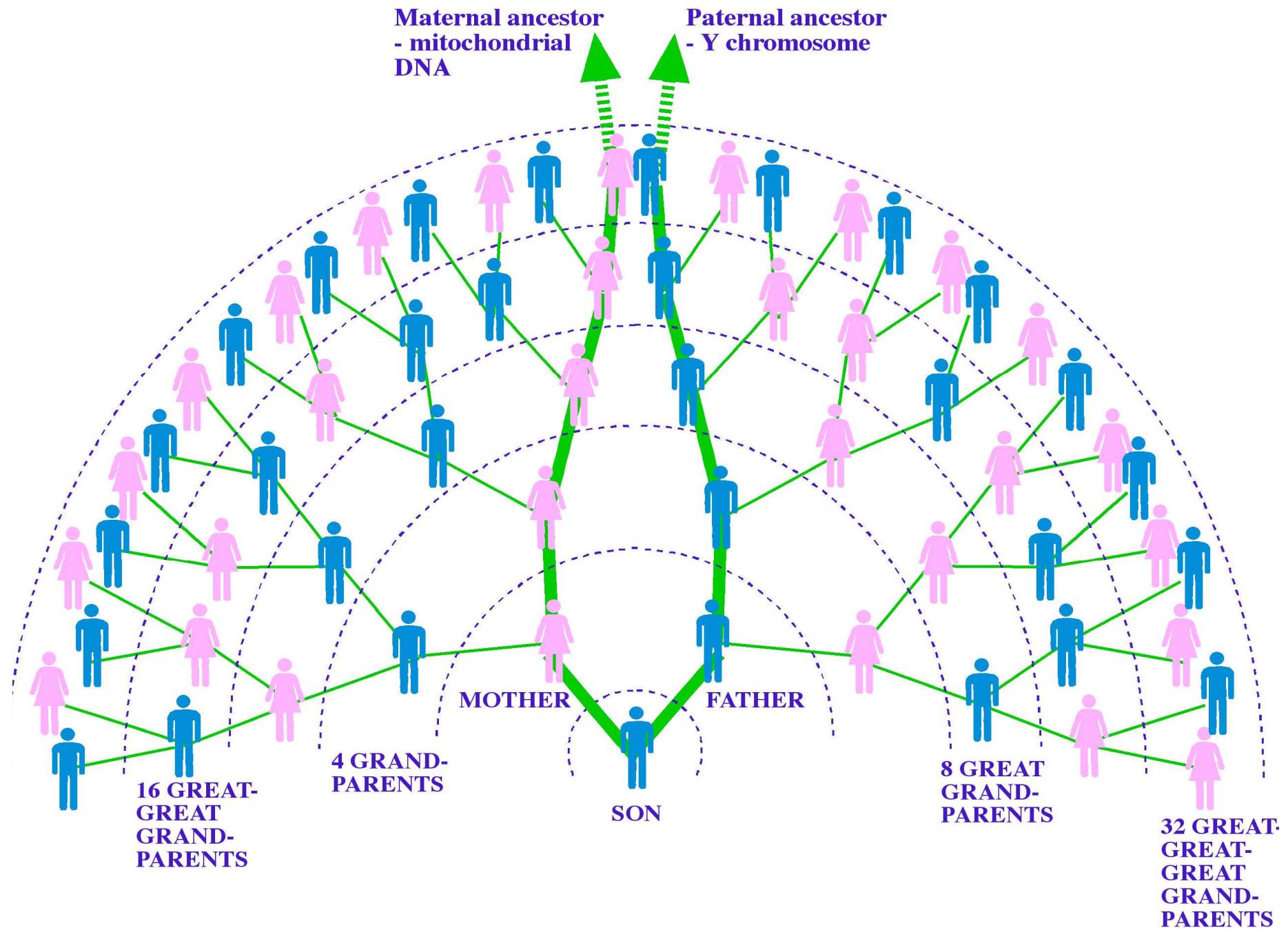
mitochondrion



nucleus



Maternally
inherited DNA



The Hardings







for men we look for 2 types of variations in Y-DNA

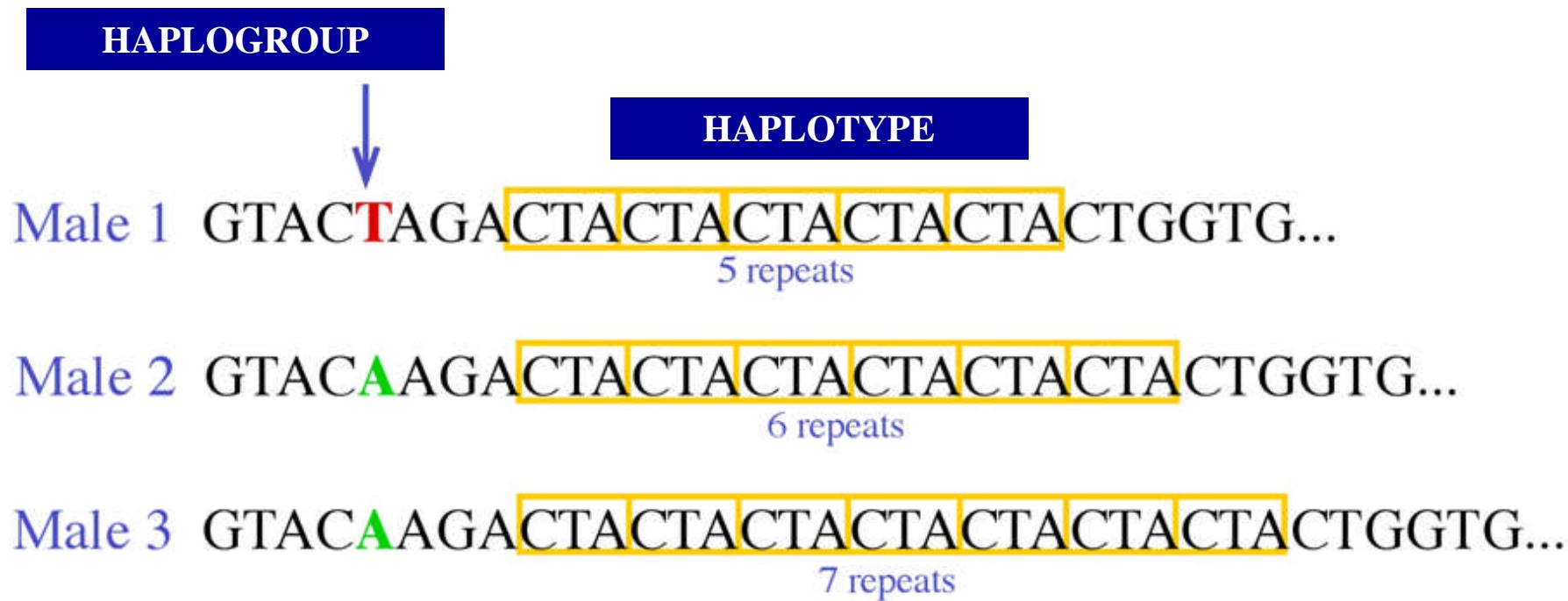


Male 1 GTACTAGACTACTACTACTACTACTACTGGTG...
5 repeats

Male 2 GTACAAGACTACTACTACTACTACTACTGGTG...
6 repeats

Male 3 GTACAAGACTACTACTACTACTACTACTGGTG...
7 repeats

for men we look for 2 types of variations in Y-DNA



Results from a man's Y-chromosome test

HAPLOGROUP

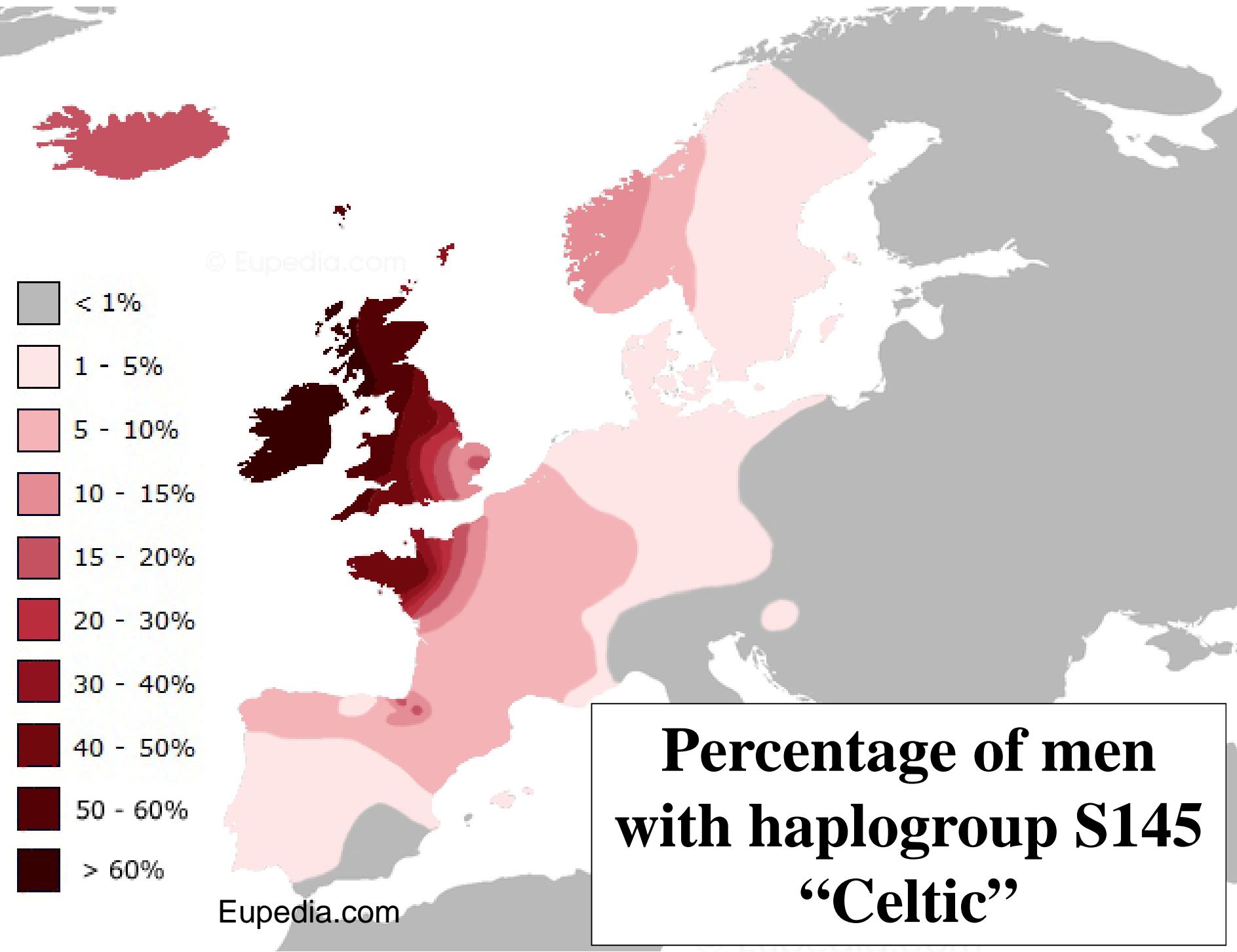
A BC DE F* G H I J K* R1* R1a R1b

HAPLOTYPE

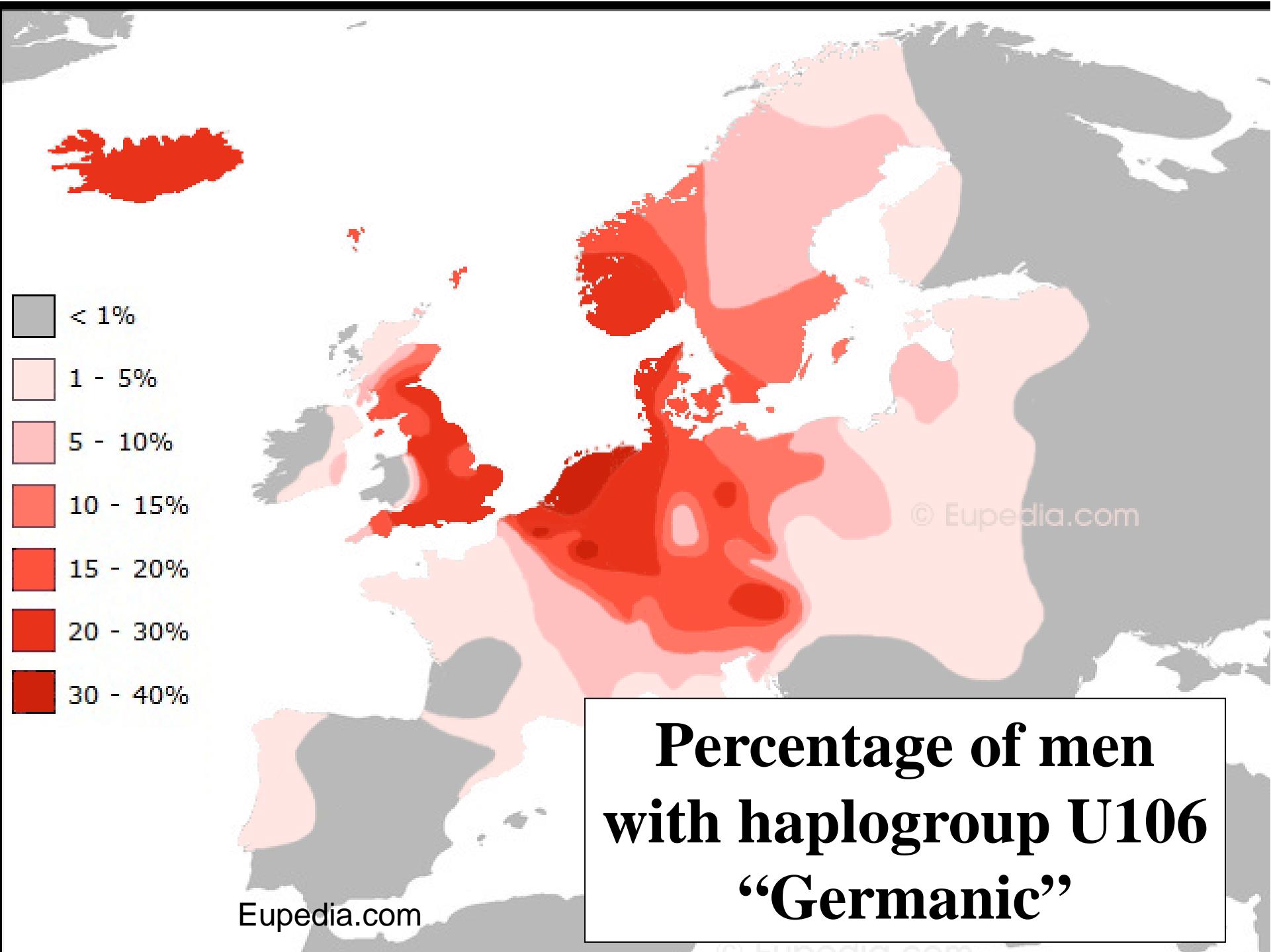
DYS436 12
DYS437 14
DYS438 10
DYS434 12
DYS435 11
DYS439 12

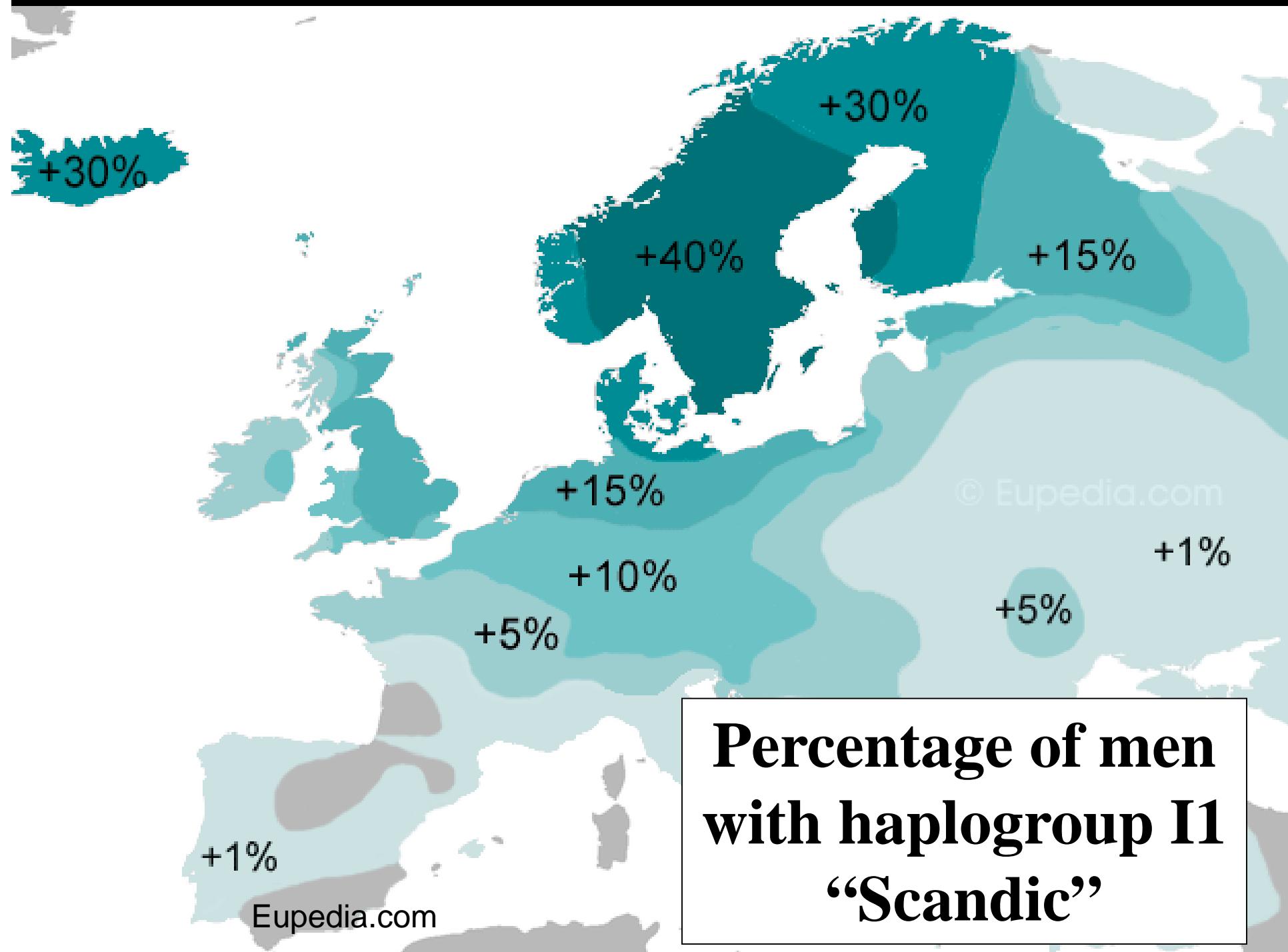
DYS391 10
DYS390 23
DYS393 13
DYS392 11
DYS398 15
DYS19 15

DYS389I 14
DYS389II 30
461 12
462 12
460 10



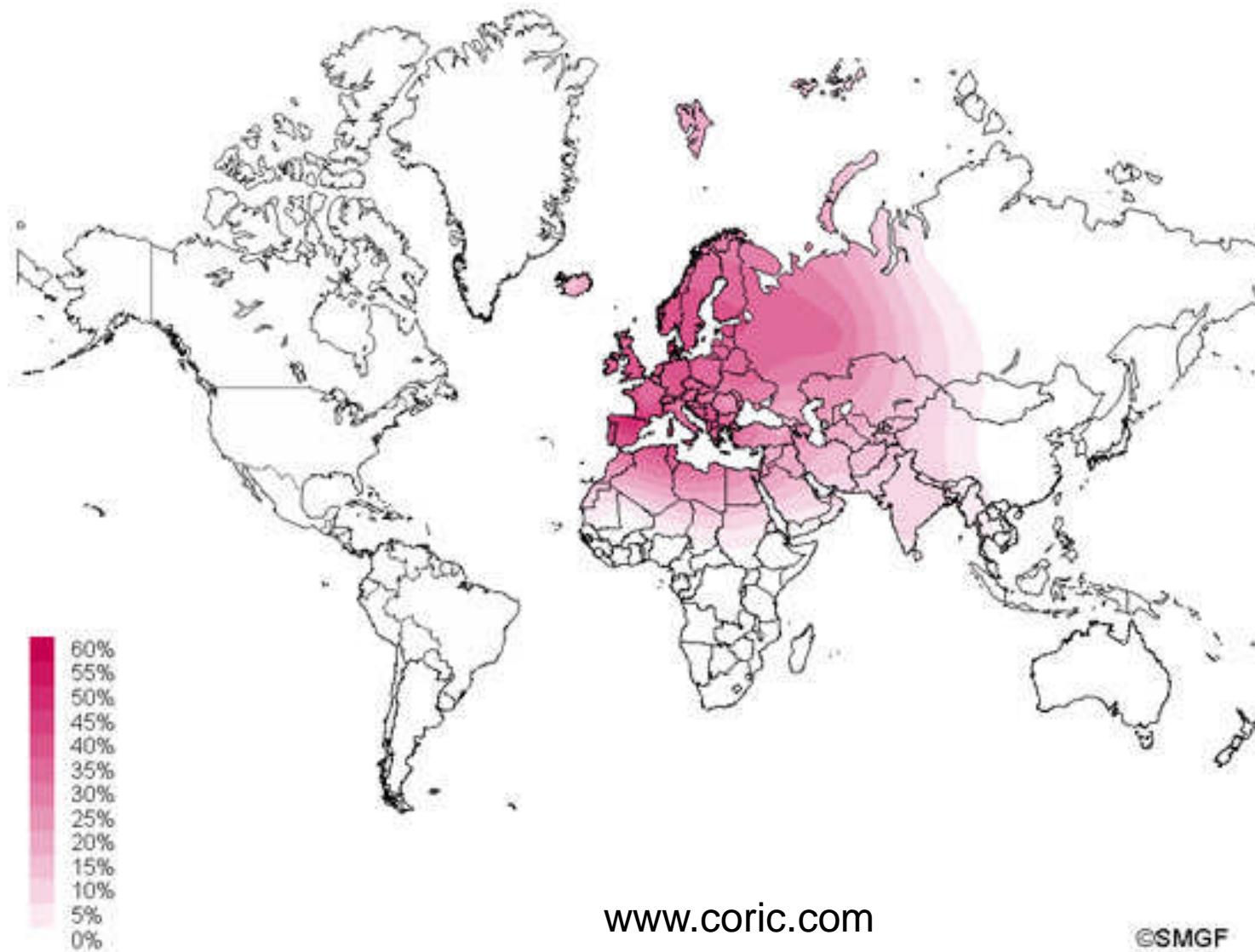
Percentage of men with haplogroup S145 “Celtic”



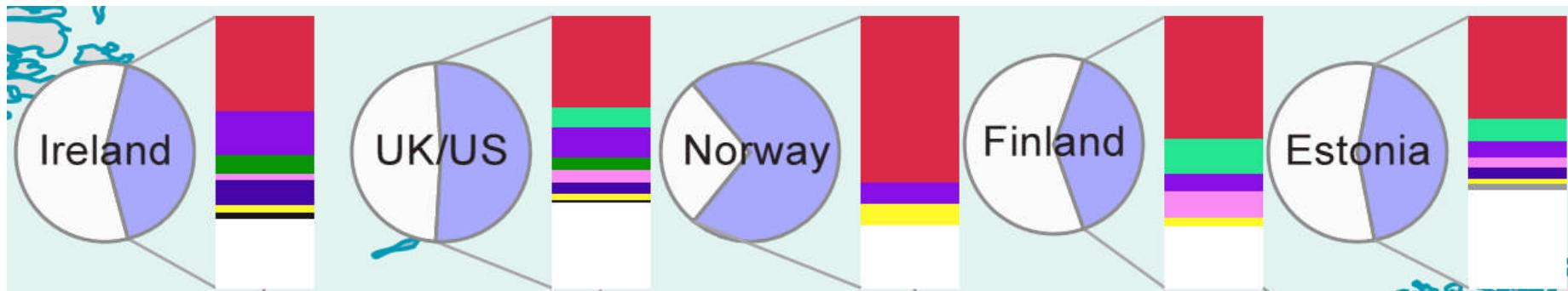


Percentage of men
with haplogroup I1
“Scandic”

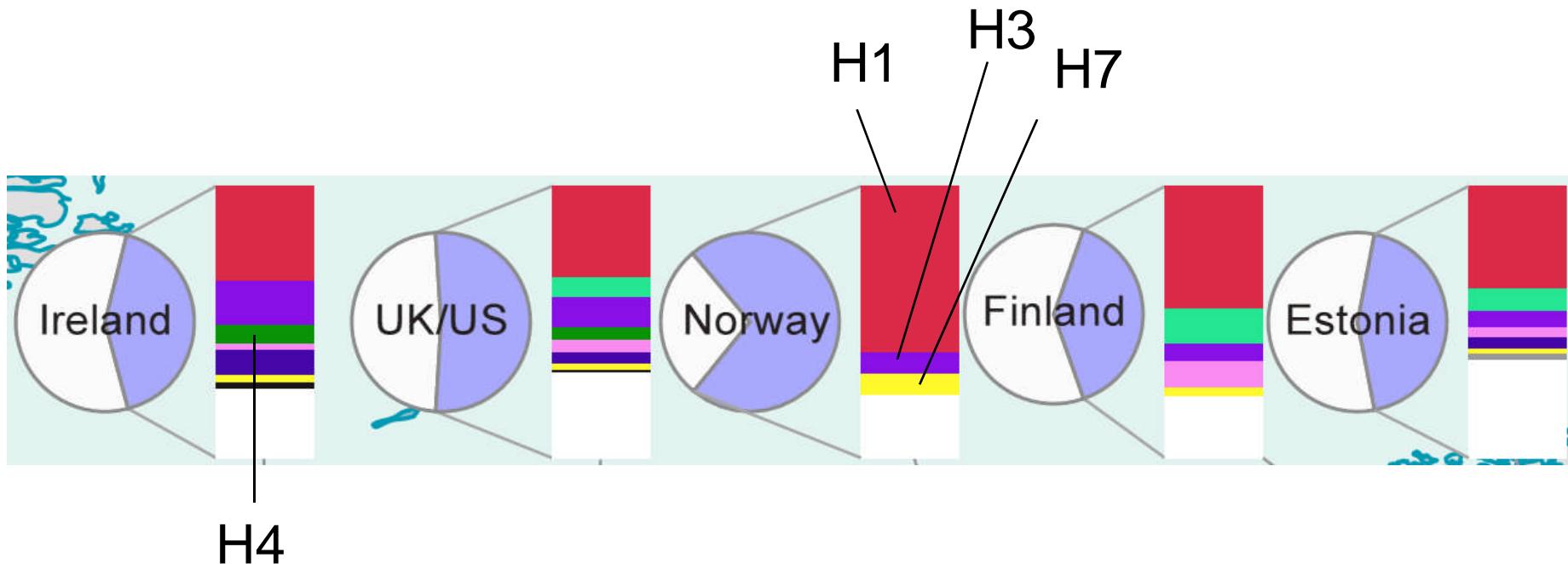
Percentage of people with Mitochondrial haplogroup H



Percentage of people with maternal haplogroup H



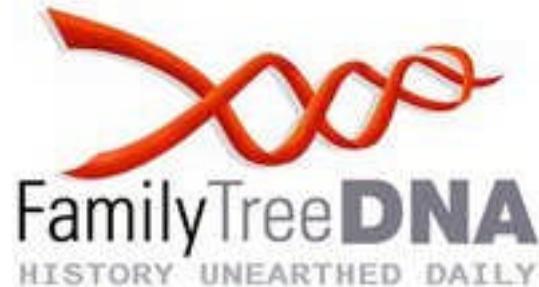
Percentage of people with maternal haplogroup H

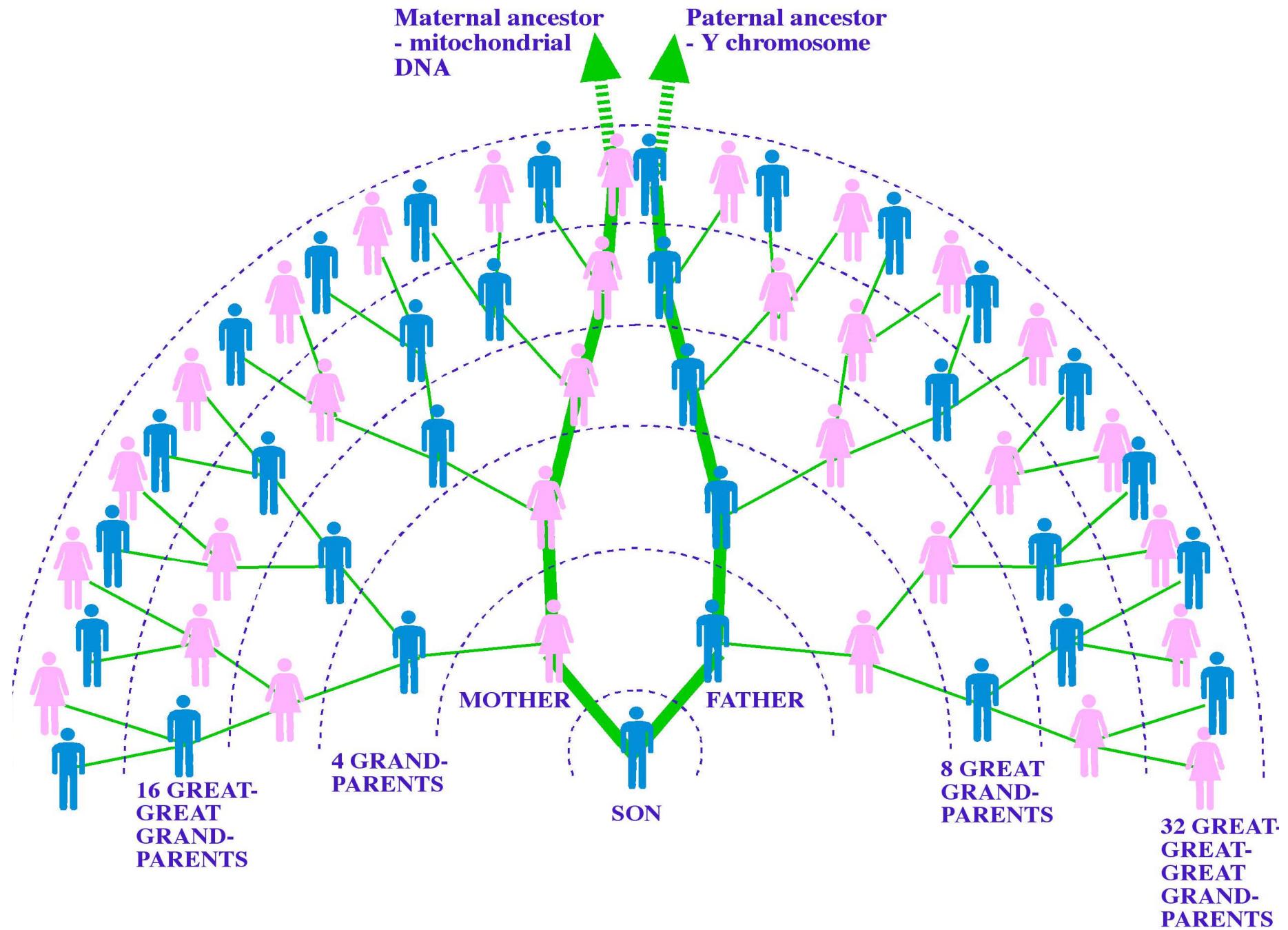


Viking ancestry?



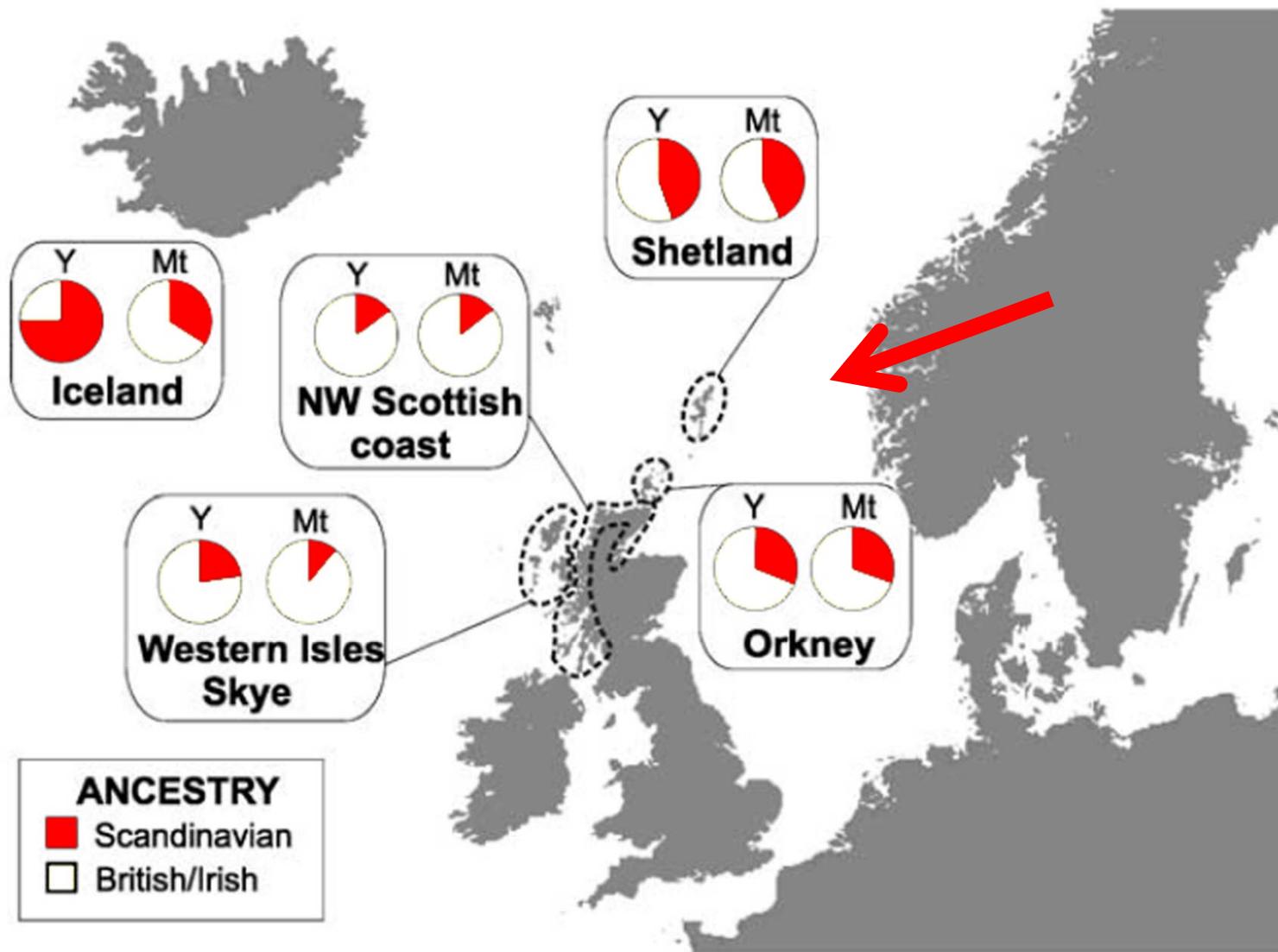
Commercial DNA testers



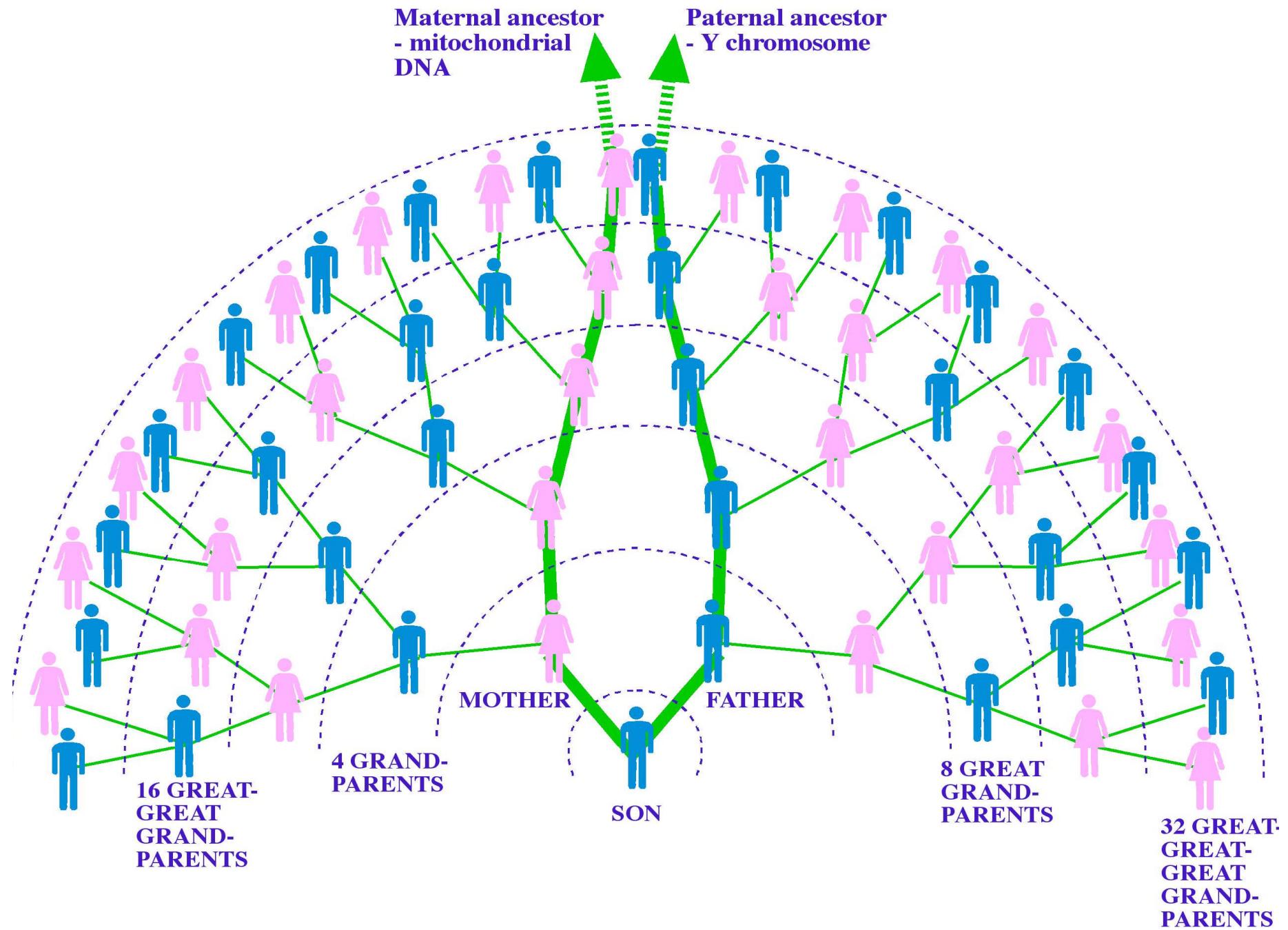


- As an individual test – gives an idea of one (or two) lines of ancestry
- Much more powerful for telling us about population ancestry

Did the Vikings take their families with them?



Goodacre,
Helgason
et al, 2005



Scandinavian settlements in England & Wales

Grey shading means a high density of Scandinavian place-names



Scandinavian settlements in England & Wales

Grey shading means a high density of Scandinavian place-names

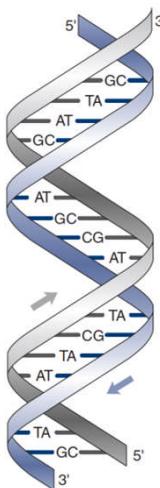




Viking genes in Northern England project

◆ Part 1 - Wirral and West Lancashire (2002-2008)

◆ Part 2 - North Lancashire, Cumbria and N. Yorks (2009-2013)



Old Wirral surnames present in area before 1600

Adam, Allin, Alleyne, Andrew, Ball, Barber, Barker, Barrell, Barrow, Bailiff, Beck, Bennett, Bergs, Billing, Bird, Blackburne, Boland, Brant, Bratherton, Browne, Brunt, Burscough, Bryde, Burrows, Bushell, Caley, Carr, Carlile, Carlisle, Challoner, Charnock, Chantrell, Coley, Colley, Colton, Coke, Corf, Corfe, Corness, Cotton, Cowper, Cross, Dalby, Dane, Danold, Davey, Davy, Denham, Denson, Dobb, Doe, Done, Duke, Dunn, Edmonds, Edmunds, Ellcock, Fazackerley, Fiddler, Fidler, Foreshaw, Forshaw, Fox, Francis, Gallie, Gardener, Gardiner, Gardner, Garratt, Garrett, Gibson, Gill, Gleave, Glegg, Goodacre, Grace, Gray, Gregory, Grey, Grice, Hale, Hancock, Hand, Harding, Hare, Harper, Harrison, Harvey, Heath, Helsby, Hesketh, Hey, Heyward, Hide, Hill, Hogg, Hole, Holme, Holmes, Home, Hough, Hulme, Hulmes, Humphrey, Huntington, Hynes, Jennion, Jensen, Jeunds, Johnson/Joynson, Jump, Kemp, Kirk, Kirkby, Leck, Lancelyn, Ledsham, Leighton, Lennard, Leonard, Ley, Lightfoot, Linacre, Little, Lunt, Macklin, Massie, Massey, Matthew, Mayle, Mayles, Middleton, Milner, Molyneuz, Moss, Moulding, Mutton, Nelson, Newbold, Newton, Otter, Otty, Oxton, Page, Parr, Pearson, Pemberton, Pendleton, Pennington, Penketh, Penney, Philip, Phylip, Pigot, Pinnington, Plumbe, Poole, Potter, Prenton, Pye, Pyke, Raby, Radcliffe, Rathbone, Richardson, Rider, Ridley, Rimmer, Robinson, Rogerson, Russell, Rutter, Saddler, Sadler, Sampson, Scarff, Scarffe, Scarisbrick, Sclater, Scriven, Sefton, Sharpe, Shephard, Shepherd, Sherlock, Skinner, Smalley, Smythe, Spenser, Stones, Swain, Swaine, Swarbrick, Swindley, Tarleton, Taskar, Tellett, Thomason, Thomasson, Thomson, Threadgill, Threadgold, Tottey/Totty, Tumath, Tyldesley, Upton, Wade, Wainwright, Walley, Walton, Warburton, Waring, Warington, Watmough, Watt, Whalley, Wharton, Wilkinson, Williamson, Whitby, Whitehead, Whitelaw, Whitfield, Whitmore, Whittle, Whyte, Williamson, Willoughby, Worral, Woods, Woodward, Wilcock, Wise, Wyse, Young, Yoxon.



Research Paper in *Molecular Biology & Evolution*, 2008

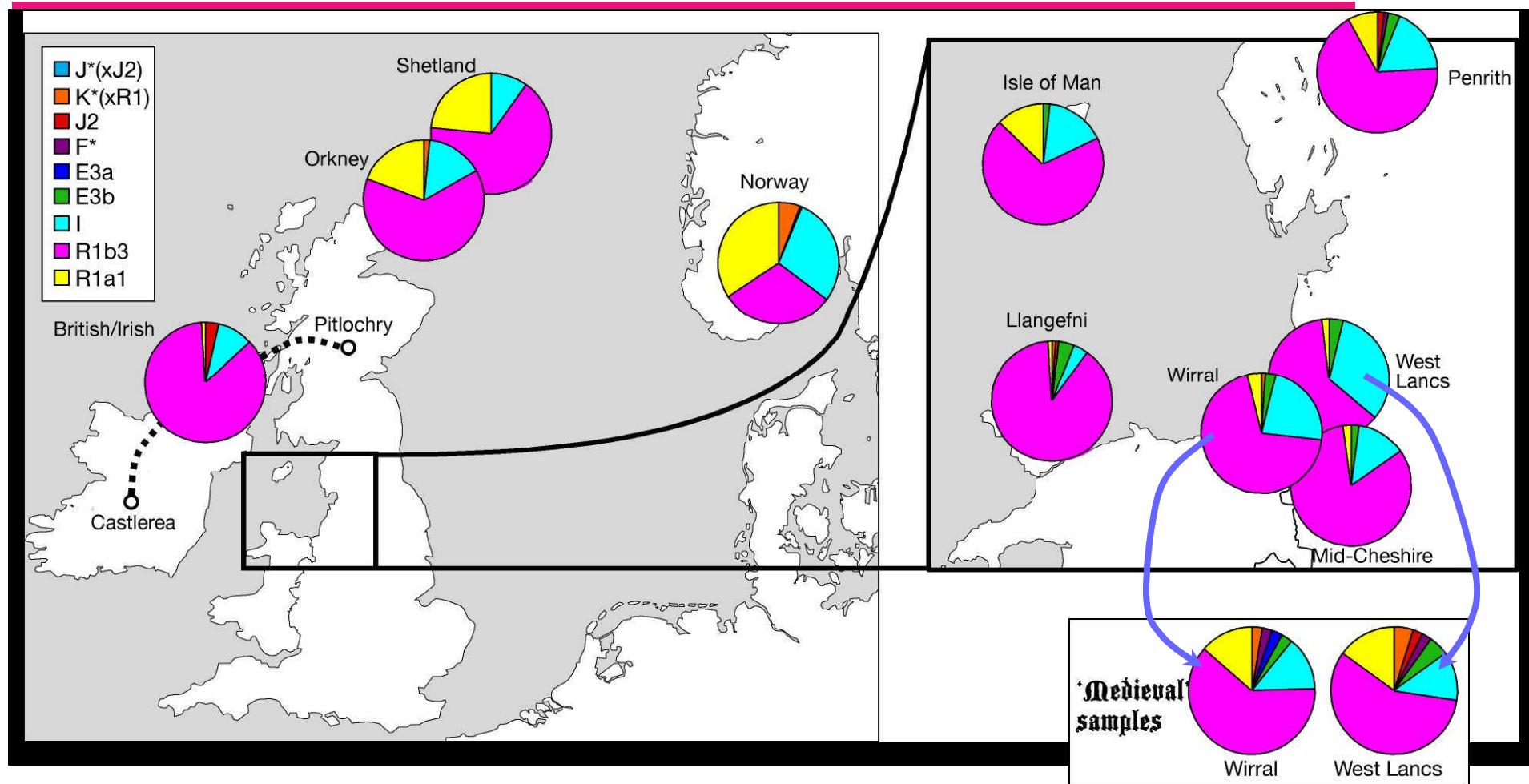
Excavating Past Population Structures by Surname-Based Sampling: The Genetic Legacy of the Vikings in Northwest England

Georgina R. Bowden, Patricia Balaresque,* Turi E. King,* Ziff Hansen,† Andrew C. Lee,*¹ Giles Pergl-Wilson,† Emma Hurley,† Stephen J. Roberts,‡ Patrick Waite,§ Judith Jesch,|| Abigail L. Jones,¶ Mark G. Thomas,# Stephen E. Harding,† and Mark A. Jobling**

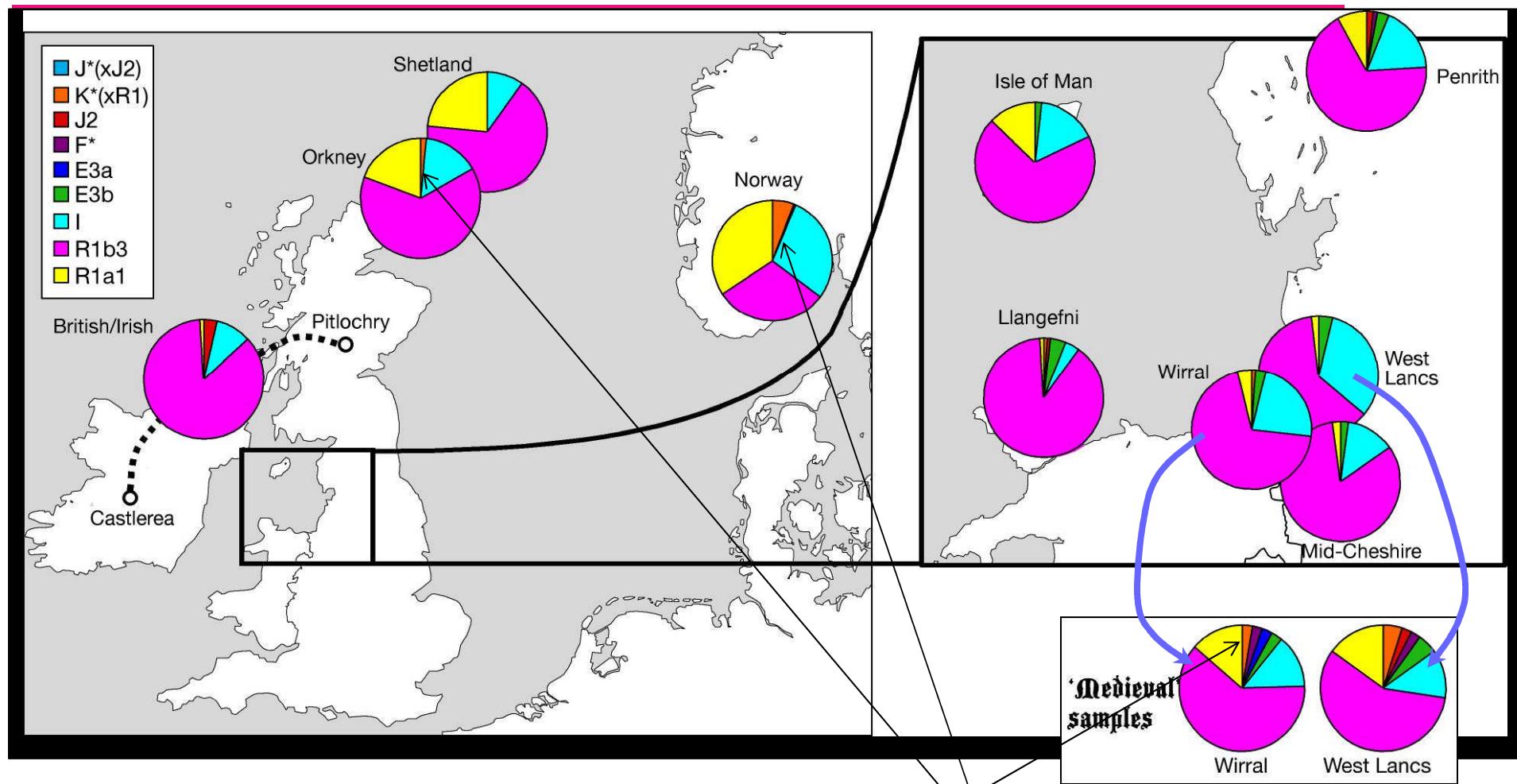
*Department of Genetics, University of Leicester, Leicester, United Kingdom; †National Centre for Macromolecular Hydrodynamics, University of Nottingham, Sutton Bonington Campus, Loughborough, United Kingdom; ‡The Queen Katherine School, Kendal, Cumbria, United Kingdom; §West Lancashire Heritage Association, Ormskirk, United Kingdom; ||School of English Studies, University of Nottingham, University Park, Nottingham, United Kingdom; ¶The Centre for Genetic Anthropology, Department of Biology, University College London, London, United Kingdom; and #Department of Biology, University College London, London, United Kingdom

→ Up to 50% of the DNA in old Wirral
& West Lancashire families is Norse

Y-chromosome distributions for the north west

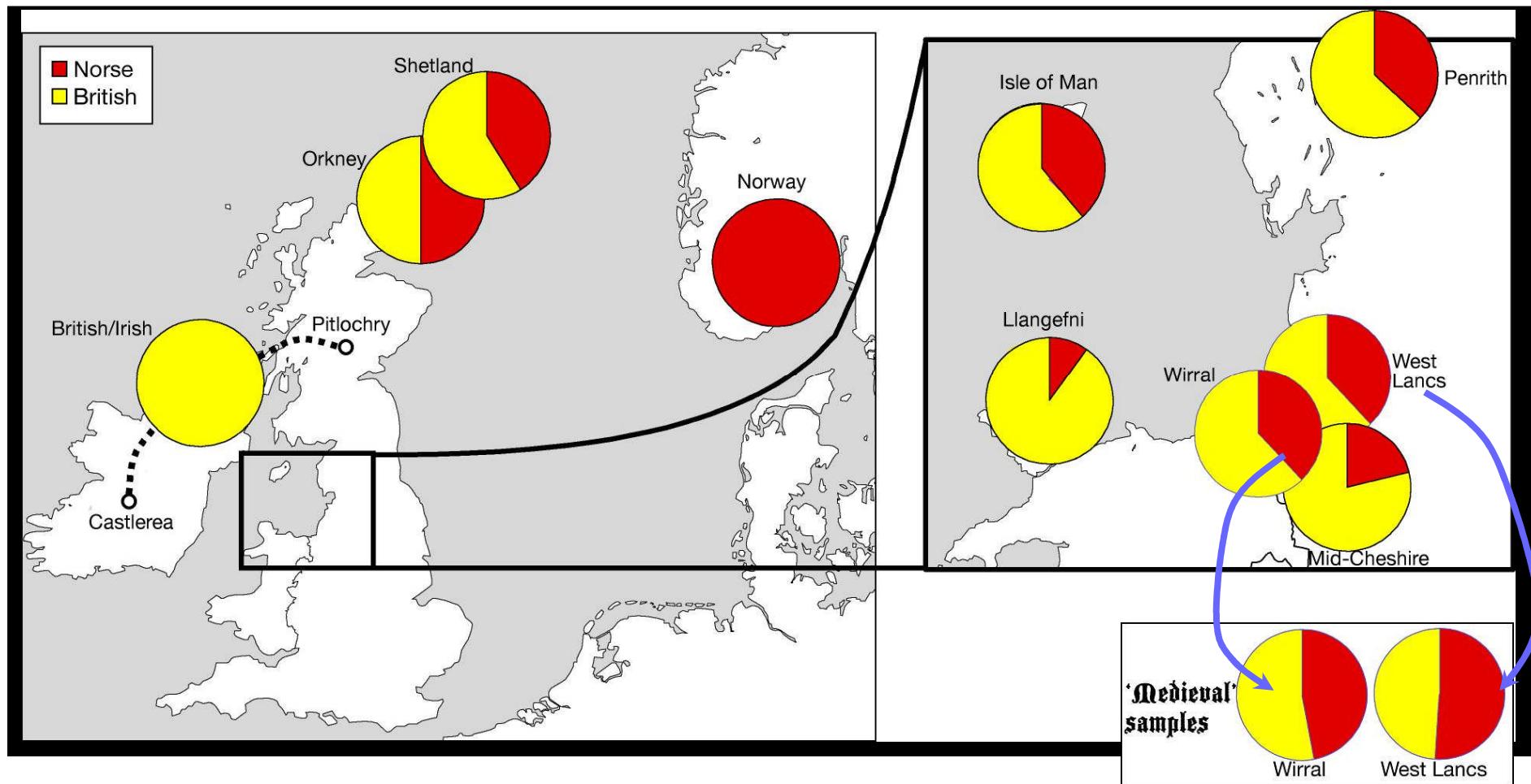


Y-chromosome distributions for the north west

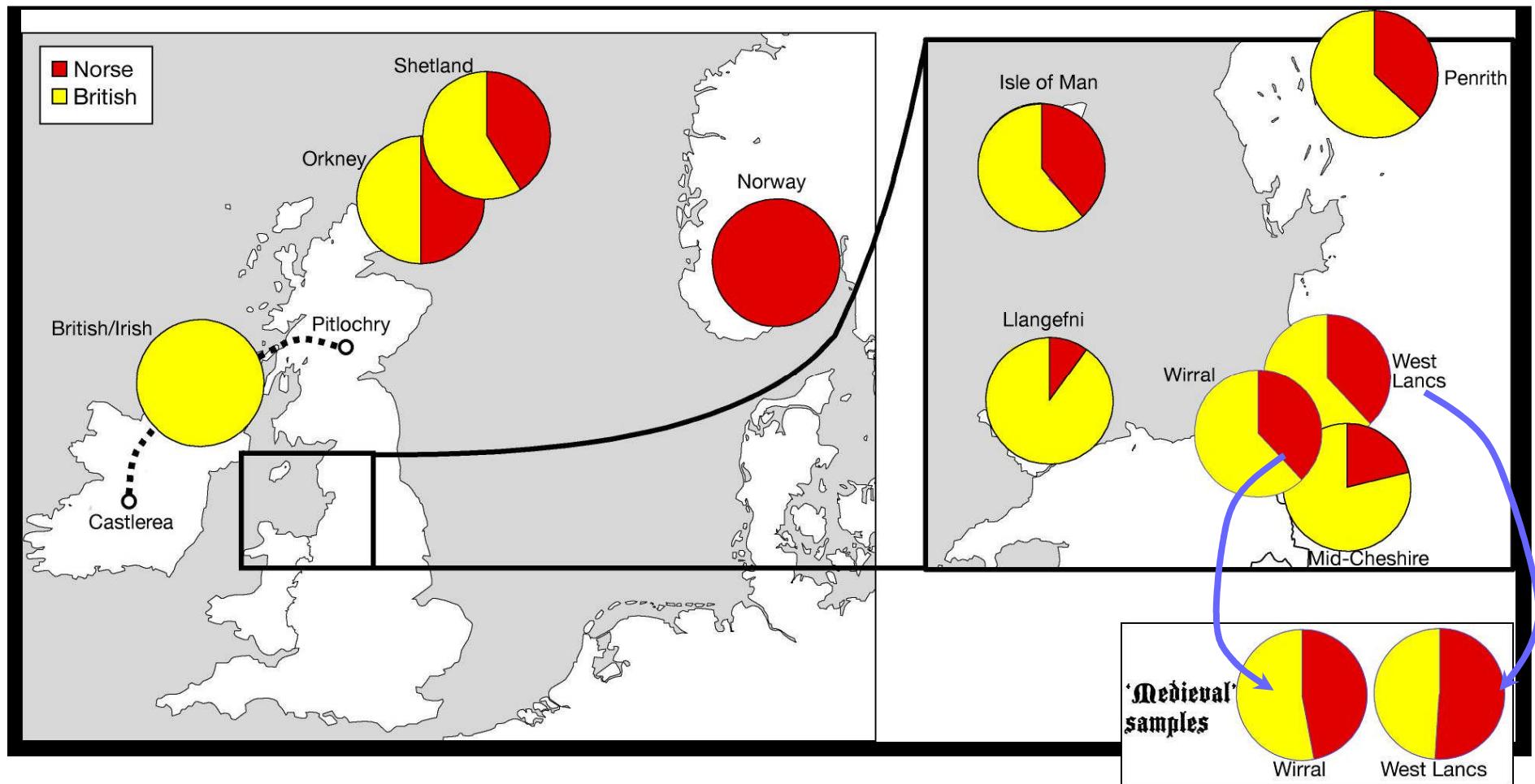


$K^*(xR1)$

Viking admixture results



Viking admixture results

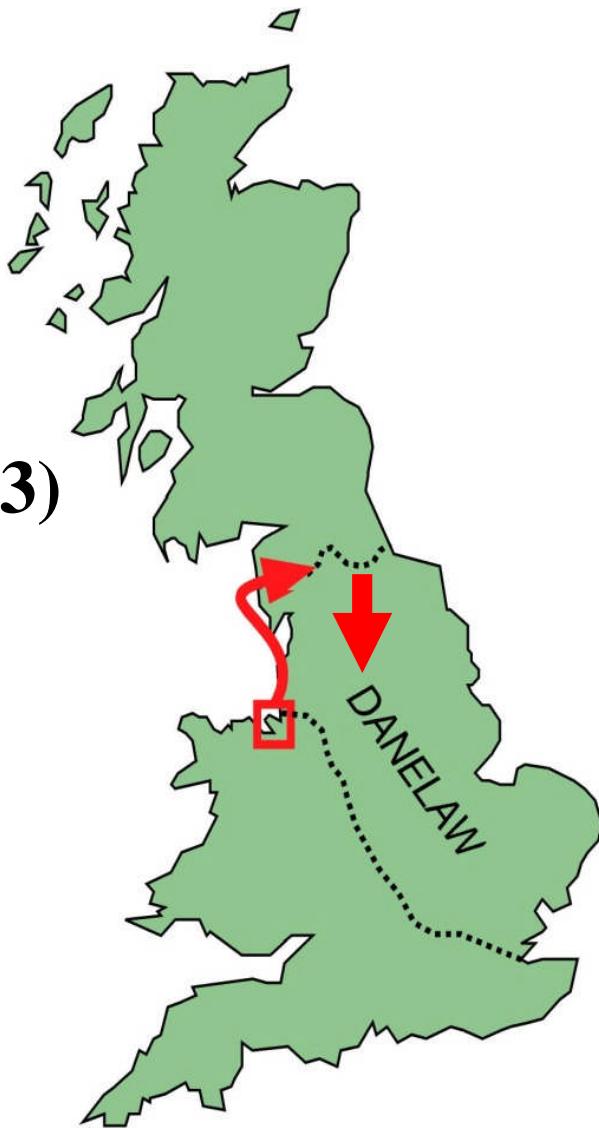
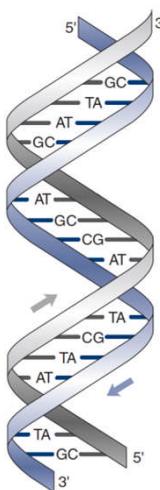


DNA admixture
~ 50% Scandinavian

Viking genes in Northern England project

◆ Part 1 - Wirral and West Lancashire (2002-2008)

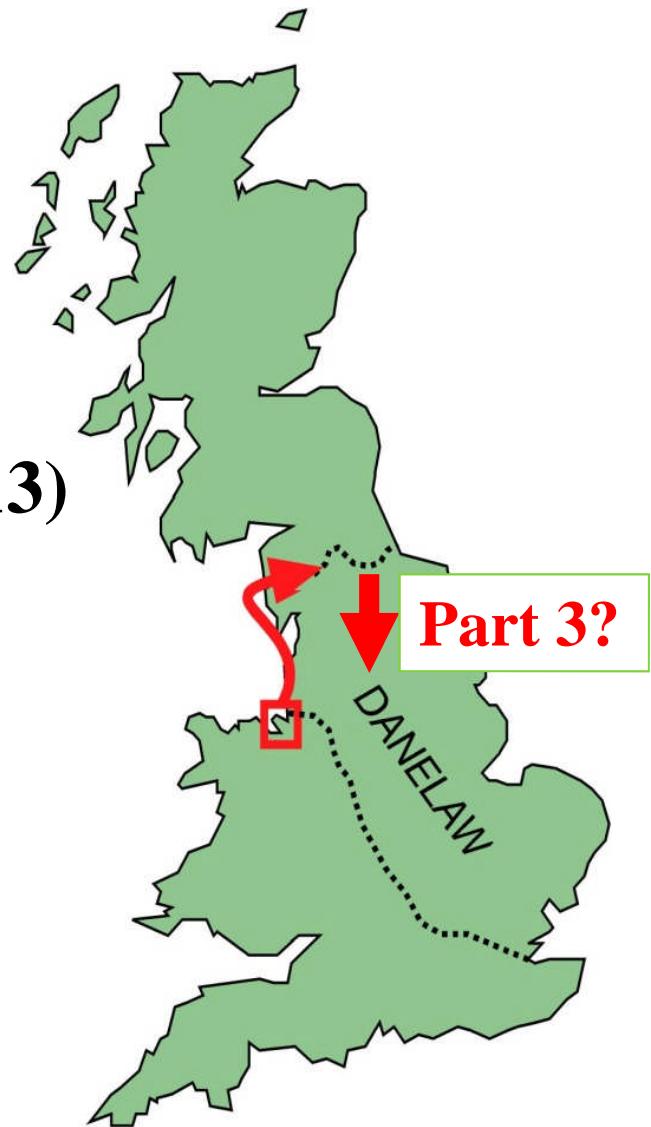
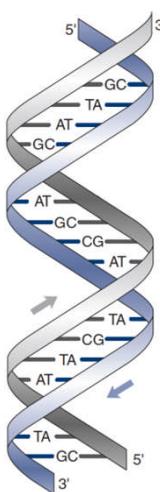
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Viking genes in Northern England project

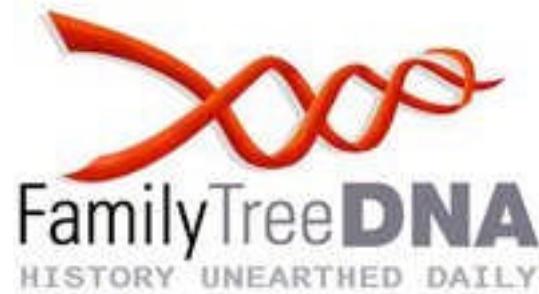
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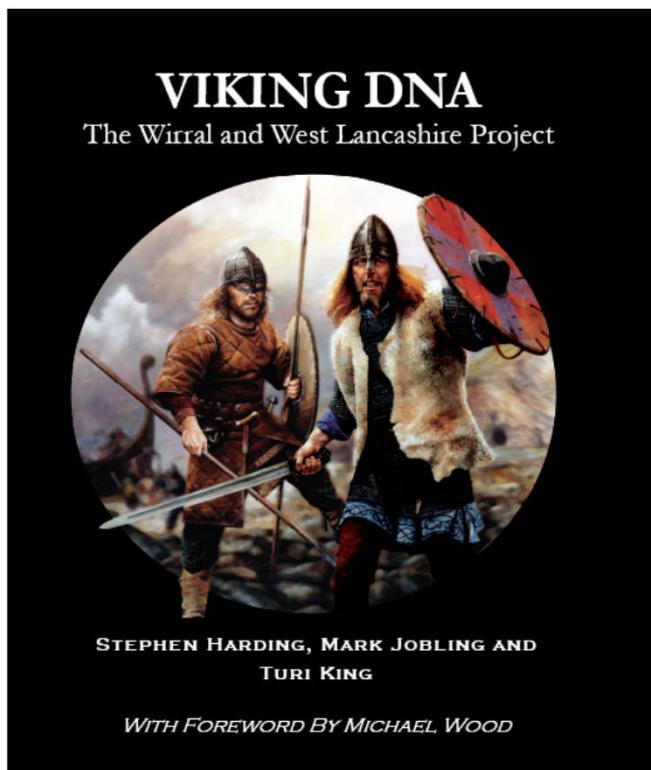
- Is it worth £100?

Commercial DNA testers



Sources

Slides 9 & 46: J.D. Richards (2005) *A Very Short Introduction to Vikings*, Oxford: Oxford University Press; Slide 31: yhrd.org; Slide 32, 34, 35: www.eupedia.com; Slide 33: N.M. Myres et al (2011), *European Journal of Human Genetics* 19, 95–101; Slide 36: www.coric.com; Slide 37,38: www.genebase.com; Slide 45: S. Goodacre, A. Helgason et al (2005) *Heredity* 95, 1-7; Slide 54: www.wirral-mbc.gov.uk/vikings/



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