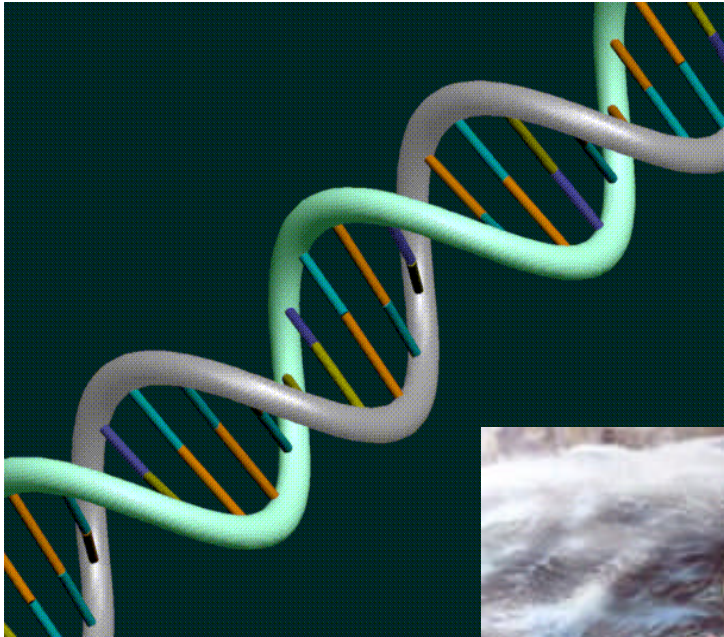


DNA Detectives



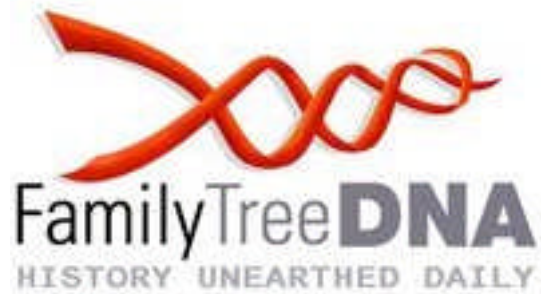
Prof. Steve Harding, University of Nottingham

U3A East Leake, 9 December 2013

Commercial DNA testers



Commercial DNA testers





Mark Jobling
Turi King



08/06/2010 21:59



Haugesund, Norway

Mark Jobling

Turi King



08/06/2010 21:59



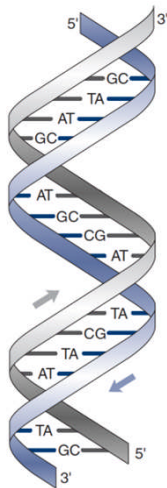
Scandinavian settlements in England & Wales

Grey shading means a high density of Scandinavian place-names



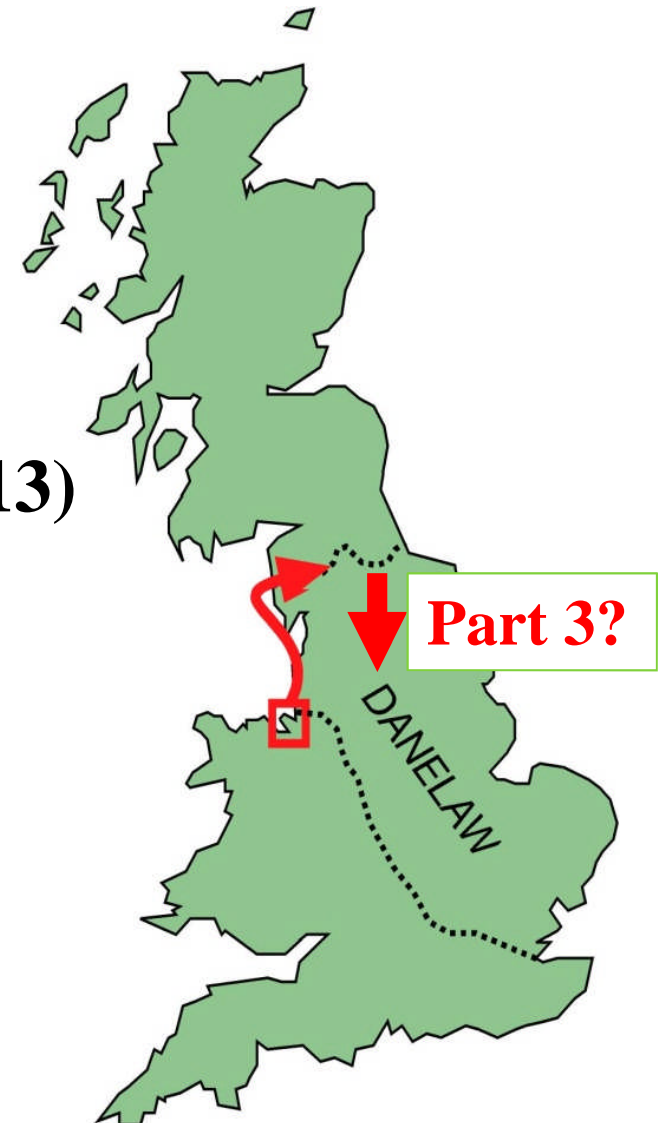
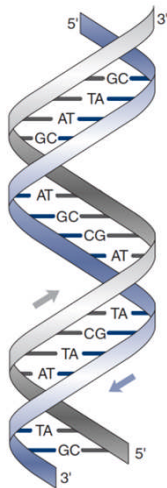
Viking genes in Northern England project

- ◆ **Part 1 - Wirral and West Lancashire (2002-2008)**
- ◆ **Part 2 - North Lancashire, Cumbria and N. Yorks (2009-2013)**



Viking genes in Northern England project

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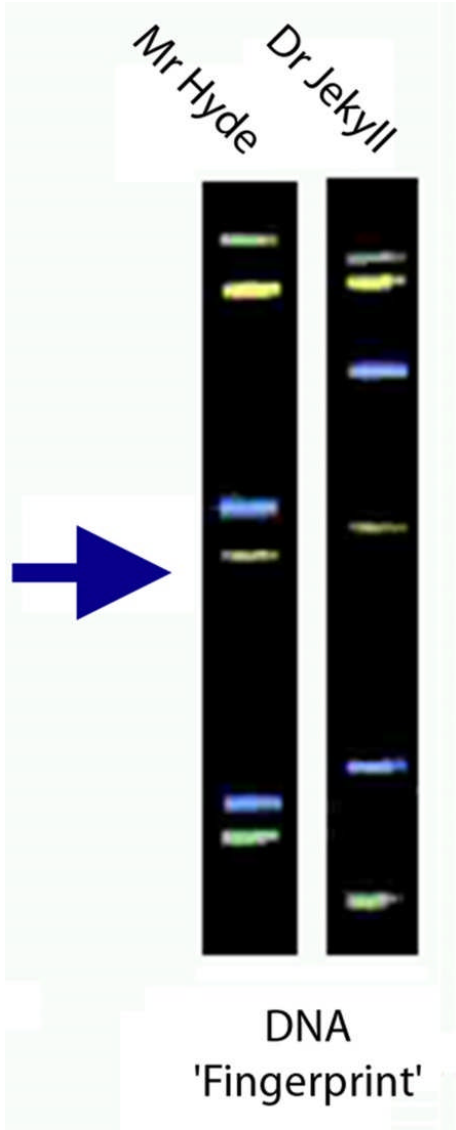


What happens to your sample?



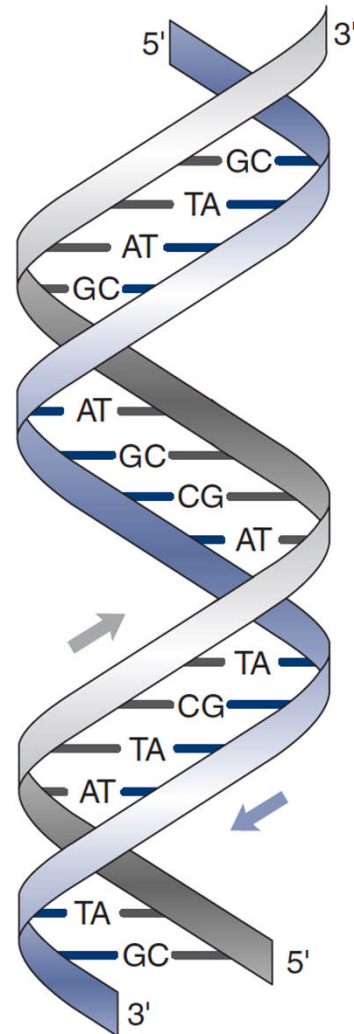
What happens to your sample?





DNA 'Fingerprint'

DNA – Message from our Ancestors



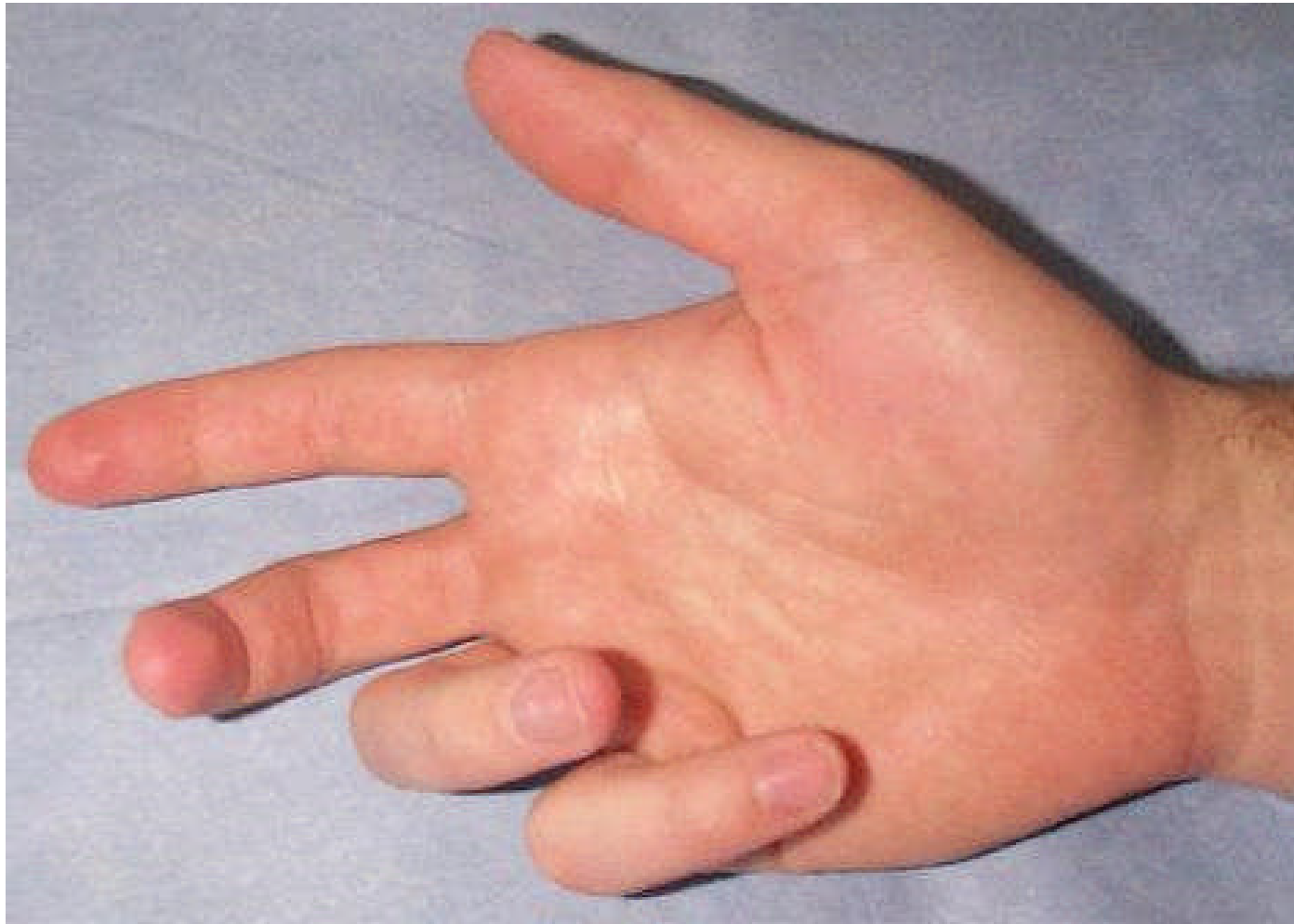
Genetics of Physical Characteristics



Genetics of Physical Characteristics



Dupuytren's contracture



**Or can we examine the DNA directly
on our chromosomes?**



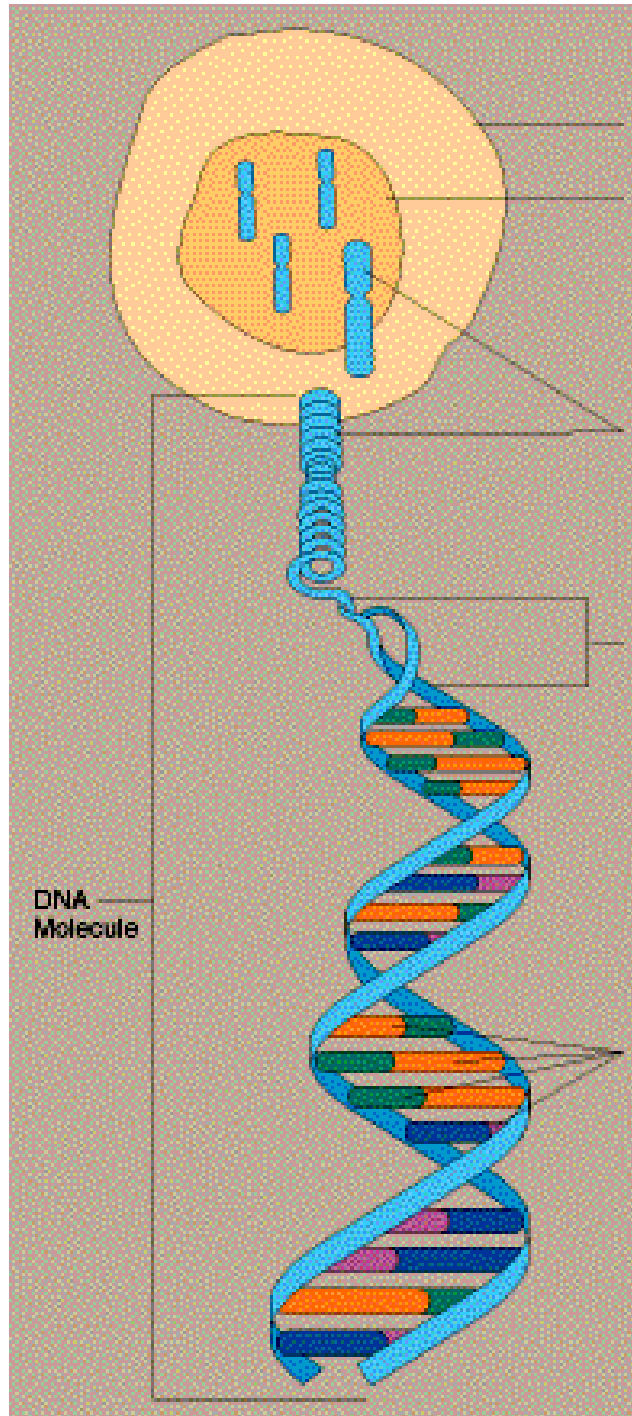
Or can we examine the DNA directly on our chromosomes?



A light micrograph of a human cell, likely a cheek cell, stained with a blue dye. The cell is roughly circular with a wavy, irregular boundary. Inside the cell, there is a large, dark, circular nucleus. A white arrow points from the word 'nucleus' to this dark structure. The text 'Human cell' is written in red in the upper right corner.

Human cell

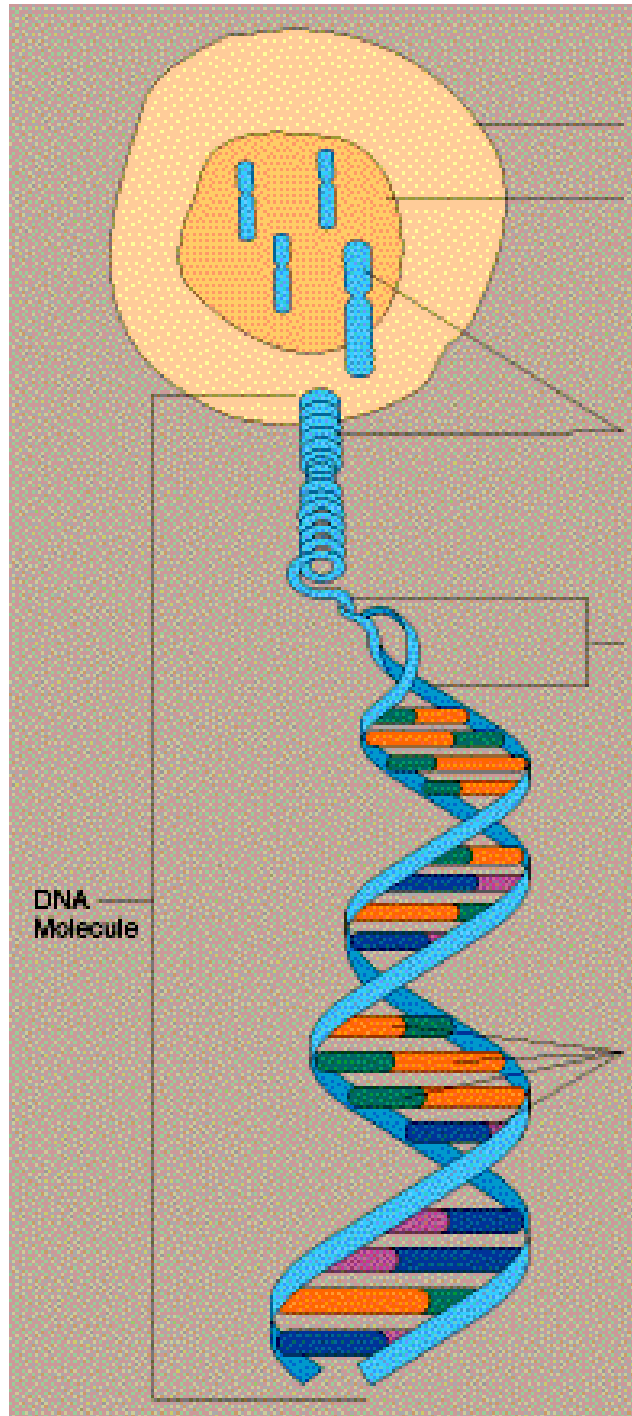
nucleus



Cell
Nucleus

Chromosomes

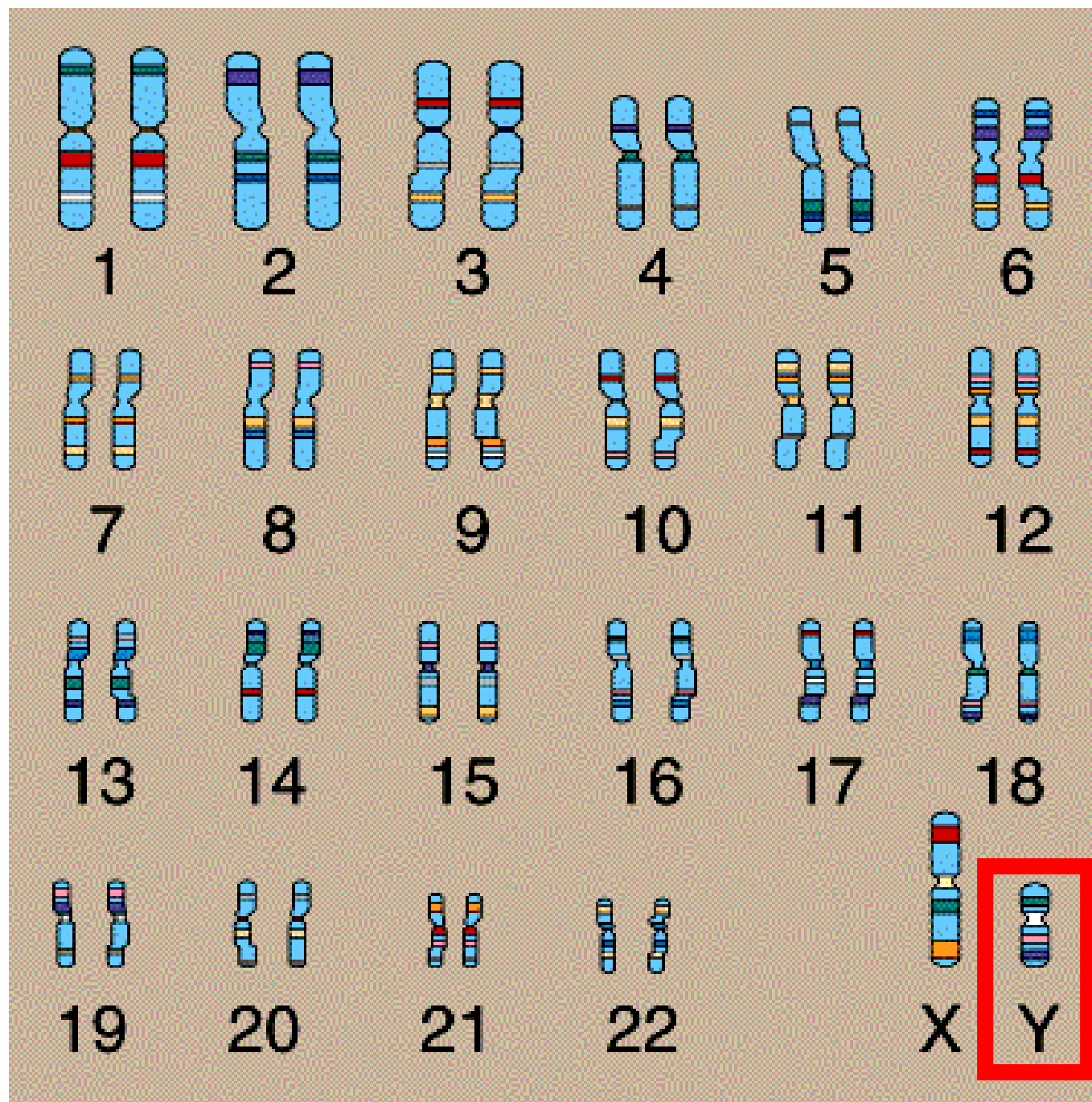
DNA



Cell
Nucleus

Chromosomes
(23 pairs in humans)

DNA



**Male Y-
chromosome**

Human cell

mitochondrion

nucleus

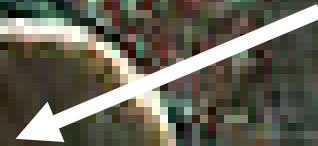


Human cell

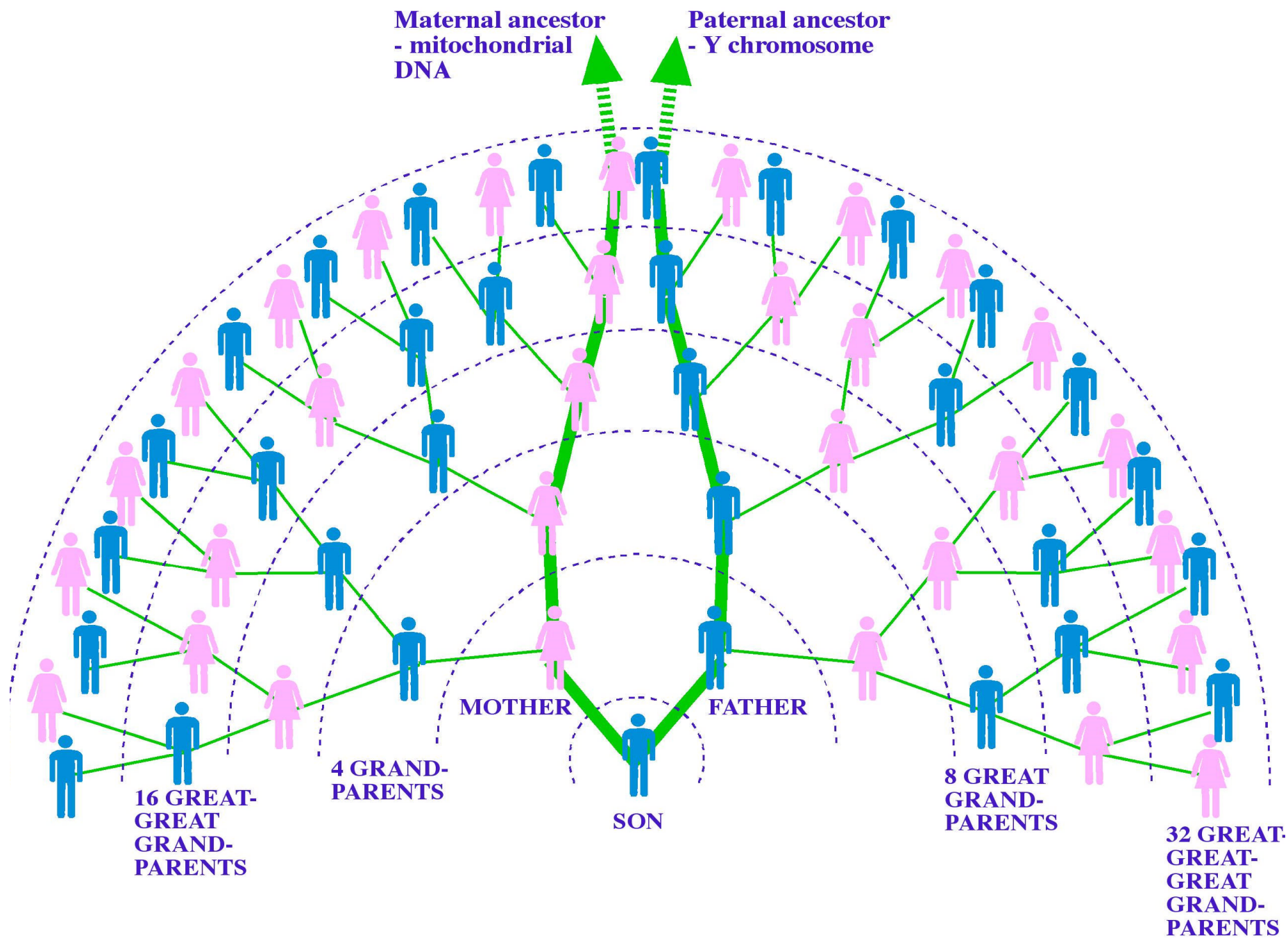
mitochondrion



nucleus



**Maternally
inherited DNA**



The Hardings







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



Male 1 GTAC**T**AGACTACTACTACTACTACTG...
5 repeats

Male 2 GTAC**A**AGACTACTACTACTACTACTACTG...
6 repeats

Male 3 GTAC**A**AGACTACTACTACTACTACTACTACTG...
7 repeats

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

HAPLOGROUP



HAPLOTYPE

Male 1 GTACT**T**AGACTACTACTACTACTACTGGGTG...
5 repeats

Male 2 GTAC**A**AGACTACTACTACTACTACTACTACTGGGTG...
6 repeats

Male 3 GTAC**A**AGACTACTACTACTACTACTACTACTACTGGGTG...
7 repeats

Results from a man's Y-chromosome test

HAPLOGROUP

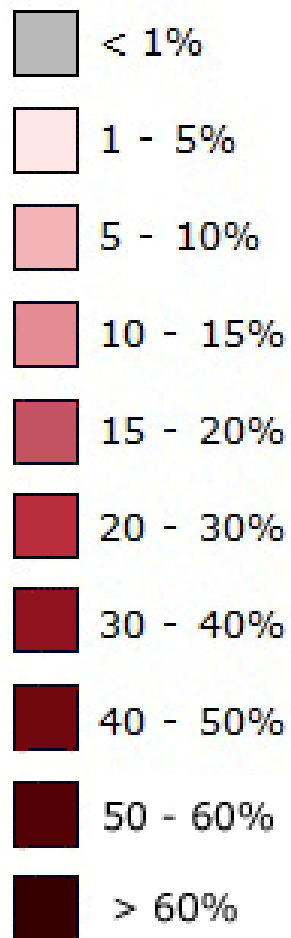
☐ A ☐ BC ☐ DE ☐ F* ☐ G ☐ H ☒ I ☐ J ☐ K* ☐ R1* ☐ R1a ☐ R1b

HAPLOTYPE

DYS436
DYS437
DYS438
DYS434
DYS435
DYS439

DYS391
DYS390
DYS393
DYS392
DYS388
DYS19

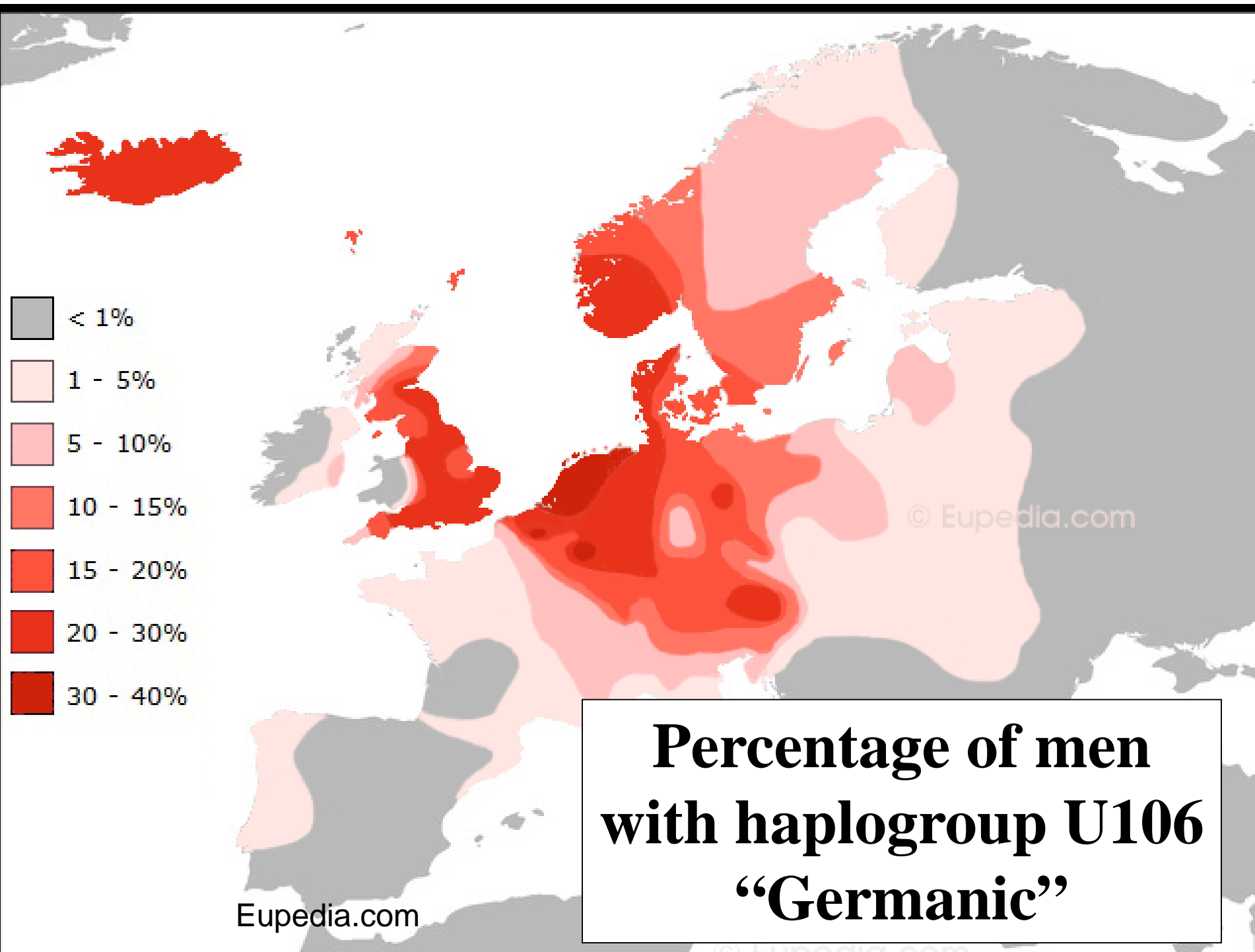
DYS389I
DYS389II
461
462
460

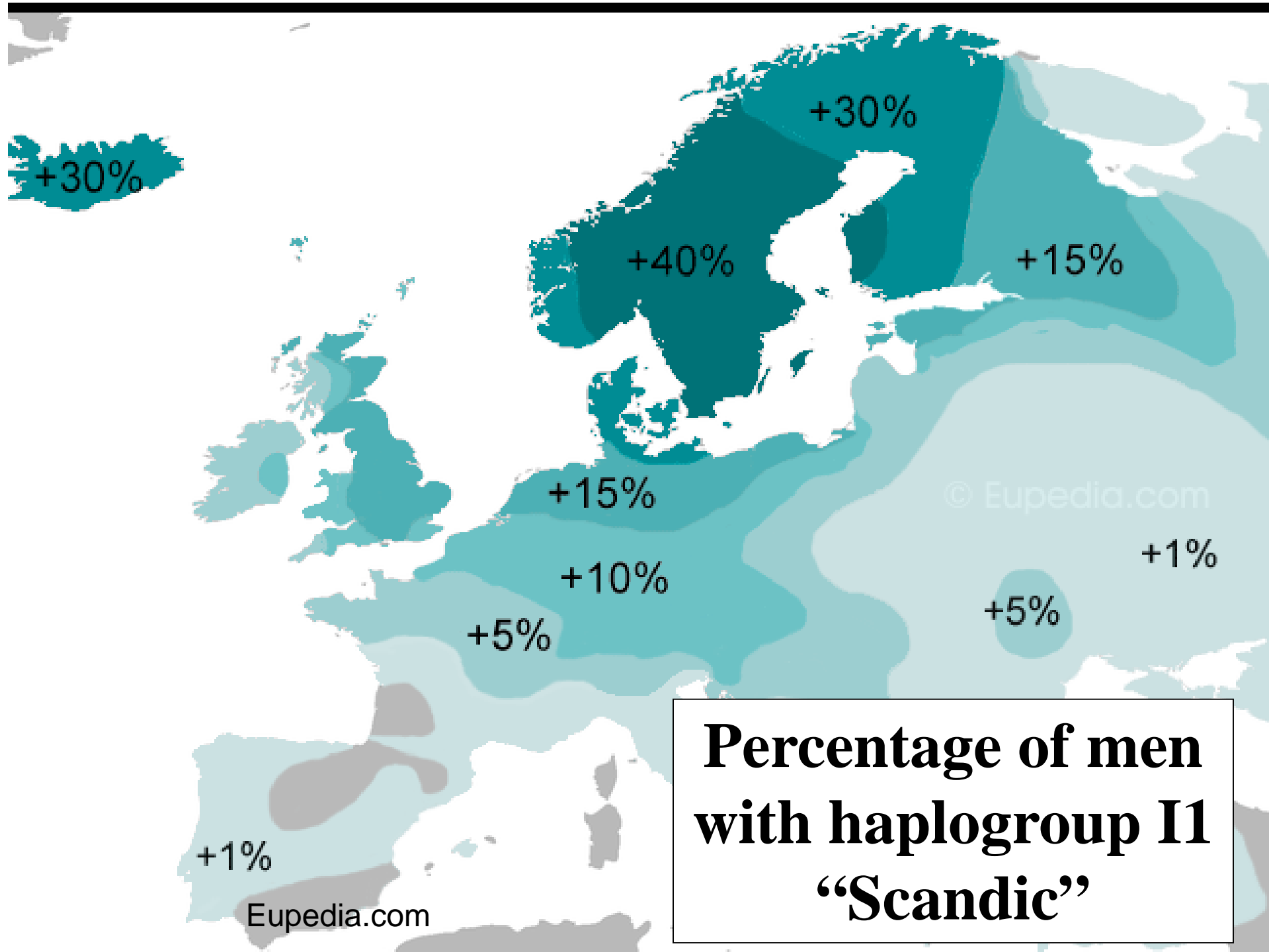


© Eupedia.com

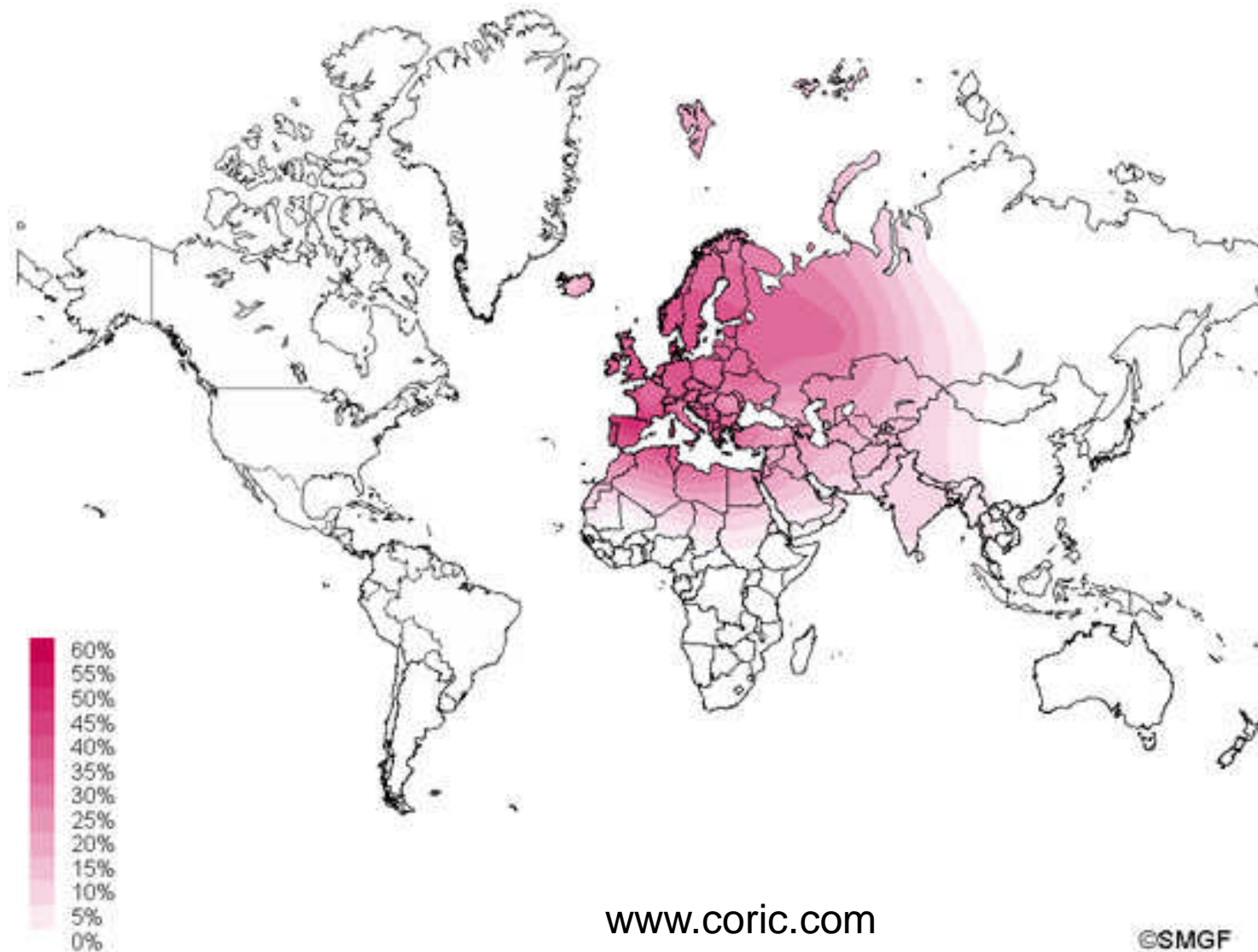
Eupedia.com

**Percentage of men
with haplogroup S145
“Celtic”**

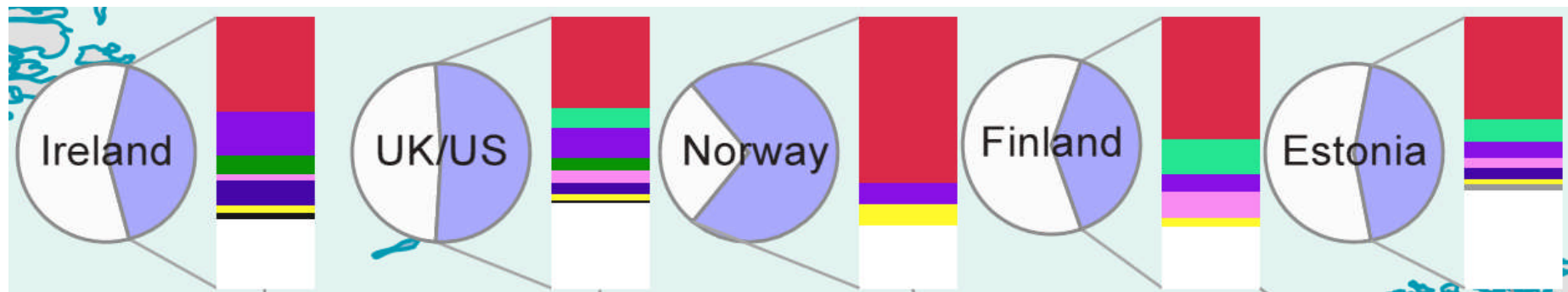




Percentage of people with Mitochondrial haplogroup H

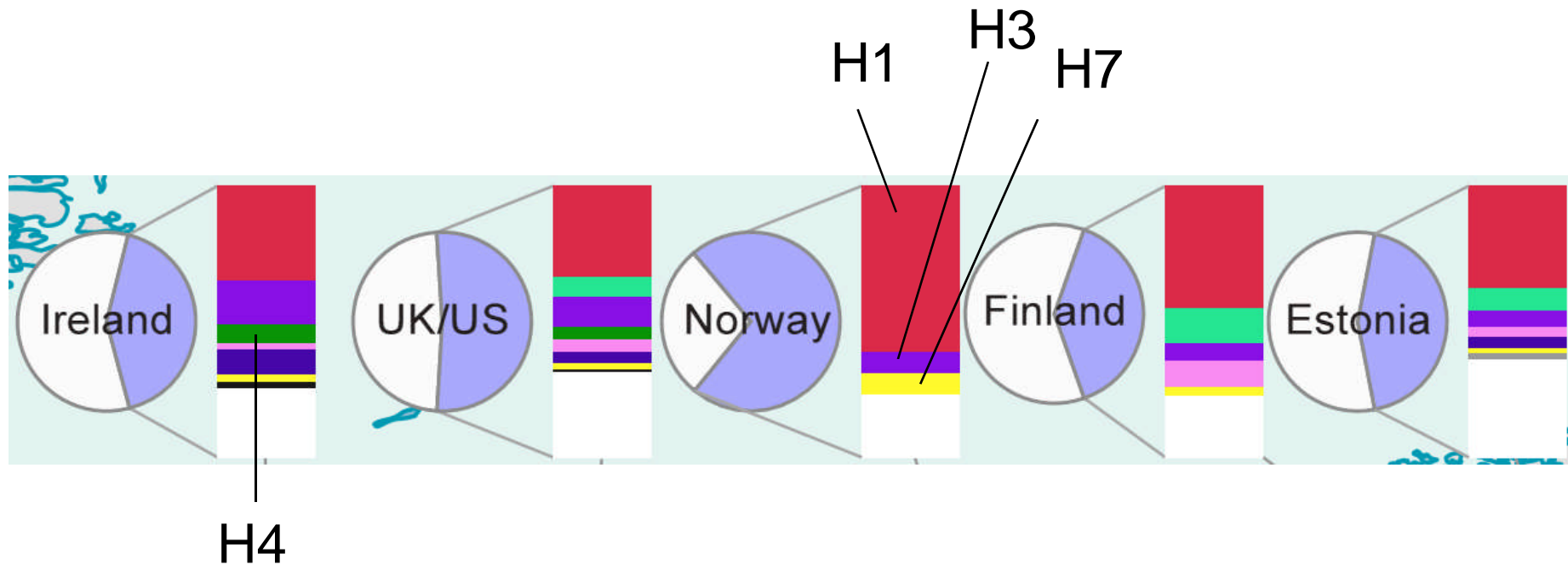


Percentage of people with maternal haplogroup H



www.genebase.com

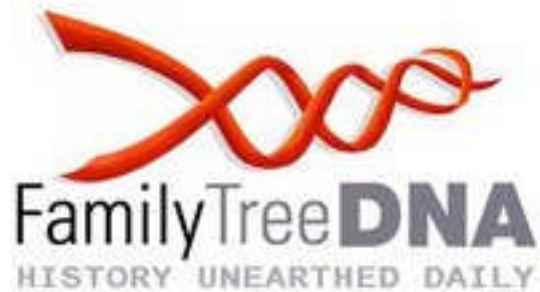
Percentage of people with maternal haplogroup H

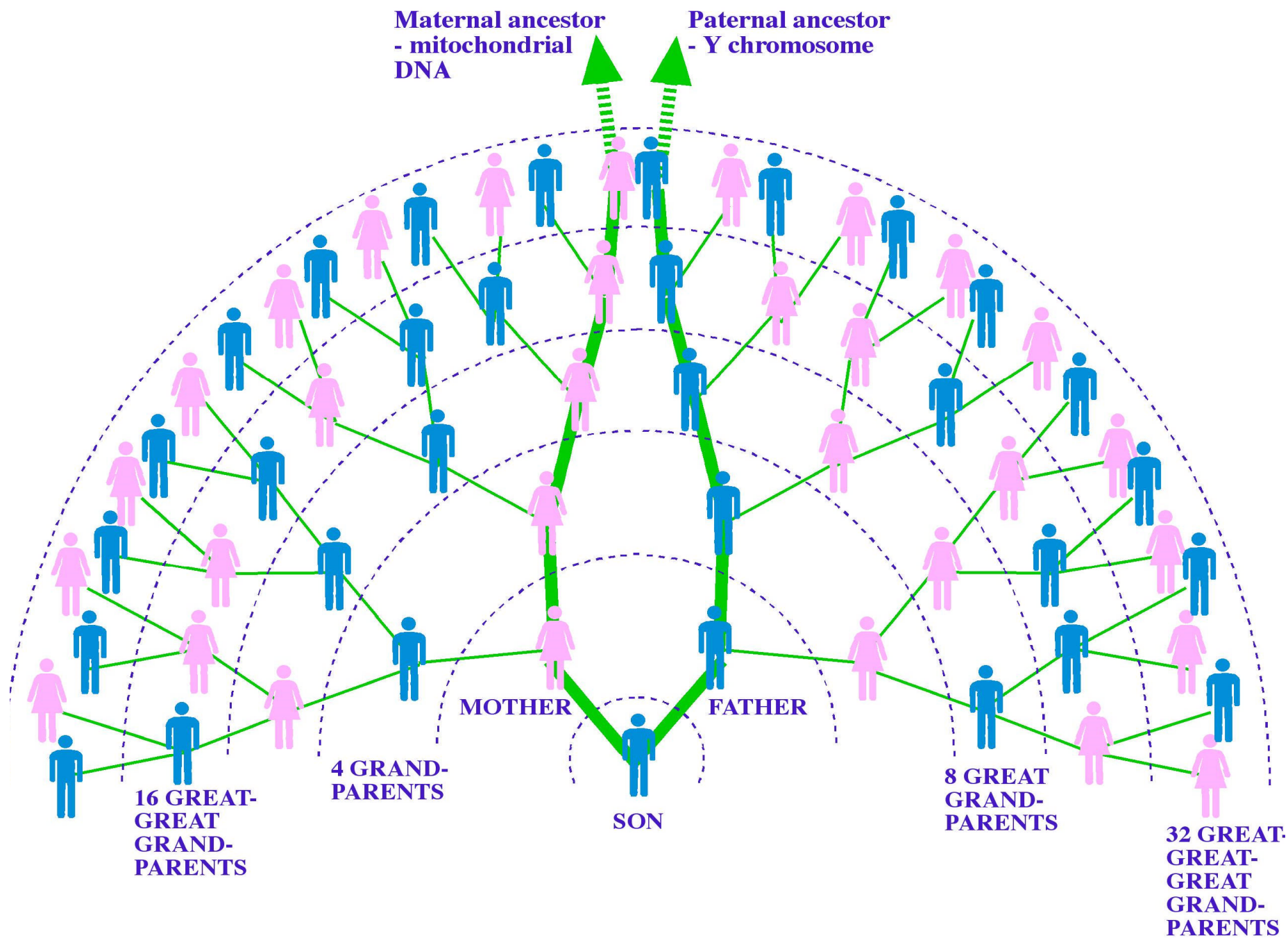


Viking ancestry?



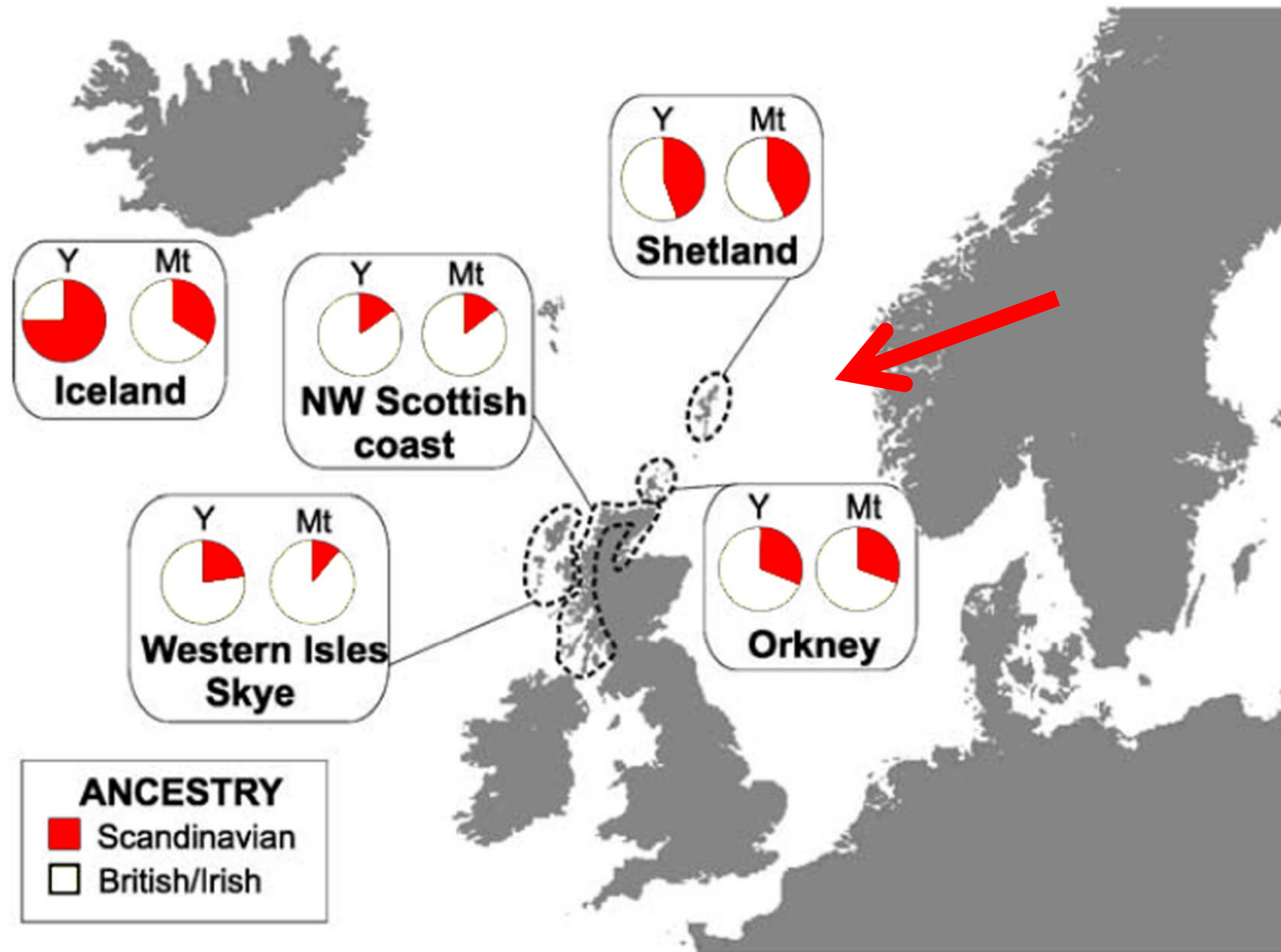
Commercial DNA testers



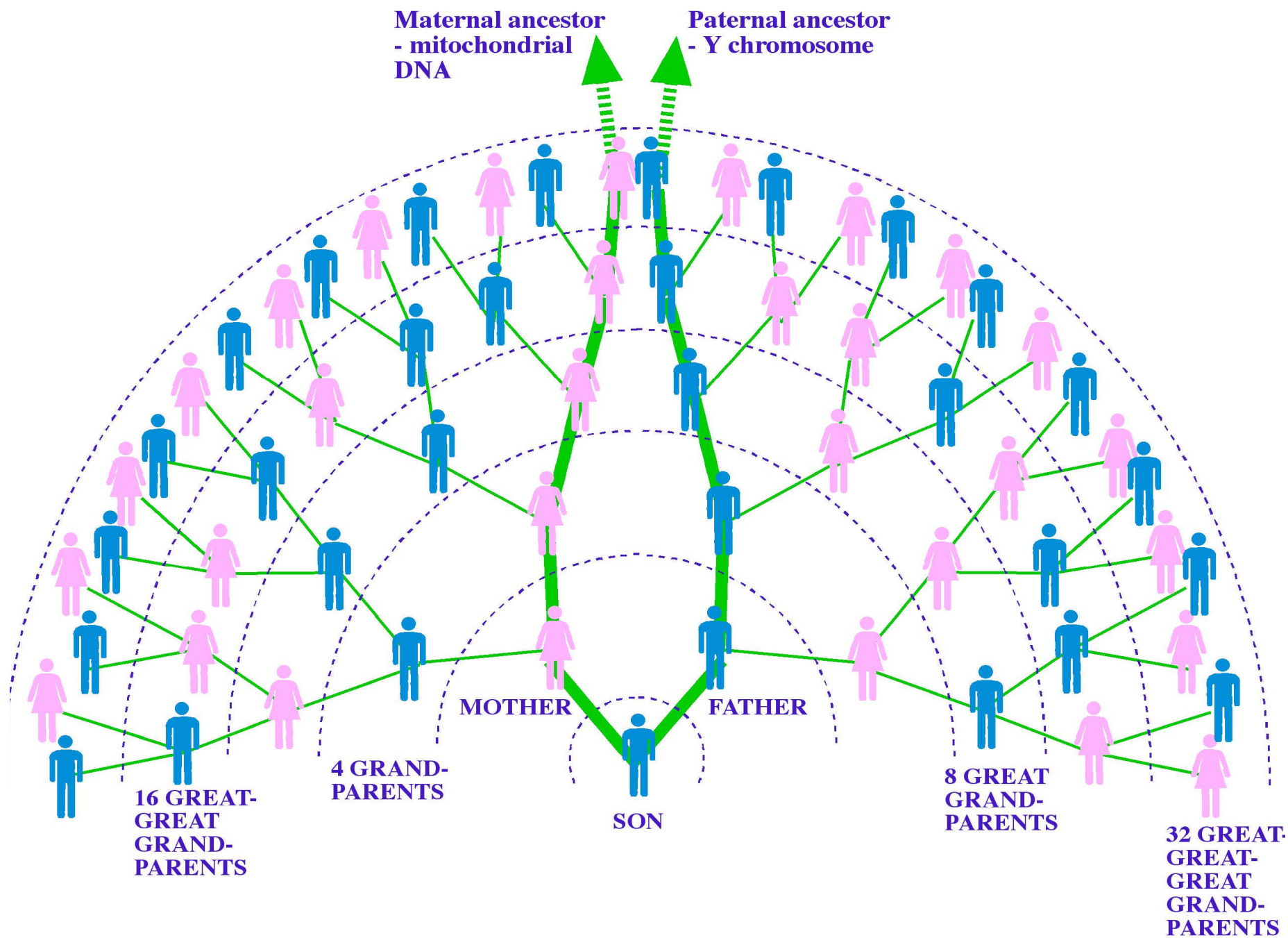


-
- **As an individual test – gives an idea of one (or two) lines of ancestry**
 - **Much more powerful for telling us about population ancestry**

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



J.D. Richards, 2005

Scandinavian settlements in England & Wales

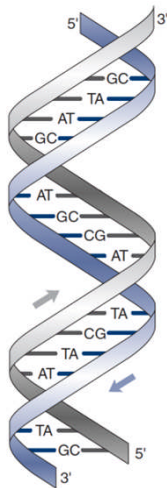
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Viking genes in Northern England project

- ◆ **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, Worrall, Woods, Woodward, Wilcock, Wise, Wyse, Young, Yoxon.



Research Paper in *Molecular Biology & Evolution*, 2008

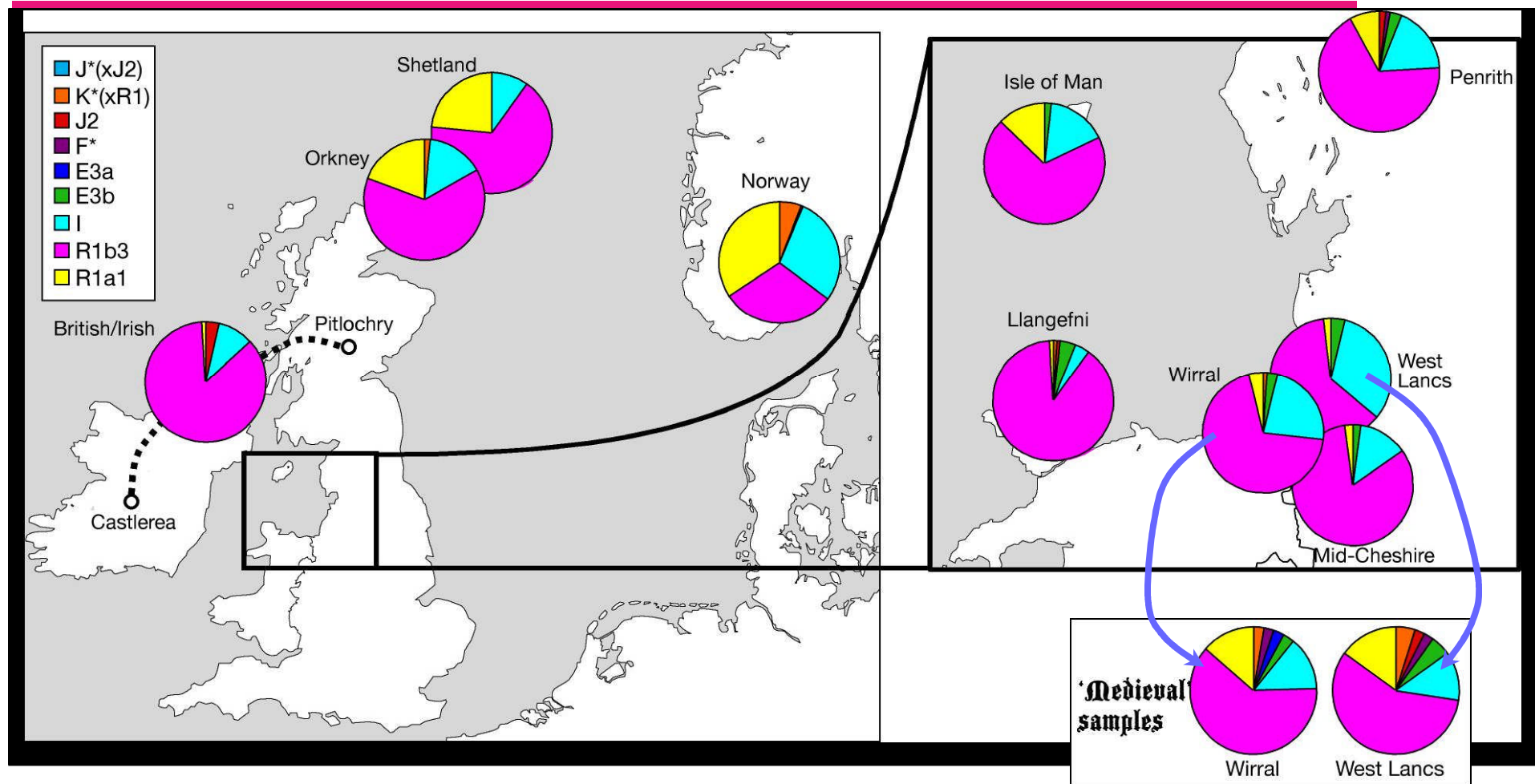
Excavating Past Population Structures by Surname-Based Sampling: The Genetic Legacy of the Vikings in Northwest England

Georgina R. Bowden, Patricia Balaesque,* 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**

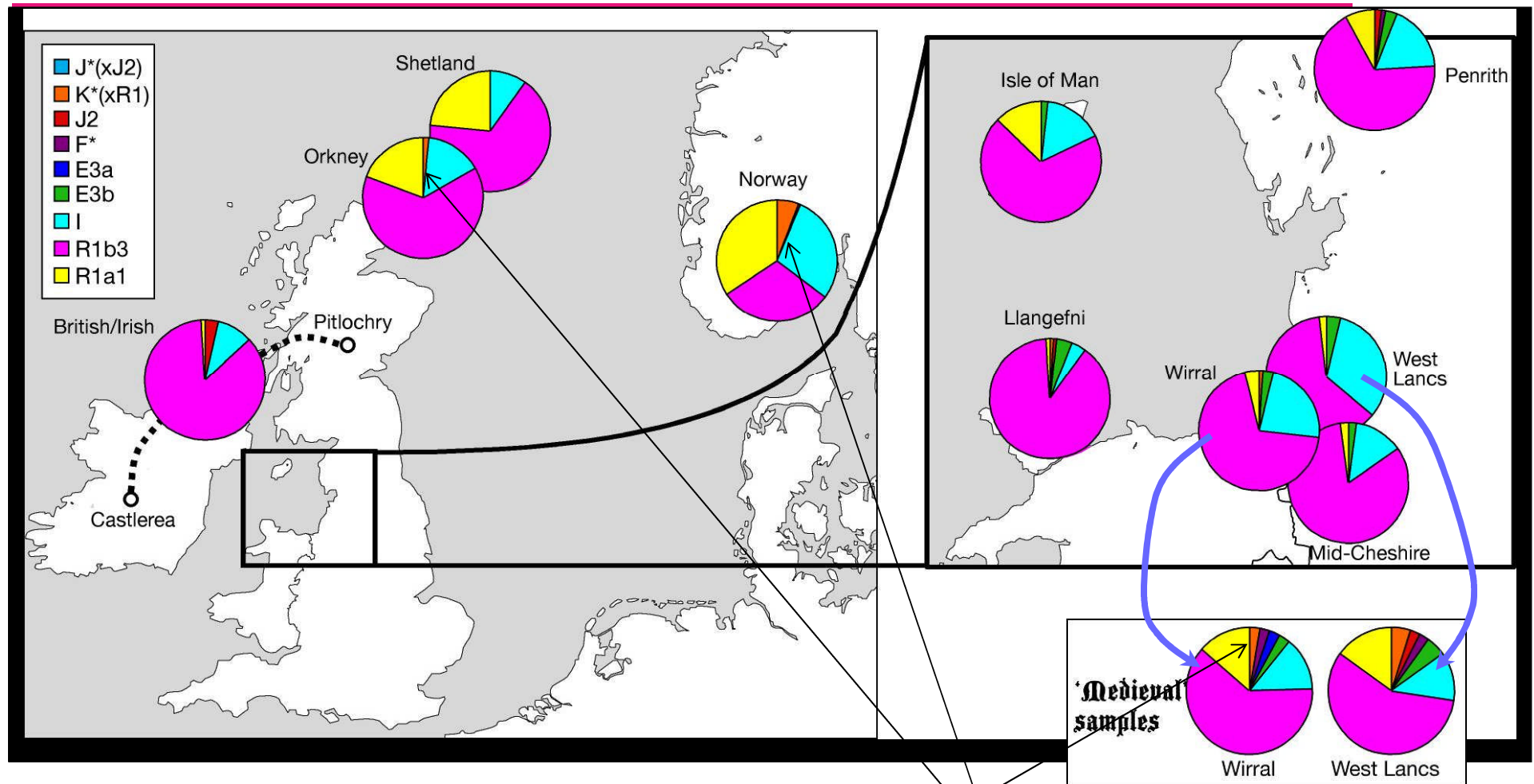
*Department of Genetics, University of Leicester, Leicester, United Kingdom; †National Centre for Macromolecular Hydrodynamics, University of Nottingham, Sutton Bonington Campus, Loughborough, United Kingdom; ‡The Queen Katherine School, Kendal, Cumbria, United Kingdom; §West Lancashire Heritage Association, 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

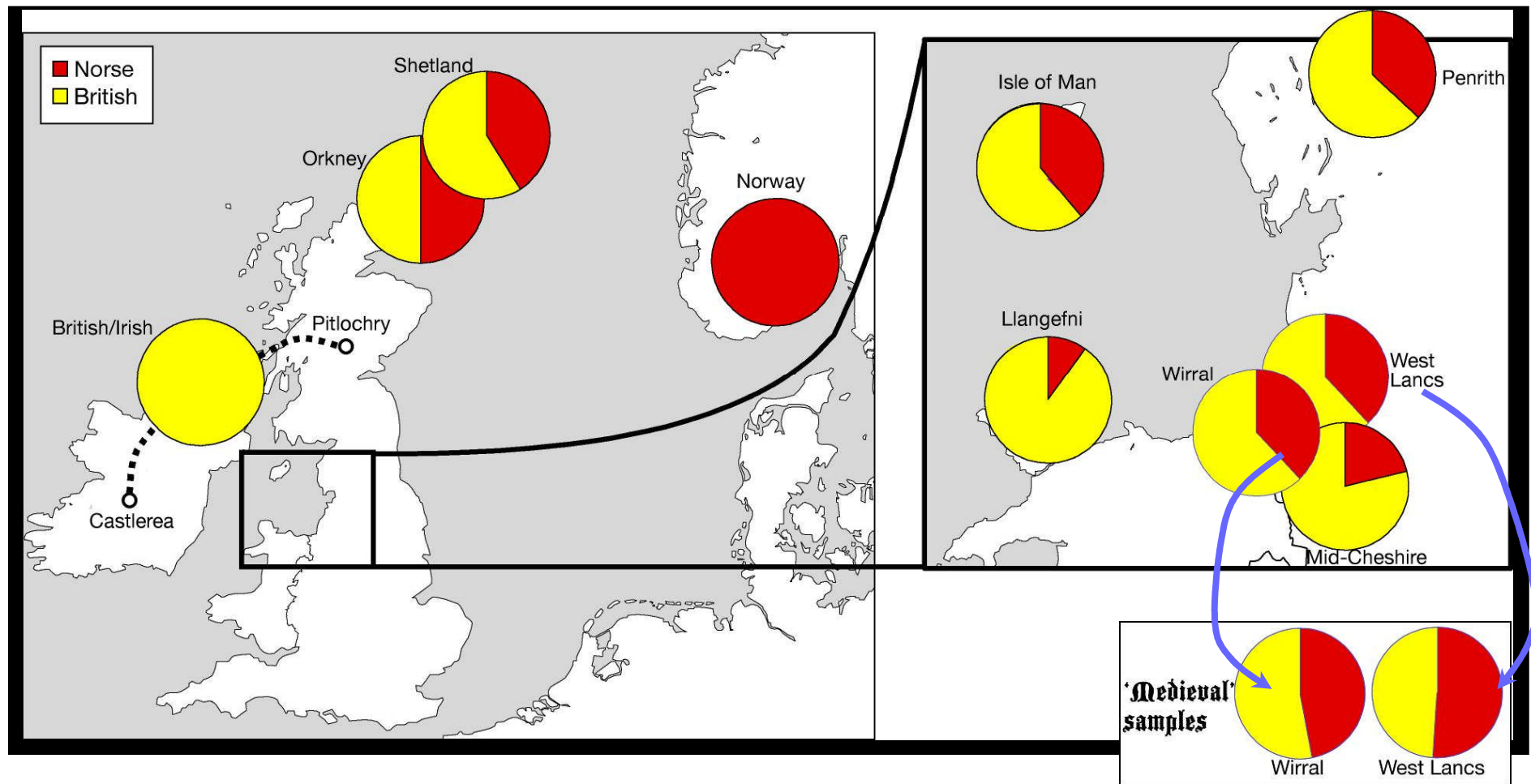


Y-chromosome distributions for the north west

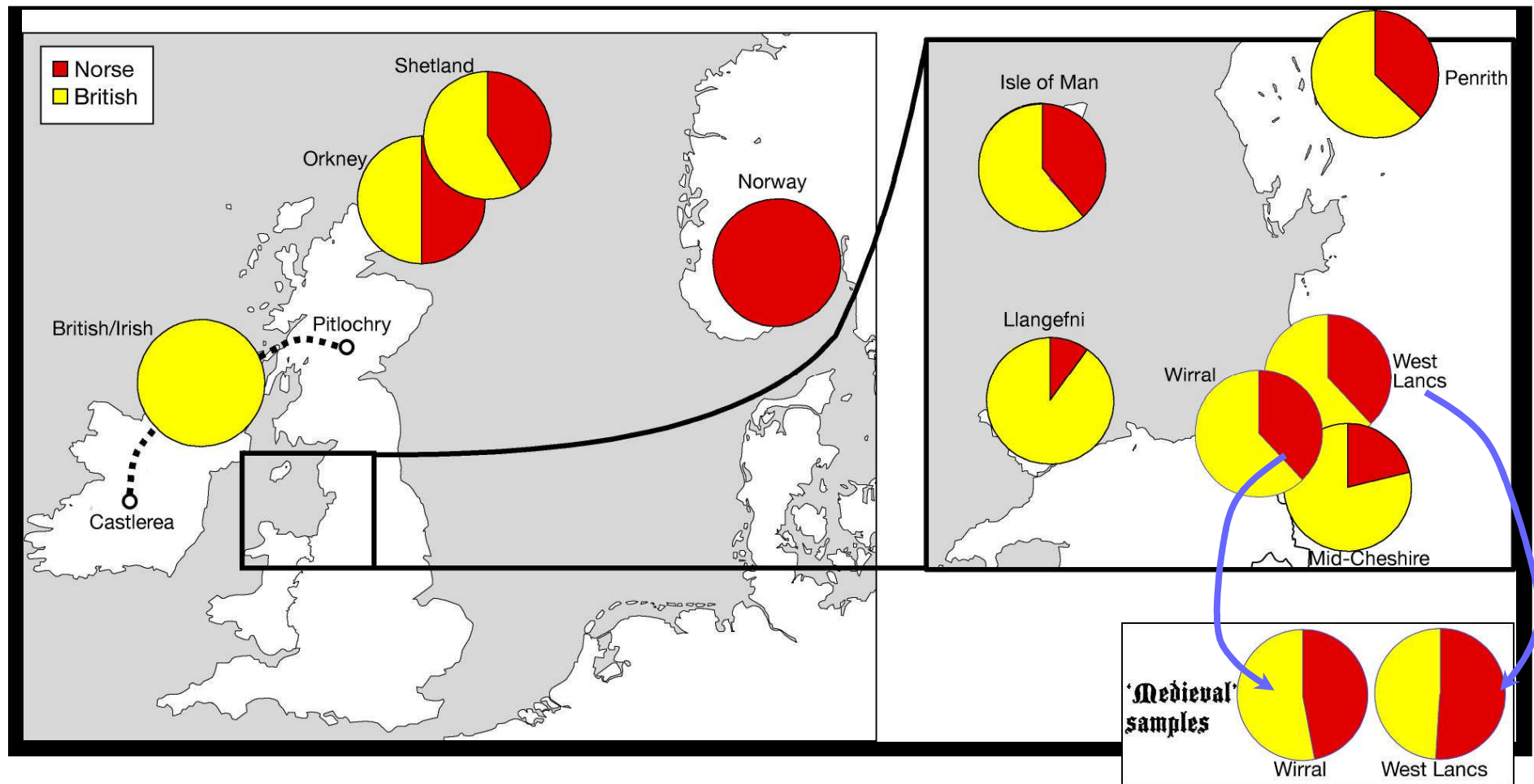


K*(xR1)

Viking admixture results



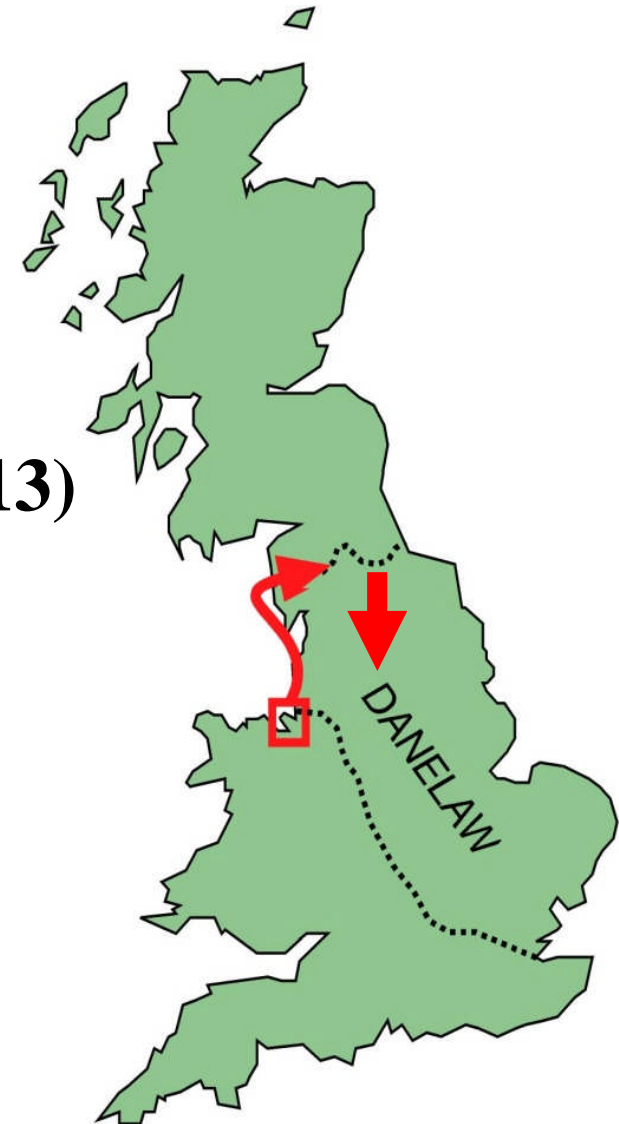
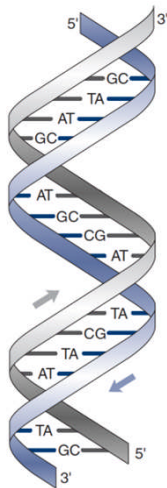
Viking admixture results



**DNA admixture
~ 50% Scandinavian**

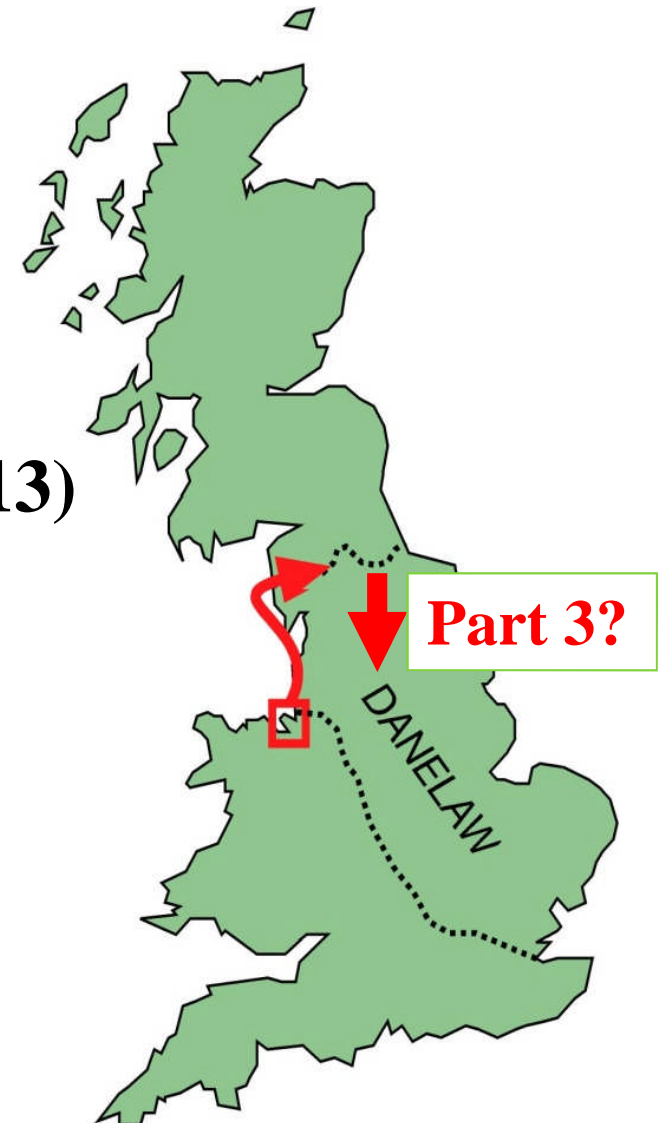
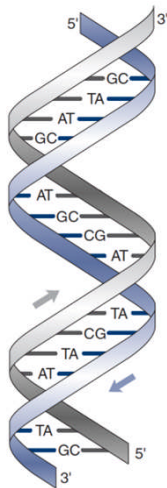
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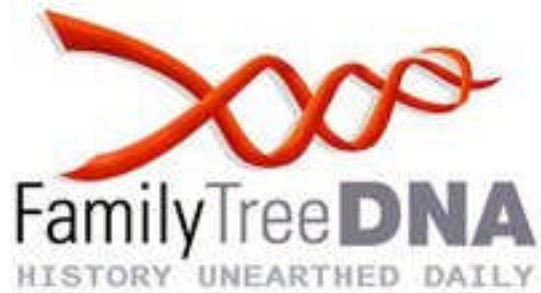
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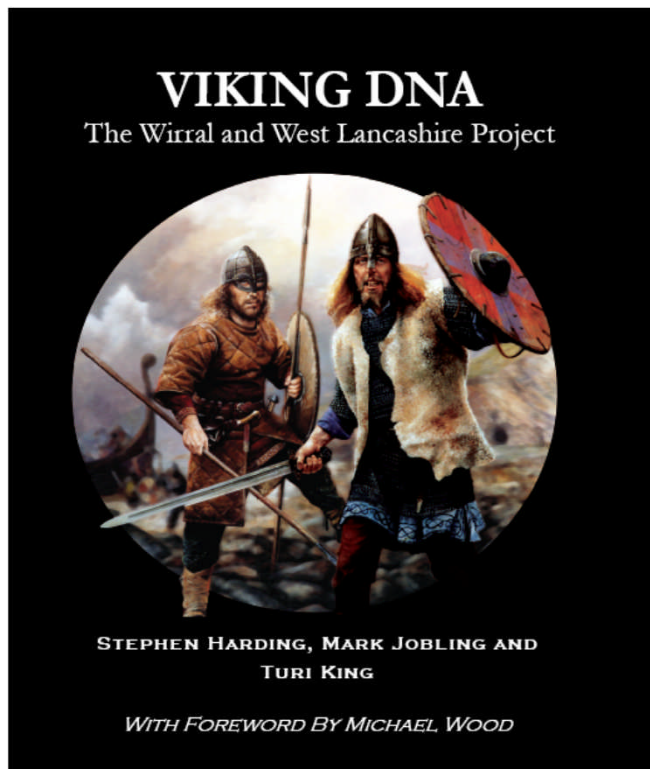
-
- **Is it worth £100?**

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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