

Viking genes in northern England project



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Team

wellcome^{trust}

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Viking genes in Northern England project

- ◆ Part 1 - Wirral and West Lancashire (2002-2007) – results published February 2008 in *Molecular Biology and Evolution*
- ◆ Part 2 - North Lancashire, Cumbria and N. Yorkshire (2008-2011)
- ◆ would be very useful if we had more extensive Scandinavian control data!



Background: Messages from our ancestors

- ◆ DNA is a ‘text’ that changes slowly through time, and varies between individuals
- ◆ **Analyse DNA from skeletons**
 - ◆ ‘Real’ information about the past
 - ◆ Difficult, small sample sizes, prone to modern DNA contamination; maybe no descendants
- ◆ **Analyse modern people**
 - ◆ Easy to get samples
 - ◆ Can be unrepresentative of past populations, need methods of inference

Genetics of physical characteristics

- ◆ Blood groups
- ◆ Poorly discriminating and widespread
- ◆ Pigmentation, stature, facial shape
- ◆ Complex, poorly understood, wide distribution in N.Europe



9 A Dane from Jutland, whose facial features remind one irresistibly of his forerunner, Tollund man (1)



10 An Icelander from Reykjavik

LIVING EUROPEAN TYPES

11 A Norwegian woman



12 Max von Sydow, Swedish film actor

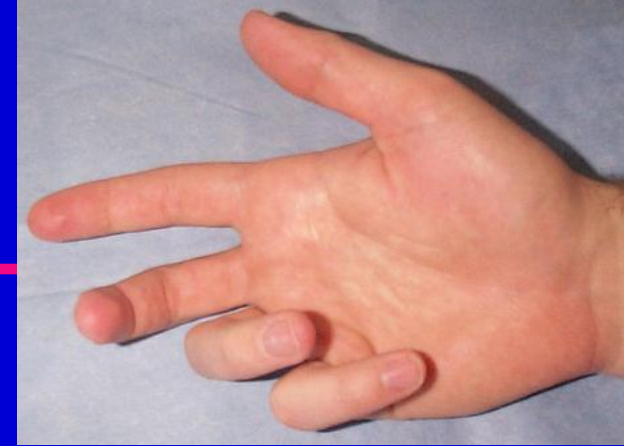


17 An English schoolgirl



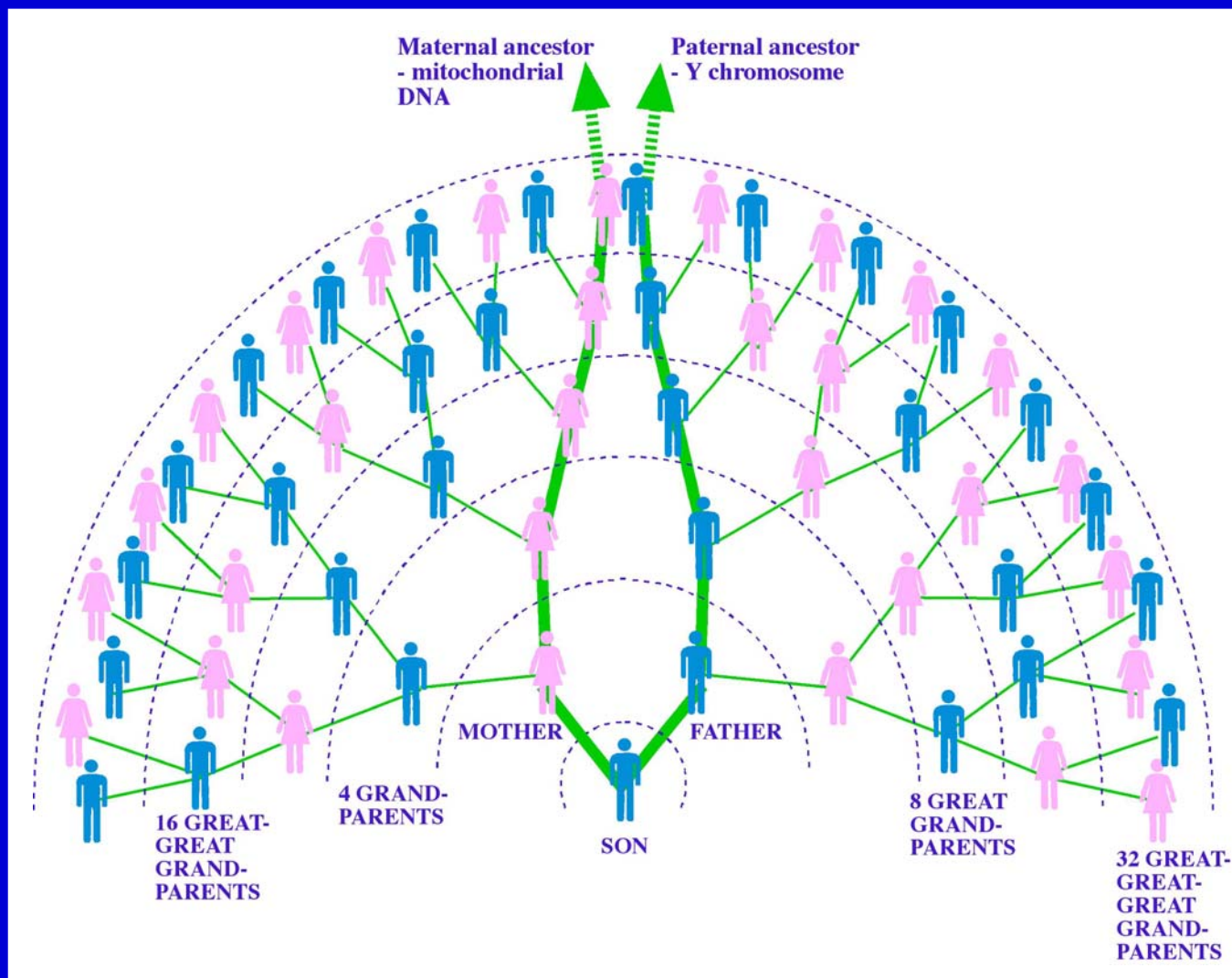
18 Ivor Emmanuel, Welsh singer

Genetics of physical characteristics



- ◆ **Dupuytren's contracture**
- ◆ **Inherited - dominant**
- ◆ **Distribution suggests possible Viking origin**
- ◆ **Evidence from Icelandic sagas**
- ◆ **More frequent in regions of Britain influenced by Vikings**
- ◆ **But - genetic basis unknown**
- ◆ **Crops up in other populations**

DNA: Maternal and paternal lines

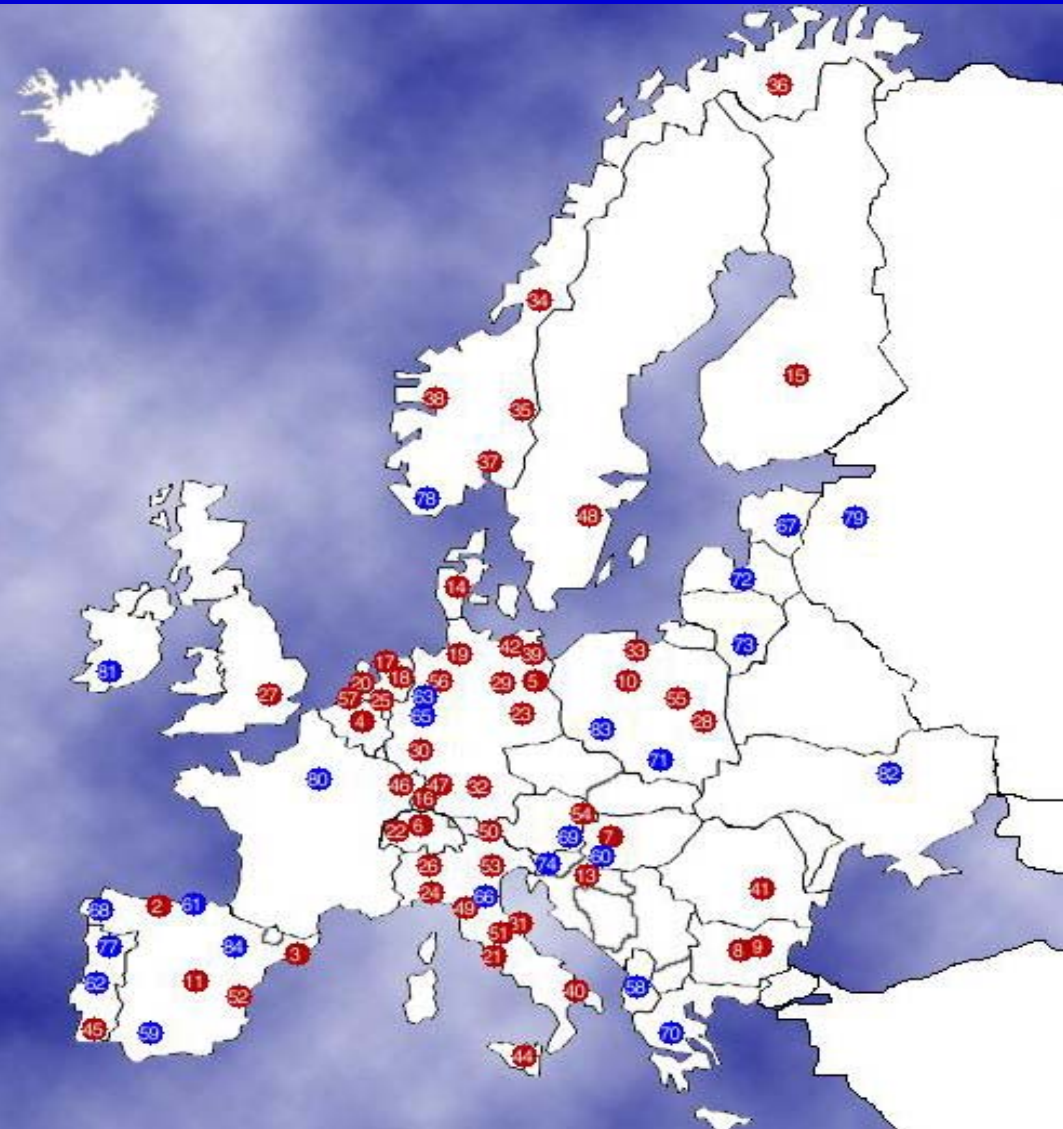


Individual Viking ancestry?



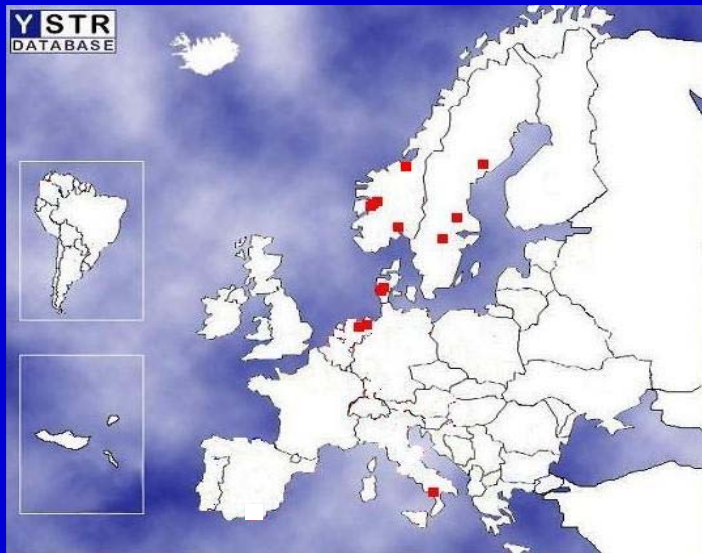
Peter Forshaw (Irby)

166 matches/13003



Population	Count	Frequency %
Norway Central	3 of 48	6
Norway East	5 of 85	6
Norway Oslo	2 of 33	6
Denmark	4 of 63	6
Norway North	2 of 45	4
Sweden	22 of 510	4
Zeeland	2 of 46	4
Budapest	3 of 117	3
Freiburg	12 of 433	3
Hamburg	3 of 114	3
Latium	6 of 222	3
Norway West	2 of 64	3

Richard Harding's y-chromosome group



No mutation, top matches:

Ostgotland-Jonköping, Sweden
and Gröningen, Friesland: ~8% of
men have a match.

**One step mutation of one of his STR's: Top
matches for each mutation:**

West Norway (2ce)

Oslo

Puglia (followed by Central Norway)

Vasterbotten, Sweden

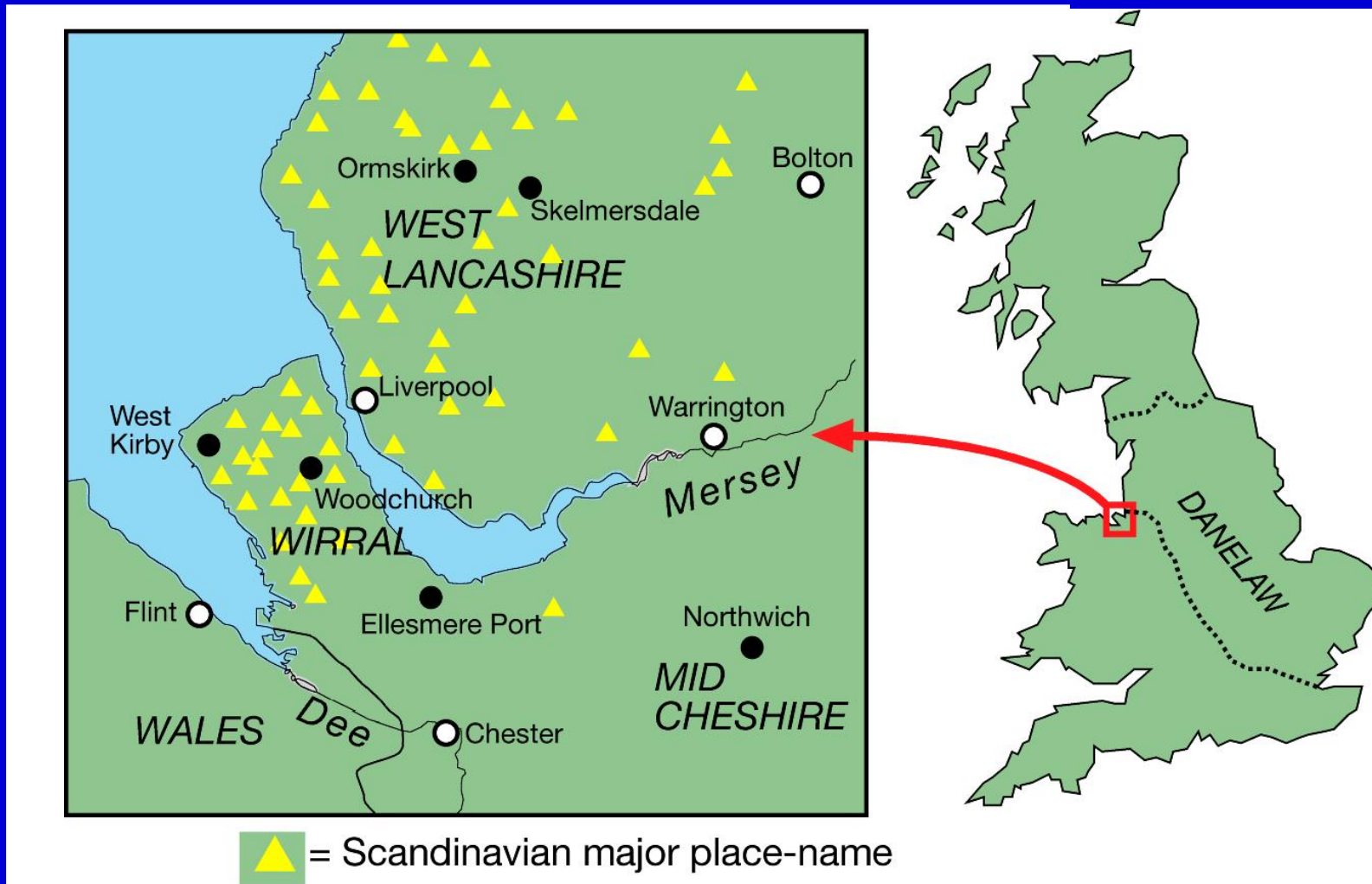
Uppsala

Denmark

Population Viking ancestry: admixture approaches

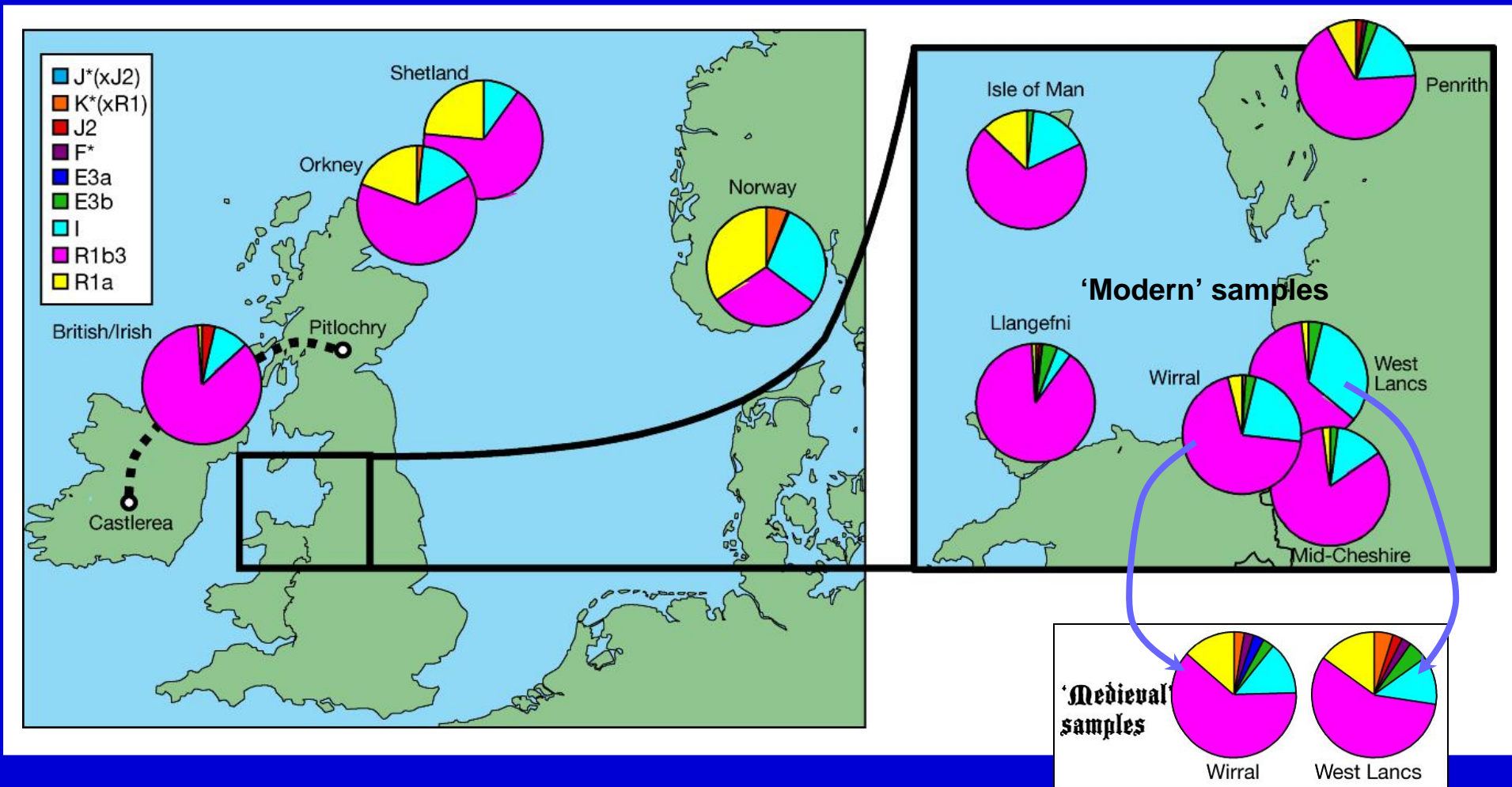
- ◆ More secure at *population* level (≥ 20 people)
- ◆ Volunteer selection and the problem of modern population movements
- ◆ 2 generation and old surname based selection criteria
- ◆ Compare distributions of y-chromosome types – “Admixture analysis”
- ◆ Resolution of the method is improving all the time

Part 1: Wirral & West Lincs



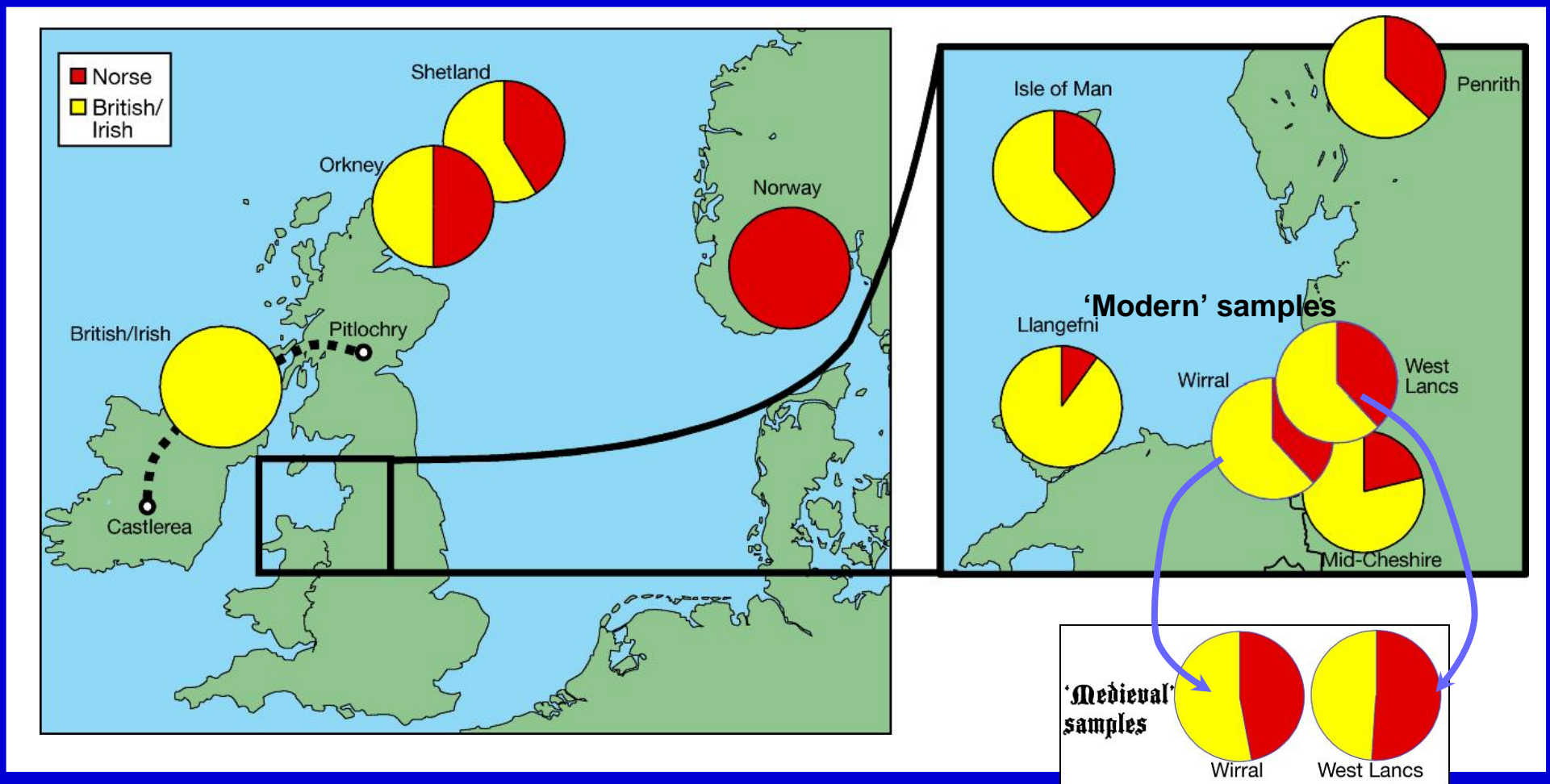
Bowden *et al.* (2008) Excavating past population structures by surname-based sampling: the genetic legacy of the Vikings in northwest England. *Molecular Biology and Evolution*

'Medieval' samples differ from 'moderns'



◆ Population differentiation test

Viking admixture results



◆ Increases in 'medieval' samples

Part 2: N. Lancashire, Cumbria and N. Yorks



... and seeking improved control data from Scandinavia



Geographical heterogeneity of Y-chromosomal lineages in Norway

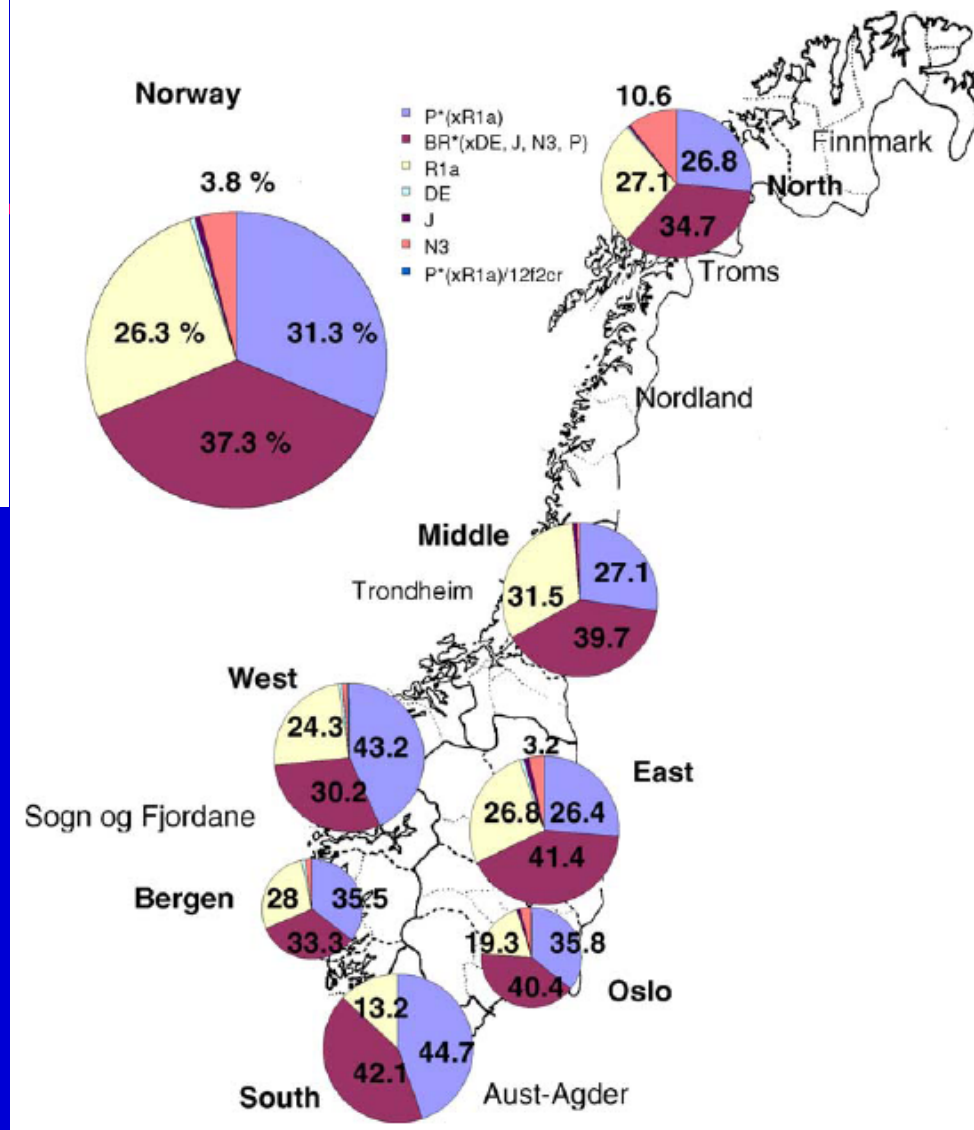
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Received 10 February 2005; received in revised form 2 November 2005; accepted 2 November 2005

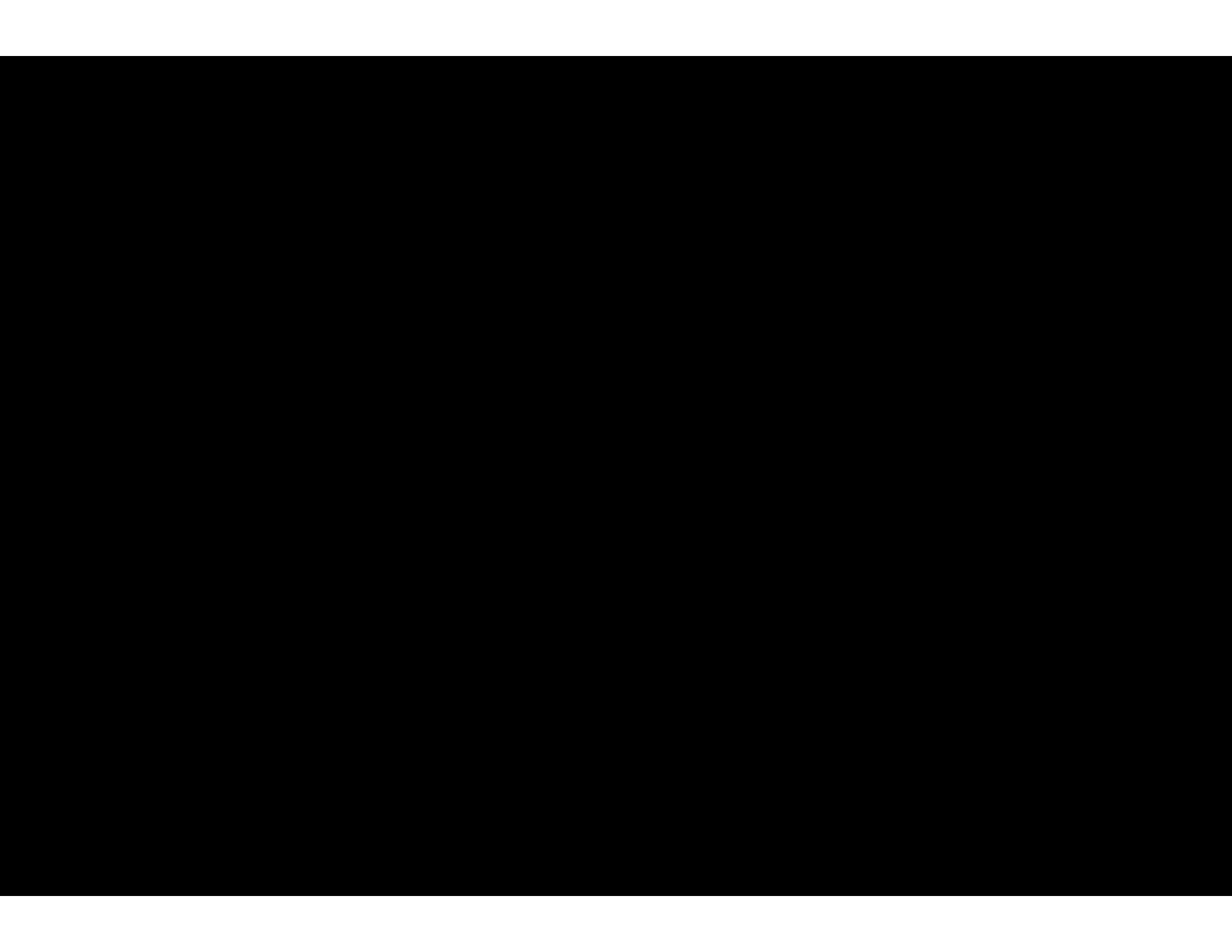
1 generation data – Norway in 1942



... is it possible to get improved control data from Scandinavia

- ◆ Berit's paper is one generation only: "Norway in 1942"
- ◆ Can we use something similar to patrilineal surnames in Britain to get a more "Medieval" data set
- ◆ So what do we do?
- ◆ Norway: suggest targetting 3 coastal sites, 3 inland sites
- ◆ Denmark: Jutland, Zealand
- ◆ Sweden: Skåne





Estimating Scandinavian and Gaelic Ancestry in the Male Settlers of Iceland

Agnar Helgason,¹ Sigrún Sigurðardóttir,³ Jayne Nicholson,² Bryan Sykes,² Emmeline W. Hill,⁴ Daniel G. Bradley,⁴ Vidar Bosnes,⁵ Jeffery R. Gulcher,³ Ryk Ward,¹ and Kári Stefánsson³

mtDNA and the Islands of the North Atlantic: Estimating the Proportions of Norse and Gaelic Ancestry

Agnar Helgason,^{1,3} Eileen Hickey,² Sara Goodacre,² Vidar Bosnes,⁴ Kári Stefánsson,³ Ryk Ward,¹ and Bryan Sykes²

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Hum Genet (2003) 112: 353–363
DOI 10.1007/s00439-003-0913-9

ORIGINAL INVESTIGATION

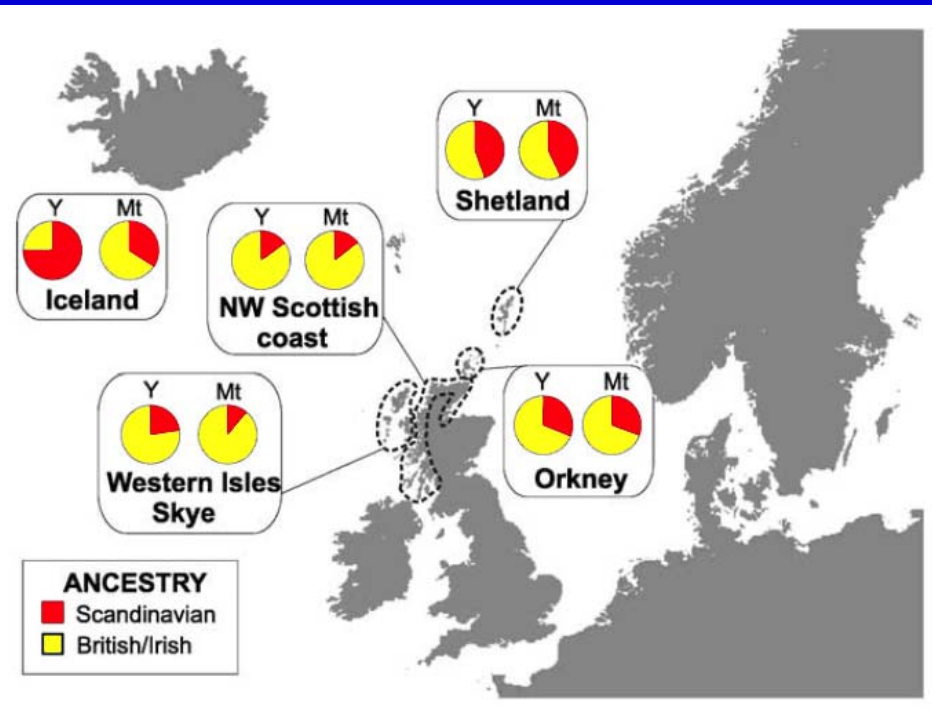
Elena Bosch · Francesc Calafell · Zoë H. Rosser
Søren Nørby · Niels Lynnerup · Matthew E. Hurles
Mark A. Jobling

**High level of male-biased Scandinavian admixture
in Greenlandic Inuit shown by Y-chromosomal analysis**

Genetic evidence for a family-based Scandinavian settlement of Shetland and Orkney during the Viking periods

S Goodacre^{1,4}, A Helgason^{2,4}, J Nicholson¹, L Southam¹, L Ferguson¹, E Hickey¹, E Vega¹, K Stefánsson², R Ward^{3,*} and B Sykes¹

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Goodacre et al. 2005

- ◆ Analysed mtDNA and Y markers, and used admixture approach
- ◆ Close to home, male and female proportions similar, so family-based settlement
- ◆ Further afield, male-biased settlement
- ◆ Most biased in Iceland