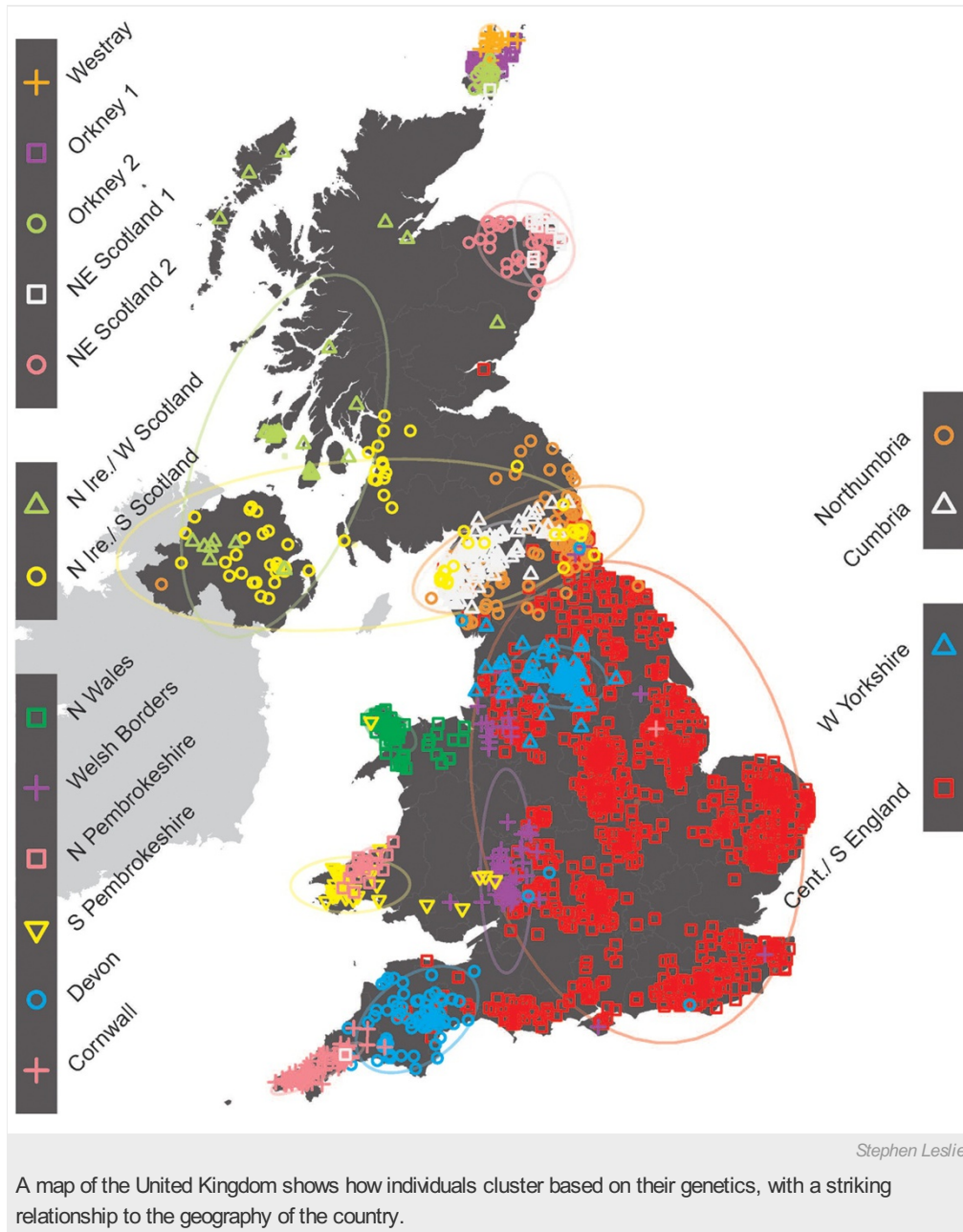


UK mapped out by genetic ancestry

Finest-scale DNA survey of any country reveals historical migrations.

Ewen Callaway

18 March 2015 | Corrected: 19 March 2015



Researchers have found genetic signatures among Britons that betray their historical roots in particular locales of the United Kingdom, leading to the finest-scale map of genetic variation yet created. The analysis — which shows a snapshot of clusters of genetic variation in the late 1800s, when people were less likely to migrate far from their region of birth — reflects historical waves of migration by different populations into the island.

“The patterns we see are extraordinary,” says Peter Donnelly, director of the Wellcome Trust Centre for Human Genetics in Oxford, UK, who co-led the study published on 18 March in *Nature*¹. “The genetic effects we’re looking at are the result of, probably, thousands of years of history.”

Nature Podcast

Today, few Britons have ancestors from just one local region of the United Kingdom, so it is

Reporter Ewen Callaway meets Peter Donnelly to discuss a portrait of British genetics.

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hard to identify patterns of genetic variation specific to any one place. But Donnelly and his team found 2,039 Britons of European ancestry who lived in rural areas and knew that their four grandparents were all born within 80 kilometres of each other. Since these volunteers' DNA was a mosaic of their grandparents', who themselves were to known be strongly linked to one British region in the late nineteenth century, Donnelly hoped to find genetic variation that clustered neatly with their grandparents' geographic location.

So it proved: a statistical model lumped participants into 17 groups based only on their DNA, and these groupings matched geography. People across central and southern England fell into the largest group, but many groupings were more isolated, such as the split between Devonians and Cornish in Britain's southwest. People who trace their ancestry to the Orkney Islands, off the northeast coast of Scotland, fell into three distinct categories. They are likely so differentiated because the islands made it hard for different populations to mingle.

As well as geographic barriers like these, the patchwork was formed by migrations into and around Britain, Donnelly says. The team analysed the genomes of 6,209 people from continental Europe to understand their ancestors' contributions to Britons' ancestry. This confirmed the flow of Anglo-Saxons from present-day Germany into Britain after the departure of the Romans in 410 ad. They interbred with local residents instead of replacing them wholly, as some historians and archaeologists have suggested. Danish Vikings, who occupied Britain between the 700s and 1100s ad, by contrast, left little signature in most Britons' genomes.

Now that DNA signatures linked to historical local settlement are known, Donnelly says that Britons or people with British heritage could conceivably use their genomes to trace the homelands of their ancestors. The team's study should also help researchers to find genetic variations linked to disease by ruling out the differences that are due to geography.

Graham Coop, a population geneticist at the University of California, Davis, says it should be possible to also map the British ancestry of people from more diverse genetic backgrounds, such as Americans. However, he says, "it gets trickier the further back that ancestry is in your family tree, as less and less of your genome is from any one ancestor."

Nature | doi:10.1038/nature.2015.17136

Corrections

Corrected: The headline of this article has been changed: the study covered the UK, not the British Isles as originally stated.

References

1. Leslie, S. *et al.* *Nature* <http://dx.doi.org/10.1038/nature14230> (18 March 2015).