

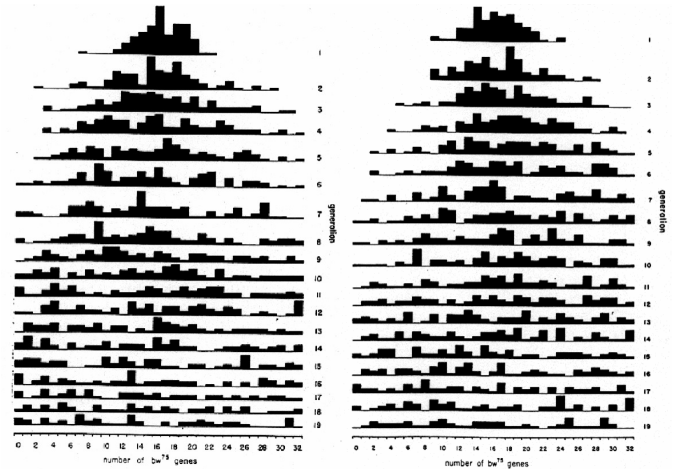
Geographic Population Structure

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April 22, 2015

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Drift Inflates Variance among Populations



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Variance among groups increases across generations (Buri 1956)

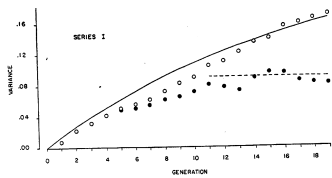


Fig. 12. Theoretical variances of the total frequency distribution by generation including fixed classes and based on a common estimate of $N_e = 18$ for series I are represented by the smooth curves. Open circles show the observed variance of the distribution including previously fixed classes. Closed circles indicate the observed total variance excluding fixed classes. The asymptote (≈ 0.091) indicates approximately the theoretical maximum value of this variance. All values are on a relative scale.

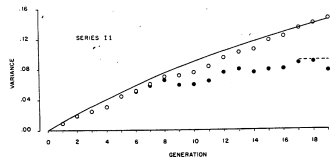
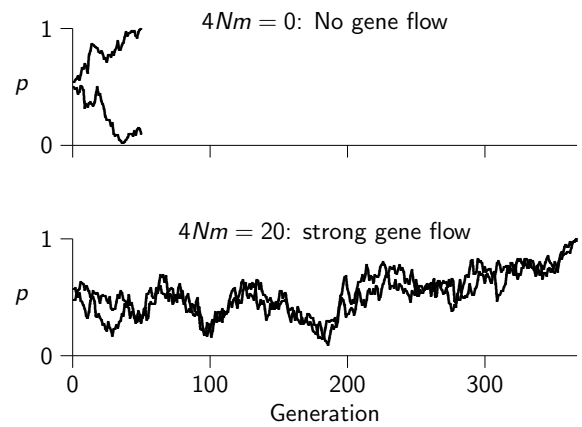


Fig. 13. Theoretical variances of the total frequency distribution by generation including fixed classes and based on a common estimate of $N_e = 23$ for series II are represented by the smooth curves. Open circles show the observed variance of the distribution including previously fixed classes. Closed circles indicate the observed total variance excluding fixed classes. The asymptote (≈ 0.091) indicates approximately the theoretical maximum value of this variance. All values are on a relative scale.

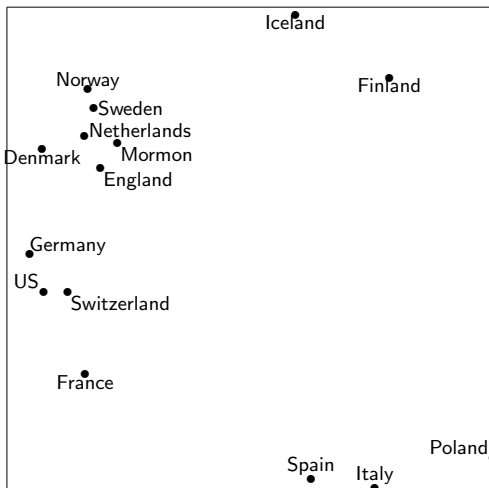
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Gene flow (migration) reduces population differences



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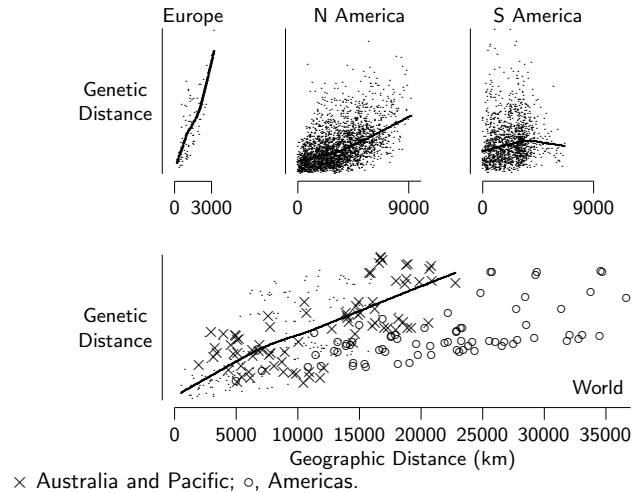
PC map of European genetic distances



Genetic differences resemble geographic differences (McLellan et al 1984)

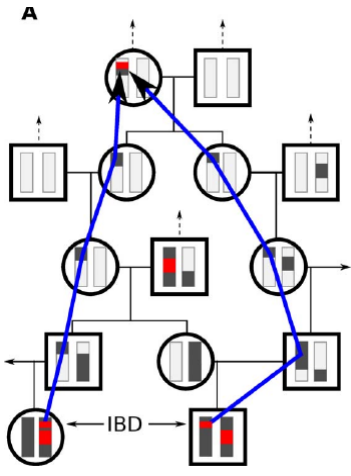
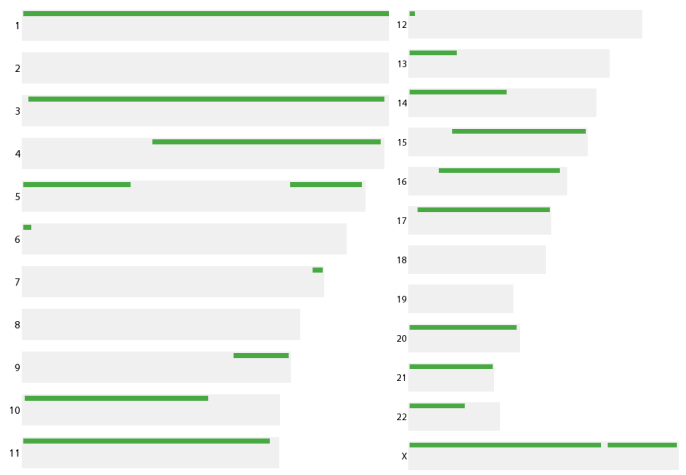
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Genetic and geographic distance



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Long shared segments => recent common ancestry

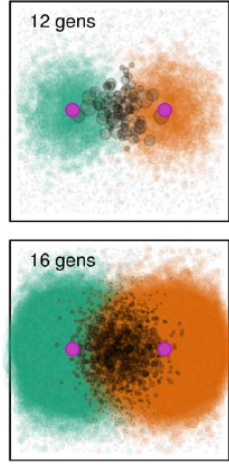


Study of Ralph and Coop (2013)

Tracing shared segments through a hypothetical genealogy.

Long segments => recent ancestry.

Ancestry spreads out in space

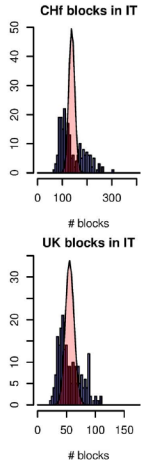


Green: geographic spread of ancestry of left point.

Orang: geographic spread of ancestry of right point.

Gray: common ancestors of left point and right.

Italians

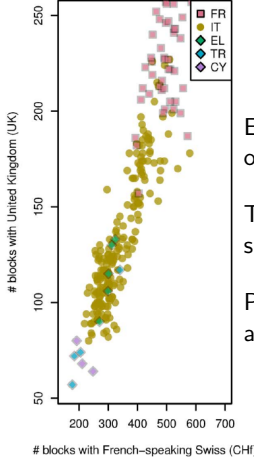


Top: number of blocks shared with French-speaking Swiss.

Bimodal: some Italians share a lot of blocks with Swiss. Others only a few.

Bottom: number shared with UK

Sharing with French-speaking Swiss and UK

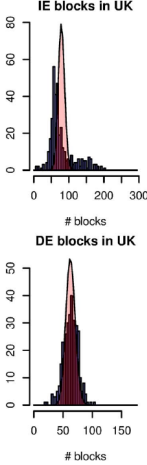


Each dot an individual. Color shows country of origin.

Those who share ancestry with Swiss also share ancestry with UK.

Presumably reflects immigration from ancestors of Swiss and British.

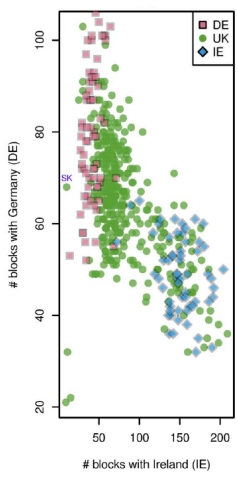
British



Top: number of blocks shared with Irish.

Bottom: number shared with Germans.

Sharing with Irish and Germans



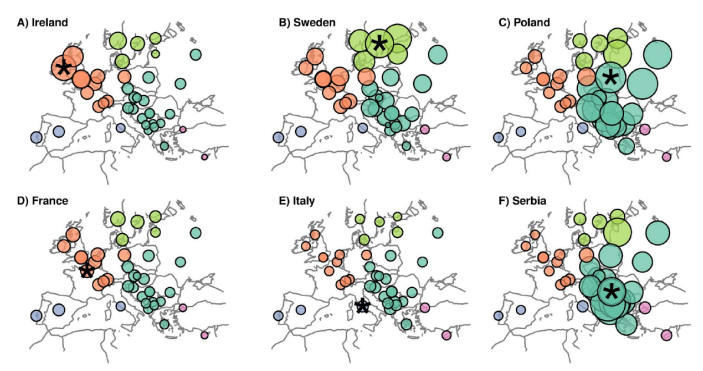
Each dot an individual. Pink, Germans; Green, British; Blue, Irish.

Brits with lots of German ancestry have little Irish ancestry.

British population is a mixture of Celts and Germans.

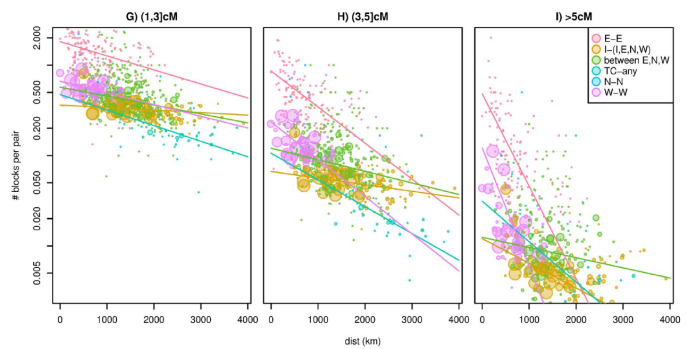
If we focused on shorter IBD blocks, we'd be studying a different time scale, and the pattern might be different.

Geographic decay of recent relatedness



Size of circle shows mean number of long ID blocks shared with labeled population.

Geographic decay of recent relatedness



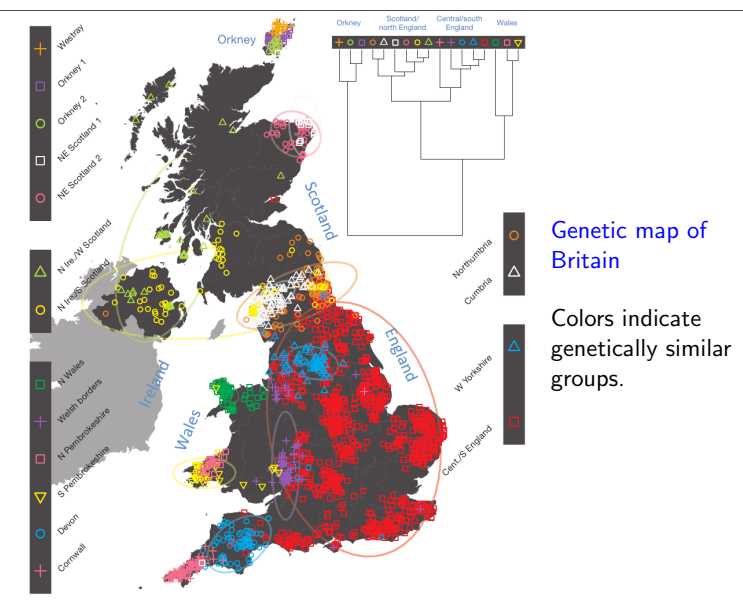
Genetic similarity versus geographic distance. Small dots are pairs of individuals. E, Eastern Europe; W, Western Europe; N, Northern Europe; I, Italy & Iberia; TC, Turkey & Cyprus. (Ralph & Coop 2013)

Fine-scale genetic structure of the British population

Leslie et al (2015)

2049 people from rural areas, whose 4 grandparents were born within 80 miles of each other.

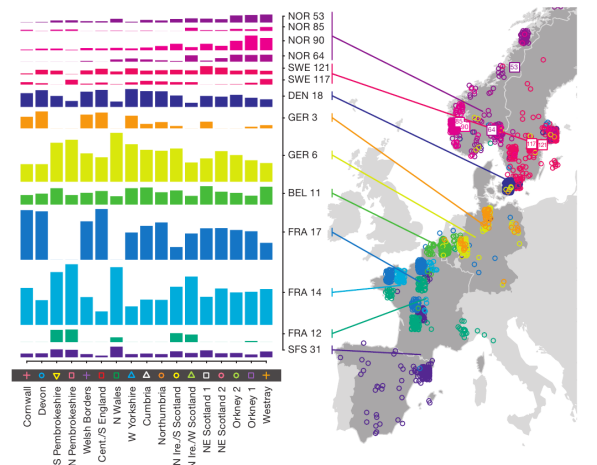
Use LD across genome in addition to variation at individual loci.

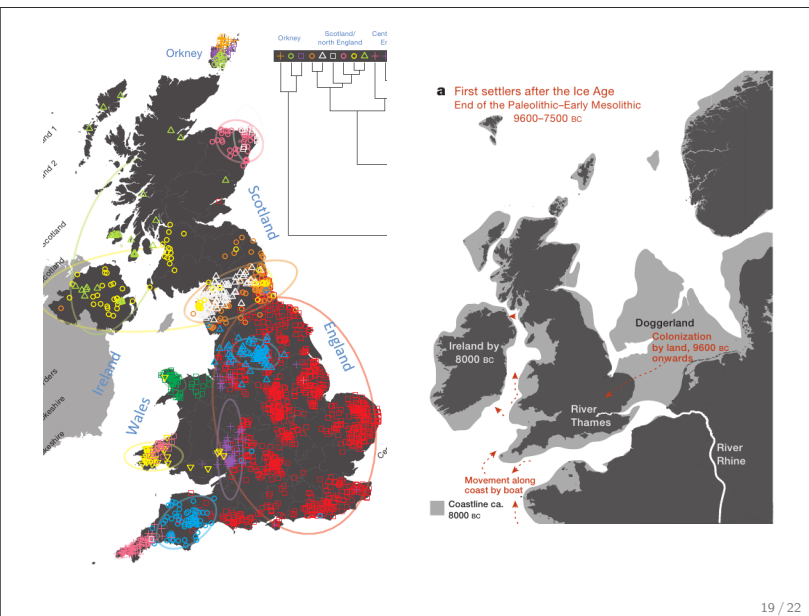


Genetic map of Britain

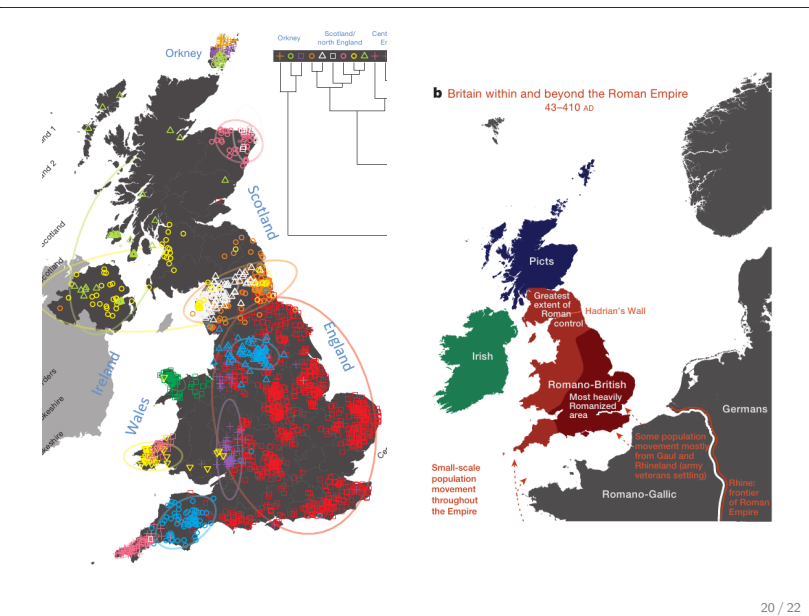
Colors indicate genetically similar groups.

Leslie-ancestryProfiles.png

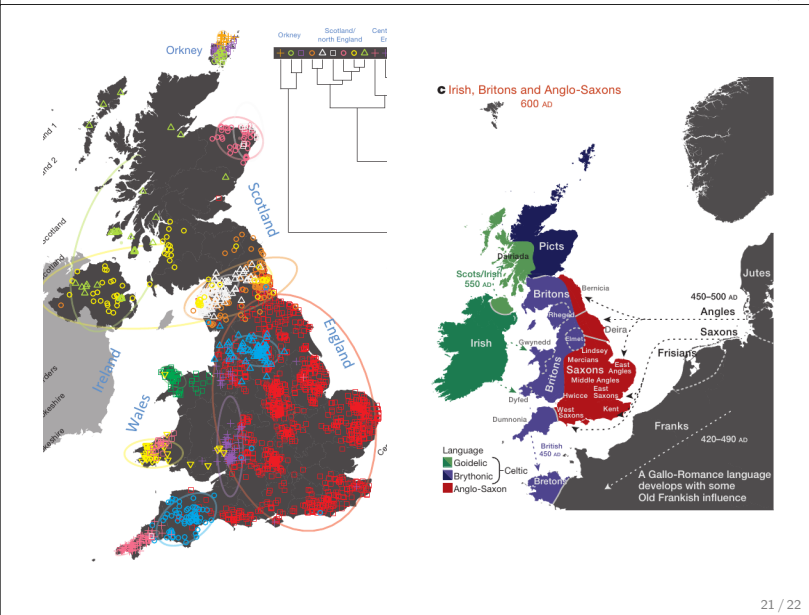




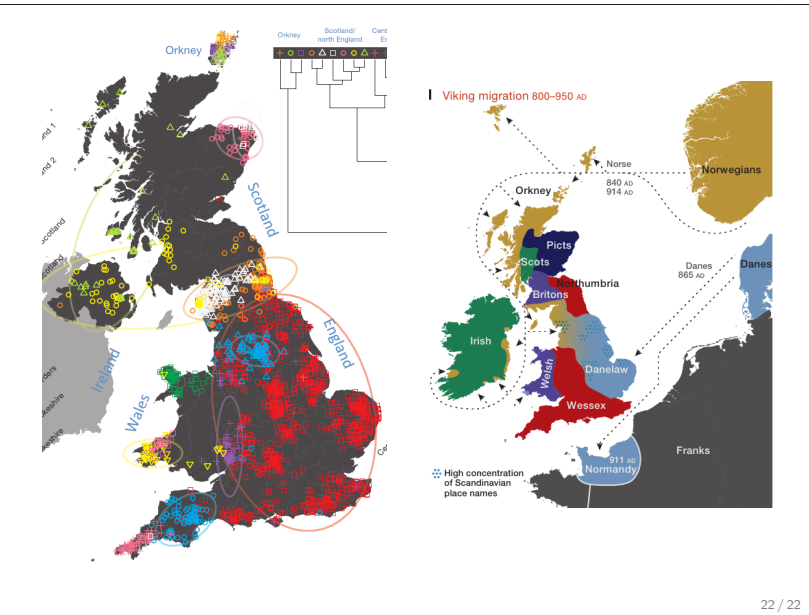
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