A simulation of early human migration

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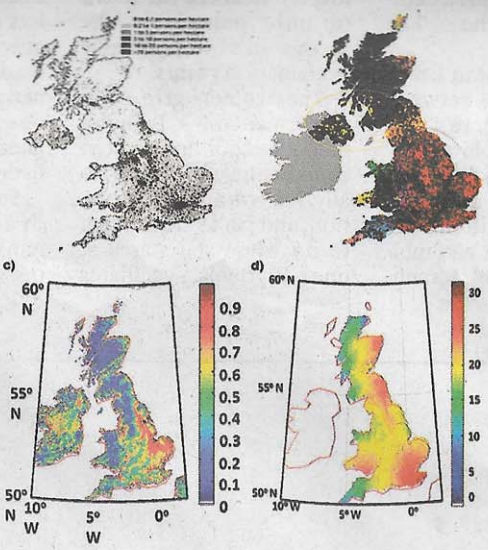
Modelling population migration in early times (prehistoric) as a diffusion process and using current topographical data, scientists from Tata Institute of Fundamental Research, Mumbai, have simulated the diffusion of prehistoric population through the British Isles. Cross-checking their results, published in *PLOS One*, with known genetic data, they find that the pathways of migration derived from their simulation match with those observed in the genetic data.

This method can now be used to understand the early migration of populations in any place in the word and to predict where archaeological remains could exist. "We chose England because it is isolated and also because good genetic map of the island is available," Dr Mayank Vahia of TIFR, the first author of the paper, said in an email.

In the model, people enter the islands from five points: Cornwall, Wales, Scotland, North England and South England. The input for this comes from Protohistorical and Prehistorical sites in England. Then the populations diffuse through the country, or move along a gradient of "habitability," which itself is defined as a function of geographical factors such as altitude and those relevant to survival such as availability of food, game etc. The premise is that migration of the bulk of people would have been motivated more on the need to settle and survive than on seeking adventure. Since the topography changes only on geological scales while the timescale they are looking at is more on the order of ten thousand years, the authors can justify the use of current topographical data in their study.



ENGLAND MAPPED(From top right, clockwise) the present population; the genetic map; simulation of population distribution and habitability. The red regions indicate more comfortable places to live. PHOTO: SPECIAL ARRANGEMENT

On the use of genetic data to validate their results, Dr Vahia says, "Each isolated group has its own unique genetic signal and where the populations merge, we get mixed signals. In our simulation, we assume that the people enter England as specific locations (with unique genes) and check where they meet. At the meeting points, you will get mixed genetic signals. This agrees with direct observations."

However, the model does not include human conflict or technological advancements and is limited to that extent. This still makes it possible to study early population migration, when vast tracts of open country would have been available to the population. "We can predict how people must have moved and suggest where one is most likely to find ancient archaeological remains will be found. The model can also be used to understand cross cultural influences etc," he says.

Now that the model has been validated by the observed correlation with genetic data,

It can go further and pinpoint places where populations merged and parted, even in places like India where the tracking of migration patterns using genetic data yields very broad features and cannot help archaeology, for instance.

To the authors, the model "probably suggests that by nature humans have been more accommodative of each others and we have been wrong in assuming that two groups coming against one another will fight."