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Genetics without borders

A UK government scheme to establish nationality through DNA testing is scientifically flawed, ethically dubious and potentially damaging to science.

Until a few years ago, the genetic variation of humans was understood only in terms of superficial characteristics, such as hair and skin colour. Today, thanks to the advent of cheap, fast genetic sequencing and DNA-microarray technologies, population geneticists can chart such variations in a more systematic way. Yet most experts agree that these studies are still in their infancy.

So it was with understandable incredulity that researchers received a plan by the UK Border Agency to use genetics to determine nationality — specifically, the origin of asylum-seekers claiming to be from war-torn Somalia. The agency's pilot programme, which began last month, aims to determine whether some 100 individuals really are Somali nationals by checking them for the individual DNA variants known as single nucleotide polymorphisms (SNPs) in mitochondrial DNA, on the Y chromosome and elsewhere in the genome. The scheme will also use isotopic ratios of elements found in hair and fingernails — which can vary depending on a person's diet or environment — to try to establish where the migrants previously lived.

The border agency says that the project has undergone scientific peer review, although it is difficult to say by whom: several geneticists contacted by *Nature* saw a preliminary proposal from the UK government in 2007, and warned that it was unlikely to work.

It is true that the recent development of large SNP databases have made it possible to determine the geographic origins of Europeans to within a few hundred kilometres (see *Nature* **456,** 98–101; 2008). But comparable data on many human populations, especially in regions such as Africa, remain patchy at best, and it is unclear what data the border agency will use to establish the origins of these particular asylum-seekers.

On a more fundamental level, the idea that genetic variability follows man-made national boundaries is absurd. Cross-border migration is common throughout the world; Y-chromosome analysis can easily be thrown off by a distant male ancestor; and SNP-based identifications are inexact to say the least. As an example of this last point, individuals whose parents come from two geographic regions are often classed into a third region from which neither parent originated.

The use of isotopic analysis for identifying nationality is also unproven. Although it may be possible to use isotopic ratios to determine the region in which a person has recently lived, it cannot provide definitive evidence of their origins.

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These problems seem to be ignored in the guidelines provided to border agents testing the asylum-seekers. Given the scientific credibility of DNA evidence, it is not difficult to imagine that these agents — who are presumably not geneticists — might place undue weight on results that are, at best, difficult to interpret and, at worst, spurious.

Migration organizations and geneticists alike have been vocal in their protests against the plan, and in response the UK government seems to have backpedalled. In a statement released earlier this week from the Home Office, which runs the border agency, the programme was described as only a proof-of-concept project that would not be used to make decisions about any asylum-seeker. But the government should cancel this scientifically dubious and politically sensitive programme outright. If it is allowed to continue, it could easily lead to a public backlash in the very populations that geneticists need to study to understand human origins and the genetic underpinnings of disease. Geneticists, and indeed all scientists, should decry the plan and make it clear that the science does not support it. ■

Putting DNA to the test

Genetic-testing companies lack regulation, and a list of guiding principles does not go far enough.

The availability of affordable, direct-to-consumer genetic tests has mushroomed, leaving regulation lagging behind. Dozens of companies now offer inexpensive home kits that allow people to spit into tubes, send the samples for DNA analysis and receive a report that allegedly details their ancestry or their possible susceptibility to a long list of disorders that have been linked — often tenuously — to particular genes. But the value of these tests remains debatable, which is why the industry needs a strong set of quality standards and codes of conduct to protect both its consumers and its own credibility.

The UK Human Genetics Commission (HGC) took a welcome step in that direction last month when it issued a set of principles to help guide consumers and to promote high standards and consistency among personal-genomics providers. But the HGC's guiding principles — which are under public review until early December — focus largely on reining in companies' promotional messages so that they reflect the limited utility of genetic testing, and to make would-be customers more aware of what they can realistically expect to learn from the tests. Most DNA testing companies say they are already doing just that, emphasizing that what they provide is information, not medical diagnoses.

The question is what happens if or when prices drop further and the tests become more popular. They are already being marketed over the Internet with little oversight, and it seems likely that increasing numbers of people will be turning to personal-genomics companies in search of definitive answers about how to improve or safeguard