

sexism nearly as well. The scientific imagination has been institutionalized to validate such moral cover with neutral-sounding nature narratives. As archaeologists, or as scientists and humanists more generally, we must think out of the box of the Enlightenment's colonial assumptions (Blakey 1998), requiring careful study of the political histories of our fields and the theories we borrow and use. Rarely part of standard curricula, for what may be obvious reasons, I have found the problem of white supremacy to be pervasive in the arts and sciences. Only with a sophisticated understanding can one rationally challenge racist colleagues and replace their imaginations with self-critical and progressive inquiry on the field of evidence.

Many a sincere person will answer me: 'Our attitude toward Negroes is the result of unfavorable experiences which we have had by living side by side with Negroes in this country. They are not our equals in intelligence, sense of responsibility, reliability.' I am firmly convinced that whoever believes this suffers from a fatal misconception. Your ancestors dragged these black people from their homes by force; and in the white man's quest for wealth and an easy life they have been ruthlessly suppressed and exploited, degraded into slavery. The modern prejudice against Negroes is the result of the desire to maintain this unworthy condition . . . (Albert Einstein, 'The negro question', *Pageant*, 1946, in Jerome and Taylor 2005, 86–87).

Notes

- 1 Lumsden and Wilson used the calculus to demonstrate their best case of an epigenetic primordial (essentially racial) basis for food preferences, a few years before today's explosive cosmopolitan culinary choices would make this laughable.
- 2 Olaudah Equiano's (1998) first accurate accounting of African societies swept into the American slave trade emphasizes the people's fastidious cleanliness, pointing to the source of southerner's descriptions of them as 'filthy' (Kiple and King 1981) as derivative of their imagination, the conditions they imposed on Africans, or both.
- 3 Single-word headings are taken from Carolus Linnaeus's first scientific descriptions of different races in *Systema naturae* (1758), in which he writes Eurocentric stereotypes, convenient to moralizing their exploitative interactions with others, onto nature.
- 4 The Smithsonian's Douglas Owsley led the racial interpretation of Kennewick Man (the Ancient One) as Caucasoid or Eurasian (Owsley and Jantz 2014) in order to have his way around NAGPRA law to its analysis. It would take 20 years for Danish geneticists to prove what Native Americans (and any working from evolutionary rather than racial taxonomic assumptions) already knew: the Ancient One is most closely related to Native Americans (Rasmussen *et al.* 2015).

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Imagined biodeterminism?

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Michael Blakey's paper is an important reminder of the egregious paths down which the 'bio-deterministic imagination' can lead. This kind of biologically deterministic thinking is a major concern amongst archaeologists digesting recent studies of archaeogenetics (Booth 2019; Frieman and Hofmann 2019; Hakenbeck 2019). Sudden progress in methods of sampling, sequencing and analysis of DNA extracted from ancient human remains has meant there has been a recent glut of papers which use ancient human DNA to investigate past population histories. Some of these articles find evidence for major population movements associated with changes to

material culture and ritual practices documented in the archaeological record (Skoglund *et al.* 2012; Haak *et al.* 2015; Olalde *et al.* 2018). The limited amount of critical discussion regarding the social mechanisms involved in these movements of people, and how they may have influenced cultural change, means that they are sometimes taken to suggest that groups with particular ancestries were genetically predisposed to developing a particular type of culture, an idea which lends itself to narratives of biologically superior groups replacing inferior ones. In addition, correlations between ancestries and cultural practices in the past are perceived to infer that material-cultural and ritual practices and other expressions of cultural identity were immutably linked to shared ancestry, reifying notions of ethnic groups in the past (Frieman and Hofmann 2019; Hakenbeck 2019). Like the genetic studies Blakey discusses, these narratives can be reminiscent of old discredited ideas that were used to prop up racist ideologies.

At the same time we have seen the direct application of the biodeterministic imagination to heritage and identity through the rise of direct-to-consumer (DTC) genetic ancestry tests which purport to tell you who you are (Nash 2015; Nelson 2008; Panofsky and Donovan 2017; Roth and Ivemark 2018). In the UK at least, ideas that aspects of heritage and identity are necessarily tied to deep ancestry are entrenched among the public. Certainly, the way in which DTC genetic ancestry companies market their tests encourages biologically deterministic thinking around these issues, but I believe this is a much older problem linked to a failure to challenge the public's view of heritage and identity linked to deep ancestry. Archaeogeneticists themselves have little to nothing to do with DTC ancestry testing companies, and in some cases geneticists have been highly critical of these tests (Balding *et al.* 2020). Genetic ancestry tests do not currently rely on data generated by ancient-DNA laboratories, but on comparisons between data from present-day populations under the (untested) assumption that they will reflect genetic diversity in past populations (Royal *et al.* 2010).

Do archaeogeneticists themselves see themselves as making biodeterministic arguments of the sort presumed to be implicit in their studies? Many studies of archaeogenetics identify substantial cultural change that is not accompanied by genetic shifts (Olalde *et al.* 2018). Indeed some studies have shown remarkable genetic heterogeneity amongst people associated with traditional cultural groupings, subverting any simplistic interpretations of well-defined ethnic groups expressing their biological identity through cultural practice. In cases where archaeogeneticists do detect associated shifts in ancestry and cultural practices, their usual argument, not always made explicit, is that one may be influencing the other, but not that they are inextricably causal, either through genes dictating cultural behaviour or through construction of distinct ethnic groups with shared ancestry.

There is often an arguably naive, unspoken and under-theorized assumption in archaeogenetics papers that new groups of people moving to a new place and reproducing a version of the culture they practised in the place from which they came is enough to explain changes in material record. No archaeogenetic studies have yet attempted to make any inferences about how people in the past constructed their identities. Many archaeogeneticists would not feel qualified to follow varied theoretical approaches that may provide alternative explanations of their data, and in any case it is likely that their data would not be good enough to test particularly complex scenarios robustly without further sampling (Booth 2019). The restrictions on word counts and citations in the high-impact academic journals of the kinds in which archaeogenetics researchers are compelled to publish mean that it is often difficult for them to be discursive regarding alternative hypotheses.

Most archaeologists understandably find it difficult to scrutinize archaeogenetics papers, meaning that they have to have a certain level of trust in archaeogeneticists that their analyses are sound and their interpretations justified. This situation is something that many archaeologists are uncomfortable with. The lack of discussion or even citation in archaeogenetics papers of up-to-date theoretical frameworks of population movement and cultural change in the archaeological record

can come across as disrespectful, or, worse still, as archaeogeneticists discarding recent work in favour of old discounted narratives on an ideological basis. Resemblances between narratives of population movement coming out of archaeogenetics studies, and old archaeological theories that helped to inspire racially supremacist ideologies, have additionally made archaeologists wary of the discourse emanating from archaeogenetics (Frieman and Hofmann 2019; Hakenbeck 2019).

All of these factors contribute to an atmosphere of mistrust between archaeologists and archaeogeneticists. Overcoming these issues of trust will be key to better integration of archaeology and archaeogenetics. Ultimately I believe this will have to involve archaeologists acquiring some literacy in archaeogenetics, but in the meantime archaeologists could consider whether the inferences they use to fill interpretive gaps in archaeogenetics papers are justified. Archaeogeneticists could better explain the assumptions implicit in their analyses and interpretations which are often omitted or obscured in their papers, try to develop a greater awareness of the history of archaeological thought and try to acknowledge this diversity of thought in their interpretations.

It is concerning that Blakey is able to construct such a forceful argument that the studies he discusses represent attempts to downplay or discount the socio-economic effects of race and racism on health and social outcomes. It is undeniable that the socio-economic effects of racial discrimination contribute substantially to unequal outcomes in particular communities. I am very aware that I am deeply embedded in the scientific tradition of which Blakey is highly critical, but I believe that the root cause of some of the issues he describes shares some parallels with the tensions between archaeogeneticists and archaeologists in terms of what is omitted and/or implicit. In these cases it is not so much that the data or analyses are inscrutable, but that the focus on biological interpretations of data creates a tunnel vision which leaves other potential explanatory factors unspoken, implicit or obscured. When combined with the history of racist thought found throughout the recent histories of disciplines which have aimed to characterize human diversity, it is easy to see how distrust and suspicions of researchers' intent can arise.

I, and I think many population geneticists, would argue that terms such as 'population' and 'ancestry' are not euphemisms for race, and do not represent attempts to sanitize racial groups. In the discussion of human genetic diversity, terms like 'population' and 'ancestry' represent a convenient way of talking about genetic structure (for an accessible summary see Birney *et al.* 2019). Genetic structure is defined by the genetic data and not by pre-existing population labels, it can be found at any resolution down to the family level, it is always clinal, and while it does reflect genetic drift it also relates to histories of admixture. This contrasts with concepts of race, which are predefined social categories, set at a continental scale and popularly thought of as discrete, indivisible and unmixed. However, the subtleties of terms like 'population' and 'ancestry' are not always explained in population-genetics papers which discuss genetic structure, where they are often presented as discrete, bounded groups. This is often done for convenience in order to be able to talk more easily about genetic structures, something like the shorthand labels applied to archaeological 'cultures' which most archaeologists agree are not 'real things'.

In this sense one of my primary concerns with David Reich's *New York times* article was that it replaced the word 'population' (as it appeared in the associated book chapter) with the word 'race' in inverted commas (Reich 2018c; 2018a; 2018b). This does conflate social concepts of race and genetic concepts of 'population' and 'ancestry' in a way that I think is misleading. In fact, such a link is undermined in the *New York times* article itself with the discussion of 'West African' ancestry. A 'West African' race bears no resemblance to popular conceptions of racial categories. The 'West African' ancestry that Reich discusses is probably even more specific to a particular time and place than the label suggests, and in all likelihood is itself composed of mixtures of ancestries from different places and times that exist on a cline with ancestries from other proximate populations.

It is also worth noting that while David Reich is an important and central figure in ancient human population genetics, he is not the only person working in the fields of human molecular biology or population genetics, and there is a diversity of opinion amongst researchers in these areas. Archaeogeneticists were amongst the group of people who signed up to a *Buzzfeed* article responding to David Reich's *New York times* piece (Kahn *et al.* 2018). I do question the relevance of David Reich's ethnicity to this discussion, given that he so freely identifies with the Enlightenment values Blakey critiques (Reich, 2018c), and I felt Blakey gave a simplistic account of the complexities of historic relationships between Jewish and white communities in the United States.

Blakey's discussion of past studies discussing hypertension in African Americans is highly pertinent and can show how the biologically deterministic tunnel vision may lead to entirely the wrong conclusions. However, I would argue that the study by Freedman *et al.* (2006) does make some attempt to control for the possibility that the association they find between 'West African' ancestry and prostate cancer may be to do with variable socio-economic circumstances deriving from race. Similar to the archaeogenetics papers I discussed, this is done implicitly, and is obscured as a result. If correlations between 'West African' ancestry and socio-economic environment were responsible for the observed associations between genetics and risk of prostate cancer, we would expect to see correlations distributed all across the genome, not just in a particular region. Freedman *et al.* (2006) test for this specifically (although without mentioning that this could be a test for the social influence of race). In addition, the authors find an association between the same part of the genome and prostate cancer in groups with variable ancestries from around the world. However, it is not made obvious by Freedman *et al.* (2006) that these observations make a social explanation less likely, and I would agree that such a possible explanation goes unacknowledged. Of course, the suggestion that there may be some genetic component to the risk of prostate cancer linked with particular ancestries does not discount the possibility that there is a substantial or even predominant role for socio-economic circumstances shaped by discrimination.

Blakey's comments on Kong *et al.* (2017) that the association between genetics and IQ scores/years in education is the result of endogamy between high-status families resulting in subtle population stratification is shrewd and plausible on the face of things. However, in this case I would argue such a scenario is unlikely, as the genetic variants associated with IQ scores were identified using populations from the US with recent ancestry in variable areas of Europe (Okbay, Beauchamp and Benjamin 2016). Unless high-status families in Iceland come from the same families or are similar genetically to populations from the US who score more highly on IQ tests (which is possible, but unlikely), then it is unlikely that genetic variants linked to IQ in Icelandic populations are reflecting shared ancestry.

However, Blakey's broader point still resonates and geneticists are beginning to find, and try to account for, this kind of subtle population structure resulting from processes like assortative mating which can significantly disrupt associations between genetic variants and phenotypes (Li *et al.* 2017; Howe *et al.* 2019). It is worth mentioning that the genetic method Kong *et al.* (2017) use explains less than 4 per cent of the variation in IQ scores amongst the Icelanders in their sample. The (admittedly little-remarked-upon) inverse observation is that most of the rest of the variation may be accounted for by non-genetic factors. While studies of these sorts suggest that there is a measurable genetic component to outcomes they investigate, more broadly they support a substantial and sometimes overarching role for environmental influences. I can certainly see the justifications for Blakey's ideas regarding the pernicious influence of the 'biodeterministic imagination', and to help build trust in the future it would be useful if researchers involved in the studies of the sort Blakey criticizes, as well as archaeogeneticists, could be more careful and self-reflective in providing greater clarity on their assumptions and discussions of alternative hypotheses.