WHO ARE WE?: THE HUMAN GENOME PROJECT, RACE AND ETHNICITY

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Abstract

Race and ethnicity continue to be evolving concepts. They are influenced by genetic research but are also shaped by discussion and debate that takes place far from laboratories. Their meanings also evolve somewhat differently in local contexts. One of the newer influences on these concepts are the findings from the ongoing Human Genome Project. This project, as well as other genetic research, is already playing a part in the ongoing evolution of ideas of who we are, both individually and collectively. However, a range of factors, including the significant intermixing of people across various boundaries, suggest that personal definitions of identity are likely to become more important than "scientific" definitions imposed by external authorities.

INTRODUCTION

In 2008 Statistics New Zealand commissioned a literature review based on the broad question "Who are we?" (Callister et al. 2009). Topics explored in this review included ethnogenesis; the official construction of ethnicity in New Zealand; ethnic intermarriage, and related to this the transmission of ethnicity to children and multiple ethnicity; ethnic mobility; indigeneity; the recent growth of "New Zealander" responses in the New Zealand census; and genetics, the Human Genome project, race and ethnicity.

Ethnic mobility, the New Zealander response and one aspect of indigeneity – being part of an iwi (tribe) – are explored in some depth in this *Social Policy Journal* collection. Some issues of intermarriage, multiple ethnicity and social policy have already been explored in this journal (Callister 2004, Keddell 2007). In this paper we have chosen to expand on the outcomes of the literature review in just one area: the Human Genome Project, race and ethnicity. We have chosen this topic for a number of reasons.

First, although New Zealand official statistics have shifted to a self-defined and, in theory, culturally constructed, definition of ethnicity, it is possible that clearly bounded "racial groups" remain in the minds of many New Zealanders, especially when categorising people other than themselves.[2] Certainly the term "race" is still used at times in public debates; for

[1] **Acknowledgements**
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[2] In New Zealand we have little idea of how New Zealanders, including a range of "experts" across various scientific disciplines think about issues such as genetics, race and ethnicity, including whether ethnicity is culturally constructed or is based on biology. In contrast, in the U.S. research has been carried out on this issue (e.g. Morning 2007).

example, regarding "race-based" social policies, there is a Race Relations Commissioner in the Human Rights Commission, and the Human Rights Commission supports a "Race Relations Day" each year (Callister 2007). Second, particularly in the U.S. there is an important public policy-related debate about whether "race" is a useful variable in both health research and in medicine. In addition, although New Zealand policy research focuses on the ethnicity variable, in areas such as ethnicity-based scholarships or law and medical school quotas, ancestry rather than ethnicity is generally the way to determine eligibility (Callister 2007). Generally, ancestry is based on biological links.[3] Another reason is that, particularly in the U.S. context, genetic testing has become part of genealogy research. Finally, of the six current official level 1 groupings of ethnicity in New Zealand, the four that are used mainly in public policy analysis (i.e. European, Māori, Pacific peoples, and, in more recent times, Asian) have some links back to current continental-based "racial" groups which have limited historical validity. Although we are not directly focusing on issues of indigeneity in this paper, these issues are inevitably confronted when studying human genetics, as will be shown.

In this paper we initially contextualise the debates with a brief history of New Zealand migration. Then, under the broad heading of the Human Genome Project, race and ethnicity, we consider a number of issues. First, we briefly discuss some early "scientific" systems of classifying groups, then move on to current debates about classification. In this discussion we talk about cultural versus biological construction of race or ethnicity. We realise there are various meanings given to the term "cultural construction", but in this context we align with the view that official ethnic categories are being created through social processes, with historical, political and economic forces shaping the naming of groups. The alternative – but not mutually exclusive – view is that ethnic groups form naturally around people with shared characteristics and that these are then recognised in official data collections. We then explore recent discussion about genes, ethnicity and health in New Zealand. This is followed by a section on genes and popular science, particularly new and cheap methods of DNA testing that allow us to determine some ancestry. We then consider wider issues of genetics and where we come from. This leads on to some final comments on a topic for which, due to the advances always being made in scientific understanding, it is very difficult to draw clear conclusions.

THE HISTORICAL CONTEXT OF NEW ZEALAND

The migration history of New Zealand influences local thinking about race, ethnicity and genetics. New Zealand has experienced a number of waves of migration. The first was by settlers from islands around the Marquesas and Cook Islands, starting perhaps about 1,000 years ago, who became New Zealand's indigenous population, the Māori. The first recorded European visit to New Zealand was by Abel Tasman in 1642. Over 100 years later James Cook arrived in 1769 from Britain. In contrast to Tasman, Cook and his crew had numerous contacts with Māori (Salmond 1991). From the earliest days of contact there has been a high level of intermarriage, both formal and informal, between Māori and the new arrivals (Pool 1991, Belich 1996).

When Cook arrived the ethnic composition was, by current definition, 100% Māori. Due to a number of factors, including exposure to introduced diseases such as measles, to which Māori

[3] In New Zealand it is mainly ethnicity that is collected in official surveys, but Māori ancestry is also collected in the census. In contrast, in Australia it is ancestry that is collected in official surveys such as the census (Hamer 2009)

had no natural resistance – a genetic influence – and land dispossession, it has been estimated that the Māori population subsequently halved by the late 1880s from its pre-contact population (Sorrenson 1956, King 2003). In the period of Māori population decline the settler population was rapidly increasing, from fewer than a thousand to half a million between 1831 and 1881 (Belich 1996: 278). Around the turn of the 20th century the Māori population began to increase again.

After World War II there was significant migration from the Pacific, with this population growing rapidly during the late 1960s and early 1970s. The fourth major group, classified as Asians, pre-dates recent Pacific migration. There have been people of Asian origins and ethnicities living in New Zealand from the early days of European settlement, although in very small numbers. Many of the "Europeans" were of course also of Asian origin, having moved on from countries such as India and Malaya. However, a century later in the 1980s and 1990s the number of people from Asia grew rapidly. A more recent component of migration comprises refugees and other settlers from Africa and the Middle East.

Although migration has long been important in New Zealand, strong migration flows in recent decades mean New Zealand, with just under a fifth of its population born overseas, is at the high end of industrialised countries in terms of the proportion of foreign-born residents. In addition, a similar proportion of the New Zealand-born population, including Māori, does not live in New Zealand (Hamer 2007).

THE HUMAN GENOME PROJECT, RACE AND ETHNICITY

> The last great battle over racism will be fought not over access to a lunch counter, or a hotel room, or the right to vote, or even the right to occupy the White House: It will be fought in the laboratory, in a test tube, under a microscope, in our genome, on the battlefield of our DNA. (Henry Louis Gates Jr, cited in Anthony 2008:36)
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> Since the early 20th century, a variety of scientists, educators, and public officials have trusted that growing knowledge of human biology would correct erroneous – and pernicious – ideas about race. (Morning 2008:106)

In February 2001 the Human Genome Project, a U.S. federal government effort, together with Celera Genomics, a private company, successfully completed drafts of the entire human genome (genome 5). This project, and what has so far flowed from it, has created a new set of debates about possible links between genetics and human behaviour, particularly health outcomes. As part of this there has been much discussion in U.S. academic journals about whether the Human Genome Project supports concepts of race or undermines them. These writings can be found in the biological science journals (for example, there was a *Nature Genetics* supplement in November 2004[4]) as well as in the area of social sciences (for example, the *American Psychologist* devoted its January 2005 edition to a discussion of "genes, race, and psychology in the genome era"). In 2008 a special edition of the *American Journal of Sociology* comprised a series of papers discussing how sociological thinking intersects with new advances coming out of genetic research. There has long been some tension between the "culturally constructed" view of identity favoured by most sociologists and that of "biologically determined" identity formation. These types of collections indicate that researchers are actively exploring these tensions. Writing in this sociological collection, Morning (2008:S108) argues that the type of research being undertaken in human genetics

[4] *Nature Genetics*, 36(11), http://www.nature.com/ng/journal/v36/n11s/index.html.

has recently shifted many people's assumptions about race "from a model based on phenotype to one grounded in genotype".

However, as Morning (2008) notes, the Human Genome Project is only one of a long line of scientific "advances" in thinking about race and ethnicity. Based on a survey of American textbooks, she argues that in the U.S. science has been continually used, and often misused, not only to rework concepts of race but also to preserve the idea of race and associated concepts of social stratification.[5]

Early Classification Systems

While having no awareness of genetics in this modern sense, early classifications of "race" tried to draw links between physical characteristics and behaviour. Perhaps not surprisingly, those doing the categorising have generally placed themselves at the top of perceived hierarchies. For example, according to Lee et al. (2001), 18th century botanist Carolus Linnaeus suggested the existence of four groups in his 1758 work. [6] These were: Americanus, Asiaticus, Africanus and Europeaeus. As an example of beliefs about linking physical characteristics with behaviours, he classified the North American group as "Americanus rubescus (American red), with characteristics of being "reddish, obstinate, and regulated by custom". These early classifications were based on an idea that there were some clearly definable racial groups and that these groups could be linked to the main continents.

According to Lee et al., the Linnaean classification was based on an amalgam of physical features and behavioural traits that reflected the social attitudes and political relations of the times. The authors go on to suggest that the resulting ideology of race was used to explain, predict and control social behaviour. Moreover, the concept of immutable, biologically based human races suited the process of colonialism, providing a scientific justification for economic exploitation and practices such as slavery. While having a major long-term impact on thinking about human classification systems, Malik (2008:81) suggests that the Linnaean system, when initially developed, was not without its critics, especially the Comte de Buffon and Johann Friedrich Blumenbach.[7] In particular, Buffon believed that neither species nor races could be easily distinguished from each other. He argued that instead there was continuity between groups, with no distinct boundaries and much within-group diversity. This debate about boundaries continues today in discussions of race, ethnicity and genetics.

[5] This has, in turn, spawned a raft of new vocabulary, with several neologisms appearing within the bibliome (itself an example) as the interconnections between genetics and epigenetics, on the one hand, and behaviour, on the other, get fleshed out in proteomics, glycomics and various other omics. This new set of fields in the neurobiological arena is in its infancy, but there are indications, especially in the work of Eric Kandel (2007, 2008) and Reinhard Stöger (2007, 2008), that there may be something to learn here with reference to the relationship between neurobiology and the individual's expression of ethnicity, and possibly even with respect to ethnogenesis. The precise link between neurobiology, epigenetics and genetics remains largely unresolved. However, there is overwhelming evidence of the role of social contexts in shaping ethnic self-identity, whatever its neurological basis, and, equally importantly, the role of outsiders' views of ethnic groups in the formation of stereotypes leading to stigmatisation and discrimination.

[6] According to Malik (2008:80), Linnaeus never referred to these groups as "races".

[7] Malik (2008:82) notes that it was Blumenbach who introduced the term "Caucasian", an expression that continues to be used in some contexts (e.g. in New Zealand, Shaw 2008).

Current Debates about Classification: Genes Versus Culture

In common with other countries, race was the basis of most early New Zealand statistical collections. Although the term "race" continues to be used in official data collections in countries like the U.S., social scientists such as Stephan and Stephan (2000) suggest that race is now more properly viewed as a social rather than a biological construct, even if biology still plays a role in the phenotypic expression of some physical characteristics.[8] As an example of the thinking of one group of social scientists, Templeton noted in 1998 (p. 632):

> Genetic surveys and the analyses of DNA haplotype trees show that human "races" are not distinct lineages, and that this is not due to recent admixture; human "races" are not and never were "pure." Instead, human evolution has been and is characterized by many locally differentiated populations coexisting at any given time, but with sufficient genetic contact to make all of humanity a single lineage sharing a common evolutionary fate.

The negation of any scientific foundation to classifying people on the basis of race has been promoted in the mainstream media by a group of biological scientists. However, there remains much debate about the genetic basis of race among the wider scientific community (Graves 2001, Morning 2007). In these debates, potentially race-related differences are being analysed on at least four levels: societal, individual, cellular and subcellular. The debates also take place at both the official level and via personal beliefs as to whether race is socially constructed or "biologically anchored" (Morning 2007:436). There are three broad positions. One is that race has no biological basis. Morning (2008) cites the finding that human beings share 99.9% of their DNA as a mainstream argument for undermining racial categories. Another argument she cites is that around 85% of human genetic variation occurs *within* the boundaries of what are commonly labelled as racial groups, as opposed to *between* them. Morning (2007) labels those who reject the biological determinism of race as "constructionists". They suggest that both historical and contemporary social processes shape thinking about race.

The second broad position is that there are "racial" differences, but that these are primarily cosmetic. They include superficial characteristics such as skin and hair colour features that involve a very small number of genes that were selected historically in particular environments.[9] However, it is argued that these superficial differences do not reflect any additional genetic distinctiveness. This view is similar to that held by the group Morning (2007) calls "anti-essentialists".[10] In addition, mixing of genes through intermarriage often blurs these characteristics. But in a U.S. context, Morning (2008: s126) argues that such blurring of visible characteristics does not necessarily undermine concepts of race:

> Geneticization makes racial sense of the new demographic landscape by relaxing the old phenotypic assumption that racial difference is visible difference. Even if we can no longer classify the widening range of physical types around us with ease, the genetic definition of race assures us that underneath the skin, racial types can be detected. This decoupling of race from surface phenotype preserves its viability as a taxonomic system in a nation that is

[8] Phenotype is defined in a popular on-line dictionary as "the appearance of an organism resulting from the interaction of the genotype and the environment", http://dictionary.reference.com/browse/phenotype.

[9] Graves (2001) estimates that perhaps out of the 30,000 to 40,000 genes individuals have, only six genes determine skin colour. However, while skin colour differences might be seen as cosmetic, they may matter in a number of outcomes, including racial discrimination (Callister 2008).

[10] Anti-essentialists draw on biological studies to refute ideas of race. In contrast, the essentialists argue that biological research does support the concept of distinct races.

> becoming ever more diverse. In a multiracial America, genetic race is perhaps the most plausible kind of scientific race.

The third broad view is that genes and race remain an important link, particularly in health (for an example of this type of debate, see Graves 2001, Kaufman and Cooper, 2002, Satel 2000, Schwartz 2001). The idea is that particular sets of genes are more common in particular racial groups and these genes alter the propensity of groups to be at risk from certain types of illness. Such a concept raises questions as to whether medical treatment should vary on the basis of ethnicity/race. In this context, Malik notes that particular drugs have already been developed that appear to be more effective for particular "racial" groups, but that there are potential costs and benefits of such approaches which require further research and debate. [11]

Some Debates about Genes, Ethnicity and Health in New Zealand

At a popular level, mixing of genes has been seen as a way of providing disease resistance. O'Regan (2001:135) notes that early in the colonisation of New Zealand, "Kāi Tahu leaders were quick to recognise the increased resistance to European illnesses in those of mixed descent." In addition, genetic influences can sometimes be assumed on the basis of unknowns. In much New Zealand research, but particularly within health research, it has been found that the usual variables that make up a measure of socio-economic status can explain about half of the differences in outcomes between Māori and Europeans (Blakely et al. 2007). Rather than treating the other half as an unknown, media commentators, and indeed sometimes biomedical experts, often assume the other half must be due to genetic influences.[12] [13]

In New Zealand and the wider Pacific, examples can also be found of medical research that considers race/ethnicity to be a critical variable, with some hint that underlying genetics may be important. These include studies of body size and health problems in Polynesians (Swinburn et al. 1999), and in Tongans and Australians (Craig et al. 2001). Other research in this field points to an accurate record of ancestry being important when considering health risk factors (Grandinetti et al. 1999).

Skin cancer is one example where genetic determination of skin colour is important (Callister 2008).[14] Shaw, in 1988 and again in 2008 (Shaw et al.), notes that malignant melanoma is uncommon among Māori and, using language that has racial undertones, shows that it is primarily a disease of "Caucasians".[15] Taylor (2002) discusses the lower incidence of skin cancer among certain darker-skinned individuals compared with fair-skinned persons. However, Taylor also argues that genetic factors are not the only ones causing differences in skin disorders, suggesting that cultural practices can also have a significant impact.

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[11] Graves (2001) suggests there are major dangers in practising "race"-based medicine. If doctors focus on risk factors that are associated with particular groups, they may overlook far more important risk factors such as family background, lifestyle and the living environment.

[12] In 2006 there was much discussion in the media about Māori having a "warrior" gene; for example, see tvnz.co.nz/view/page/425826/810285.

[13] Some New Zealand studies suggest a major part of the unexplained influences is due to institutional racism (Harris et al. 2006).

[14] In parallel, in New Zealand in 2008 a debate occurred over whether there is a strong causal, but inverse, relationship between sun exposure, vitamin D production and cancer. Part of the debate involved questioning the relationship between ethnicity and skin colour (Callister 2008).

[15] This may be changing given that in parallel to the "browning" of New Zealand there is a "whitening" of Māori and Pacific people.

Other New Zealand health researchers have suggested that "genetics plays only a small part in ethnic differences in health, and other factors are often more amenable to change" (Pearce et al. 2004:1070). In their review article, Pearce et al. note one study on alcoholism and genes, which showed a particular gene that is believed to protect against alcoholism is relatively common among Māori but not found in Europeans. Yet, indicating the problem of linking ethnicity to disease via genes, they note that alcoholism is actually more common among Māori. The researchers go on to suggest that an "overemphasis on genetic explanations may divert attention and resources from other more important influences on health" (p. 1071).

In New Zealand, debates around "raced-based" medicine take a different form to those seen in the U.S. The focus is not on drugs that may benefit particular ethnic groups, but on issues of who should undertake research into areas such as Pacific and Māori health and, underpinning this, concepts of specific Māori or Pacific knowledge. There is also much discussion about the potential benefits of health practitioners, particularly doctors and nurses, affiliating with the same ethnic group(s) as their patients. The idea is that the perceptions of both the patient and the health-care provider – perhaps based on cultural practices, but possibly also recognisable characteristics of both parties – may influence various aspects of health-care delivery and outcomes. This has led to concepts such as "by Māori, for Māori" health services. These types of issues have been canvassed in this journal (e.g. Henwood 2007, Jones et al. 2006, Edwards et al. 2005), in health-related journals (Wilson 2008), as well as elsewhere (e.g. Durie 1998, Callister 2007).

Of particular relevance to any discussion about genes, ethnicity and health is the relationship between genetics and environmentally induced changes in biological outcomes. It has been shown that some diseases that had previously been cited as evidence of particular genetic propensities are more clearly linked to factors such as life style and diet, as has been shown in various recent studies (Wang 2008, Rush 2008). This is a position taken by many overseas researchers as well (e.g. Nazroo 2003, Lee et al. 2001). Lee et al. note (p.37):

> ...the application of a naive genetic determinism will not only reinforce the idea that discrete human races exist, but will divert attention from the complex environmental, behavioral, and social factors contributing to an excess burden of illness among certain segments of the diverse U.S. population.

A further line of thought suggests that while the concept of "races" based on continents of origin is flawed, it may be useful for scientists to develop their own genetically based classification system, especially in relation to health. For example, Condit (2005: no page numbers) suggests:

> If it is unsound to refer to genetic clusters as races, one might turn instead to the underlying scientific basis of the clusters themselves to begin to formulate an appropriate classification strategy. Instead of referring to genetic clusters as "races", one might reasonably refer to them as LDGPs (Large Diffuse Geographically-based Populations). Instead of using the inaccurate labels of "Asian" and "African" and "Caucasian" to describe specific clusters, one might derive distinctive, technical labels that more accurately capture the geography involved. As a first pass, one might identify LDGP-EAS for the East Asian cluster, LDGP-EM for the European/Mediterranean cluster, LDGP-SWA for the cluster located in southern and western Africa, LDGP-API for the cluster deriving from Australia and the Pacific Islands, and LDGP-AM for the populations indigenous to the two American continents.

However, Condit acknowledges that such a classification remains problematic because the LDGPs do not correspond systematically with medically relevant alleles.[16] Malik (2008) also discusses such approaches in relation to health, and notes that systems of classifications have involved a range of variables including blood type and certain combinations of genes. Some techniques have involved clustering people into predetermined groups or allowing computer programs to create their own clusters. However, in the latter situation, generally the number of acceptable clusters is predetermined.

Further complicating the thinking about genes and health, environmental factors such as stress and diet can have biological consequences that are transmitted to offspring without a single change to a gene. This requires a major rethink of some aspects of evolutionary genetics and heredity, and is now regarded as an important aspect of disease and disorder transmission. This is especially so in the study of cancers and mental disorders that may be transmitted along family lines with no discernible genetic cause. These epigenetic effects have been noted above as a potential element in ethnogenesis. At one level, the human genome explains most of the phenotypical differences between people. But a number of non-physical attributes may also require explanation by other mechanisms such as epigenetic effects and social environmental contexts, though caution is required in ascribing causes to these factors when there may be many as yet unknown and equally shadowy interacting factors at play.[17]

Genes and Pop Science

Discussions about genetics and race are now taking place at two broad levels. One is via the scientific research that has been briefly touched upon above. The other is the popular discussion, often taking place via websites such as Wikipedia and discussion forums such as YahooGroups. But the two overlap in various ways. Selective scientific discoveries are reported in the popular discussions, sometimes with exaggerated claims, while scientists make attempts to communicate some of the scientific knowledge from time to time with the public. For example the American Anthropological Association has an interactive website that discusses aspects of the Human Genome Project as well as issues such as skin colour, history and genetics.[18]

One of the areas with potentially exaggerated claims that has captured public attention is DNA testing. On one level DNA testing for ancestry has allowed people to take ancestry beyond what parents or perhaps grandparents "choose to tell us" or actually know for certain themselves. But U.S. commercial companies, primarily tracking African ancestry, are now making statements such as:

> Find your roots on your mother's side over 500 years ago! The MatriClan Test traces maternal ancestry by analyzing the mitochondrial DNA (mtDNA) women and men inherit exclusively from their mothers. Find your roots on your father's side over 500 years ago! The PatriClan Test traces paternal ancestry by analyzing the Y-chromosome men inherit exclusively from their fathers. Since only men carry a Y-chromosome, women CANNOT take

16 The Encyclopaedia Britannica online defines an allele as any one of two or more genes that may occur alternatively at a given site on a chromosome. Alleles may occur in pairs, or there may be multiple alleles affecting the expression of a particular trait.

17 We should bear in mind, though, that the words of Charles Darwin in *The Expressions of the Emotions in Man and Animals* in 1872 (p. 66) remain as true of neuroscience today: "our present subject is very obscure and it is always advisable to perceive clearly our ignorance".

18 http://www.understandingrace.org/home.html.

> the PatriClan Test. But luckily, women may trace their paternal lineage by having a male relative with their father's last name take the test for them.19

Such companies claim that they find African ancestry for a significant number of the paternal lineages they test, stating also, "If our tests indicate that you are not of African descent, we will identify your continent of origin".[20]

Malik (2008:63) suggests this new use of genetics for tracking ancestry changes some aspects of "who we are". Commenting specifically on Black identity, which he sees as in recent decades being primarily a cultural or political expression, he now argues that it is increasingly being seen as a genetic heritage, "inextricably linking race, culture and belonging".

But scientists are now issuing warnings about such tests, suggesting that "inexpensive genetic testing that purportedly traces a person's ancestry to historical figures such as Mongolian warlord [sic] Genghis Khan is more titillating than medically relevant."21 In particular, there is concern about the use of such tests to determine susceptibility to particular illnesses. The American Society of Human Genetics notes that mitochondrial DNA tests trace the mother's lineage and Y-chromosome tests track paternal ancestry, while ancestry informative marker (AIM) or single nucleotide polymorphism (SNP) tests examine non-sex chromosomes inherited from both parents. They go on to note that all these tests exclude a significant part of a person's genetic heritage. Maternal and paternal tests only trace one bloodline, leaving out many ancestors. As an illustration, the society noted that if one went back 10 generations, each test tells a person about only one of 1,024 ancestors.

The society also noted that SNP testing could be problematic because gene variants influenced by natural selection may be found among several populations around the world, and thus produce false leads. As an example, they noted that if an SNP is associated with malarial resistance, it may be common in populations exposed to malaria even if they do not share recent ancestry. Such discussions about the potential costs and benefits of genetic tests are likely to become more intense as parts of the scientific community move towards producing low-cost genetic mapping for individuals ("Babies to be genetically mapped – expert" 2009).

Genetics and Where We Come From

But genetic testing is not just being carried out for individuals who choose to do this for themselves. There are large projects that are endeavouring to analyse collections of DNA. One is the Genographic Project, a five-year research partnership led by the National Geographic Society and IBM who are using genetic and computational technologies to analyse historical patterns in DNA from participants around the world to better understand genetic roots. The three stated aims of the project are: to gather field research data in collaboration with indigenous and traditional peoples around the world; to invite the general public to join the project by purchasing a Genographic Project Public Participation Kit; and to use proceeds from Genographic Public Participation Kit sales to further field research and the Genographic Legacy Fund, which in turn supports indigenous conservation and revitalisation projects.

[19] http://www.africanancestry.com/index.html [accessed 21/1/09].
[20] http://www.africanancestry.com/matriclan.html [accessed 21/1/09].
[21] http://www.medpagetoday.com/Genetics/GeneticTesting/11800 [accessed 17/11/08].

Not surprisingly, such projects are not universally supported. For example, it was reported in the New Zealand media that spokespeople from indigenous groups, including Māori and aboriginal people in Australia, objected to the research.22 One of them was Paul Reynolds, a postdoctoral fellow at the Auckland University-based National Centre of Research Excellence for Māori Development, Ngā Pae o te Māramatanga, who stated:

> We've been here before. We've had centuries of exploitation by non-indigenous people. This is highly political. It's race-based research, and therefore it can be manipulated and used for political benefit. This could link straight into what Don Brash wants to hear, that everybody comes from the same place, that we are all common and have common ancestors.

Part of the objection to such research relates to intellectual property and ownership issues. One view is that genetic information from Māori belongs to hapū, whānau and iwi collectively, not to individuals. But reflecting within-group diversity of opinion about research such as the Genographic Project, Manuka Henare noted: "It's the first question Maori ask of each other – where do you come from? Genetics offers another way of finding the answer to that question."

But with or without widespread support, in various ways genetic work is helping establish where historical migrations have taken place. A popular view is the Recent African Origin (RAO), or "out-of-Africa", hypothesis that modern humans originated from Africa and only very recently migrated outwards into the rest of the world.23 Back in 2002 Kaufman and Cooper commented on how the U.S. Office of Management and Budget define the Black population in the U.S. This definition links ancestry back to Africa. But perhaps reflecting concerns about glossing over "difference", Kaufman and Cooper note that "[i]n the broadest interpretation, all of humanity meets this definition" (p. 292). However, this RAO theory is currently being challenged by an "Out of Africa Many Times" theory. While still subject to a number of unanswered questions about the interaction of modern humans and earlier humans, the multiple African exodus theory fits human genetic history more satisfactorily.

In the New Zealand context, DNA testing as well as other methods have been used to determine timings and origins of colonisation (Penny and Meyer 2008). Radiocarbon dating of Pacific rat (kiore) bones and native seeds (Landcare Research 2008) has suggested that the earliest time for human colonisation of New Zealand is about 1280–1300. But rat-based DNA testing has also been used to determine Pacific migrations (Matisoo-Smith et al 1998, Murray-McIntosh et al 1998, Pierson et al 2006, Wilmshurst et al 2008), including migration to New Zealand. This type of work suggests a genetic link between Māori and indigenous Taiwanese, suggesting Pacific people came to New Zealand ultimately from Asia, which accords with linguistic evidence (Lynch 1998, Himmelmann 2004, Friedlaender 2007).

CONCLUSION

The, Human Genome Project, as well as other genetic research, is providing many new insights into "who we are". Such research not only has the potential to give us a better idea of who we are now, but also insights into where we have come from. But like many areas of

[22] http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10338228.

[23] Archaeogeneticists have been collecting evidence of this theory since the 1990s, replacing the competing multi-regional hypothesis, which sees humans as originating from independent hominid populations (Morning 2008). Morning notes that in the U.S. the multi-regional theory helps distance Whites' ancestry from being shared with Blacks in a similar way that creationists distance themselves from any kind of relationship between "man' and "monkeys" (p. 124).

science, the results are being interpreted in a variety of ways. One view is that the genetic research confirms the commonality of all humans. Others see it as providing new ways to categorise people into distinct groups. As such, the scientific findings can be used to prop up concepts of social stratification or to break them down. In countries such as the U.SA., where concepts of biological race are still deeply embedded in official statistics and day-to-day life, the findings from the genetic research are being debated in a number of settings in order to assess how the new knowledge either supports or undermines historical classification systems. At times this challenges or supports disciplinary-based thinking; for example, the strong view in sociology that races are a cultural rather than a biological construct. As part of these debates there are very practical questions around issues such as the role of "race-based" medicine.

In New Zealand, although concepts of race, itself culturally constructed, underpinned early official data collections, ethnicity is more explicitly a cultural construction. Through an official acceptance of the idea that ethnicity is culturally constructed, New Zealand is at the forefront of thinking when officially recording an important aspect of people's identity. Yet it is also recognised that there are a variety of factors that influence how people construct their ethnic identity, many of them having some biological basis. These influences can be through ancestry and/or perhaps through expression of particular visual characteristics such as skin colour or eye shapes that are determined by genes. As in the U.S., there is some discussion in the health sector as to how much genetics and how much environmental issues affect health outcomes. There are some relatively clear areas where genes are likely to have some influence, such as the relationship between skin colour and skin cancer, but in most other areas the relationships are far less clear-cut.

However, while there is a general acceptance that ethnicity should be culturally constructed, one of the many reasons for the uneasiness about the growth in the New Zealander-type responses in the census, particularly from within the health sector, may be an ongoing attraction to the idea that people can be placed in discrete genetically determined categories.[24] It would be useful to carry out the type of research Morning has undertaken in the U.S. determining how ethnicity "experts" in New Zealand actually conceptualise ethnicity, and particularly how much they think there is some biological underpinning to the broad groupings used in policy research.

Although overall New Zealand is a small player in genetic research, genetically based research undertaken in New Zealand has influenced thinking about the timing of the arrival of Māori and where Māori migrated from. Research takes Māori back, in a journey of five millennia or more, to origins within Asia. But wider international research is still examining where we all originally came from and when.

Race and ethnicity have always been evolving concepts. They evolve through science, but also through discussion and debate that takes place far from laboratories. They also evolve somewhat differently in local contexts. The findings from the ongoing Human Genome Project, as well as other genetic research, are very likely to play a significant part in the ongoing evolution of these concepts and overall ideas of who we are. However, a range of factors, including the significant intermixing of people across various boundaries, suggest that personal definitions of identity are likely to become more important than "scientific" definitions imposed by external authorities.

[24] The New Zealander issue is discussed more fully in Kukutai and Didham (2009)

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