

New Paths to the Past: DNA and Linguistics

Introduction

In recent times, there has been a significant expansion of the domain of history, temporally into more ancient times, socially into classes of people not represented in traditional sources, and geographically, exploring phenomena that transcend the kingdom, state, and region. This expanded agenda outstrips the written sources we have, and so new types of evidence must be found and used. Two of these, DNA and language, are evaluated here through a number of case studies. The first case examines the usefulness of DNA to identify a historical individual. It is followed by five case studies looking at the contribution of DNA and linguistic evidence, separately or together, to the history of nations, continents, and cross-oceanic or global enterprises. The take-home message is that these evidentiary types do indeed have the power to reveal otherwise inaccessible historical events and processes – but a little knowledge and judgment is needed in assessing claims based on them.

1. DNA and the ‘king in the car-park’

DNA is known to provide potentially extremely strong forensic evidence, when for example a sample from the scene of a crime matches a sample taken from the suspect (provided samples are sufficient and uncontaminated, of course). But is it as useful in the historical context? The following case, relatively recent and involving a single individual, illustrates how DNA is evaluated and the issues that arise. In 2012, a search for the remains of Richard III was undertaken in a Leicester car park believed to be built over the friary of the Grey (Franciscan) Friars. It was there that, according to a 1484 chronicle (John Rous’s *Historia Regum Angliae*), the king was buried. Unbelievably, in the very first trench excavated by the mechanical digger an old skeleton was unearthed; a skeleton with severe battle wounds and scoliosis. After considerable post-exhumation analysis a team of experts¹ concluded that the evidence was ‘overwhelming’ – they were 99% confident – that this was indeed the king’s skeleton.

A Bayesian analysis [see Appendix] was used to evaluate this evidence, revealing the relative strengths of the different types of evidence adduced, in particular the genetic and non-genetic evidence. One component, of course, was DNA, but much other evidence was also adduced. Osteological evidence, for example, revealing the presence of severe spinal scoliosis and violent perimortem injuries; radio-carbon dating, which gave evidence of the high-class diet of the skeleton’s owner; and historical records. The non-genetic evidence was completely compelling on its own: there was a 99.99% probability the skeleton was Richard III. In contrast, the genetic evidence on its own only yielded a 67% chance of the skeleton being Richard III. Why was this? Because there was a difference between the evidential strength of the

¹ T.E King et al. ‘Identification of the Remains of King Richard III’ , *Nature Communications* 02 December 2014 doi: 1038/ncomms6631.

two kinds of DNA evidence adduced: mitochondrial DNA (mtDNA), which is transmitted through the female line, and the Y chromosome, which is transmitted through the male line.

The mtDNA contained a rare haplotype (a set of DNA variations that tend to be inherited together) not found in a database of nearly 2,000 British Isles individuals or in a European database of over 26,000 individuals². Given this rarity, the experts calculated that this particular mtDNA match was 478 times more likely assuming the skeleton was indeed Richard III. This figure had to be reduced, however, when the Y chromosome DNA results were taken into account. Samples were obtained from five anonymous living donors, all members of the extended family of the present Duke of Beaufort, who claim descent from both the Plantagenets and the Tudors through the children of John of Gaunt. None matched the skeleton's DNA. This when combined with the mitochondrial DNA evidence reduced the above figure of 478 times more likely to 79 times. The experts suggested that there had been a break in the claimed line of Beaufort descent, caused by what is called "a false [or non-] paternity event", i.e. when the biological father is someone other than the mother's husband.

To sum up, actually the DNA evidence only 'gilded the lily' of the non-genetic evidence which had already shown that it was 99.99% likely to be Richard III. The case illustrates that the interpretation of DNA evidence is complex, and it is by no means always superior to other sorts of evidence.

The following section deals with the performance of DNA in identifying not just one individual but whole populations, and at a much earlier period than that of Richard III.

² Ibid.

2. Britain: ‘Saxon and Norman and Dane are we’?³

Until recently it was generally believed that the present-day English population was descended from the Angles, Saxons and Jutes, the 5th century invaders from the area of Germany, Denmark and the Low Countries. They allegedly wiped out most of the earlier Celtic population of England, and the English have therefore commonly been described as ‘Anglo-Saxon’. But in 2006, Oppenheimer published a book, based on the work of geneticist Peter Forster, provocatively entitled *Myths of British ancestry*⁴. He argued that, actually, three quarters of the ancestors of the British population were not Anglo-Saxon but descended from hunter-gatherers who arrived between 15,000 and 7,500 years ago, venturing into the land-mass recently vacated by the great ice sheets, before it broke away from the mainland and divided into islands. They came from Spain, a refuge for humans in the glaciation, and they were most likely Basques. Each of the later migrations – the Celts, Angles and Saxons, Vikings and Normans – left a genetic signal, but none contributed much more than 5 per cent to the modern genetic mix. Oppenheimer claimed that only 5 per cent of modern English male lines (rising to 15 per cent in parts of Norfolk where the Angles first settled) trace their ancestry to the Angles Saxons and Jutes – and almost *no* English females do. The Normans contributed about 2% of the population, while the Roman conquerors left hardly a trace⁵.

³ ‘Saxon and Norman and Dane are we,^[SEP]

But all of us Danes in our welcome of thee,^[SEP] Alexandra!’, from Alfred, Lord Tennyson, *Welcome to Alexandra*.

⁴ Stephen Oppenheimer ??2006. *Myths of British ancestry*, http://www.prospectmagazine.co.uk/magazine/mythsofbritishancestry/#.Udt8Kb_6lHg.. 2006. Accessed 8 July 2013.

⁵ Bryan Sykes, *Blood of the isles: exploring the genetic roots of our tribal history*. London: Bantam, 2006, pp.286-7.

The link deduced by Oppenheimer between the majority of the UK population and a Paleolithic ‘Basque’ population was subsequently criticized for a number of reasons.

First, Oppenheimer used Y-chromosome material from *modern* populations to arrive at his conclusions, focussing on the commonest haplogroup in West Europe, R1b (a haplogroup is a genetic population who share a common ancestor on the patrilineal or matrilineal line). The fact that its highest frequency was among Basques and British ‘Celts’ was what led him to conclude that a palaeolithic Basque population had settled in the UK at the beginning of the Holocene, and that their genes have been overwhelmingly dominant ever since.

Oppenheimer estimated the arrival time of this ‘Basque’ DNA in the UK using the number of mutations which can be expected to occur over time as DNA is passed down through the generations. This ‘mutation rate’, which has been variously estimated, drives what is called the ‘molecular clock’. Dawkins writes: ‘Fluctuations in population size leave their own characteristic signature. So we can work backwards from today’s patterns of gene distribution, and make inferences about population sizes, and about the timings of migrations’⁶. Furthermore: ‘The molecular clock has an apparent ability to tell the time in years as well as generations’⁷.

This sounds wonderful, but other passages reveal that things are, actually, not entirely straightforward. For instance, while Dawkins claims that with the aid of the molecular clock we can work out population expansions and bottlenecks, he immediately qualifies this with the statement that, unfortunately, severe bottlenecks tend to erase the traces of what happened before them⁸. Perhaps even more importantly, it is vitally necessary to *calibrate* the arbitrary timescale of the molecular clock,

⁶ Richard Dawkins, *The Ancestor’s tale: a pilgrimage to the dawn of life*, Phoenix Paperbacks London 2004, p. 58.

⁷ Dawkins, *Ancestor’s tale*, pp. 467-8.

⁸ Dawkins, *Ancestor’s tale*, p. 58.

translating it into real years, by using fossils of known date. So molecular clocks ultimately depend on calibration by fossils⁹. This is not an entirely simple matter and there are complications, difficulties and controversies¹⁰. And as we go further back in time and the supply of fossils peters out, we enter a realm of ‘almost complete conjecture’¹¹.

DNA patterns can be affected by happenstance, sometimes termed ‘genetic drift’. This acknowledges the fact that gene frequencies actually do *not* behave with perfect regularity but fluctuate unpredictably from one generation to the next due to the effect of chance events. It is an especially big problem in small populations, since, for instance, a rise in the mortality rate due to chance events such as plagues or war can lead to a significant loss of genetic variation.

Returning to Oppenheimer’s work on the U.K population, it should be noted that he has been criticized for using an extreme evolutionary mutation rate that actually *overestimates* time depth by almost an order of magnitude¹². Furthermore, his ‘Basque theory’ has also been criticized for drawing an erroneous conclusion on the evidence of Y-chromosome haplogroup R1b. It seems certain that this did *not* actually originate in Spain but in West Asia, as demonstrated in a 2011 study¹³. And finally, Oppenheimer’s depiction of the Basques as Palaeolithic migrants to Britain is

⁹ Dawkins, *Ancestor’s tale*, p. 469.

¹⁰ Dawkins, *Ancestor’s tale*, p.24. See also Rose Hoberman, ‘Molecular Clocks’ for a Bayesian statistical analysis of the likelihood of correctly dating a fossil.

¹¹ Dawkins, *Ancestor’s tale*, p. 470.

¹² Borachio <http://dienekes.blogspot.com.au/2009/10/stephen-oppenheimers-bad-science.html>

¹³ Natalie M Myres, Siiri Rootsi, Alice A Lin, Mari Järve, Roy J King, Ildus Kutuev, Vicente M Cabrera, Elza K Khusnutdinova, Andrey Pshenichnov, Bayazit Yunusbayev, Oleg Balanovsky, Elena Balanovska, Pavao Rudan, Marian Baldovic, Rene J Herrera, Jacques Chirani, Julie Di Cristofaro, Richard Villems, Toomas Kivisild, and Peter A Underhill, *A major Y-chromosome haplogroup R1b Holocene era founder effect in Central and Western Europe*, *European Journal of Human Genetics* 2011 Jan; 19(1): 95–101. Published online 2010 Aug 25. doi: [10.1038/ejhg.2010.146](https://doi.org/10.1038/ejhg.2010.146)

disproved by a recent article that actually *did* use ancient DNA, analysing the genomes of eight human skeletons from El Portalón in Atapuerca, northern Spain, dating to between 3,500 and 5,500 years ago – after the transition to farming in southwest Europe. The results showed that these early Iberian farmers are the closest ancestors to present-day Basques, who are not, therefore, a remnant population going back to the Paleolithic, but belong to the same group of people as other Early European farmers involved in the spread of agriculture during the Neolithic.

A more detailed coverage of UK DNA than any earlier one was provided by a Wellcome Trust-funded study of the fine-scale genetic structure of the British population, which appeared in 2014. It analysed the DNA of 2,039 people from rural areas of the UK, whose grandparents were all born within 80km of each other¹⁴.

Some of the key findings were, firstly that there was no single “Celtic” genetic group. The Celtic parts of the UK (Scotland, Northern Ireland, Wales and Cornwall) actually proved to be among the most different from each other genetically. For example, the Cornish are much more similar genetically to other English groups than they are to the Welsh or the Scots. ^[L]_[SEP] There were also separate genetic groups in Cornwall and Devon.

The majority of eastern, central and southern England comprised a single, relatively homogeneous, genetic group with a significant DNA contribution from Anglo-Saxon migrations (10-40% of total ancestry). The population in Orkney was the most genetically distinct, with 25% of DNA coming from Norwegian ancestors. There was no obvious genetic signature of the Danish Vikings, who controlled large parts of England (the Danelaw) from the 9th century. ^[L]_[SEP] The Romans and Norman French also

¹⁴ Stephen Leslie et al. ‘The fine-scale genetic structure of the British population’, *Nature* 519 (19 March 2015) pp. 309-314.

had little genetic impact, consistent with Oppenheimer's conclusion. However, the authors claim that there was a substantial migration across the channel after the original post-ice-age settlers, but before Roman times. Without any ancient DNA this claim cannot be substantiated¹⁵.

The usefulness of the data for historians was limited. Again, no ancient DNA was collected, so conclusions about population *history* had to be inferred. Each of the 'components' of the British population identified was geographical, and may have included Mesolithic, Neolithic, Bronze Age, Iron Age and recent migrations. This combined with the tangled population history of the continent, with its depopulations and repopulations, migrations and back-migrations, made it impossible to come up with a scenario that had the badge of certainty.

And ultimately, DNA studies cannot tell us anything about the social, intellectual, economic and religious spheres. Historical linguistics, on the other hand, *can* tell us a great deal about these things.

The contribution of linguistics.

Historical linguistics, an older discipline than DNA studies, has much to tell us about, firstly, the genetic or family tree relationships of languages, and secondly about contact influence, from one language to another. Linguistics developed a rigorously genealogical mode of analysis a long time before DNA was discovered, particularly in reconstructing the Indo-European language family. In 1786, William Jones uttered the following now famous sentence: 'The Sanskrit language is of a wonderful

¹⁵ Another problem was that the data collected and on which the authors' conclusions are based have not been released, giving credence to allegations that the study was primarily for the benefit of commercial pharmacogenetics.

structure; more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident; so strong indeed, that no philologist could examine ... all three, without believing them to have sprung from some common source, which, perhaps, no longer exists¹⁶. This led within a few decades to the development of modern historical linguistics based on a *vertical* concept of evolving languages, at a time when most biologists still thought of species as fixed¹⁷. It was to be nearly a century before this genealogical perspective was introduced into biology, principally by Darwin, who recognized the ‘curiously parallel’ way in which both languages and species developed through gradual processes¹⁸.

Much work has been done on developing linguistic methodology, including how to establish if a particular word has been borrowed from another language in a process known as ‘contact influence’. The procedure is simply described by Wolff.¹⁹

Loanwords reveal a great deal about political, social, and intellectual history. English is a West Germanic language brought by the 5th century invaders. Yet this West Germanic language was to be so heavily influenced languages spoken by very small minorities that, in terms of its lexicon, English (at least educated English) looks more like a Romance language than a Germanic one.

¹⁶ William Jones, ‘The Third Anniversary Discourse’ (delivered 2 February, 1786, by the President, at the Asiatick Society of Bengal),^[SEP]URL http://www.unifi.it/testi/700/jones/Jones_Discourse_3.html^[SEP]Html edition for *Eliohs* by Guido Abbattista (July 1999).

¹⁷ David N. Stamos, *Darwin and the nature of species*, New York: State University of New York Press 2007, p. 55.

¹⁸ Charles Darwin, *The Descent of man*, London: John Murray and New York: D. Appleton 1871, pp. 89-90.

¹⁹ John Wolff, ‘Malay borrowings in Tagalog’ in C.D.Cowan and O.W. Wolters eds. *Southeast Asian history and historiography : essays presented to D. G. E. Hall* Ithaca, N.Y. : Cornell University Press, 1976, pp. 345-367.

English has clearly been both an exceptionally eager borrower and also a great lender. It has ‘borrowed’ (an illogical but firmly entrenched term – ‘taken’ would be more accurate) an enormous amount of words from many different sources. According to an authoritative history of the language, by the 16th century it had already borrowed words from more than 50 other languages²⁰. However, two languages have supplied the overwhelming majority of loan-words in English: Latin and French.

Somewhat counter-intuitively, less than five Latin words can be shown to have been introduced when the Romans occupied Britain²¹. Most were borrowed later, in waves, the first beginning in 597 with the conversion to Roman Christianity, when around 450 words were introduced²². The fourteenth to sixteenth centuries saw the introduction of many more Latin words, as well as some Greek ones, such as ‘democracy’. The peak period for French borrowings was 1250-1400, introducing a total of about 10,000 words, 75% of which are still used²³.

Whereas Latin loanwords were introduced by Christianity and by Renaissance ideas, the French ones were the result of invasion and conquest. These were less in basic vocabulary than in such areas as government, the law, the church, the armed forces, fashion and social life, and also in what one might label ‘conceptual’ vocabulary denoting abstract, nuanced and philosophical concepts. ‘Conceptual’ words can pertain to high-level and influential realms: *government, society, law, nation, power, state, civilization, philosophy, ethics* and *politics* for example. But they can also pertain to the world of the individual – *joy, pleasure, and different*, for example.

²⁰ Albert C. Baugh and Thomas Cable. *A History of the English language*, Fifth Edition. Abingdon: Routledge, 2002, p.227.

²¹ Baugh and Cable, *A History*, p. 81.

²² Baugh and Cable, *A History*, pp. 81-91.

²³ Baugh and Cable, *A History*, 184-233.

French has had only a negligible impact on English morpho-syntax but its impact on the way new words are formed by adding elements such as suffixes (called derivational morphology) is much more significant. The suffixes *-ment* *-able*, for instance, have spread to English words that are not loans from French.

Following the Viking invasions and settlement over the late 8th to late 10th centuries there was significant Scandinavian influence on English, both on syntax and in the lexicon. About 900 words were borrowed – in contrast to French, in basic everyday vocabulary. These borrowings were not confined to nouns and adjectives and verbs but extended to pronouns, prepositions, adverbs and even a part of the verb *to be*. Baugh and Cable point out that this stems from the intimate mingling, based on constant social contact, between the two languages²⁴. The history of Britain shows with particular clarity the lack of correlation between the size of a certain population group and the amount of influence it has on the language and hence on what one might call the mental landscape.

Due to England's extensive trading and colonial history from about the 17th century, English has also borrowed many words denoting new material objects rather than ideas. From Indian vernacular languages, for instance, English borrowed words for culinary items like *kedgerie* and *chutney*, and novelties like *shampoo* and *khaki*, discovered by English colonists stationed in India. To conclude, loanwords reveal the significantly different types of impact on the English language – and therefore on daily life and on the political and cultural spheres – of the many peoples with whom the English had one sort of contact or another at different times in their history.

²⁴ Baugh and Cable, *A History*, pp. 102-5.

3. China

The present writer was once criticized by a senior scholar for studying DNA, which he considered racist. This came as a surprise, but in case this opinion is more widespread than I imagined I will address it here – or rather, refer the reader to someone who does it much better than I could²⁵. In fact DNA continues the work done earlier, notably by Darwin, to critique beliefs that there are actually definable ‘races’. Again however it is helpful to look at an example. The Chinese population is often characterized as overwhelmingly ‘Han’ – one of 56 so-called ‘ethnic groups’ officially recognized by the government. In official statistics the Han make up 91.51% of the population, and the other, minority, ‘ethnic’ groups 8.49%²⁶. However, recent biological and genetic studies have revealed that, over and over again, the closest relative of a Han population is *not* another Han population but some neighbouring group considered non-Han and ethnically different. In the North one Han group is closest to the Koreans; in another region the Han population is closest to Mongols; and in southern regions the Han population is most closely related to minority groups speaking Tibeto-Burman languages. So the concept of ‘Han’ is not in fact based on internal genetic cohesion, but on language and culture: the Han speak Sinitic languages, of which one, Mandarin, is now the national language. The overwhelming ‘Han’ majority is actually a fairly recent phenomenon, resulting from the spread of the superstratum language of the Hans radiating out from the Central Plains. In particular, the *written* language and its associated culture has played a vital

²⁵ Luigi Luca Cavalli-Sforza, *Genes, peoples and languages*, London : Allen Lane 2000, Chapter 1.

²⁶http://www.stats.gov.cn/english/newsandcomingevents/t20110428_402722244.htm

role in the ascent of the Han from a small tribe to their dominant position today,²⁷ when the DNA studies show how much intermarriage has occurred between ‘Han’ people and the minorities whose genes they carry. Furthermore, Cavalli-Sforza discovered a major divide in the Chinese population into north and south, with the latter genetically close to Southeast Asia²⁸. This provides a very different picture to the one we get from Chinese chronicles, where the Southeast Asians are usually construed as the ‘other’ in racial terms. For instance, a third-century description of the people of Funan describes them as ugly and black, with frizzy hair²⁹. The DNA however reveals that this sharp line-drawing does not reflect the historical reality. And the linguistic evidence – for example the influence of Thai and Miao-Yao languages on Cantonese – reveals that the “Han” and the “Nanyang” peoples not only produced children together, they shared ideas as well³⁰. The case of China reveals that even when there is a significant amount of written sources available, DNA and linguistics are still a valuable supplement to and sometimes corrective of these sources – particularly perhaps in revealing aspects of reality that deviate from official normative values.

4. The Settlement of America

The American case is perhaps the most striking example of how circumstances can affect the relative strengths of DNA and linguistic evidence. The origins of the first settlers of America and the time of their arrival have been canvassed since the 16th

²⁷ William S.-Y. Wang, ‘Linguistic Diversity and Language Relationships’, in C-T James Huang and Audrey Li Yen Hui eds. *New Horizons in Chinese Linguistics: Studies in Natural Language and Linguistic Theory*, Springer Kluwer Dordrecht 1996, pp. 237-40.

²⁸ Cavalli-Sforza, *Genes, peoples and languages*, p. 124, p.144.

²⁹ G. Coedès, *Les États Hindouisés d’Indochine et d’Indonésie*, Paris: Eds. E. de Boccard, 2nd edition, 1962, p. 85.

³⁰ See Hílarío de Sousa, ‘The Far Southern Sinitic Languages as part of Mainland Southeast Asia’, in N.J. Enfield and Bernard Comrie eds., *Languages of Mainland Southeast Asia: the State of the Art and New Directions*, Boston 2015 pp. 356-439.

century. At that time it was speculated that there had once been a land bridge between Asia and America across which northeast Asians had travelled to settle America³¹. And, in fact, during the Last Ice Age the water level of the oceans was lower, exposing land that today is under the Bering and Chukchi Seas – so many researchers believe that the people who first settled the Americas came across this Bering Land Bridge, also called Beringia. This means that the first settlers arrived a very long time ago.

Linguistic evidence. Johanna Nichols used a particular type of linguistic evidence, not mentioned so far, to estimate just when the first settlers arrived. And in 1990 she seriously challenged earlier views of the settlement of America³² – especially that of Greenberg. In 1987, Greenberg had proposed the following scenario for the linguistic history of the Americas³³: Proto-Amerind came first and is associated with a Paleo-Indian stone tool culture of about 12,000 years ago, named the ‘Clovis’ culture, which is found in sites across North America. The next language to enter was Proto-Na-Dene, associated with the Paleo-Arctic or Beringian Culture of 7,000-10,000 years ago, and subsequently displaced by Eskimo-Aleut. Proto-Eskimo Aleut was allegedly associated with the Anangula Culture of the eastern Aleutian Islands, some 8,500-10,000 years ago, and according to Greenberg entered the New World later than Na-Dene.

Though the genetic unity of the languages Greenberg categorized as ‘Amerind’ was questioned by other historical linguists working on America, other aspects of this scenario – a first wave of colonizers reflected relatively soon after entry in the Clovis

³¹ See for example José de Acosta, *Natural and moral history of the Indies*, edited by Jane E. Mangan; translated by Frances López-Morillas. Durham: Duke University Press, 2002.

³² Johanna Nichols, ‘Linguistic Diversity and the First Settlement of the New World’, *Language* 19, 3, 1990, pp. 475-521.

³³ Joseph Harold Greenberg, *Language in the Americas*, Stanford: Stanford University Press 1987.

culture, a first entry not substantially earlier than 12,000 years ago, and subsequent entries by Na-Dene and then Eskimo – were widely accepted. His model also became entrenched in the *genetics* literature as the hypothesis against which new genetic data should be evaluated³⁴.

Nichols, however, contested his chronology on the basis of a ‘fundamental tenet of science known as UNIFORMITARIANISM’ – the assumption that, although conditions may vary over time, principles do not. She argued that the unmistakable conclusion from the linguistic evidence must be that the new world has actually been inhabited nearly as long as Australia and New Guinea, perhaps some 35,000 years. She contested the Clovis chronology, pointing out that it became standard at a time when our species was believed to be only 40,000 years old, whereas it was now known to be at least 100,000 years old. She also criticized another widely current chronology (which she terms the ‘received’ chronology) that pushed the date of the settlement of the Americas back to 17,000-20,000 years. Both current chronologies, Nichols concluded, were in the wrong ‘ballpark’. Her argument was based on the extent and nature of the linguistic diversity of the Americas today, measured in ‘stocks’. A ‘stock’ is the deepest reconstructable grouping of related languages, most stocks going back around 6,000 years. One such ‘stock’ is Indo-European. Less deep in time than the stock is its first-order split, the ‘family’ – examples of which are Germanic, Celtic, and Balto-Slavic, three of the families within the Indo-European stock³⁵. Nichols has computed the number of stocks and families in different parts of the world, and found something very striking indeed in the Americas. Whereas in

³⁴ See for example Deborah A. Bolnick, (Weiss), Beth. A. Shook (Schultz), Lyle Campbell and Ives Goddard, ‘Problematic Use of Greenberg’s Linguistic Classification of the Americas in Studies of Native American Genetic Variation’, *American Journal of Human Genetics* 2004, Sept; 75(3): 519–523.

³⁵ *Ibid.* p. 477.

Europe (including Russia) there are 14 or 15 stocks, in the Americas there are 140 in ‘Amerind’ *alone*³⁶. This is an enormous number, much greater than in any other part of the world³⁷.

From her ‘uniformitarian’ position Nichols argues that unless we can demonstrate very different conditions, , we have no business in accepting a tenfold discrepancy in the rate of differentiation of language stocks – which would be necessary if we retain the ‘Clovis’ or ‘received’ chronologies³⁸. She believes the linguistic evidence suggests multiple migrations into the Americas, perhaps ten of them over a period of 37,500 years³⁹. She notes, however, the archaeological and palaeoclimatological evidence put forward by Gruhn in support of the argument that there was actually only *one* ‘window of opportunity’ for a migration, and that was during the ‘Middle Wisconsin interval’, a significant glacial retreat that occurred slightly over 50,000 years ago. This date happens to be identical to the 50,000 years which would be required for the 140 stocks in the ‘Amerind’ category to evolve from a single ancestor.⁴⁰ So whether Gruhn is right in saying only one migration was possible, or Nichols is right in saying there must have been multiple migrations (on the grounds that only *one* entry in 50,000 years is implausible and that the linguistic evidence is more supportive of a multiple-entry scenario⁴¹) in both cases the chronological depth of the settlement of America is calculated at 50,000 years – much earlier than the 12,000 – 20,000 years previously believed to be the case.

Linguists working on American languages have also discovered a surprising case of language transmission over a huge distance. Based on vocabulary and language

³⁶Ibid. p. 513.

³⁷ Ibid. pp. 514-8.

³⁸ Ibid. p. 476.

³⁹ Ibid. p. 511.

⁴⁰ Ibid.

⁴¹ Ibid.

structure, they deduced that Navaho and Apache, languages spoken in the desert areas of the southwestern United States and northwestern Mexico, are not related to nearby languages. They are actually Athapascan languages – an entirely different language family from the Amerindian languages, spoken in the snowy region of northwest Canada and eastern Alaska. A major difference that separates Athapascan languages from the other Amerindian languages and links them to East Asian languages is that they are *tonal*. The obvious question is, did the Athapascan language family originate in the south, and then some of it migrate north, or vice versa? Since all the Southern Athapascan dialects (Navaho and the Apache dialects) form a close-knit dialectic unity and there is much more complex dialect variation in Pacific and Northern Athapascan, linguists have concluded that the geographical centre of gravity of the language must be in the north⁴².

Additionally, Sapir⁴³ found in Navaho words that he claims originally denoted items that their ancestors had been familiar with in their northern homeland – such as spoons made of horn, snow, and canoes. In their southern homeland, the Navaho adopted a new way of life, greatly influenced by the Pueblos – for instance, in the introduction of corn growing. How exactly was the language transmitted over three thousand kilometres in ancient times? This unknown historical process must have taken a long time, and the gene pool of the original speakers must have been altered by intermarriage with other groups on the way south – a reminder that language and genes are not inseparable.

Edward Sapir, ‘Internal Linguistic Evidence Suggestive of the Northern Origin of the Navaho’, in David G. Mandelbaum ed., *Selected writings of Edward Sapir in language, culture and personality*, Berkeley and Los Angeles: University of California Press, pp. 212-224. (First published in *American Anthropologist*, n.s. 38, 1936, pp. 224-225).

⁴³ Ibid. p. 223.

DNA evidence. If you were trying to demonstrate that one should not accept *every* proposition made by a scientist as gospel, the claims made by scientists about the genetic history of the Americas would make the case for you. Why is this? It springs from paucity of evidence – both human skeletal evidence⁴⁴, and DNA. DNA samples from modern populations are very limited, because native Americans in the United States have generally been reluctant to participate in inquiries into their origins. The extreme paucity of American DNA samples compared to other parts of the world is demonstrated graphically in a recent genetic atlas⁴⁵, revealing that the settlement of America is still less well understood than that of other continents.

The only fact on which all are agreed is that the earliest settlers of America were genetically related to the people of Siberia. Mitochondrial studies have shown that the mitochondrial DNA found in Native America is a subset of that found in central and northeast Asia. But there is no consensus about the date of the migration to America. Estimates vary greatly, from 15,000 years ago to 30,000 years ago. Studies of Y-chromosome variation have similarly come up with very different dates, with estimates ranging from between 7,000 to 30,000 years ago. In addition, a striking variety of hypotheses is still being put forward re *the route* taken, and the question of *how many* migrations there were.

⁴⁴ Goebel, et al. ‘ Late Pleistocene Dispersal’ p. 1498.

⁴⁵ <http://admixturemap.paintmychromosomes.com>, companion website for, Garrett Hellenthal, George B.J Busby, Gavin Band, James F. Wilson, Cristian Capelli, Daniel Falush and Simon Myers, "A genetic atlas of human admixture history" *Science* 14 February 2014: Vol. 343 no. 6172 pp. 747-751
DOI: 10.1126/science.1243518.

In 2008, for instance, one group of researchers⁴⁶ concluded that a *single Siberian population moved toward the Bering Land Bridge no earlier than about 30,000 years ago* –and possibly after 22,000 years ago – subsequently migrating from Beringia to the Americas sometime after 16, 500 years ago. This study confirmed Nichols’ rejection of the Clovis-first (or ‘blitzkrieg’) hypothesis. The authors note archaeological evidence pre-dating Clovis, and the fact that the highest concentration of Clovis artifacts is found in eastern North America rather than in the interior of the continent as would be expected under the ‘blitzkrieg’ model. In addition, DNA evidence indicates, according to the authors, that a late-entry and rapid dispersal of humans across the New World is inconsistent with the distribution of genetic variation observed in North American populations today.⁴⁷

In contrast to the traditional model of a single, rapid migration across the Beringian land bridge, another model posits a Pacific coastal migration from Siberia to South America around 20,000 to 15, 000 years ago, followed by a *second* migration into North America once the ice-free corridor appeared⁴⁸. Both single and dual migration scenarios have been alternately favoured in analyses of Y-chromosome lineages in the Americas and Siberia. One model posits somewhere in the Altai Mountain region of Siberia as the starting point for a single migration after the Last Glacial Maximum [LGM] migration between 17, 200 and 10, 100 years ago⁴⁹, and a study of mtDNA data also suggested a single origin. One of the problems in finally settling this issue is

⁴⁶ Ted Goebel, Michael R. Waters, Dennis H. O’Rourke, ‘The Late Pleistocene Dispersal of Modern Humans in the Americas’ *Science* 14 March 2008, vol. 319 no. 5869 pp. 1497-1502.

⁴⁷ *Ibid.* pp. 1499-1450.

⁴⁸ Dennis H. O’Rourke and Jennifer A. Raff, ‘The Human Genetic History of the Americas: The Final Frontier’, *Current Biology* 20, R202–R207, February 23, 2010 a2010 Elsevier Ltd DOI 10.1016/j.cub.2009.11.051, last accessed 1 Jan 2015; R204.

⁴⁹ *Ibid.*

that DNA studies are not yet very good at identifying locations, let alone separating out plural migrations from the same location.

Later, O'Rourke – one of the authors of the 2008 proposal – and Raff suggested yet another possible migration route from north Asia to the Americas. They point out that Beringia had two coastlines, northern and southern. People were inhabiting the north coast of Beringia very early, up to 30,000 years ago. If they were exploiting coastal resources, foraging movement along that coast in the early stages of the last glacial cycle 'could easily have resulted' in occupation of the north coast of modern Alaska prior to the LGM. Thus, movement to the interior of the continent via the McKenzie river drainage prior to the LGM is plausible. Moreover, if, as some evidence suggests, there were open coastal areas for continued movement eastward, this would have provided access to the open water of Baffin Bay and Davis Strait, and a coastal route south along the eastern seaboard of North America. O'Rourke and Raff point out that though this scenario is speculative, it does have the advantage of bringing Asian populations to eastern North America early, to serve as a source for the development of the Clovis culture, in the region where Clovis artefacts are found early and in highest density. It also provides a geographically shorter route to both the interior and the east coast of North America than alternative scenarios, and posits movement of populations from an interior Siberian source population in regions that share the most mitochondrial and y-chromosome haplotypes with modern Native American populations⁵⁰. It brings the date of the colonization of the Americas back to a very much earlier period than the 12,000 years ago accepted quite recently– nearly back to the 'perhaps some 35,000 years' suggested by Nichols in 1990 on the basis of linguistic evidence.

⁵⁰ O'Rourke and Raff, 'Human Genetic History', p.R206.

As noted, the above hypothesis is speculative; others rest on very small foundations. For example, Maanasa Raghavan and his colleagues managed to extract DNA from one of two ancient Siberian skeletons, that of a young boy, from approximately 24,000 years ago⁵¹. The mitochondrial DNA was of a type common among Upper Palaeolithic and Mesolithic European hunter-gatherers, and the Y chromosome was one common to modern-day western Eurasians and most Native Americans. Similarly, the other chromosomes (the 22 autosomes) linked modern-day western Eurasians and modern-day Native Americans, but had no close affinity to east Asians. The authors estimated that 14-38% of Native American genes may originate through gene flow from this ancient population. They claim this means that western Eurasian genetic signatures in modern-day Native Americans derive not only from post-Columbian admixture, as commonly thought, but also from a mixed ancestry in the First Americans. This large conclusion about whole populations made on the basis of one or two skeletons is not the only example of a scientist succumbing to professional pressure or personal desire to produce a substantial finding. It need hardly be said that in science no less than in traditional history, the amount and quality of the evidence is of prime importance.

Mistaken belief in a necessary mapping between DNA and language has also led to some questionable conclusions. In 2012, a team led by David Reich and Andres Ruiz-Linares studying whole genomes of Native Americans in South America plus a few from Canada (U.S American samples collected for medical reasons could not be

⁵¹ M. Raghavan, P. Skoglund, K.E. Graf, M. Metspalu, A. Albrechtsen, I. Moltke, S. Rasmussen, T.W. Stafford Jr., L. Orlando, E. Metspalu, M. Karmin, K. Tambets, S. Rootsi, R. Mägi, P.F. Campos, E. Balanovska, O. Balanovsky, E. Khusnudinova, S. Litvinov, L.P. Osipova, S.A. Fedorova, M.I Voevoda, M. DeGiorgio, T. Sicheritz-Ponten, S. Brunak, S. Demeshchenko, T. Kivisild, R. Villems, R. Nielsen, M. Jakobbson, and E. Willerslev, 'Upper Palaeolithic Siberian Genome Reveals Dual Ancestry of Native Americans', *Nature* Jan 2 2014;505 (7481) pp. 87-91; doi: 10.1038/nature 12736.Epub 2013 Nov 20.

used for research) claimed that North and South America were first populated by three waves of migrants from Siberia rather than just a single migration⁵². They found that there was a main migration that populated the entire Americas, followed by two further waves of migration, one containing Na-Dene speakers and the other Eskimo-Aleut speakers, which they claimed confirms Greenberg's conclusions based on linguistics. But identification of the three waves of migrants with Greenberg's language groups is purely speculative. There were even contradictions within the evidence adduced itself, with population groups like the Chipewyans of Canada who are genetically part of the 'Amerind' migration actually speaking a Na-Dene language.

In DNA studies, as in conventional historiographical work, the less the evidence, the more numerous the possible hypotheses. To state the obvious, if you have only a few pieces of evidence many different scenarios can be proposed that will explain them, and there is not much hope of saying which scenario is actually right. If, on the other hand, you have dozens or hundreds of pieces of evidence, it is likely that only a few scenarios, perhaps only one, will satisfactorily explain all of them.

To sum up, our understanding of the peopling of the Americas is not as much better than the sixteenth century one as one might have expected. We still have no consensus on whether there was only one migration or two or three; on what route(s) the earliest immigrants followed; on how many of them there were; and on when they

⁵² David Reich, Nick Patterson, Desmond Campbell, Arti Tandon, Stéphane Mazieres, Nicolas Ray, Maria V. Parra, Winston Rojas, Constanza Duque, Natalia Mesa³, Luis F. Garcia, Omar Triana, Silvia Blair, Amanda Maestre, Juan C. Dib, mClaudio M. Bravi, Graciela Bailliet, Daniel Corach, Tábita Hünemeier, Maria Cátira Bortolini, Francisco M. Salzano, Maria Luiza Petzl-Erler, Victor Acuña-Alonzo, Carlos Aguilar-Salinas, Samuel Canizales-Quinteros, et al., 'Reconstructing Native American Population History', *Nature* 488, 370-374 (16 August 2012) ; doi:10.1038/nature 11258

arrived, though it is now widely believed that this was earlier than previously thought. This lack of consensus is primarily due to insufficient evidence: the dearth of well-dated ancient DNA samples and of modern DNA samples from the descendants of the earliest settlers. Without this evidence to constrain the imagination, the many scenarios proposed for the settlement of the Americas remain more or less speculative.

5. Madagascar: the ‘single most astonishing fact of human geography’⁵³

Perhaps the most striking successes of DNA and linguistics have been in giving us very strong evidence of oceanic voyaging before Columbus, once considered impossible. Two striking cases are discussed below.

Madagascar is perhaps best known for its remarkable and unique fauna – tomato frogs, panther chameleons, fossas, a multitude of lemurs and the now extinct elephant bird to name a few – which are the product of isolation. Isolation also accounts for the relative lateness of human settlement. One might have expected Madagascar to have been settled much earlier than the Americas and from ‘neighbouring’ Africa, the cradle of humankind. However, between Africa and Madagascar runs the hazardous Mozambique Channel, a highly dangerous seaway with many reefs (notably the Firebrass or Geysers reef, located in the middle of the Channel). European ships often chose to sail east of Madagascar where there were fewer dangers, and Findlay remarks that during the southerly monsoon it is almost impossible for any sailing vessel to make progress on the coast of Africa side⁵⁴. Ferocious cyclones were

⁵³ Jared Diamond, *Guns, Germs, and Steel: a Short History of Everybody for the last 13,000 Years*, London, Vintage 1998, p.381.

⁵⁴ Alex Geo. Findlay, *A Directory for the navigation of the Indian Ocean with descriptions of its coasts, islands, etc., from the Cape of Good Hope to the Strait of Sunda and western*

another hazard, leading to numerous shipwrecks⁵⁵. These perils explain why the first settlers of Madagascar did not in fact come from the obvious place, Africa. Still, it seems at first blush highly unlikely that Madagascar was actually settled by people from a place about *twenty times* further away than Africa.

Some historical context makes this less incredible. The settlement of Madagascar followed trade routes that go back c.5000 years. By the late centuries BCE a world trading system linked the civilizations of the Mediterranean Basin and Han China via Southeast Asia⁵⁶. Indonesian states had an exceptionally advanced marine technology and considerable navigational experience. The Javanese states had large-scale distribution systems, exported local crops, handled the spices of the eastern islands, and manufactured bronze axes that were traded to other islands. A direct link connected Indonesia and Africa/Madagascar in the first to third centuries⁵⁷.

So it is interesting that the Portuguese priest Luis Mariano, in his description of a voyage to Madagascar in 1613-14, says that the island's inhabitants must have come from Malacca⁵⁸. Comparisons between Malagasy and languages from the region of present-day Malaysia and Indonesia followed, beginning with the Dutch professor

Australia; including also the Red Sea and the Persian Gulf; the winds, monsoons and currents and the passages from Europe to its various ports, London: Richard Holmes, 1866, pp. 152, 395, and 421.

⁵⁵ Pierre van den Boogaerde, *Shipwrecks of Madagascar*, Strategic Book Publishing, electronic book 2011.

⁵⁶ Bérénice Bellina and Ian Glover 2004. 'The Archaeology of Early Contact with India and the Mediterranean World, from the Fourth Century BC to the Fourth Century AD', in IC Glover, P. Bellwood, eds. *Southeast Asia: from prehistory to history*, London/New York: RoutledgeCurzon, pp.68-89: 83.

⁵⁷ Philippe Beaujard, 'The Indian Ocean in Eurasian and African World-Systems before the Sixteenth Century', *Journal of World History* 16/4 (Dec. 2005), pp. 411-465, Map 1.

⁵⁸ Otto Christian Dahl, *Malgache et maanjan : une comparaison linguistique*, Oslo: Egede-Instituttet i hovedkommissjon hos Arne Gimnes forlag, Avhandling utgitt av Egede-Instituttet / Studies of the Egede Institute, 3, 1951, pp. 9-13.

Adriaan (or Hadrianus) Reland, in 1708⁵⁹. Malagasy remained a linguistic challenge for three centuries, during which the methodology of historical linguistics was incrementally improved. Finally, in 1951, Otto Christian Dahl established that Malagasy was in origin a South-east Barito language, most closely related to Ma'anyan. Ma'anyan is spoken by a relatively small group living in the interior of Kalimantan at a latitude of around two degrees south, on the eastern shores of the Barito river and separated from the coast by mountains⁶⁰.

This would not be the first part of the world one would look to for the origins of Madagascar's first settlers. And an inland-dwelling group would appear especially improbable. Of course, the Ma'anyan may not *always* have been an inland group, as there are other cases of populations, originally coastal, being pushed inland by later immigrants. Nevertheless, this whole area is not known for long-distance voyaging, and Adelaar deduces that the Ma'anyan were actually brought to Madagascar by Malays, probably in the seventh century. Malagasy language and culture still exhibit a remarkably high level of Malay and Javanese influence, and Adelaar deduces that the Ma'anyan had already taken on much of Malay culture while in Kalimantan. They had also undergone Javanese influence, as indicated by their adoption of the Javanese respect marker *ra-*, which is now found in Malagasy⁶¹.

⁵⁹ Dahl, *Malgache et maanjan*, pp. 14-15.

⁶⁰ Dahl *Malgache et maanjan* , pp.15-23.

⁶¹ Alexander Adelaar, 'Who Were the First Malagasy and What Did They Speak?' in Andrea Acri and Alexandra Landmann, forthcoming, p.457; and Alexander Adelaar, 'Loanwords in Malagasy', in Martin Haspelmath and Uri Tadmor eds., *Loanwords in the world's languages: A comparative handbook*, p.724.

DNA evidence began to appear around three centuries after linguistic investigation began. In 2005 Hurles et al.⁶² published a paper stating that Asian lineages made up around half the Madagascan population, the other half being the lineages of Africans who had arrived later. Indonesian samples were taken from Banjarmasin in Kalimantan (Borneo) and Kota Kinabalu in Sabah. Only one other island Southeast Asian sample was collected, from the Philippines. This was not as close to the Malagasy Asian lineages as were the Indonesian samples. The samples of Pacific populations were more distant still. However, taking Indonesian samples *only* for the island indicated by the linguistic evidence is not ideal. True, it does show that the people of Kalimantan share DNA with the Madagascans, but it cannot establish that they were the only, the earliest or the closest ancestors of the Madagascans since no samples were taken from other parts of Indonesia.

In 2009, Sergio Tofanelli et al. published an article that set out to enlarge the focus of the Hurles et al. study in space and push it back in time⁶³. They remark that the uniqueness of Malagasy DNA in the landscape of human genetic variation is due to a ‘recent’ [using this term in a prehistoric rather than historical sense, which historians have to be aware of] mix of gene pools each of which had been shaped by at least 60,000 years of independent evolution. This admixture took place due to the meeting of the extreme edges of two of the broadest historical waves: the Austronesian and Bantu expansions. All Madagascan living groups (colonial and post-colonial immigrants aside) have a mixture of DNA typical of present African and South East

⁶² M.E. Hurles, B.C. Sykes, M.A. Jobling, P. Forster 2005. ‘The dual origin of the Malagasy in Island Southeast Asia and East Africa: evidence from maternal and paternal lineages’. *American Journal of Human Genetics* 76(2005), pp. 894-901.

⁶³ Sergio Tofanelli, Stefania Bertoni, Loredana Castrì, Donata Luiselli, Francesco Calafell, Giuseppe Donati and Giorgio Paoli, ‘On the Origins and Admixture of Malagasy: New Evidence from High-Resolution Analyses of Paternal and Maternal Lineages’, *Molecular Biology and Evolution*, (2009) 26 (9): 2109-2124.

Asian populations. Population samples from a region embracing ‘Sunda Islands, Molucca islands, and Malaysia’ showed the closest genetic affinities with Malagasy ‘Indonesian-type’ DNA. Malagasy ‘Indonesian-type’ mitochondrial DNA and also Y chromosome DNA matched closely with that of insular Southeast Asia. Samples from the Molucca islands (Ambon) and ‘Sunda’ Islands (i.e. Sulawesi, Lombok, and Borneo) were closest. The fact that Borneans from the Barito River region (Banjarmasin) were more distant –in fifth ranking place– from the Malagasy samples may mean that the Malagasy had ancestors different from the present-day Banjar. Alternatively, it might just be because what the authors label ‘Maanyan properly speaking groups’, currently living North of Banjarmasin, have not actually had their DNA analyzed so far! This is but one instance of the poor sampling of island Southeast Asia DNA.

Tofanelli et al. sub-divided the Madagascan population into ‘coastal’ and ‘highland’ groups. Highlanders include the Merina, by far the largest ethnic group on the island, the most ‘Indonesian-looking’, and highly endogamous. They had 63% Indonesian mitochondrial DNA while the coastal group had minimally less, 62%. On the paternal line, African lineages comprised 50% in the highlands but as much as 74% in the coastal group. So in contrast to the Malagasy language, which is spoken universally across the island, the genes reveal the diversity of the Malagasy population.

Tofanelli et al. also set out to determine the *time period* when the African and Asian DNA first became mixed. The male African component of the gene pool was deduced to derive from between 200–2,000 men at a date around 750-800 years ago – quite recently. In contrast, the African *female* genes came into the population much earlier and the date of arrival differed in the coast and highlands, at 1,820 and 3,820 years

ago respectively. The former largely overlaps with the estimate made for the Asian founders. (The authors were unable to make an estimate of the time depth of the *male* Asian component, again because of inadequate samples, in this case from both Madagascar and Southeast Asia.) They conclude that this suggests that a major Indonesian migration occurred significantly earlier than the time of the Malay political and cultural dominance in Indonesia in the sixth to seventh century AD.

Like the Hurles study, Tofanelli et al. refer to linguistic research. In particular, they note that the Malagasy language seems to preserve an earlier form of the language than present-day Maanyan, which provides additional support for their argument for an early migration to Madagascar.

Tofanelli et al. also note other evidence of an early interaction between Southeast Asia and sub-Saharan Africa, including evidence of the cultivation of Asian banana species in Southern Cameroon and Uganda before 500 BCE. This date seems to the present author to be too late: a relatively conservative account⁶⁴ puts the arrival of plantains, probably accompanied by Indonesian cultigens of taro and water yam, at earlier than 3000 B.P in West Africa, while Denham and Donohue tentatively suggest it may have been as early as 5000 B.P for Uganda⁶⁵. The banana has long been a major food crop, next after rice, wheat and maize, enabling population growth.

The Javanese also left a botanical signature of their presence in the introduction of *javanica* rice⁶⁶, one of the three major groups alongside *indica* and *japonica*.

⁶⁴ Roger Blench, 'Bananas and Plantains in Africa: Reinterpreting the Linguistic Evidence', *Ethnobotany Research and Applications* 7, July 30 2009: 363-380: 363.

⁶⁵ Tim Denham, and Mark Donohue, 'Pre-Austronesian dispersal of banana cultivars West from New Guinea: linguistic relics from Eastern Indonesia', *Archaeologica Oceania* 44/1, 2009, pp. 18-28: 26.

⁶⁶ See Gwyn Campbell, *David Griffiths and the missionary 'History of Madagascar'*, Koninklijke Brill, Leiden 2012, p. 517.

Tofanelli et al. also note archeo-zoological evidence for an early (second millennium BCE–first millennium AD) introduction of Asian *bos indicus* cattle into East Africa from Asian routes; and the excavation of chicken bones from a Neolithic limestone cave site at Zanzibar. In sum, increasing support exists for long-distance contacts between Austronesians and Bantu via the Indian Ocean much earlier than the first archaeological evidence of human settlements in Madagascar 2,300–2,200 years ago. The authors remark that the Malagasy admixture of island Southeast Asian and African genes could have had a history in East Africa before it crossed the Mozambique Channel, even though genetic signatures of these first mainland contacts are still missing. They suggest future genetic research on populations from the Swahili coast – and again point out the need for a better Indonesian population sample in order to produce more precise results.

In 2009, Razafindrazaka et al. published a study of the occurrence of the ‘Polynesian motif’ – a particular configuration of mitochondrial DNA found in Polynesia and some other places – in Madagascar. Yet again, we find that the research was hampered by the very small amount of DNA available from Melanesia, Polynesia and Island Southeast Asia, though there was sufficient to suggest that Polynesia was not the ancestral region for the colonization of Madagascar. The DNA data provided evidence of a sub-group within the Polynesian motif that the authors call the ‘Malagasy motif’. They hope that this will eventually localize the Southeast Asian ancestors of the Malagasy. They too comment on the paucity of available data and recommend ‘microgeographic sampling of well-defined populations (e.g. linguistically and culturally)’⁶⁷.

⁶⁷ Harilanto Razafindrazaka, François-X Ricaut, Murray P. Cox, Maru Mormina, Jean-Michel Dugoujon, Louis P Randriamarolaza, Evelyne Guitard, Laure Tonasso, Bertrand Ludes and Eric Crubézy, ‘Complete mitochondrial DNA sequences provide new insights into the

What would we know about the settlement and early history of Madagascar without the linguistic and DNA evidence? What other sources are there? Some archaeological evidence has been mentioned above. For what would certainly be considered ‘historical’ times elsewhere in the world, there are indeed some written sources. These, however, are rather limited, especially on the Indonesian end of the connection, though there are some inscriptions that do appear to demonstrate a special link between the Maanyan and the Sumatran Malay kingdom of Srivijaya. In the Telaga Batu and Kota Kapur inscriptions of 686 there are a few lines at the beginning which appear to be a form of Maanyan, though attempts at their translation have not been successful⁶⁸.

Turning to the other end of the connection, the Arabic sources are more numerous. They date from the 10th to 12th centuries, and rather clearly demonstrate that the presence of written texts is no guarantee of reliable information. Like some European accounts of distant lands, the Arabic ones are extremely rich in tall tales – fireproof birds, speaking trees, a sea of darkness from which no-one emerges alive, and, most popular of all, a tree, the ‘Waqwaq’ tree, whose fruit is beautiful naked girls. This became a favourite subject in Arab and other paintings, and remains popular today, as can be discovered by googling Waqwaq tree. But their geographical information – not helped by the heritage of Ptolemaic geography with its bizarre world map⁶⁹ – is never precise and sometimes spectacularly wrong. Most of it is second-hand, and the area

Polynesian motif and the peopling of Madagascar’, *European Journal of Human Genetics* May 2010; 18(5): 575–581. Published online Dec 23, 2009. doi: 10.1038/ejhg.2009.222

⁶⁸ Alexander K. Adelaar, ‘The Indonesian migrations to Madagascar: making sense of the multidisciplinary evidence.’ In Truman Simanjuntak, Ingrid Harriet Eileen Pojoh and Mohammad Hisyam, *Austronesian diaspora and the ethnogenesis of people in Indonesian archipelago*, Jakarta, LIPI press, 2006, p.13.

⁶⁹ Nicholas Nicastro, *Circumference: Eratosthenes and the ancient quest to measure the globe*, New York: St. Martin's Press, 2008, pp. 152-9.

beyond the Straits of Melaka is particularly badly covered. We can however glean a few things from these texts⁷⁰, apart from the tall stories. They do provide some idea of the aggressive nature and economic motivation for the Indonesian presence⁷¹. An account written only about a decade after the event relates how in 334 AH [945-6 CE] the ‘Waqwaq’ arrived in 1000 boats and fought with extreme vigour to take the citadel Qanbaloh⁷² (a trading centre usually identified with Pemba), eventually without success⁷³. Some of them, asked why they had chosen this particular place, said it was because it had goods suitable for their country and for China, such as ivory, tortoise shells, panther [skins] and ambergris, and because they wanted to get Bantu who were strong and bore slavery easily. The ‘Waqwaq’ also said that they had plundered some islands six days distant from Qanbaloh and had taken a certain number of villages and towns including the seaport Sofala in the Bantu lands.

In the eleventh century, Al-Bīrūnī mentions shipping between Sofala and China and island Southeast Asia⁷⁴, and in the twelfth century, Idrīsī emphasizes the production of iron on the Sofala coast, and its export by the Javanese to India. There it was esteemed as being of the highest quality and used for the manufacture of swords of unequalled excellence⁷⁵.

So we can see that written sources do provide some useful information about military campaigns and trade that cannot be found in DNA or linguistic studies. On the other hand, they lack the information that these latter studies *do* produce – notably, where

⁷⁰ See further Ann Kumar, ‘The Single Most Astonishing Fact of Human Geography’: Indonesia’s Far West Colony’, *Indonesia* 92 (October 2011): 59-95.

⁷¹ See further Kumar, ‘Single Most Astonishing Fact’, pp. 59-95.

⁷² H. Neville Chittick, ‘The East Coast, Madagascar and the Indian Ocean’, in Roland Oliver ed., *The Cambridge History of Africa* vol. 3, from c. 1050 to c. 1600, Cambridge: Cambridge University Press 1977, pp. 183-213: p. 195.

⁷³ Chittick, ‘The East Coast’ p.220.

⁷⁴ Dahl *Malgache et maanjan*, p. 357.

⁷⁵ *Ibid.* p.195.

the ‘Waqwaq’ actually came from. It seems impossible that this could have been discovered without the linguistic and DNA work, without which no-one would have believed in such a long oceanic voyage, let alone an Indonesian colonization. Very few of us today have experience of ocean-going boats powered only by the wind, the tides, and human muscle. So our default expectation is that in ancient times any migrants must have come from somewhere close, and if they came by sea they probably crept along the coastline (which is often not the safest option, whatever landlubbers may imagine).

Yet already in 1960, evidence of trans-oceanic contact before Columbus was provided by the discovery of the L'Anse aux Meadows (L'Anse-aux-Méduses, ‘Jellyfish Cove’) settlement, an archaeological site on the northernmost tip of Newfoundland. An excellent survey of the different theories re the origins, size, and date of this settlement is given by Wallace⁷⁶. She concludes that it was an offshoot of the Viking colony on Greenland, and required considerable effort and materials to set up and to maintain. It was eventually abandoned as not worth the effort (and indeed the Greenland colony itself did not endure).

L'Anse aux Meadows is allegedly ‘the only site widely accepted as evidence of pre-Columbian trans-oceanic contact’⁷⁷. But Madagascar is an equally well-established case, with DNA and linguistics providing evidence no less strong than that of artefacts.

The first settlement and early history of Madagascar is better understood than the first settlement of the Americas. The reasons for this are firstly, that the settlement of Madagascar is very much less distant in time than that of the Americas, secondly, that

⁷⁶ Birgitta Wallace, ‘The Norse in Newfoundland: L'Anse aux Meadows and Vinland’, *Newfoundland and Labrador Studies*, Vol 19, No 1: The New Early Modern Newfoundland: Part 2, (2003).

⁷⁷ http://en.wikipedia.org/wiki/L'Anse_aux_Meadows

the DNA evidence, though limited, is not virtually unobtainable, and lastly, that only one language is spoken on Madagascar, as opposed to the immense linguistic diversity of the Americas. Even so, it took centuries to arrive at its Ma'anyan origins. But the linguistic and DNA evidence is undoubtedly the key evidence in the Madagascar case, and there is every reason to hope that a more clearly defined and detailed picture will emerge— if the oft-deplored paucity of DNA samples from island Southeast Asia can be remedied.

6. DNA, language, and the origins of Japanese civilization.

A mystery has long hung over a major transition in the basis of Japanese society. This transition began at the end of the 'Jōmon period', when epoch characterized by a hunter-gatherer economy that lasted for many millennia. Just how many is debated, but recent radio-carbon dating of Jōmon pottery gave results of 15,500 years ago. This age-old society was transformed relatively swiftly in the second half of the first millennium B.C. by the arrival on the scene of a staggering number of innovations. These included not merely agriculture but a sophisticated wet-rice agriculture, as well as a whole slew of new technologies: metallurgy (including weaponry), cloth weaving, storehouses and fences, and non-material innovations such as a kinship system, a social hierarchy, and a complex of religious beliefs. This transformative era is referred to as the 'Yayoi period', and it is now generally recognized that immigrants were involved. But where did they come from? Most have sought their origins on the mainland, especially Korea. However, a recent book uses DNA and linguistics, as well as conventional evidence, to argue that they actually came from *Java* – arguably a bigger affront to established concepts of the 'possible' than the

settlement of Madagascar.⁷⁸ Though the author noted some conventional archaeological evidence that supported her conclusion – for example, scientists working on rice had already discovered the close genetic relationship between *javanica* rice and Japanese rice - she regarded the linguistic and DNA evidence as offering much greater certainty.

Evidence of an Indonesian element in the Japanese population was found using a very large range of indicators from numerous independent studies. A number of craniometric and cranioscopic and dental studies supporting a genetic link are surveyed in Kumar (1998), which also reports on a d-loop study carried out by Kumar herself. In 2004, a complete investigation of the mitochondrial genome also, like the Kumar study, identified DNA found *exclusively* in the Japanese and Indonesian populations⁷⁹. The indications so far are of a group not much larger than the Norman French in the UK. But as this comparison reminds us, small groups can have a very large amount of influence.

Linguistic evidence

It is axiomatic that if some Javanese/Indonesians settled in Japan this must have involved language contact and borrowing.

A very large number of diverse theories concerning the relationships of the Japanese language has been put forward by previous researchers: Japanese has been said to be related to languages ranging, if not from Arabic to Zulu, at least from Basque to

⁷⁸ Ann Kumar, *Globalizing the prehistory of Japan: language, genes and civilization*, London and New York: Routledge, 2009.

⁷⁹ Ann Kumar, 'An Indonesian Element in the Yayoi? The Evidence of Biological Anthropology'. *Anthropological Science* 106/3 (1998): 265–76.; M. Tanaka et al., 'Mitochondrial Genome Variation in Eastern Asia and the Peopling of Japan', *Genome Research* 14 (2004), pp. 1832-1850.

Tamil. The two ‘front runners’ are (a) some sort of connection with Korean and/or the putative Altaic language family; and (b) some Austronesian element. There are however many competing hypotheses as to whether only (a) or only (b) is involved, or if both are involved, which arrived first and what was the nature of the relationship between the two!

One thing is clear however: while there may very possibly be some Korean element in the Japanese language, Korean *cannot* have been the language introduced in the Yayoi period. If it had been, it would have been very much easier to demonstrate the connection by using the Comparative Method than it actually has been. The Comparative Method is a powerful tool that can reach back 6,000 years or more to demonstrate linguistic relationships, i.e. much further back than the Yayoi period. The very serious problems in establishing the relationship between Korean and Japanese can only indicate that any such relationship would have to have been from a much more distant time than the Yayoi period – that is to say from a time outside the reach of the Comparative Method.

The linguistic data were statistically evaluated by Rose (see Kumar and Rose 2000), using the appropriate framework for assessing the strength of evidence in support of a hypothesis, namely Bayesian probability. These data clearly established linguistic borrowing into an earlier form of Old Japanese, not from Korean, but from an antecedent of Old Javanese.

In fact linguistic evidence can, and in this case did, elucidating many different aspects of the contact. These include:

- directionality, which can be deduced from the nature of the sound shifts that took place when words were borrowed^[SEP]

- precise location of the donor language
- [L] [SEP] intensity of contact: the borrowings include items such as many verbs from the basic vocabulary (words like *sosok*, to pour, *wuwuh*, to grow or increase, and *tutup*, to cover) and there is also evidence of structural influence, both of which are typical of cases of intense contact
- the ideas and concepts which were imported, and which by their nature cannot be visible in archaeological remains.
- material culture, specifically items introduced in the Yayoi period. These words include *tapih*, cloth, *wakul*, basket, *lěsung*, rice mortar, *piring*, plate, *gudang*, warehouse for rice or for precious objects, *duduk*, spear/stabbing weapon and *kikis*, fence.

Some of the borrowed words are from the high-culture end of the language spectrum, such as Old Javanese *matur*, ‘to present, offer, tell or report to person of higher rank’, which was borrowed into an antecedent of Old Japanese as *matur* – ‘to give or present something to a person of high rank/God; to offer prayers; to honour the memory of God by making offerings at a shrine’ etc. It had in Old Japanese the full range of meanings it had in Old Javanese and which it still has in Javanese and Balinese today. (The Modern Japanese form *matsuri* is used to mean a religious ceremony or religious worship).

There are other borrowed words that refer to abstract concepts, for example *tuntun*, to lead. With this data we can draw a very much fuller and more interesting picture of the first Japanese civilisation than is possible from archaeological research alone.

TABLE 5. SOUND CORRESPONDENCES BETWEEN OLD JAVANESE (OJAV) AND OLD JAPANESE (OJAP)

Sound correspondences in primary and secondary data between Old Javanese (OJAV) and Old Japanese (OJAP) consonants (A) and vowels (B).

A

| OJAV | OJAP | env't |
|------|-------------|--|
| | | |
| p | m F | /_+ i verbal suffix / elsewhere. |
| t | t | |
| k | k | |
| b | F b | / #_ / elsewhere |
| d | t r | / #_ / elsewhere |
| dç | r | /intervocally |
| g | k g | / #_, + i verbal suffix / elsewhere |
| m | ∅ m | / syllable-final / elsewhere |
| n | n ~ ∅ n | / syllable-final / elsewhere |
| N | ∅ | / syllable-final |
| r | t ∅ r | / #_ / _# / elsewhere |
| l | ∅ r | / #_ elsewhere |
| s | s | |
| h | ∅ r | / word-final / + i verbal suffix |
| w | ∅ w ~ F | /_ u / elsewhere |

| | B | |
|------|------|--|
| OJAV | OJAP | |
| | | |

| | | |
|----|------------|---------------------|
| i | i ~ e2 ~ a | |
| a | a | |
| o | o ~ o2 ~ u | |
| u | o u ~ o | / w_ / elsewhere |
| e* | e a ~ u | / __bilabial C |

Old Javanese (or more precisely, an earlier form of that language) has contributed more than lexicon to Old Japanese (again, an earlier form⁸⁰). It has also affected the very nature of the language and its social function. The most notable example, so far, is the introduction of the so-called ‘humble auxiliary’ verbs. There are a total of six of these verbs in Old Japanese: *matur-*, *tatematur-*, *tamapey-*, *tamapar-* ~ *taNpar-*, *mawos-*, and *mawi-*. These auxiliary verbs were ‘grammaticalized’, to use a linguistic term, from ordinary verbs. As ordinary verbs they denote the basic transactions of human society – meaning respectively to speak, to report, to present or offer, to receive, to come/bring. Their grammaticalization as ‘humble auxiliary’ verbs indicates a very strong impulse to emphasize and reinforce status difference through the medium of language⁸¹, by requiring speakers and writers to use special forms when talking to or about someone of high status.

| Old Japanese humble auxiliary | Old Japanese independent verb: meaning | Old Javanese verb | Old Javanese verb: meaning |
|-------------------------------|--|-------------------|----------------------------|
| matur- | present, offer | matur | present, offer, report |
| tatematur- | present, offer | matur | present, offer, |

⁸⁰ A. Kumar and P. Rose, ‘Lexical Evidence for Early Contact between Indonesian Languages and Japanese’, *Oceanic Linguistics* vol. 29, no.2 (2000), pp.219-255.

⁸¹ Ann Kumar, ‘The ‘humble auxiliaries’ of Old Japanese: Javanese derivations, context, and significance’ in Cathryn Donohue, Shunichi Ishihara and William Steed eds., *Quantitative approaches to problems in linguistics: studies in honour of Phil Rose*, Muenchen: Lincolnm Europa, 2012, pp. 241-263.

| | | | |
|------------------|----------------|---------|---------------------------|
| | | | report |
| mawos- | say, report | mawuwus | say, speak |
| tamapar-/taNpar- | receive | tampa | receive, accept, carry |
| tamapey- | receive, drink | tumampe | receive, come down on |
| mawi- | come, bring | mawi | bring, come |

The following example shows how these auxiliaries are used. It relates to the humble auxiliary verb *matur-* (also the base from which *matsuri*, Japanese religion, is derived)⁸².

tukapey-matur-am-u opo myiya-n-tökörö

translated as:

‘the great palace **that** [I] **will** [always] **serve.**’

The verb is in bold type, showing the humble auxiliary *matur* following the main verb *tukapey*, ‘to serve’ [with the verbal suffixes *am*, indicating future or intent, and *u*, the attributive].

There are no cognates of these Old Javanese verbs in other languages, and there are no Korean or Ural-Altaic cognates for any of the Old Japanese verbs – Korean and Ural-Altaic being, respectively, the language and language group considered most likely to be related to Japanese. So these verbs occur *exclusively* in Old Japanese and Old Javanese. (This is analogous to the mitochondrial DNA found *exclusively* in the Japanese and Indonesian populations⁸³, indicating that, as in Madagascar, women were part of this sea-borne migration.)

⁸² Alexander Vovin, *A Descriptive and comparative grammar of Western Old Japanese*, 2 vols. Languages of Asia Series. Folkestone: Global Oriental, 2009, pp.1032–5.

⁸³ Ann Kumar, ‘An Indonesian Element’; M. Tanaka et al., ‘Mitochondrial Genome Variation in Eastern Asia and the Peopling of Japan’, *Genome Research* 14 (2004), pp. 1832-1850.

(Another word class, the toponym or place-name may yield some information, as it has in tracing for example Anglo-Saxon migration routes and settlements in England. This has not yet been explored, although it is known that the name of the west Javanese kingdom Taruma/i occurs as a place-name in Japan.)

The linguistic evidence, lexical and structural, provides a comprehensive picture of a great social change, affecting everything from means of existence and economy through technology to hierarchy and power. The population of Japan was provided with vastly more advanced agricultural and technological skills (which they developed magnificently in coming centuries) and brought into a very much more organized and tightly-integrated society. This tight hierarchy that culminated in a divine ruler - something that would have major consequences down the centuries.

Kumar's work undoubtedly challenged established beliefs concerning what was possible in past millennia. This can be seen in the most positive review of her book, by a very distinguished DNA scientist, Saitou Naruya. He reviewed all the evidence, concluded that it was sound, and even found some more supporting evidence that had been published later. Yet he concluded it was just too far to get from Java to Japan and he would prefer to believe the immigrants came from somewhere closer like Taiwan!

Kumar's work challenged not just ideas about the possibility of oceanic voyages in ancient times. It also challenged established ideas about the Javanese. Epictetus remarked that *it is impossible for a man to learn what he thinks he already knows*. As far as the Javanese were concerned, what everybody knew owed a huge amount to the writings of two enormously influential anthropologists, Clifford and Hilary Geertz. The first adopted the dogma of Dutch colonial scholars that Java's Great Tradition derived from India - a policy of Gramscian-type cultural hegemony, portraying

Indonesians as benighted under-achievers whose higher civilization came from overseas. Geertz also made an absolute cultural distinction between the Javanese élite who had created a world where power served pomp, and their Western counterparts, for whom pomp was used in the service of power.

Geertz deserves credit for living among the Javanese for some months, something not characteristic of colonial scholars. The problem stems from his claim that his training as an ethnographer fitted him to write the *history* of Java and other places, assuming that what he saw, or deduced, about the present had also been the case in the past⁸⁴. I believe it is in fact part of the historian's job to reveal that things, including hierarchies of different societies, were *not* the same in the past. (Actually, this doesn't seem a difficult point to grasp. If someone without knowledge of ancient history spent some time in a Greek village or provincial town they would probably not know that they were in the land that had produced a civilization of unparalleled glory, whose legacy in philosophy, logic, mathematics and political organization endured for millennia.) In fact, the Javanese court system considerably pre-dated Indic influence. As the great iconoclast of colonial historiography wrote, 'The length of time needed for the development of wet-rice farming and the phenomena related to it – irrigation and terrace-construction, and special forms of social organization in the village, the region, and the royal court with its corps of officials – needs to be measured in ages.'⁸⁵

Van Leur's wide-ranging insights were all formulated before he was 34, at which age he was killed in the battle of the Java Sea, in 1942. At this very time, his deduction

⁸⁴ Clifford Geertz, *Geertz, Negara: the Theatre State in Nineteenth-Century Bali*, Princeton U.P 1980, e.g. pp.9-13.

⁸⁵ J.C. van Leur, *Indonesian Trade and Society: Essays in Asian Social and Economic History*, Selected Studies on Indonesia by Dutch Scholars published for the Royal Tropical Institute vol.1, The Hague/Bandung: W. van Hoeve 1955.

from first principles about the antiquity of Javanese society, including its élite, was empirically confirmed by a stranger. This was W. Rothpletz, a Swiss attached to the Geologisch Museum in Bandung from 1941-5. The most remarkable of Rothpletz's discoveries pertained to the casting moulds of bronze axes, lances, and jewellery⁸⁶. He found fragments of around 40 moulds, a remarkable number given that only one small mould had then been found in Indonesia (at Kerinci in Sumatra), and that such moulds were also extremely rare in Asia and even in Europe. They attest to the presence of a significant wealthy elite and a very high level of metallurgical craftsmanship.

Again *pace* Geertz, Javanese élite culture was not only pre-Indic but also strongly militaristic from early times until as recently as the late eighteenth century⁸⁷. In fact, many Indonesian and Southeast Asian societies would have preferred the Javanese to have less lust for power.

Hildred Geertz further defined Java as *inland* and *agrarian*, reinforcing the belief that such a people could not possibly have undertaken an oceanic voyage from Southeast to Northeast Asia, across a well-established conceptual boundary not generally believed to have been much crossed from south to north in early times.

The 'back story' of the voyages to Madagascar and Japan

The Madagascar and Japan migrations described above are a relatively late stage of a much larger maritime expansion: the global spread of the Austronesians. These non-European people made ships that were indeed used to cross the ocean, however frail

⁸⁶ Kumar, *Globalizing*, p.

⁸⁷ Ann Kumar, "Javanese Court Society and Politics in the Late Eighteenth Century: the record of a Lady Soldier: Part I: The Religious, Social and Economic Life of the Court. *Indonesia* 29 (May 1980), pp.1-46.

Part II: Political Developments: the Courts and the Company 1784-1791", *Indonesia* 30 (October 1980), pp.67-111.

and dangerous they seem to modern eyes. From their starting point, most likely in Taiwan, they began around 5000 years ago a global expansion of such magnitude that Austronesian languages now extend more than half way around the globe, from Madagascar to Easter Island. This made them the most widespread language family in the world prior to European expansion post 1500⁸⁸. The clear language relationship is one of the strongest proofs of the Austronesian settlement of the Pacific, which otherwise strains credulity. We moderns remain convinced that *we* introduced the technology needed for ocean-going voyages, despite considerable evidence to the contrary. Yet the sea has always offered greater speed, and the possibility of seeking out many different places to settle or to trade, and so has always been more profitable and attractive to risk-takers – of which no more astonishing example than the Austronesians. As is well known, even the great navigator James Cook benefitted from the skill and knowledge of a Polynesian, Polynesia being one of the Austronesian sub-groups. The Javanese are part of this Austronesian family, for whom getting to Japan on the back of the powerful Kuroshio current would not have been a major challenge.

This section has dealt with migrations *out of* Indonesia. But DNA and linguistics are also very useful for expanding our knowledge of migrations *into* Indonesia. These are the Indian, Islamic and European migrants: again comparatively few in number but with very significant influence. What DNA and linguistic evidence can contribute to our understanding of these processes deserves a separate paper.

⁸⁸ See Peter Bellwood, James J. Fox and Darrell Tryon ‘The Austronesians in History: Common Origins and Diverse Transformations’ in Peter Bellwood, James J. Fox and Darrell Tryon eds., *The Austronesians: historical and comparative perspectives*, Australian National University Press 2006, p.1.

Conclusion

That DNA and linguistics *can* solve historical mysteries is shown by the cases of Madagascar and Japan, outlined above. These two cases shared certain conditions: the time depth was much less than, say, the settlement of the Americas; and both the demographic and the linguistic complexity were relatively limited. Linguistic investigation led the way in both cases, in the case of Madagascar starting centuries before the discovery of DNA and its uses. Of course it is unfair to criticize DNA studies for coming second to linguistic work, given that linguistic analysis has had the field to itself for centuries. And further work is likely to solve some serious issues that currently beset DNA studies, such as the lack of a consensus on mutation rates. But, as a forensic expert put it, “DNA can’t talk”⁸⁹. It cannot tell you what an individual thought or what social and technological developments occurred – things which *are* encoded in language.

Should historians acquire some knowledge of these skills? Well, without them we can look forward to an increasing number of pronouncements on history from DNA specialists, which we will be unable to assess in an informed manner.

But it is not just a matter of defending the turf of our profession. These skills can in fact greatly expand the reach of history both temporally and spatially. And when linguistics and DNA are used together, they can indeed solve historical mysteries, as we have seen. They are extremely useful in tracing the history of:

- Societies or social classes where written records are poor or non-existent
- Developments and processes – like trade and technological developments – not covered in élite chronicles

⁸⁹ Philip Rose, *Forensic Speaker Identification*, CRC Press, Taylor and Francis, 2002, p.4.

- Processes which, though major and influential, transcend national and regional boundaries and have not been covered in court or national histories

Together, DNA and historical linguistics help us write a history that is more comprehensive, revealing what cannot be found in elite records. It is also a history that makes much more visible those extremely important parts of human history that were not confined within a kingdom, nation-state, or even a conventional region defined as a bloc within a perimeter. As we have seen, there was much more movement and interaction over long distances than is contained in conventional historical narratives, and we should not reify conceptual boundaries that are modern. More and more, DNA and historical linguistics enable us to develop life and activity in what were formerly the blank pages of world history.