

# The Gene Wars

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Macedonian nationalists want Greece back, or at least its northern provinces. Their latest weapon is an obscure genetic study, which claims that while Macedonians belong to the older Mediterranean substratum of peoples, Greeks do not. Consequently, the study concludes, the Macedonians predate even the earliest Greek civilization.<sup>1</sup> Among Macedonian political activists who believe that Greece “has held Macedonian territory illegally for... ninety-three years” and who dream of the re-unification of historical ethnic Macedonia, there is considerable excitement at the prospect of their view that Macedonians “are the oldest people living in the Balkans” being genetically corroborated.<sup>2</sup> Welcome to the gene wars.

Genetically based claims to sovereignty are the newest tactics employed in old struggles over national sovereignty and borders.<sup>3</sup> They are used to support assertions of historical primacy, the principle that the first of the nations still existing to have established collective life on a specific territory has a right to statehood there. The desire to claim historical primacy is so strong that national groups of recent origin and nations that arrived comparatively recently to the territory where they now demand sovereignty are inclined to

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invent histories alleging ancient roots. An example is the case of Ataturk, the founder of the Turkish Republic.

When Ataturk set about fashioning a Turkish nation from the ruins of the Ottoman Empire, he was confronted with the presence of the indigenous Greek and Armenian peoples of Anatolia, both of whom boast well-documented histories predating the Turkic speakers. The brutal ethnic cleansing and genocide by which Ataturk proceeded to eliminate these populations are well known, but less familiar is his re-writing of history in order to grant the Turks a claim to historical primacy. As Bernard Lewis explains, Ataturk's narrative asserted that "the Turks were a white, Aryan people, originating in Central Asia... [who] migrated in waves to various parts of Asia and Africa, carrying the arts of civilization with them.... Sumerians and Hittites [an ancient Anatolian people]... were both Turkic peoples. Anatolia had thus been a Turkish land since antiquity."<sup>4</sup> And indeed, Ataturk's remains lie in a grand Hittite-style mausoleum. Legal scholar Chaim Gans has also pointed out that the appeal of the historical primacy argument is such that national movements that were not, in fact, the oldest organized society on the territory where they claim sovereignty "do not try to deny the validity of the argument. What they do instead is construct a genealogy that supposedly demonstrates their kinship ties to extinct peoples who had occupied the disputed territories before their rivals."<sup>5</sup>

For national movements that can demonstrate historical, linguistic, and archaeological evidence of primacy, such as the Basques, genetics are simply added to the list of determining factors when claiming rights to a given piece of land.<sup>6</sup> But for national groups that lack these proofs, such as the Macedonians, justification must be sought elsewhere. Recently, they have turned to the field of genetics.

As its advocates maintain, genetics can be used to trace the descent of a population; in this, it offers an appearance of scientific certitude that is compelling to those who wish to bolster their claims to territorial sovereignty. But, as this essay will demonstrate, genetic data in truth offer virtually nothing to such groups: Much of the information being marshaled to support

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claims of national primacy is culled from studies that are either flawed or misinterpreted. Moreover, even when high-quality research *does* indicate a specific ancient people among a modern group's ancestors, such data are not magic bullets that enable the group to confirm, scientifically, whichever assertion of ancestry it wishes to be true.<sup>7</sup> Rather, as we will see, rights to territorial sovereignty are legitimately determined by a much more complex array of considerations. Put simply, fighting wars for territory using the rhetoric of genetics is bound to be a losing proposition.

**C**laims that genetic studies validate ethnic territorial aspirations cannot begin to be evaluated without some understanding of the science involved. How does one “prove,” for example, that Macedonians are more closely related to other Mediterranean peoples than are Greeks? The answer begins with the molecules that code our genetic endowment, called DNA. Chains of DNA are composed of four smaller molecules, strung together much like beads on a necklace, with each chain paired with a complementary string of DNA. The two strands are then woven together in a double helix. Each of the component molecules—called “bases,” and known by the first letters of their names as A, C, G, and T—has a regular partner in the opposing strand: A always pairs with T, and C with G.<sup>8</sup> When cells reproduce, in order to insure that each daughter cell has a full complement of chromosomes, the DNA helices are replicated as well, each strand producing a matching strand by attracting the complementary molecules, A, C, G, or T.

Since all humans probably descend from a small number of common ancestors, we would all share identical, or near-identical, genetic endowments if DNA replication worked perfectly. Indeed, any two randomly chosen humans will have 99.9 percent of their DNA sequences in common.<sup>9</sup> But because of imprecision in the replication process—that is, mutation—DNA patterns have diverged over time.

Now, if our DNA patterns simply differed randomly from everyone else's, the first shot of the gene wars would never have been fired. But

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matters are not that simple: Patterns of mutation are passed down from parent to child, and among groups that are largely endogamous (that is, mating tends to occur within the group) those patterns may come to be widely shared. Particular DNA patterns are therefore more prevalent among some groups than others, and knowledge of these patterns has allowed researchers to map the genetic closeness of different ethnic communities.<sup>10</sup> Moreover, since mutation rates tend to be constant over time, the degree of difference in DNA sequences between two ethnic groups yields a rough approximation of when they branched off from the common human tree, allowing scientists to trace migration patterns across the globe.<sup>11</sup> These are precisely the studies that have been recruited to support claims of historical primacy.

Three levels of analysis are used in the study of intergroup genetic differences:<sup>12</sup> The earliest studies did not look at DNA, but instead inferred differences in DNA patterns by looking at the products of particular genes, such as blood type. Frequencies of types A, B, and O differ systematically across the world, as is true for other markers found on cell surfaces, such as those associated with the immune system. More recent work has looked at the variant DNA sequences of particular genes—called alleles—in different population groups. But studying gene products or even the sequences of individual genes, although still in vogue in some places, turns out to be a crude method of determining genetic relatedness.<sup>13</sup> Today, machines that rapidly sequence DNA strands have made it possible to look directly at the variations in DNA itself.

DNA sequences are usually compared in one of two ways.<sup>14</sup> Variation at a single site among the three billion base pairs is called a SNP (pronounced “snip”). For example, if sequencing of DNA bases shows that most people have an A at a given locus, but the person being tested has a C, a SNP has been identified in that person’s genome. Examining variation in SNPs at dozens or even hundreds of loci in the genome allows the differences between two populations to be quantified. In the second way that DNA sequences are compared, researchers can examine groups of SNPs that tend

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to be inherited as a set, usually because they are close to each other on a particular chromosome. These sets are called haplotypes, and studies can explore their frequency across populations. Whether looking at SNPs or haplotypes, the larger the number of sites in the genome that are examined, the more reliable are the findings regarding the genetic closeness of the groups being studied.<sup>15</sup>

To understand who is winning or losing the gene wars, one other distinction is important: SNPs and haplotypes can be examined in the genome as a whole, or in only part of the genome. Two parts that can be uniquely informative are the Y chromosome and mitochondrial DNA. Since only men have a Y chromosome, and most of it tends to be passed down relatively unchanged from father to son, Y chromosome patterns can be used to track descent along the patrilineal line. The now-famous “Cohen haplotype” that is highly prevalent among male Jews who identify themselves as descendants of the biblical high priest Aaron is an example of such a Y chromosome haplotype.<sup>16</sup> Similarly, mitochondrial DNA is separate from the rest of the genome and contained in mitochondria, which provide energy to the cells. Human mitochondria derive from the mitochondria in the maternal egg; both men and women inherit their mother’s mitochondrial DNA, but only women can pass their mitochondrial DNA to their offspring. Thus, examining mitochondrial DNA allows descent to be tracked through the maternal line. The recently announced finding that a large proportion of Ashkenazi Jews probably descended from as few as four women of Middle Eastern origin, for example, is the product of research on mitochondrial DNA patterns.<sup>17</sup>

**W**ith this basic understanding of genetics in mind, we can now turn to the use—or misuse—of genetic findings in the battle of territorial claims. The Macedonians, the Sami of northern Scandinavia, and the Palestinians are three groups that have seized upon deeply problematic

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interpretations of new genetic evidence to bolster claims to sovereignty. While each case is unique, they all share a common effort to “prove” direct descent from the most ancient of the nations who occupied a given piece of land.

Most of today’s Macedonians are in fact citizens of the Former Yugoslav Republic of Macedonia, carved out of the remains of Yugoslavia in 1991, with many others living in northern Greece. They speak a Slavic language, part of a family of tongues brought to the Balkans by Slavic tribes in the sixth and seventh centuries, and first began to develop a unique national identity at the turn of the twentieth century.<sup>18</sup> Nonetheless, as the title of a recent book explains, some of these citizens believe that they are in fact the descendants of Alexander the Great of Macedon, and as such “are not Slavs, but have a direct descent from the ancient Macedonians.”<sup>19</sup> Consequently, they claim territorial rights to Greece’s northern province, also called Macedonia and part of the site of the ancient Macedon kingdom.

The study much ballyhooed by Macedonian nationalists for this purpose looked at the differences in DNA in a cell surface marker gene in thirty-one different populations from the Mediterranean basin, the Near East, and Africa.<sup>20</sup> The frequency of variant DNA sequences, or alleles, in the Macedonian sample most closely resembled that found in a sample from Crete, and was similar to what was seen in almost all of the other Mediterranean groups. On the other hand, the frequencies in the three Greek samples were grouped with samples from sub-Saharan Africa, quite different from that seen in the other Mediterranean populations. To undermine Macedonian claims to northern Greece, Greeks prefer to portray them as Slavs, who are relatively late arrivals in the Balkans and therefore, they believe, without any entitlement to Greek land.<sup>21</sup> Yet the genetic data on cell surface markers have been used by Macedonians to turn the tables on the Greeks. As the authors of the study themselves wrote, “Our results show that Macedonians are related to other Mediterraneans and do not show a close relationship with Greeks; however, they do with Cretans.... This supports the theory that Macedonians are one of the most ancient peoples existing in the

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Balkan Peninsula, probably long before the arrival of the Mycaenian Greeks in about 2000 B.C.E.”<sup>22</sup> According to these findings, then, it is the modern *Greeks* whose legitimacy in the region is suspect.

The Sami (also called Laplander) have lived in northern Scandinavia since before recorded history. They speak ten distinct languages, and historically, the disparate Sami peoples had distinctive customs, religious traditions, and legends.<sup>23</sup> All Sami languages are in the Finno-Ugric group, a linguistic family that reached Europe later and by a different route than the Indo-European languages ancestral to Norwegian and Swedish. The overwhelming majority of Sami today speak a Scandinavian language, live in modern homes, and have jobs in the modern economy. Like other Scandinavians, most Sami are lapsed Lutherans. Sami national consciousness arose only in the last decades of the twentieth century; today, some Sami have begun to speak of a “Sami nation,” and to promote a quest for self-determination. Moreover, as minorities in Norway, Sweden, Finland, and, to a lesser extent, the neighboring areas of Russia, they seek access to traditional herding and fishing territories, and the maintenance of their languages and culture.<sup>24</sup> They have indeed made some strides: Sami parliaments exist in all three Scandinavian countries, though they lack the full apparatus of self-rule. Moreover, their cause has gained popularity among some non-Sami, who work with Sami activists in “helping the Sami people assert their unique identity.” They have now identified a thirteenth-century “Sami homeland... called Sampi or Samiland, which once occupied most of Norway, Sweden, and Finland,” and assert that Sami “are the indigenous people who live in northern [Scandinavia]...”<sup>25</sup>

Genetic claims on behalf of the Sami are somewhat more complex than those of the Macedonians, since no one denies that Sami (or proto-Sami) have been in Scandinavia for thousands of years. Studies of mitochondrial DNA have been of greatest use to the Sami; most show distinctive haplotypes found only at much lower frequencies in other European populations, and advocates for the Sami claim that these data indicate that the Sami were the earliest settlers of northern Scandinavia. As the website of the Swedish

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Sami Parliament puts it, “There has never been any reason to doubt that the Sami people have always been here.”<sup>26</sup>

The Palestinians are another example of a national identity that emerged in the twentieth century and has now turned to genetics to support its territorial claims. Culturally, religiously, and linguistically, they are part of the Arab people that arrived in the Levant as conquerors in the seventh century. Yet it remains unclear to what extent today’s Palestinians, who are overwhelmingly Muslim, descend from the conquered Christian population, some of whom are known to have converted to the religion of their Islamic rulers, or from the conquering Arabs or other Muslims who came to the region to take advantage of economic opportunities at various periods from the seventh century to the present.<sup>27</sup> The historical record shows that an Arab army conquered the area, some local people converted, and some Muslims arrived later as immigrants; it does not show the proportion of the population accounted for by these events.

Because Palestinian Arabs are part of an ethnic group historically proud of having arrived as conquerors, the question of how to claim historical primacy has been the source of some perplexity among Palestinian nationalists. After all, the lack of evidence for Arab primacy jumbles the logic of their arguments. Various claims have been articulated; one holds that, “The Arabian desert and the area around it gave birth to a number of tribes and civilizations: Phoenicians, Assyrians, Chaldeans, Arameans, Hebrews, Canaanites, Nabateans, etc. These tribes continuously drifted out of the desert into the fertile areas of the Levant,” which, since all of its inhabitants throughout history were Arabs from Arabia, was always Arab.<sup>28</sup> A separate style of argument simply states that the Palestinians are the original and eternal people of Palestine. “Palestine was conquered in times past by ancient Egyptians, Hittites, Philistines, Assyrians, Babylonians, Persians, Romans, Muslim Arabs, Mamelukes, Ottomans, the British, the Zionists... but essentially (especially in villages) the population remained constant—and is now still Palestinian.”<sup>29</sup>

Another tactic has been to negate the *Jewish* claim to primacy by denying that Jews are in fact the descendants of the ancient Hebrews: “The claim

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made by the Zionists... that late nineteenth-century European Jews are direct descendants of ancient Palestinian Hebrews is what is preposterous here.... That they somehow descend from first-century Hebrews, despite the fact that they look like other Europeans, that they speak European languages is what is absurd.”<sup>30</sup> Arthur Koestler’s book *The Thirteenth Tribe* is widely cited as proving “that most Ashkenazim are the descendants of convert Khazars [a Central Asian Turkic people that embraced Judaism to some extent in the eighth or ninth century, but disappeared from history not long thereafter] with closer ties to the Slavic people than to Semitic people.”<sup>31</sup> They are, then, according to this view, mere interlopers in the Middle East with no historic claim to Israel.

The advent of genetic science has debunked the claim that Jews are descended from the Khazars, but it has bolstered other arguments that seek to sever the connection between ancient Hebrews and modern Jews. Palestinian nationalists have seized upon new genetic data to prove that, as Columbia University professor Joseph Massad says, “many can claim easily that the Palestinians of today are the descendants of the ancient Hebrews.”<sup>32</sup> According to this narrative, some of the ancient Hebrews became Christians at the time of Jesus, and some became Arabic-speaking Muslims after the Arab conquest. Arguing by turns that they are the descendants of ancient Canaanites or ancient Jews who converted but never left the land, Palestinian nationalists claim a genetically based right to inherit the ancient Hebrew homeland.

Studies of Y chromosome haplotypes showed very similar patterns in Ashkenazi and Sephardi Jews, who were less closely, but still clearly, related to other Middle Eastern populations.<sup>33</sup> Along the same lines, the research team that claimed to have established the Macedonians’ Mediterranean heritage also examined Palestinian-Jewish similarities in alleles for the same cell surface marker. Their conclusion was that “Jews and Palestinians share a very similar HLA genetic pool... that support[s] a common ancient Canaanite origin.”<sup>34</sup> Thus, some Palestinian advocates now claim that Jews and Palestinians descended from common ancestors, with the Palestinians

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having remained on the land after most Jews were exiled, sequentially accepting conversion to Christianity under the Byzantines and Islam under the Arabs.<sup>35</sup> Hence, Palestinians and Jews have at least equal claims to the land, with the Palestinians claiming a stronger position by virtue of what is taken to be their continuous settlement.

In each case, genetic data would seem to lend scientific proof to these groups' claims of historical primacy. After all, if Philip of Macedon's blood courses through the veins of the Macedonians, but not the Greeks, then Macedonian arguments for political control of his historical kingdom would appear to be enhanced in some ineffable way. Whether genetic data can carry this burden of proof is a question to which we will turn shortly; first, however, it is important to recognize that not everything purporting to be good genetics actually is. Many of the data or interpretations thereupon that have been enlisted in the gene wars are of dubious validity—including those relied upon by the Macedonians, Sami, and Palestinians. Given that claims of this sort are only likely to increase as more genetic data become available, understanding the problems with the methods and conclusions of these studies is essential to evaluating the contentions of competing groups.

Complex genetic studies are inherently challenging for the layman to assess. In theory, the peer review process used by scientific journals to determine which papers to accept for publication should ensure that published findings do not suffer from obvious flaws. But the process is imperfect, and the result is a body of scientific literature riddled with work of questionable validity, by virtue of either the data generated or the interpretations offered. The studies relied on by Macedonians, Sami, and Palestinians each illustrate some of the problems that afflict this area of research.

Recall that Macedonian claims are based on a single study showing Greeks to have a disproportionate percentage of sub-Saharan alleles of a

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particular cell surface marker, compared to the more typically Mediterranean pattern that they themselves display.<sup>36</sup> The authors of this study succumbed to what can only be called scientific hubris in asserting that the cultural, historical, and genetic identity of Macedonians may be established according to their results. If there is a cardinal rule of science, it is to be exceedingly leery of drawing conclusions on the basis of a single study. After all, extraordinary claims such as this demand the strongest levels of proof. In the absence of any plausible basis on which to assert that modern Greeks descend in substantial part from sub-Saharan Africans, only truly convincing data, replicated independently, should be accepted as proof of that claim.

The primary defect of the Macedonian study is that the authors relied on a single genetic marker, the HLA-DRB1 gene, to determine the genetic closeness of a large number of ethnic groups from Africa, the Near East, and the Mediterranean. Commenting on the work of this research group, Luigi Luca Cavalli-Sforza—probably the world’s leading expert on studies of this sort—and his colleagues stated, “Using results from the analysis of a single marker, particularly one likely to have undergone selection, for the purpose of reconstructing genealogies is unreliable and unacceptable practice in population genetics.”<sup>37</sup> How many markers are appropriate? Experts suggest that distinguishing reliably between even distantly related groups from different continents requires roughly 60 SNPs for 90-percent accuracy, and perhaps 100-160 for 99-100-percent accuracy.<sup>38</sup> Even if a smaller number of haplotypes can be used on account of their relatively unique characteristics (each haplotype incorporates multiple SNPs or other mutations), the right number for assessing the relatedness of populations will never be just one. As Cavalli-Sforza and colleagues conclude, “the ordinary process of [peer review]” should preclude publication of papers of this sort.<sup>39</sup>

Indeed, when another research group attempted to replicate the analysis of the HLA-DRB1 allele distributions among Macedonians, they found that their closest relatives were—of all peoples—the Greeks, the very group from which the Macedonians have been attempting to distinguish themselves.<sup>40</sup>

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As would be expected, Macedonians and Greeks clustered with other European populations on genetic maps, far from the aggregation of North African and sub-Saharan groups. Although these results have not stopped Macedonian nationalists from proclaiming their lineage superior to that of the Greeks, they effectively neutralize the earlier study, leaving Macedonians bereft of scientific support for their claims.

A much larger body of work exists on Sami genetics—which creates its own set of problems. Studies of Sami mitochondrial DNA do indeed suggest links to ancient European populations, but examination of the Y chromosomes of the Sami presents a different picture. Studies have shown that many Sami men carry Y chromosome markers associated with other Finno-Ugric-speaking populations, such as Estonians and Finns.<sup>41</sup> The expansion of Finno-Ugric—that is, the moment when the group speaking the parental language broke up, and languages in the family begin to diverge—is dated by linguists to between 4,000 and 6,000 years ago. Which is to say, Finno-Ugric speakers likely arrived after the post-glacial resettlement of Scandinavia.<sup>42</sup>

The most probable explanation, though debates over the interpretation of the genetic data continue, is that as the glaciers receded from Europe, the continent was re-populated from southwest to northeast by survivors who had taken refuge in southern Europe. Sami carry a higher percentage of mitochondrial DNA markers from this group than do most European populations, and from this derive their assertions of indigeneity. Several thousand years later, the now-dominant Indo-European groups arrived from the east and, in all likelihood, some time later the major Finno-Ugric migration—carrying the markers found on many Sami Y chromosomes—began.<sup>43</sup> Thus, based on their maternally transmitted DNA, we might say that the Sami are an ancient, indigenous population; looking at their paternal line, however, we might conclude that they are more recent arrivals even than the Scandinavian groups with which they contend for territorial sovereignty.<sup>44</sup> In other words, like most ethnic groups today, Sami genetics reflect a mixture of populations over the millennia. Advocates, however, can be counted on

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to select the most supportive findings, and assertions of Sami indigeneity are never tempered by references to the Y chromosome data that undercut the absolute nature of the Sami narrative.<sup>45</sup>

The comparative genetics of Palestinians and Jews demonstrate other pitfalls in generating and interpreting data. When populations are genetically diverse for the markers of interest, as most groups are, the selection of the samples to be studied is crucial. Since the numbers of subjects involved are usually small by epidemiologic standards, selecting a truly representative group is critical to drawing valid conclusions. For example, the study that compared HLA cell surface markers in Palestinians and Jews looked at 165 Palestinians, 94 Moroccan Jews, and 80 each of Ashkenazi and “non-Ashkenazi” Jews, and it is not clear that efforts were made to avoid sampling persons from the same extended family, clan, or region, and who may thus bias the results toward their particular genetic profile.<sup>46</sup> Likewise, is it unclear whether consideration was given to sampling those local populations most likely to have deep indigeneity in the region, such as Samaritans, Palestinian Christians, and Aramaic-speaking Christians. Surprisingly, many genetic studies provide little information about how their subjects were selected and what their characteristics are. For some kinds of medical research, whether the sample studied is representative of a broader population makes little difference. But when conclusions are being generalized to entire ethnic groups, what may be methodological fine points in other circumstances here become critical.

Moreover, given that current contentions about the genetic basis for Palestinian claims of historical primacy (or at least equality) are based on studies demonstrating similarity between Palestinian and Jewish genomes, the question “Compared to what?” becomes vital. For instance, when researchers at the Hebrew University reported “substantial overlap” between Israeli and Palestinian Arab Y chromosome haplotypes and those of Jews, they compared both groups to a sample drawn from northern Wales.<sup>47</sup> Of course, when compared with people from Wales, Jews and Arabs indeed look quite similar. However, when they compared Israeli Jews with the same

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Arab sample, but this time included comparisons with Kurds, Armenians, Turks, Syrians, Jordanians, Lebanese, and Bedouin, the picture looked quite different. Although all of the Middle Eastern populations bore some similarities to each other (a fairly robust finding confirmed in other works), “Jews were found to be more closely related to groups in the north of the Fertile Crescent (Kurds, Turks, and Armenians) than to their Arab neighbors.”<sup>48</sup> For some, this will evoke the biblical account of Abraham’s origins in Ur of the Chaldees, and raise the possibility that the story contains echoes of an ancient population movement. Alternatively, Jews, Kurds, Armenians, and Anatolian Turks may all carry the genetic markers of ancient indigenous populations of the Fertile Crescent, while Palestinian Arabs and Bedouin may largely descend from the Arab conquerors, with their distinctive genetic signifiers. All these hypotheses are highly tentative until confirmed or disproved by further genetic data. What is certain, however, is that one gets a very different picture of the genetic relatedness of Jews and Palestinians when their respective genetic portfolios are placed in the context of the Middle East, rather than compared with distant Wales.

What can we say, then, about the claim that genetic science has proven that “Palestinians are, in most cases, descended from the old Hebrew tribes”? Or about the alternative formulation that the Palestinians’ “ancestors, the Canaanites, were the original inhabitants of the land”?<sup>49</sup> In short, existing genetic data lend no support whatsoever to these assertions. True, both Jewish and Palestinian genetic endowments bear some of the similarities found in most Levantine groups, but they differ substantially as well, and both groups resemble other Middle Eastern populations (other Arabs in the case of the Palestinians, and groups from the Fertile Crescent for the Jews) more than they do each other. Hence, there is no basis for the belief that Palestinians are descended from the Hebrew tribes.

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The difficulty involved in comparing the genetic heritage of ethnic groups, however, does not mean that good studies cannot be conducted and their results accurately analyzed. Indeed, as DNA sequencing technology improves, genetic inquiry will no doubt be more common in the future. We therefore must begin to think about one critical question: How far can genetic evidence take us in establishing the competing claims of two peoples to a land?

Genetic data on ancestry are appealing to nationalists because of their aura of scientific certainty, but they will always be an uncertain descriptor of the relationship between modern groups and ancient peoples. At least four factors contribute to this inherent indeterminacy: (i) The limits of comparisons to ancient populations; (ii) the intrinsically mixed nature of almost all population groups; (iii) the variation in results depending on the markers examined; and (iv) the effects of pure chance. None of these problems is likely to be overcome by technical advances, and, taken as a whole, they suggest that genetics should have little or no role to play in the adjudication of disputes over sovereignty.

For example, both Jews and Palestinians, or at least some advocates in each group, claim descent from the ancient Hebrews who held sovereignty over the land. Without knowing what the Hebrew genome looked like, or even whether it was distinctive in any way from the surrounding populations, Jews and Palestinians are both left to compare themselves with other populations in the Levant to demonstrate their general degree of relatedness to the other peoples who are presumed to have lived in the region.<sup>50</sup> Such data, however, only get one so far. For even if both groups *could* demonstrate an equal genetic relationship to the ancient populations of the western Mediterranean, there would be no way to know whether one of them was descended from the twelve tribes of Israel, while the other comprised the distant grandchildren of the Midianites or Phoenicians. This difficulty

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in fine-resolution comparisons to a population that no longer exists is not likely to be overcome by advances in science or technology.

In addition, both Jews and Palestinians, like all modern population groups, bear the genetic imprint of the ebb and flow of peoples over time. Roughly 15 percent of Palestinians and other Arabs carry mitochondrial markers associated with sub-Saharan Africa, probably the legacy of a slave trade of millennia and of the close ties between Yemen and the Horn of Africa.<sup>51</sup> Such markers, however, are essentially absent in Jews. On the other hand, while Jews carry the genetic legacy of their Middle Eastern roots to a substantial degree, there is no question that infusions of genes from host populations occurred over the centuries of their existence in the diaspora. Similarly, like all modern Finns and Scandinavians, today's Sami show descent from three population groups: Paleolithic Europeans, the Indo-Europeans who arrived next, and the Finno-Ugric migration that followed. Because no contemporary group is a pure descendant of any ancient people, genetic claims will always be a matter of degrees of relatedness. What is often mistakenly viewed as a black-and-white question becomes in practice something much more like distinguishing points on a continuum, and we are then left with the question: Should the difference of a few percentage points on a scientific table of genetic markers entitle a group to territorial control?

If this were not messy enough, the degree of genetic relatedness between populations will often vary depending on which marker is being examined. The conclusions that can be drawn about the indigeneity of the Sami may turn on whether one looks at their mitochondrial DNA or Y chromosomes. Similarly, some writers still want to claim a genetic influence for the Khazars on the Ashkenazi Jewish population (though the notion that Ashkenazim are entirely descended from the Khazars seems to have been retired).<sup>52</sup> Assuming that a minority of Ashkenazi Jews carries haplotypes with Khazar origins—which is by no means certain—does that dilute the probative value of the much larger number of Jews with markers derived from the

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Levant? And if one person carries markers from both sources, into which category should he or she be sorted? How can one ever hope to resolve these questions?

A final complicating factor is the role of chance in determining genetic makeup. Two population groups starting out from the same origin but isolated from each other will, over time, begin to differ from each other—and from the parent population—on account of the random nature of mutation. Those differences will be enhanced by contingent events, such as the phenomena that population geneticists refer to as “founder effects” and “bottlenecks.” In the case of the former, when a small group breaks off from a parent population—such as the first Jewish merchants who migrated to Yemen—merely by chance, the proportion of haplotypes in its genetic endowment is likely to differ from that of the larger group. Over time, those differences may be enhanced by endogamous marriage and the chance survival of some group members as opposed to others. As for bottlenecks, should there be a dramatic decrease in population due to war, plague, or famine—as occurred multiple times with Jews in both Israel and the diaspora—followed by a resurgence in numbers, there can be a dramatic shift in the proportion of haplotypes in the group merely on the basis of who happened to survive. Hence, it is not improbable that of two groups that each split from a common parent population, one will undergo greater change in its collective genome than the other, and thus will bear a lesser resemblance to the parent group. Such chance phenomena hardly seem the right foundation on which to make determinations on the merits of two national groups’ territorial aspirations.

**F**or all the acrimony aroused by countervailing genetic claims to historical primacy, then, genetics seems unlikely to contribute much to the resolution of contending claims of territorial sovereignty. But what, we may ask, is the relevance of historical primacy, for whose sake the gene wars were

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begun? Here, it seems, is the deepest flaw in the claims to land arising from the gene wars.

The claim of a people to sovereignty over a disputed territory must involve two contentions. First, there is the assertion—almost always contested by the rival claimant—that the people in question actually constitute a nation. Second, there is the assertion that this nation's claim to sovereignty over the disputed territory is superior to that of any rival group. David Miller, a professor of political theory at Oxford University, offers perhaps the most thoughtful set of definitions on what constitutes a nation, and none of them involves genetics. The first of his five criteria is that “nations exist when their members recognize one another as compatriots.”<sup>53</sup> In other words, they exist only at the will of their members. For example, Savoy has a national liberation movement, but as long as most putative Savoyards continue to think of themselves as French, the Savoy League is unlikely to get very far.<sup>54</sup> Indeed, with some Sami caring strongly enough about *not* becoming a nation to form an anti-autonomy movement, Sami nationalists have a similar problem. So, too, are Palestinian nationalists challenged by the fact that some proportion of the population of the West Bank and Gaza prefer to identify as members of a larger Islamic *umma*, or nation.

Second, nationality “embodies historical continuity.” Members of a nation believe that, “Because our forebears have toiled and spilt their blood to build and defend the nation, we who are born into it inherit an obligation to continue their work, which we discharge partly toward our contemporaries and partly toward our descendants.”<sup>55</sup> Belief in a shared future and memory of a shared past are essential components of national identity. This lack of a history as a nation makes it more difficult for the Sami, Macedonians, or Palestinians to build effective national identities.

Third, nationality is an “active identity.”<sup>56</sup> Sovereign nations, of course, actively define, defend, and govern themselves, and even before gaining sovereignty, national movements routinely undertake such actions as creating a unique language (in the case of the Macedonians) or establishing

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a university (in the case of the Jews in Palestine prior to the declaration of statehood).

Fourth, “national identity... connects a group of people to a particular geographical place.”<sup>57</sup> The Roma, or Gypsy, people are an example of a strongly identified ethnic group that has nonetheless been unable to organize an effective national movement because it lacks a connection to a homeland.

Finally, national identity requires that the people who share it should have “a common public culture.”<sup>58</sup> The mundane markers of a common culture are language and religion, along with matters of style in dress, food, entertainment, and the like. Of these, language is the crucial factor; its role as conveyer of culture makes language as close to a *sine qua non* of national identity as there is. But there is also that amalgam of assumptions regarding such things as the role of government, the responsibilities of individuals, and the definition of concepts like honor and truth, all of which vary to a surprising degree from one nation to another, and all of which make up that very real but nonetheless hard-to-define entity that is a nation’s common public culture.

Noticeably missing from this list is any mention of genetic relatedness. Indeed, students of nationalism do not regard literal kinship as essential for the existence of a nation, although everyone is aware that almost all nations have myths of common origins. And like most myths, this one is functional; belief in a common descent is a powerful unifying force. And again, like most myths, this one contains an element of truth; nations usually do share a degree of common descent. However, very few if any nations define membership principally according to literal kinship. For example, no one would argue that the descendants of the several hundred thousand Poles who migrated to the Ruhr Valley at the end of the nineteenth century are anything but German, even those among them who have married only the descendants of other Polish immigrants. Nationality is a matter of culture, not genetics.<sup>59</sup>

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Now, even if claims to membership in a nation are made on the basis of culture, not genetics, some weight is given to ancestry, both in public opinion and by many national governments. Thus an individual born in Alexandria or Baku who has no knowledge of Greek can receive Greek citizenship by demonstrating that his parents were of Greek ethnicity, although he may not have an ancestor born on Greek soil for many centuries. Nevertheless, it is not solely genetic kinship in a literal sense that defines nations; it is something more multi-faceted and complex.

Of course, the mere fact that a people constitutes a nation that desires or has already established sovereignty over a territory does not settle the question of its right to rule that land. Several criteria are widely employed in assessing the relative validity of such alleged rights, criteria that make a moral argument beyond what we may call the Genghis Khan approach: "I conquered it; therefore I own it." They include: Self-determination, efficiency, corrective justice, and several types of historical criteria. It is probable that no particular case meets all of the criteria, and no single criterion is a trump card guaranteeing sovereignty in all cases. Historical primacy plays an important role, but is by no means the predominant one; hence, we examine it last.

Claims to sovereignty made under the rubric of self-determination are based on the fact that a group constitutes a majority of the population in a given territory. This concept is widely accepted. Difficulties arise not so much over the principle of self-determination as over the challenges of drawing borders when two or more national groups live in intermingled settlements. For example, the impossibility of creating a border that would leave Muslims on one side and Hindus on the other when Britain ended its rule of India left millions of people on the "wrong" side in 1948. No effort was made to arrange an organized exchange of populations between the newly created states of India and Pakistan, resulting in widespread massacres, the creation of millions of refugees, and a Pakistani state that has been largely cleansed of its indigenous Hindu population.

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The principle of national self-determination, moreover, assumes that national identity is a settled thing; in reality, national identity may be undecided and potentially fluid, within limits. Although it was never possible that the Slavic-speaking people of what is now the Republic of Macedonia would choose to identify themselves as Turkish or Austrian, they had no distinct national identity in the nineteenth century. Thus Bulgaria, Greece, and Serbia plausibly competed for the right to absorb the territory that would become Macedonia, along with its people. An additional difficulty with the principle of self-determination arises when differential birth and emigration rates change the ethnic equation. In 1948, Arabs were the clear majority in the land between the Jordan River and the Mediterranean Sea. The fact that there is, today, a Jewish majority in this area makes it more difficult for Palestinian nationalists to advance an argument for the Arab right to sovereignty over the entire land. The Arab majority in Judea and Samaria, on the other hand, makes it similarly difficult for Israel to justify expansion in those areas.

Efficiency-based and use claims are also widespread, derived from the Lockean idea that ownership can be established by the productive use of territory, or, likewise, weakened by failure to settle and use available territory productively.<sup>60</sup> Efficiency-based arguments are most frequently appealed to in discussions of such settler nations as the United States and Australia, but the moral weight of efficiency-based claims is regularly acknowledged by the actual practice of governments worldwide. Think of the strenuous, expensive, and centuries-long Norwegian effort to create and maintain population centers north of the Arctic Circle. Oslo viewed the existence of Sami populations in the area as irrelevant to the goal of insuring that the North not slip from Norwegian control (and into the hands of expansionist Russia). Thus was remote Tromsø provided with a bishop, a university, an economy, and a population, even though the region has few resources and would not be a viable settlement without massive government intervention.

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Corrective justice is another strong argument on which to base a claim to sovereignty. Here, the argument is for restoring what has been wrongly taken away, usually by conquest. The argument for restoring sovereignty to the Korean nation after half a century of Japanese occupation was so strong that the case scarcely had to be made. Most cases, however, are more difficult. Indeed, both Palestinians *and* Israelis make corrective justice arguments for their rights to territory.

There is more than one variety of historical claims, but all of them require that the group “show that it is indeed, and has been continuously, the same cultural group as that which inhabited the relevant territories all those many years ago.”<sup>61</sup> Evidence of prior sovereignty is probably the strongest historic argument that a national movement can make, a claim that strengthens with the length and recency of that rule. When the Slavic peoples of the Balkans moved toward the formation of modern nation states as the Ottoman Empire disintegrated, Bulgaria was able to claim descent from an important medieval kingdom. Macedonia, by contrast, had last been a sovereign entity at the time of Philip of Macedon, with whom Macedonian nationalists can demonstrate no cultural continuity. The Sami and Palestinians are in a similar predicament, with no prior history of national sovereignty, or even of rule as a unified province.

The existence of a deep historical connection between a land and nation is also compelling; the strongest form of this argument is that the land in question is the nation’s “cradle,” with rights deriving from the fact that “the events thought to have formed the historical identity of a national group took place in specific territories.”<sup>62</sup> The claim of Jews to Israel or of the Arabs to Mecca and Medina epitomizes these arguments.

Thus, the determination of the legitimacy of a claim to sovereignty involves the complex balancing of variables that may seem incommensurate, but somehow must be weighed one against the other. The partisans of a national cause can hardly be blamed for casting about for yet one more argument that might prove dispositive. Genetics, with its appearance of

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scientific objectivity, holds obvious—albeit illusory—appeal. For nations with strong claims to territorial sovereignty, genetic data will be irrelevant; for nations with weak claims, such data will always be inadequate. Advocates who look to genetics for a decisive victory are certain to be disappointed.

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## Notes

1. Antonio Arnaiz-Villena et al., "HLA Genes in Macedonians and the Sub-Saharan Origin of the Greeks," *Tissue Antigens* 57:2 (2001), pp. 118-127.

2. Nikola Spasikov, "Elendzija (Cheater)!" *Macedonian News*, at [www.maknews.com/html/articles/spasikov/elendzija.htm](http://www.maknews.com/html/articles/spasikov/elendzija.htm); Nikola Spasikov, "Gatanka (Puzzle)!" *Macedonian News* (May 2005), at [www.maknews.com/html/articles/spasikov/gatanka\\_puzzle.html](http://www.maknews.com/html/articles/spasikov/gatanka_puzzle.html). For a map of historical ethnic Macedonia, see [www.historyofmacedonia.org/ConciseMacedonia/map.html](http://www.historyofmacedonia.org/ConciseMacedonia/map.html).

3. Although we have limited this paper to discussing claims being made by Sami, Macedonian, and Palestinian nationalists, there are other groups making similar claims, including the Lebanese, who claim to be the heirs of the Phoenicians (see "Proving History Through Science: Phoenicians Reborn Through the DNA 'Alphabet,' the Y Chromosome," on the website of the Virtual Center for Phoenician Studies (<http://phoenicia.org/genetics.html>)); and the Assyrian Christians, who claim to be the heirs of ancient Assyria (see the website of the Assyrian Heritage DNA Project, [www.familytreedna.com/\(zghblo45rkaxrfmazpi15ng\)/public/AssyrianHeritageDNAProject/index.aspx](http://www.familytreedna.com/(zghblo45rkaxrfmazpi15ng)/public/AssyrianHeritageDNAProject/index.aspx)).

4. Bernard Lewis, *The Emergence of Modern Turkey* (New York: Oxford, 2002), p. 359.

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5. Chaim Gans, "Historical Rights: The Evaluation of Nationalist Claims to Sovereignty," *Political Theory* 29:1 (February 2001), p. 59.

6. Thus a Basque blog, Euskal Blog, can confidently reproduce a map of the Basque homeland, *Euskal Herria*, printed in *National Geographic* in November 1995 with a caption that began, "One nation in two countries, Euskal Herria, as three million Basques call their nation..." along with the news that, "Genetic studies show the Basques to be a people distinct from any other in Europe, rooted in the region of the Pyrenees and Cantabrian Mountains before Indo-European tribes arrived. As a saying goes, 'Before God was God and boulders were boulders, Basques were already Basques.'" See [http://txikilike.blogspot.com/2002\\_01\\_01\\_txikilike\\_archive.html](http://txikilike.blogspot.com/2002_01_01_txikilike_archive.html).

7. Tariq Ali, "To Be Intimidated Is to Be an Accomplice: Notes on Anti-Semitism, Zionism, and Palestine," *Counterpunch*, March 4, 2004.

8. A=adenine, C=cytosine, G=guanine, and T=thymine.

9. Michael Bamshad, Stephen Wooding, Benjamin A. Salisbury, and J. Claiborne Stephens, "Deconstructing the Relationship Between Genetics and Race," *Nature Reviews Genetics* 5 (August 2004), pp. 598-609.

10. Endogamous mating was characteristic of the pre-modern world, where geographic barriers generally determined the group from which one could choose a mate. War and migration could produce major disruptions in endogamy, and even among pre-modern peoples, there was also some new genetic material introduced at the margins of the populations as a result of contacts stimulated by trade. See, for example, Noah A. Rosenberg et al., "Genetic Structure of Human Populations," *Science* 298, December 20, 2002, pp. 2381-2385.

11. See, for example, Luigi Luca Cavalli-Sforza, Paolo Menozzi, and Alberto Piazza, *The History and Geography of Human Genes* (Princeton, N.J.: Princeton, 1994). The statement above is a necessarily oversimplified description of the development of genetic differences across population groups. A number of additional factors determine the degree of divergence among populations. Many mutations that affect gene function are incompatible with life, or cause marked functional impairment; when they arise, these deleterious mutations are unlikely to be passed on to progeny, restricting change in the genome. On the other hand, positive effects on survival can accelerate dissemination of a mutation in a population; the relative protective effects of sickle cell and thalassemia genes on survival from malaria contribute to their widespread presence in malarial belts in Africa and parts of Europe. Hence, precision in determining the degree of relatedness of populations is increased if only areas of chromosomes that are not directly involved in coding for genes are examined. Other influences that can magnify differences across populations are the so-called founder and bottleneck effects. Founder effects relate to the restricted gene pool present in a small number of families that migrate to colonize new territories; their descendants will differ more markedly from the

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population of origin (and resemble each other more closely) than would be expected merely by the passage of time. The genetics of Ashkenazi Jews are thought to reflect a founder effect. Bottlenecks are related phenomena that occur when populations are markedly reduced in size, with a concomitant reduction in genetic diversity, only to begin to grow again afterward. Finally, geneticists talk about “genetic drift,” chance variation in the genetic makeup of populations that can accentuate differences among them over time.

12. Luigi Luca Cavalli-Sforza and Marcus W. Feldman, “The Application of Molecular Genetic Approaches to the Study of Human Evolution,” *Nature Reviews Genetics Supplement* 33 (March 2003), pp. 266-275.

13. In addition to the problems in generalizing conclusions from the limited number of genes (often a single one) that are used for these studies, interpretation of the data is often confounded by selective pressures. That is, since mutations in genes that code for proteins are likely to lead to deleterious or (less commonly) advantageous consequences, their spread through a population will be retarded or enhanced accordingly. Calculations of time since divergence, based on such data may be inaccurate, and differences between populations artificially reduced or exaggerated. To the extent that a highly beneficial mutation arises separately in two populations with little genetic relationship, examination of that gene alone will falsely suggest a close genetic relationship between otherwise distant groups.

14. Bamshad, Wooding, Salisbury, and Stephens, “Deconstructing the Relationship Between Genetics and Race.”

15. Other types of mutations that may lead to genetic diversity include insertions, deletions, or transpositions of genetic material in a chromosome. Like SNPs, any of these mutations can be a component of a haplotype.

16. Michael F. Hammer et al., “Y Chromosomes of Jewish Priests,” *Nature* 385 (January 1997), p. 32; Mark G. Thomas et al., “Origins of Old Testament Priests,” *Nature* 394 (July 1998), pp. 138-140.

17. Doron M. Behar, et al., “The Matrilineal Ancestry of Ashkenazi Jewry: Portrait of a Recent Founder Event,” *American Journal of Human Genetics* 78:3 (March 2006), pp. 487-497. An added benefit of using the non-recombining portion of the Y chromosome or mitochondrial DNA for population studies is that so-called recombination events (crossing over of pieces of each pair of chromosomes), which occur in the rest of the genome and can complicate calculations of genetic distance, do not take place in these stretches of DNA. Differences in Y or mitochondrial DNA are almost solely due to random mutation, and hence provide more accurate estimates of the time when two population groups diverged.

18. Loring M. Danforth, *The Macedonian Conflict* (Princeton, N.J.: Princeton, 1995).

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19. Aleksandar Donski, *The Descendants of Alexander the Great of Macedon*, ed. Michael Seraphinoff, trans. Marijan Galevski and Michael Seraphinoff (Shtip: Macedonian Literary Association, 2004); "Why the Macedonians Are Not Slavs," [www.historyofmacedonia.org/ConciseMacedonia/MacedoniansNotSlavs.html](http://www.historyofmacedonia.org/ConciseMacedonia/MacedoniansNotSlavs.html).
20. Arnaiz-Villena et al., "HLA Genes in Macedonians."
21. Victor Roudometof, "Nationalism and Identity Politics in the Balkans: Greece and the Macedonian Question," *Journal of Modern Greek Studies* 14:2 (1996), pp. 253-301.
22. Arnaiz-Villena et al., "HLA Genes in Macedonians."
23. Lyle Campbell, "Review of *The Saami Languages: An Introduction*," *Language* 75:3 (September 1999), p. 645.
24. "The Honningsvåg Declaration," issued by the 18th Sami Conference, Honningsvåg, Norway on October 7-9, 2004, refers to the Sami as "an indigenous people and as one nation." See the website of the Sami Council at [www.saamicouncil.net/files/20041215142715.doc](http://www.saamicouncil.net/files/20041215142715.doc), and the following Sami advocacy websites: <http://boreale.konto.itv.se/seatnam.htm>; [www.sametinget.se/sametinget/view.cfm?oid=2000&sat=no](http://www.sametinget.se/sametinget/view.cfm?oid=2000&sat=no); and <http://arcticcircle.uconn.edu/HistoryCulture/Sami/samisf.html>.
25. Diana Muir, "Exhibition Notes: 'Frost: Life and Culture of the Sami Reindeer People of Norway,'" *The New Criterion* 24:8 (April 2006), p. 46.
26. Antonio Torroni et al., "MtDNA Analysis Reveals a Major Late Paleolithic Population Expansion from Southwestern to Northeastern Europe," *American Journal of Human Genetics* 62:5 (1998), pp. 1137-1152; K. Tambets et al., "The Western and Eastern Roots of the Saami: The Story of Genetic 'Outliers' Told by Mitochondrial DNA and Y Chromosomes," *American Journal of Human Genetics* 74 (2004), pp. 661-682; Muir, "Exhibition Notes"; [www.sametinget.se/sametinget/view.cfm?oid=1429](http://www.sametinget.se/sametinget/view.cfm?oid=1429).
27. Moshe Gil, *A History of Palestine, 634-1099*, trans. Ethel Broido (Cambridge: Cambridge, 1992).
28. Rajah G. Mattar, "Arab Christians Are Arabs," *Baltimore Chronicle*, August 30, 2005, and posted on the website of PASSIA, the Palestine Academic Society for the Study of International Affairs, at [www.passia.org/meetings/rsunit/Articles/E-August-2005.htm](http://www.passia.org/meetings/rsunit/Articles/E-August-2005.htm).
29. Al Quds University Homepage, "Jerusalem, the Old City: An Introduction," at [www.alquds.edu/gen\\_info/index.php?page=jerusalem\\_history](http://www.alquds.edu/gen_info/index.php?page=jerusalem_history).
30. Joseph Massad, quoted in Andrew Whitehead, "History on the Line, 'No Common Ground': Joseph Massad and Benny Morris Discuss the Middle East," *History Workshop Journal* 53:1 (2002), pp. 214-215.
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31. Arthur Koestler, *The Thirteenth Tribe: The Khazar Empire and Its Heritage* (London: Pan, 1976); D.M. Dunlop, *The History of the Jewish Khazars* (New York: Schocken, 1967); Mazin Qumsiyeh, *Sharing the Land of Canaan: Human Rights and the Israeli Palestinian Struggle* (London: Pluto, 2004), p. 28.

32. Whitehead, "History on the Line," p. 215.

33. Michael F. Hammer et al., "Jewish and Middle Eastern Non-Jewish Populations Share a Common Pool of Y-Chromosome Biallelic Haplotypes," *Proceedings of the National Academy of Sciences* 97:12 (June 2000), pp. 6769-6774; Almut Nebel et al., "High-Resolution Y Chromosome Haplotypes of Israeli and Palestinian Arabs Reveal Geographic Substructure and Substantial Overlap with Haplotypes of Jews," *Human Genetics* 107:6 (November 2000), pp. 630-641.

34. Antonio Arnaiz-Villena et al., "The Origin of Palestinians and Their Genetic Relatedness with Other Mediterranean Populations," *Human Immunology* 62:9 (September 2001), pp. 889-900. The paper was later withdrawn from the scientific literature by the editor of the journal in which it was published—an unusual step, justified by its rather extraordinary historical claims, for example, "[T]he Palestinians are nowadays thought to come from the Egyptian garrisons that were abandoned to their own fate on the Canaan land by 1200 years B.C.E...." and "[T]he origin of the long-lasting Jewish-Palestinian hostility is the fight for land in ancient times" are just two examples. Erica Klarreich, "Genetics Paper Erased from Journal over Political Content," *Nature* 414 (November 2001), p. 382.

35. Whitehead, "History on the Line," p. 215; Ali, "To Be Intimidated Is to Be an Accomplice."

36. Arnaiz-Villena et al., "HLA Genes in Macedonians."

37. Neil Risch, Alberto Piazza, and Luigi Luca Cavalli-Sforza, "Correspondence: Dropped Genetics Paper Lacked Scientific Merit," *Nature* 415 (January 2002), p. 115. Although the letter was focused on the controversy surrounding the withdrawal of the paper on Palestinian-Jewish similarities, the critique applies equally well to the Macedonian analyses; both papers were based on the same data set and used the same techniques.

38. Bamshad et al., "Deconstructing the Relationship Between Genetics and Race."

39. Risch, Piazza, and Cavalli-Sforza, "Dropped Genetics Paper Lacked Scientific Merit."

40. Alexander Petlichkovski et al., "High-Resolution Typing of HLA-DRB1 Locus in the Macedonian Population," *Tissue Antigens* 64:4 (October 2004), pp. 486-491.

41. Zoe Rosser et al., "Y-Chromosomal Diversity in Europe Is Clinal and Influenced Primarily by Geography Rather than by Language," *American Journal*

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of *Human Genetics* 67:6 (December 2000), pp. 1526-1543; Tatiana Zerjal et al., "Geographical, Linguistic, and Cultural Influences on Genetic Diversity: Y-Chromosomal Distribution in Northern European Populations," *Molecular Biology and Evolution* 18:6 (June 2001), pp. 1077-1087; Mirja Raitio et al., "Y-Chromosomal SNPs in Finno-Ugric-Speaking Populations Analyzed by Minisequencing on Microarrays," *Genome Research* 11:3 (March 2001), pp. 471-482.

42. Lyle Campbell, "On the Linguistic Prehistory of Finno-Ugric," in Raymond Kickey and Stanisaw Puppel, eds., *Language History and Linguistic Modeling: A Festschrift for Jacek Fisiak on His 60th Birthday* (Berlin: Walter de Gruyter, 1997), pp. 829-861.

43. Torroni et al., "MtDNA Analysis Reveals a Major Late Paleolithic Population Expansion from Southwestern to Northeastern Europe." Expansion of Neolithic technology carried by an Indo-European population into Europe is dated to around 6000 B.C.E. See Cavalli-Sforza, Menozzi, and Piazza, *The History and Geography of Human Genes*, ch. 5.

44. The most plausible interpretation of these data is that the ancestors of today's Sami were predominantly the males of the later Finno-Ugric migration, who mated mostly with the women descended from the glacial refugee population. However, recent research on Sami genetics has found evidence of maternal mitochondrial DNA from the Finno-Ugric line as well, probably derived from a migration roughly 2,700 years ago. These data help to date the Finno-Ugric migration (and agree with independent linguistic data), and underscore the complexity of the genetics of even as isolated a population as the Sami, which, like almost all groups, reflects a mixture of lineage in both paternal and maternal lines. See Max Ingman and Ulf Gyllensten, "A Recent Genetic Link Between Sami and the Volga-Ural Region of Russia." *European Journal of Human Genetics*, advance online publication, September 20, 2006.

45. Controversy continues to surround the origins of the Sami, underscoring the virtue of caution in making claims about their genetic heritage. See Tambets et al., "The Western and Eastern Roots of the Saami"; H. Ikegaya et al., "Genetic Diversity of JC Virus in the Saami and the Finns: Implications for Their Population History," *American Journal of Physical Anthropology* 128:1 (September 2005), pp. 185-193.

46. Arnaiz-Villena et al., "The Origin of Palestinians." Studies of Palestinians' genetics have suggested non-random differences, for example, between highland and other groups. See Nebel et al., "High-Resolution Y Chromosome Haplotypes of Israeli and Palestinian Arabs."

47. Nebel, et al., "High-Resolution Y Chromosome Haplotypes of Israeli and Palestinian Arabs."

48. Almut Nebel et al., "The Y Chromosome Pool of Jews as Part of the Genetic Landscape of the Middle East," *American Journal of Human Genetics* 69:5

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(November 2001), p. 1095; Hammer et al., "Jewish and Middle Eastern Non-Jewish Populations."

49. Ali, "To Be Intimidated Is to Be an Accomplice"; Saliba, "Rebutting a 'Misguided Political Project.'"

50. Note that such comparisons require *a priori* assumptions about which groups in fact descended from the ancient inhabitants of the land. Demonstrating that Macedonians have a high degree of genetic relatedness to Cretans, as Arnaiz-Villena et al. claimed, is of little value in establishing historical primacy unless one begins with the belief that the Cretans themselves are not descendants of later interlopers. Assumptions about comparison groups in population genetics studies must be scrutinized as carefully as the data themselves. Arnaiz-Villena et al., "The Origin of Palestinians and Their Genetic Relatedness with Other Mediterranean Populations."

51. Martin Richards et al., "Extensive Female-Mediated Gene Flow from Sub-Saharan Africa into Near Eastern Arab Populations," *American Journal of Human Genetics* 72:4 (April 2003), pp. 1058-1064.

52. Ellen Levy-Coffman, "A Mosaic of People: The Jewish Story and a Reassessment of the DNA Evidence," *Journal of Genetic Genealogy* 1:1 (Spring 2005), pp. 12-33.

53. David Miller, *On Nationality* (Oxford: Oxford, 1995), p. 22.

54. [http://notre.savoie.free.fr/acc\\_a.htm](http://notre.savoie.free.fr/acc_a.htm).

55. Miller, *On Nationality*, p. 23.

56. Miller, *On Nationality*, p. 24.

57. Miller, *On Nationality*, p. 24.

58. Miller, *On Nationality*, p. 25.

59. Nations confer automatic membership on the offspring of members, a practice that may appear to support the notion that nations are biologically based communities, until it is examined more closely. The Jewish nation, for example, defines every child born of a Jewish mother as Jewish. The mother, however, may be Jewish either because she was born to a Jewish mother or because she converted to Judaism. And anyone born Jewish can cease to be Jewish by the act of conversion. Thus, even in this instance, cultural identity trumps lineage.

60. Tamar Meisels, *Territorial Rights* (Dordrecht, The Netherlands: Springer, 2005), ch. 5.

61. Meisels, *Territorial Rights*, p. 31.

62. Gans, "Historical Rights," p. 66; see also Chaim Gans' essay in the current issue, pp. 80-111.