ANATOLIA AND MODERN HUMAN ORIGINS

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ABSTRACT

A growing number of genetic studies suggest that waves of people and/or genes moved from Africa into Eurasia (and sometimes back again) several times over the course of the Middle and Late Pleistocene. These genetic events are commonly linked to the origins of anatomically, genetically, and eventually behaviorally modern humans. Archaeological findings also suggest a certain level of cultural exchange between Europe and the Middle East during this period, indicative of some form of culture contact if not of the movement of human populations. It is even possible that genetic and archaeological data tell the same story. However, a key piece of the puzzle is missing.

Whether the modern genetic and archaeological data indicate actual migration or simply the diffusion of cultural and genetic information, Anatolia is the most obvious route of communication between the Africa, the Middle East, and Eurasia. The late Middle and early Upper Paleolithic archaeology of Turkey should be crucial to resolving alternative hypotheses for explaining the modern distributions of genes and the ancient distributions of fossils and artifacts. Unfortunately, the number of well-investigated Middle and Upper Pleistocene sites in Turkey is extremely limited, and the data currently available are insufficient to provide answers to these large-scale questions. This paper reviews the evidence and state of knowledge, and outlines some research priorities for research on the Upper Pleistocene archaeological record of Anatolia.

Keywords: Anatolia, Paleolithic, Modern Human Origins

ANADOLU VE MODERN İNSANIN KÖKENİ

ÖZET

Genetik çalışmaların büyük bir kısmı, Orta ve Geç Pleistosen'in çeşitli zamanlarında Afrika'dan Avrasya'ya (ve bazen tekrar geriye) insanlar ve/veya genlerin yayıldığını ileri sürmektedir. Bu genetik kanıtlar genellikle anatomik, genetik ve davranışsal olarak modern insanların orijinleri ile bağlantılıdır. Ayrıca arkeolojik bulgular bu periyot boyunca, Avrupa ve Orta Doğu arasında eğer

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insan populasyonlarının hareketleri değilse, bazı kültürel bağlantıların bir göstergesi olarak kültürel değiş tokuşun belirli bir seviyesini göstermektedir. Genetik ve arkeolojik verilerin benzer hikayeyi anlatması da mümkündür. Bununla birlikte, bilmecenin bir anahtar parçası kayıptır.

Modern genetik ve arkeolojik veriler, göç ya da kültürel ve genetik bilgilerin basitçe yayılışının göstergesiyse de, Anadolu Afrika, Orta Doğu ve Avrasya arasındaki iletişimin en açık rotasıdır. Türkiye'nin Geç Orta ve Erken Üst Paleolitik arkeolojisi, modern genlerin yayılımları ve eski fosiller ile aletlerin dağılımlarının açıklanması açısından alternatif hipotezlerle çözüme ulaşmada son derece önemlidir. Maalesef, Türkiye'de iyi araştırılmış Orta ve Üst Pleistosen alanlarının sayısı son derece sınırlıdır ve kullanılabilir güncel veriler bu geniş ölçekli sorulara cevap vermede yetersizdir. Bu makale, bulguları ve bilgilerin durumunu yeniden gözden geçirmekte ve Anadolu'nun Üst Pleistosen arkeolojik kayıtlarındaki bazı öncelikli araştırmaları ana hatlarıyla özetlemektedir.

Anahtar Kelimeler: Anadolu, Paleolitik, Modern İnsanın Kökeni

OUT OF AFRICA (AND ACROSS ANATOLIA?)

Beginning in the early 1980s, a series of studies of the human mitochondrial, Y-chromosome, and nuclear genomes have attempted to reconstruct global patterns of human evolution and migration based on the distribution and diversity of genetic variants in the modern world (e.g., Cann et al. 1987, Hammer et al 1998, Maca-Meyer et al. 2001, Watson et al. 1997). The first studies of mitochondrial data (Cann et al. 1987) were used to support the hypothesis, often called the "Out of Africa" model, that anatomically modern humans originated in sub-Saharan Africa some 200,000 years ago, and subsequently spread into the rest of the world, replacing all existing archaic hominids (Neandertals and their contemporaries). As results from additional genetic studies have accumulated, however, the picture has become increasingly complicated. In place a single, catastrophic expansion of African modern human populations, researchers have reconstructed a series of bottlenecks, expansions of genes out of Africa, and even some movement of genes back into Africa from Asia and Europe (e.g., Hammer et al. 1998, Relethford 2001, Sherry et al. 1997). Clearly, more complex models of population expansion and gene flow are needed (Eswaran 2002) Nonetheless, some aspects of the general picture are consistently supported: (1) most, though not all, neutral human genetic systems have their deepest roots in sub Saharan Africa, and (2) many of the genetic systems most typical of extant human populations seem to have originated between 100,000 and 200,000 years ago (Relethford 2001).

From the first, paleoanthropologists turned to skeletal and archaeological data for corroborative evidence of the hypothetical movement of modern human populations out of Africa. As might be expected, the earliest skeletal remains classified as anatomically modern *Homo sapiens* come from eastern and southern Africa. The first modern human skeletons from the Levant date to just slightly later, roughly 70-90,000 BP, whereas anatomically modern skeletal remains from Europe, Eastern and Central Asia all date to after 40,000 BP (Klein 1999). Still, human skeletal evidence has not been able to resolve the issue. For one thing, the number of finds of the appropriate age is simply too small to produce a sufficiently detailed map of the spread of anatomically modern populations. Second, the anatomical differences between late archaic and early modern humans are small, leaving much room for alternative interpretations of individual specimens. Third, many researchers see considerable regional continuity in anatomy between archaics such as Neandertals and early modern humans (Durarte et al. 1999, Smith 1985). And finally, it appears that Neandertals moved into the Levant after the first anatomically modern populations had appeared (Bar Yosef 2000, Shea 2001), a fact which does not sit comfortably with the model of a single expansion modern people out of Africa.

Because archaeological remains are much more common than human fossils, the archaeological record has the potential to play a major role in distinguishing between alternative scenarios of modern human origins. If all living humans are directly descended from a single southern African populations which replaced all archaic hominids, we would expect to see rapid and abrupt replacement of local Middle Paleolithic industries with entirely new forms of material culture. Not only should the transition be abrupt, it should be nearly complete, as the invading populations would have brought not only modern cognition and social organization but their own particular ways of doing and making things. Novelty alone is not enough, however. The novel material culture associated with invading groups of modern humans should show definite links to contemporary material culture remains from the African homeland. Obviously these links would become weaker with distance, so African affinities should be especially evident in the areas closest to the African homeland.

The scenario of modern human origins as the spread of a genetic package has very different implications for archaeology. In this case we might well expect to see new elements introduced into the material culture of local archaic hominids both as a result of evolutionary changes in human biology and cognition and through contacts with neighboring

areas. However, these new elements should be superimposed on a foundation of locally-evolved characteristics. While there might be sudden changes in material culture, these would take the form of additions to and modifications of an existing technological repertoire rather than the replacement of an entire system. Moreover, the novel elements need not have any link to sub-Saharan Africa, as they would be likely to take their own local forms.

Of course the actual situation was probably much more complex than either model. Even if a single African population of modern humans replaced all local archaic hominids we might expect some convergence of technology and material culture through the influence of local environments and raw materials. Conversely, even if we are faced with the large scale spread of genes rather than populations, small scale movements and local extinctions of human groups would result in abrupt changes in some places and gradual changes in others.

Despite the abundance of sites the archaeological record has not provided evidence that clearly supports or refutes the Out of Africa model. Many unique elements of modern human behavior, from decorative/symbolic art to elaborate weapons of organic materials, appear much earlier in Africa than in the rest of the world (McBrearty and Brooks 2000, Wadley 2001). However, there is little continuity to these precocious developments. They flourished briefly and then disappeared, not what we would expect from a robust and expanding population of modern humans. The major episodes of change in human behavior, the so-called Middle-Upper Paleolithic transition, occurred much later in Eurasia, sometime between 50,000 and 40,000 years ago. The earliest Upper Paleolithic industries, thought to be associated with the earliest modern humans in Eurasia, are surprisingly diverse, again not what would be expected of the products of a rapidly expanding population coming from a single source. And while many early Upper Paleolithic technologies appear to be intrusive to the region in which they are found, with no connection to late Middle Paleolithic industries made by Neandertals, others appear to have very deep local roots. Moreover it is difficult to find clear links to African artifact industries among the novel, "intrusive" technologies of Eurasia. Of the two earliest Upper Paleolithic complexes, only one, the "Initial Upper Paleolithic" or "Lepto-Levalloisian" (Bar-Yosef 2000, Gilead 1991, Schyle 1992) seems to have originated in the eastern Mediterranean. It now appears that the better-known Aurignacian complex was present in Central Europe (Conard 2002, Kozlowski 1999) well before it appeared in the Middle East (Bar-Yosef 2000). And neither of these industries has clear African roots.

In sum, although the genetic evidence consistently points to some kind of expansion out of Africa during the Upper Pleistocene, the archaeological and skeletal records do not show any clear traces of such an event. Three reasons can be cited for this lack of fit. One has to do with the different natures of the evidence, and the difficulty of comparing selectively neutral genetic traits to skeletal or behavioral features that are phenotypically and adaptively significant. A second has to do with models for explaining the genetic evidence. It seems very clear that cultural and biological evolutionary developments occurring quite early (> 100,000 years ago) in southern Africa had consequences for cultural and biological changes occurring much later in Europe and Asia. What is not at all clear, however, is whether these consequences resulted from the movement of human populations, as the original "Out of Africa" model posited, or whether they reflect the spread of a specific range of beneficial genetic characteristics. What appeared initially to be massive expansion of modern human populations and extinctions of indigenous archaic hominids may in fact be attributable to gradual, wave-like spread of genetic characteristics alone (Eswaran 2002).

The third reason for the lack of fit between archaeology, skeletal biology and genetic evidence stems from a lack of evidence from the most likely routes of migration or communication between sub-Saharan Africa and the rest of the world. We currently know a great deal about the Upper and Middle Paleolithic archaeology in the Levant, the region closest to Africa, and in western and central Europe, the areas most distant from the hypothetical point of origin. Unfortunately, we have *much less information about the most likely geographical link between* these two regions. Yet this middle ground is crucial to distinguishing the two models described above. In particular, the issue of whether or not the new aspects of culture associated with modern humans have African roots is best addressed in areas neither too far from nor too close to the presumed source. Questions surrounding the rate of spread of modern humans (or modern genes) also depend on knowing how rapidly the Upper Paleolithic spread and how its rate of advance was affected by geographic barriers.

For decades Anatolia has been seen as one potential route of population movement or conduit for gene flow between Africa, the Levant, and the rest of Eurasia. Recent results make it even more likely that Anatolia was the primary bridge between Africa and temperate Eurasia. Archaeological studies in western Georgia indicate that the Upper Paleolithic came very late to the southern Caucuses. Upper Paleolithic industries, and the set of behaviors thought to be associated

with modern humans appeared more in this area than 10,000 years later than in the Levant, and several thousand years later than in eastern Europe and even the northern Caucuses (Adler 2002, Meshveliani et al. in press). The Caucuses mountains were more likely a barrier to communication than a conduit for movement of people or genes. Although there has been little research in the last 30 years, the same is probably true of the Zagros Mountains and the region east of the Caspian Sea. Thus, Anatolia remains as the only really likely route, and a key to resolving the major questions about modern human origins and the "Out of Africa" model.

THE UPPER PLEISTOCENE ARCHAEOLOGICAL RECORD OF ANATOLIA

The key time range for investigating modern human origins is the first part of the Upper Pleistocene, between roughly 100,000 and 30,000 years before present. While some genetic data suggest evolutionary events in southern Africa occurred earlier, there are no major changes in the archaeological record either outside of Africa until the Late Pleistocene. In archaeological terms this period includes the late Mousterian or Middle Paleolithic as well as the major industrial complexes of the early Upper Paleolithic.

The presence of Paleolithic remains in Turkey has been recognized since the early 20th century (e.g., Campbell-Thompson 1910), and researchers have been recording sites discovered accidentally or through systematic survey for more nearly a century. Turkey encompasses nearly 780,000 square kilometers, and, despite the efforts of a small number of dedicated researchers, much of the land area simply has not been investigated in detail. The TAY project (Harmankaya and Tanındı 1996), listed more than 200 Paleolithic sites as of 1996: Middle and Upper Paleolithic sites are shown in figures 1a and 1b, respectively. Yet fewer than 25 of these sites even been test excavated, and findings from only a handful of them have been reported in detail. The greatest concentrations of sites are found in the areas around Istanbul and the Bosporous/Marmara region, the southern Mediterranean coast near the city of Antalya, the Hatay region along the coast near the border with Syria, and in the large river basins of southeastern Anatolia. In large part, the greatest site densities coincide with the regions where archaeological survey has been most thorough. The most glaring gap in the distribution of Paleolithic sites is in the central Anatolian plateau. Aside from a concentration of sites around Ankara documented Paleolithic localities are few and widely scattered. The scarcity of late Pleistocene remains in

central Anatolia cannot be due entirely to a lack of research. Reasons for this gap in the record are discussed below.

It appears that there were Mousterian occupations in most, if not all of Anatolia (Harmankaya and Tanındı 1996, Minzoni-Deroche 1988). The TAY database lists nearly 100 Middle Paleolithic sites. The longest and most extensively described Middle Paleolithic sequence in Turkey belongs is that of the site of Karain Cave, near Antalya (Otte et al. 1998, 1999, Yalçinkaya 1989, Yalçinkaya et al. 1992). An important concentration of Middle Paleolithic sites also occurs on the of the Hatay region, around the mouth of the Asi (Orontes) river. Three cave sites to the north of the river, Kanal, Merdivenli, and Tıkalı, excavated by M. Şenyürek and E. Bostancı (Bostancı 1968, Şenyürek and Bostancı 1958a, 1958b) also contained extensive Mousterian sequences, with industries very different from those found at Karain. Less extensive Middle Paleolithic deposits are also known from Üçağızlı cave and surrounding localities to the south of the river. Surface occurrences of Mousterian artifacts have been documented in virtually every region of Turkey, from the Black Sea coast to the Tigris and Euphrates river terraces of the southeast, and from the shores of the Marmara to the far northeast of the country (Harmankaya and Tanındı 1996). Middle Paleolithic remains are even known to occur in central Anatolia. An important recent case is the Levallois Mousterian assemblage recovered at the well-known obsidian quarry site of Kömürcü/Kaletepe (Balkan-Atlı et al. 1999). Unlike most of the known Paleolithic open-air sites in Turkey, the Mousterian component at this site is found in a well-stratified context.

At first glance, it would appear that Upper Paleolithic sites are nearly as numerous as Middle Paleolithic ones. The TAY gazetteer lists more than 75 sites with possible Upper Paleolithic or Epipaleolithic components (Harmankaya and Tanındı 1996), and a recent review counts more than 20 published reports of Upper Paleolithic sites (Schyle 1992). However few of these have been investigated subsequent to their original discovery and reporting (Özdoğan 1998): efforts to field-check reported sites are ongoing. More importantly for this discussion, true **early** Upper Paleolithic (EUP) sites are exceedingly rare. The great majority of Upper Paleolithic sites reported in Turkey yield retouched bladelets and microliths, and almost certainly correspond with the late UP or Epipaleolithic. To date, only three sites have been shown to contain what are definitely early Upper Paleolithic components: layers 19-23 in Karain B (Albrecht 1988, Yalçinkaya and Otte 2000) and Kanal and Üçağızlı Caves near Antakya (Bostancı 1968, Kuhn et al. 1999, 2001, Şenyürek

and Bostancı 1958a, 1958b). All of these sites are situated along the Mediterranean coast.

It is unclear to what we might attribute the overall scarcity of early Upper Paleolithic sites in Turkey. In all likelihood it is partly but not entirely an artifact of geological processes or biases in past investigations. In western Europe, cave sites above 500 m elevation were seldom if ever occupied during the Upper Paleolithic (Bocquet-Appel and Demars 2000). Much of inland Turkey, and virtually the entire central Anatolian plateau, is more than 1000m above sea level. The central plateau may therefore have supported very low population densities due to harsh conditions (Özdoğan 1998). Milder Mediterranean habitats would have been magnets to human populations during the coldest and driest intervals of the late Pleistocene (Oxygen Isotope Stages 3 and 2), as they were to populations of other animals and plants. Unfortunately, most of these same coastal sites would currently be submerged, except in areas where there has been a great deal of tectonic uplift over the terminal Pleistocene and Holocene.

Because so few sites have been excavated, it is difficult to compare the late Pleistocene archaeological sequence of Anatolia to that of surrounding regions. Moreover, radiometric dates are available for the Middle Paleolithic at only at Karain, and for the EUP only in Karain B and Üçağızlı Cave. Absolute ages have yet to be determined for the Mousterian sites in Hatay and other parts of the country. The dates from Karain E indicate that it is a rather early Mousterian sequence, with most of the deposits dating to the Middle (rather than Late) Pleistocene (Rink et al. 1994). What these few cases do demonstrate is that there is considerable variability along the Mediterranean coast. In the long sequences known from Karain B and E, the early Upper Paleolithic is represented by thin set of Aurignacian layers dating to ca. 28,000 years ago (Yalçinkaya and Otte 2000). In contrast, EUP sequences at Kanal and Üçağızlı Caves are several meters deep. Üçağızlı cave has yielded AMS radiocarbon dates ranging from 28,000 to 41,000 BP (uncalibrated radiocarbon years): even older Upper Paleolithic layers are present but have not yet been dated. The Aurignacian is absent from these two sites, which instead contain materials attributable to the Initial Upper Paleolithic/"Lepto-Levalloisian" and Ahmarian complexes, both of which are typical of the eastern Mediterranean Levant. Thus, Kanal and Üçağızlı Caves show clear affinities with regions to the south and east. If the Aurignacian is indeed of European origin Karain shows closer links with the west. If nothing else, these contrasts suggest that Anatolia may

eventually provide evidence for complex and geographically variable dynamics at the end of the Middle and the start of the Upper Paleolithic.

If the late Mousterian and early Upper Paleolithic data from Anatolia do not enable us to propose a solution to questions surrounding modern human origins, they certainly point to where more research is needed. Some of the most outstanding priorities for future research on the Upper Pleistocene of Anatolia are outlined below.

One of the first priorities is to document variability across the breadth of Anatolia in the Mousterian or Middle Paleolithic. Understanding whether the earliest Upper Paleolithic industries evolved *in situ* or arrived fully developed from somewhere else requires that we first have a better understanding of the late Middle Paleolithic. For the most part, published Mousterian assemblages seem to resemble materials from the regions closest to them. Assemblages from surface sites and caves in the southeastern part of the country, such as Merdivenli and Tıkalı, contain numerous Levallois flakes, points and cores and relatively few retouched pieces (e.g., Algaze et al. 1991, Garrard et al. 1996, Şenyürek and Bostancı 1958a, 1958b), similar to what is typical of the Mousterian in Syria and Lebanon (Copeland 1975, Copeland and Moloney 1998). Mousterian assemblages from the Marmara region have been described as resembling the "Balkan" Middle Paleolithic from Bulgaria and Greece (Runnels and Özdoğan nd.). The distinctive Mousterian of Karain Cave and surrounding sites, which has been investigated and described in detail by Prof. Yalçinkaya and colleagues, resembles industries from the Zagros Mountains to the east, but it is also similar to industries from the Balkans (Minzoni-Deroche 1988, Otte et al. 1998, Yalçinkaya 1989).

It is also crucial to obtain some level of chronological control over the Middle Paleolithic in order to establish whether the early Upper Paleolithic represents the culmination of long-term trends or an abrupt change in direction. Mousterian assemblages were probably produced for at least 150,000 years, and it is unlikely to have persisted unchanged for all that time. In the neighboring Levant, broad changes over time in the nature of Middle Paleolithic stone artifact technologies permit investigators to assign assemblages to broadly-defined chronological groups without the benefit of chronometric dates (Bar Yosef 2000, Garrod and Bate 1937, Jelinek 1982). The Karain sequence also shows change through time (Otte et al. 1999), though it is not yet clear whether this can be generalized to other sites. It would be particularly important to know whether Merdivenli, Tıkalı, and the other Hatay Middle Paleolithic

sites show change over time similar to what has been defined for the Levant: due to the lack of radiometric dates it is currently impossible to answer this question. It will also be particularly interesting to see if there are changes in the late Mousterian, prior to the appearance of the Upper Paleolithic. Chronological control will also be important to sorting out the geographical distribution of occurrences, and to determining whether the ubiquity of Mousterian sites is due simply to the long period of time it represents, or whether Mousterian populations might always have been present throughout Anatolia.

A second major priority is to more precisely assess the distribution of early Upper Paleolithic sites in Turkey. It is impossible to make any generalizations from the tiny handful of localities investigated thus far. The apparent localization of EUP sites along the Mediterranean coast could be a simple artifact of sample bias. On the other hand, if it proves to be valid it suggests a very narrow, spatially constrained route for population movement and/or gene flow, which would have important implications for genetic diversity as well as human adaptations. In part this will require locating more sites of similar age along the Mediterranean littoral: areas that have experienced significant tectonic uplift over the past 50,000 years should be especially productive. Just as importantly, it will require a concerted attempt to verify the presence or absence of EUP sites in the rest of the country. It might well be the case that human groups avoided the central Anatolian plateau during the cold intervals of the late Pleistocene. However, the Black Sea coast north of the Pontic Mountains represents another potential refugium with relatively mild, marine regulated climate. Information about an early Upper Paleolithic human presence along the Black Sea coast, or the lack of one, would be helpful in determining whether the first Upper Paleolithic humans entered Anatolia through a narrow southern corridor or over a broad front.

At present, the range of things one would like to know about the Upper Pleistocene archaeology of Anatolia far exceeds with what is actually known about it. Nonetheless, due to its geographic position Anatolia has the potential to play a central role in resolving questions about the mechanisms of modern human evolution and dispersal. The past three decades have seen an upsurge in the amount of Paleolithic research conducted by Turkish scholars, both operating independently and in collaboration with foreign research teams (e.g., Balkan-Atlı et al. 1999, Güleç et al. 2002, Yalçinkaya et al. 1992). We can only hope that this trend continues, and that within a few decades the map of Pleistocene human distributions from can be filled in from Africa to northern Eurasia.

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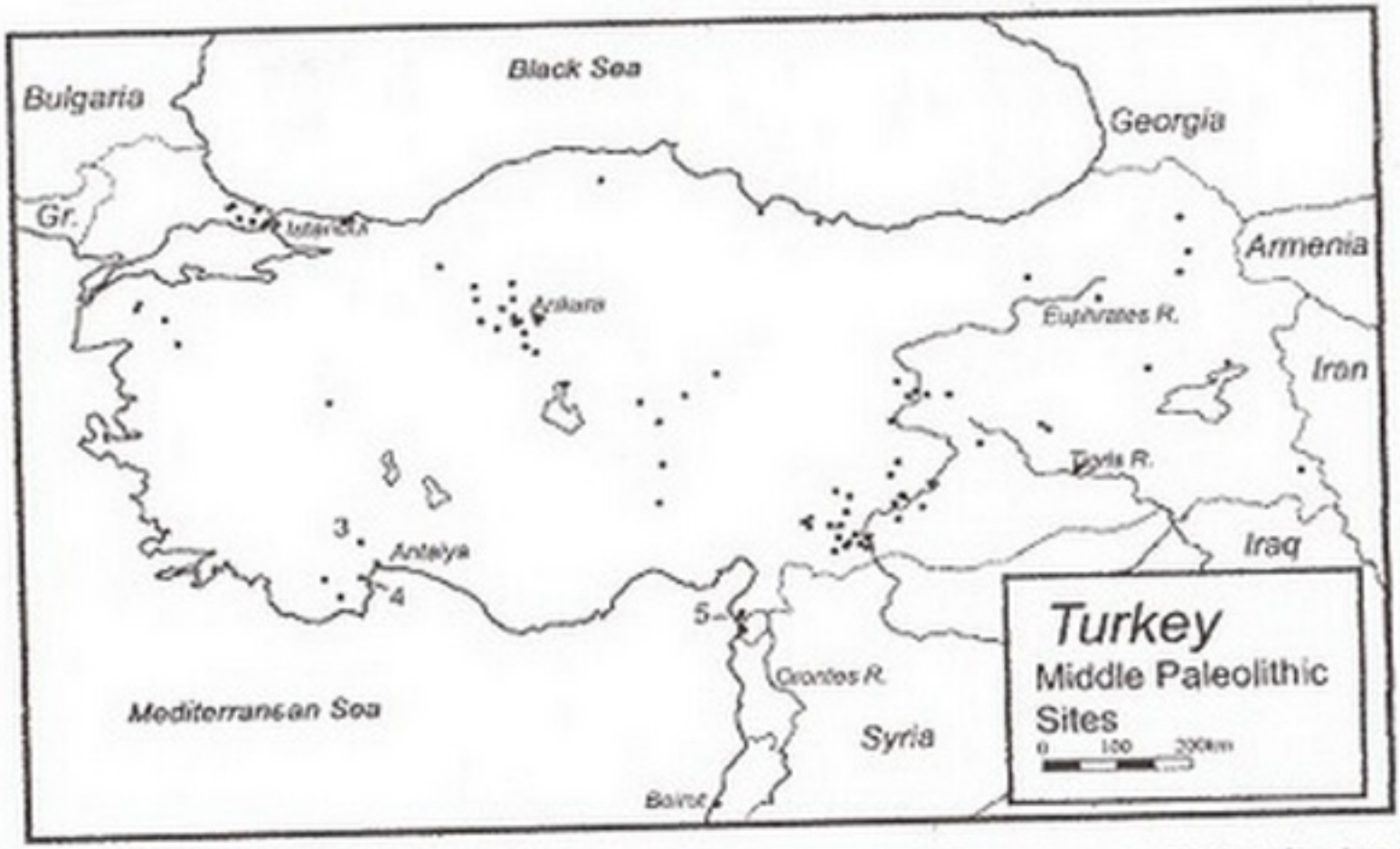

Figure 1: Distribution in Anatolia of sites identified as having Middle Paleolithic components. Site location data from TAY project (Harmankaya and Tanındı 1996).

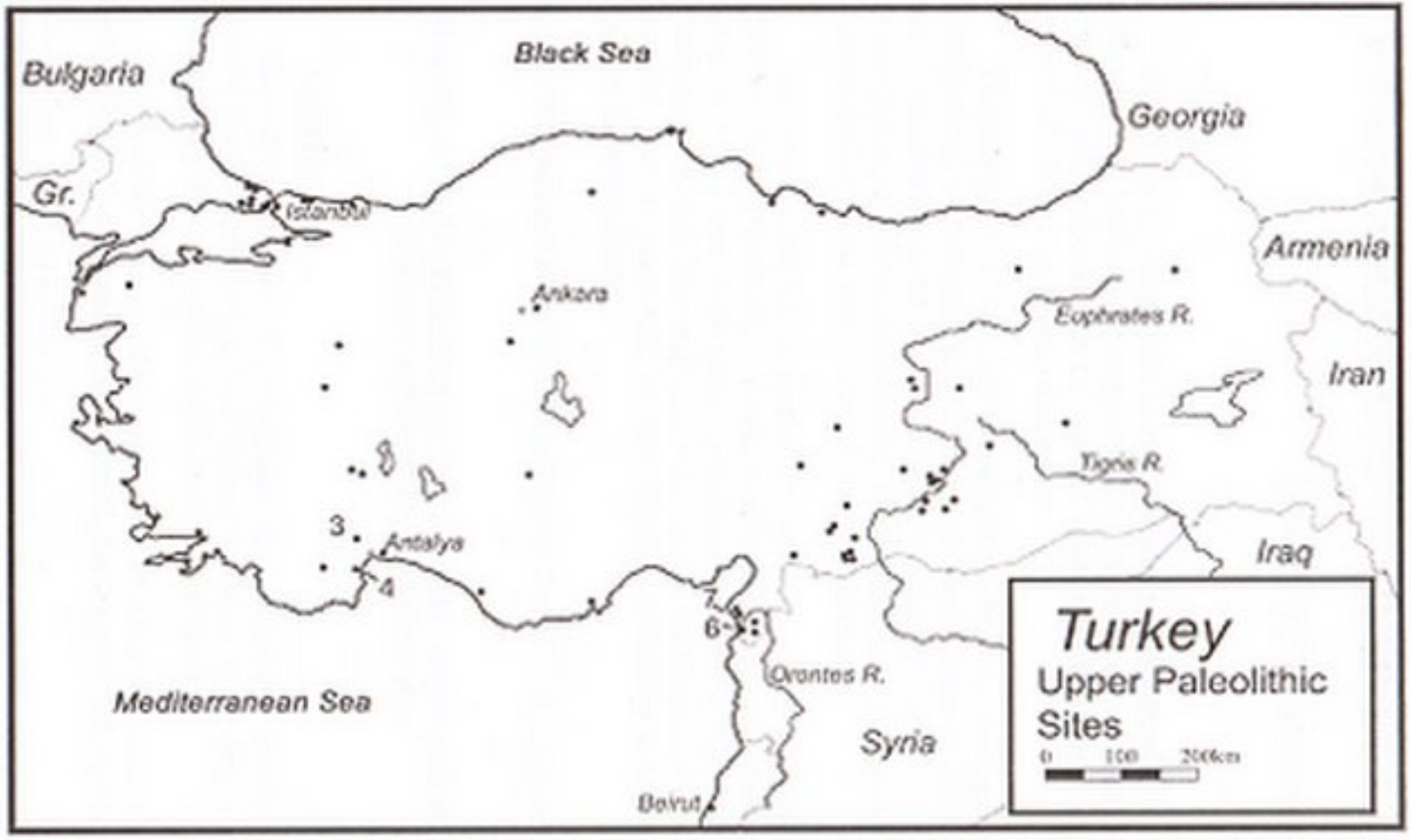

Figure 2: Distribution in Anatolia of sites identified as having Upper Paleolithic components. Site location data from TAY project (Harmankaya and Tanındı 1996).