Science AAAS

Supplementary Materials for

Ancient DNA from Mesopotamia suggests distinct Pre-Pottery and Pottery Neolithic migrations into Anatolia

Iosif Lazaridis, Songül Alpaslan-Roodenberg *et al*.

Corresponding authors: Iosif Lazaridis, lazaridis@genetics.med.harvard.edu; Songül Alpaslan-Roodenberg, msglalpaslan@gmail.com; Ron Pinhasi, ron.pinhasi@univie.ac.at; David Reich, reich@genetics.med.harvard.edu

Science **377**, 982 (2022)
DOI: 10.1126/science.abq0762

The PDF file includes:

Materials and Methods
Supplementary Text
Tables S1 to S5
References

Other Supplementary Material for this manuscript includes the following:

MDAR Reproducibility Checklist

Materials and Methods

The materials and methods of this paper were shared across it and two other studies (*12, 25*) and to avoid duplication are described uniquely in the Supplementary Information of (*12*).

S1: The Near Eastern Neolithic Continuum

In this section we perform qpWave/qpAdm analysis(*18*) in otrder to study the formation of Neolithic populations in West Eurasia and in particular to place the new Neolithic data from Albania, Armenia, Cyprus, Iraq, and Turkey in the context of other known Neolithic populations. We use a set of 9 'right' outgroups:

Mbuti.DG(*28*), CHG(*10*), EHG(*2, 18*), ISR_Natufian_EpiP(*1*), MAR_Taforalt_EpiP(*29*), RUS_AfontovaGora3(*30*), SRB_Iron_Gates_HG(*19*), TUR_Pınarbaşı_EpiP(*6*), WHG(*17, 10, 30, 31*)

This set includes an African outgroup (Mbuti), pre-Neolithic hunter-gatherers from mainland Europe (WHG), eastern Europe (EHG), Siberia (AfontovaGora3), and the Caucasus (CHG), Epipaleolithic hunter-gatherers from Anatolia (Pınarbaşı), the Levant (Natufians), and North Africa (Taforalt). (We note that the WHG group includes Loschbour, Villabruna, LaBrana1, and Bichon, EHG the two hunter-gatherers from Karelia and one from Samara(*2, 18*), and CHG two hunter-gatherers from Kotias and Satsurblia caves in Georgia).

This set of outgroups is conservative in the sense that it avoids the use of any Neolithic populations themselves, and consists only of pre-Neolithic hunter-gatherers from Europe, the Near East and North Africa (plus the Central African outgroup). Outgroups more closely intertwined with the phylogeny of the modeled population have increased power to determine its origins, but this comes at a cost of potential gene flow from it *to* the outgroups. By choosing the conservative set of outgroups we eliminate this possibility and thus model rejections (which occur when the relationship between the modeled Test population and the outgroups is not wholly mediated via the Sources) clearly signify that the Test population cannot indeed be modeled in a proposed way.

We use a set of 20 candidate Source populations:

ARM_Aknashen_N (this study), ARM_Masis_Blur_N (this study), AZE_N(*7*), CHG, CYP_PPNB (this study), EHG, IRN_Ganj_Dareh_N(*1*), ISR_Natufian_EpiP(*1*), Levant_PPN(*1*), Mesopotamia_PPN (this study, combining IRQ_Nemrik9_PPN and the TUR_SE_Mardin_PPN population from the Boncuklu Tarla site), MAR_Taforalt_EpiP(*31*), RUS_AfontovaGora3(*29*), RUS_MA1_HG(*32*), SRB_Iron_Gates_HG(*19*), TUR_C_AşıklıHöyük_PPN,(*8*) TUR_C_Boncuklu_PPN(*6*), TUR_C_Çatalhöyük_N,(*8*) TUR_Marmara_Barcın_N(*2*), TUR_Pınarbaşı_EpiP(*6*), WHG

Two sets of individuals were published from the Boncuklu PPN site from Central Anatolia(*5, 6*) and we use the 1240K capture data of (*6*) to represent this population.

The Sources include all of the 'right' outgroups (except the right basis population Mbuti). They also include additional Neolithic source populations from the Near East, including new Neolithic populations of our study. The Levant_PPN and Mesopotamia_PPN populations include samples from multiple countries: Israel and Jordan for the Levant and Nemrik9 from Iraq and Mardin (Boncuklu Tarla) from SE Turkey for Mesopotamia.

We use a set of 15 Test populations, which includes all the new Neolithic populations from our study

ALB_N, ARM_Aknashen_N, ARM_Masis_Blur_N, AZE_N, CYP_PPNB, IRN_Ganj_Dareh_N, IRQ_Bestansur_PPN, IRQ_Shanidar_N, Levant_PPN, Mesopotamia_PPN, TUR_C_AşıklıHöyük_PPN, TUR_C_Boncuklu_PPN_Feldman, TUR_C_Çatalhöyük_N, TUR_Marmara_Barcın_N, and IRQ_Nemrik9_LBA (a late 3rd millennium BCE individual from Nemrik9 that is the only post-Neolithic individual from Iraq and clusters with the earlier PPN ones),

We try to fit models for each Test population as a mixture of K=1, 2 from the sources. In Table S 1 and Table S 2 that follow we list feasible models (mixture proportions within [0, 1] interval and p-value for rank K-1 ≥0.01)

The inclusion of new Neolithic populations of our study as well as previously published ones in both Test and Sources helps us avoid "publication order bias", i.e., the potential pitfall of trying to fit newly published samples as mixtures of previously published ones rather than considering all samples de novo on an equal footing.

Below, we describe how each Test population can be modeled.

Modeling of Test Neolithic populations

Neolithic Albania (ALB_N; this study)

The Neolithic of Albania is represented by individual I15705 (6223-6067 calBCE) and can be modeled as a simple clade (Table S 1) with the Northwest Anatolian Neolithic of Barcın, and the Central Anatolian Neolithic of Aşıklı Höyük and Çatalhöyük as well as the PPN of Cyprus, which as we shall see is a related population to the Anatolian farmers. The Neolithic sample from Masis Blur in Armenia and the Epipaleolithic sample from Pınarbaşı in Turkey can also be sources for this population, albeit with low p-values; our inability to reject these latter two models at high statistical significance may reflect loss of power for these source populations consisting of single individuals.

Overall, we conclude that the single individual of the Neolithic of Albania was NW Anatolian-like, and similar to other early farmers from southeastern Europe.(*2, 4*) Interesting models not listed in the Tables include WHG or SRB_Iron_Gates_HG as a 2nd source to complement the NW Anatolian Neolithic. The proportion of Anatolian Neolithic ancestry in these models is estimated as 103±2.2% and 102±2.5% respectively, suggesting that there is no evidence for absorption of European hunter-gatherer ancestry in Albania, part of a general pattern of lack of such hunter-gatherer ancestry in the South Balkans, which we also discuss in terms of the main 5-way model of (*12*).

Neolithic South Caucasus (Armenia: ARM_Aknashen_N and ARM_Masis_Blur_N, this study; Azerbaijan(7): AZE_N)

The two newly reported Neolithic individuals from Armenia in the 6th millennium BCE can be modeled with each other as a source (p=0.059) and also with AZE_N as a source, and all South Caucasus Neolithic populations can be modeled with Mesopotamia_PPN as a source, complementing the picture from PCA (Fig. 2) that all these samples cluster broadly together in the context of West Eurasian variation. The Masis Blur individual can also be modeled well (p=0.56) as deriving from the PPN population of Aşıklı Höyük in Central Anatolia, while this source is less convincing for the Aknashen individual (p=0.018).

Given that the p-value of many of the 1-way models are rather close to the 0.01 cutoff, we also examined 2-way models (Table S 2). When we model the Aknashen individual as one other Neolithic population (Anatolian or Levantine) plus CHG, the mixture proportion for CHG ancestry is positive, suggesting that greater CHG-related ancestry is what differentiates this individual from other Neolithic populations of the Near East. The Masis Blur individual, more "southern" in the PCA, can be modeled as a mixture of the Aknashen one with extra Levantine ancestry. Comparing both individuals from Armenia using Anatolian Neolithic as one source and CHG as the other, we observe that the CHG ancestry is higher in the Aknashen one.

Given that the Aknashen individual is earlier (5985-5836 calBCE) than the one from Masis Blur (5633-5532 calBCE), and considering that it is differentiated from it in a greater CHG/less Levantine ancestry direction, it is possible to interpret these results as pointing to the Masis Blur individual belonging to a later or perhaps a transient population, as it also stands apart from the entirety of the (later) time series of samples from Armenia in its more "southern" tendency. The samples from Azerbaijan can be modeled as mixtures of these two extrema (albeit with high standard errors); they date from ~5700-5400BCE and are thus roughly contemporaneous. In sum, the Neolithic data from the South Caucasus point to the presence there of higher CHG-related ancestry compared to other areas of the Southern Arc to the west and south, and the presence of some variability suggesting "southern" admixture exemplified by the Masis Blur individual.

Pre-Pottery Neolithic Cyprus (CYP_PPNB; this study)

The PPN population of Cyprus can be modeled as a clade with that of NW and Central Anatolia (Table S 1), but with a positive coefficient of ancestry from Levantine (PPN or Natufian) sources when considering two-way models. This pattern is also evident in the main 5-way model of (*12*). Thus, while Cyprus is geographically intermediate between the Levant and Anatolia, its PPN population is more related to that of Anatolia than the Levant, although the pattern seems possibly consistent with ancestry from both sources. However, when modeling the PPN of Cyprus as a mixture of the Aşıklı Höyük PPN population from Central Anatolia and Levantine PPN, only a non-significant 6.8±4.2% of the latter is estimated, so overall, we can say that the PPN of Cyprus resembled that of the PPN of the Anatolian mainland to the north.

Zagros (IRQ_Bestansur_PPN, IRQ_Shanidar_N, IRN_Ganj_Dareh_N(1))

We note that one of the Test populations, the Neolithic population of the Zagros from Iran(*1*) cannot be well-modeled with either 1 or 2 of the Sources, consistent with its extreme PCA position in the context of West Eurasian variation. The only population that can be modeled with it as a source is the Bestansur PPN individual from the Zagros foothills in Iraq; however, the low data yield of this individual allows it to be modeled with a variety of sources (Table S 1). Two more Neolithic individuals from Shanidar in the Zagros in Iraq can be modeled as a clade with either of the Neolithic individuals of Armenia, however this should not be over-interpreted given the low data yield for these individuals. Both the Bestansur and Shanidar individuals carry a substantial proportion of CHG ancestry in terms of the main 5-way model of (*12*). Moreover, 2-way models with Ganj Dareh as one source and an Anatolian or Mesopotamian source as the 2^{nd}, show an excess of Ganj Dareh ancestry consistent with the eastern geographical position relative to Anatolia and Mesopotamia. While data quality precludes very precise inferences of ancestral composition, the data from the Zagros in Iraq seems consistent with these populations being transitional from Anatolia and Mesopotamia and the population at Ganj Dareh further south in the Central Zagros mountains.

Levant_PPN(1)

A single source for the Levantine Neolithic (from Jordan and Israel) can be firmly rejected (p<1e-12), but a total of six 2-way models work well, all of which involve an Anatolian Neolithic or related source and the Epipaleolithic Natufians.(*1*) Interestingly, the model in which the source for the Levantine Neolithic is Mesopotamian rather Anatolian is firmly rejected as well (p=5e-6). In a previous publication(*1*), the Levantine PPN population was modeled in a similar 2-way fashion but there was an open question whether a more intermediate population (such as Mesopotamian) might be contributing to the Levant. Our results prove that this was not the case by rejecting a contribution from Mesopotamian populations of the Tigris region. As we will now see in the modeling of the population of Mesopotamia, this can be explained by the presence of CHG-related ancestry in Mesopotamia.

Neolithic North Mesopotamia (Mesopotamia_PPN; this study)

The Northern Mesopotamian population includes two individuals from Nemrik9 in Iraq and an individual from Mardin (Boncuklu Tarla) in SE Turkey; the two are co-analyzed given their geographical and temporal proximity and clustering in PCA. A one-way model fits them with Aknashen (p=0.894), Masis Blur (p=0.103), or Azerbaijan Neolithic (p=0.340) as a source (Table S 1). Given that the Mesopotamian samples predate these 6th millennium BCE ones, the Mesopotamian samples are unlikely to be derived from those of the South Caucasus, and these models merely point to the overall similarity of North Mesopotamian with South Caucasus populations. To determine the origins of the Mesopotamian PPN population we also examined 2-way models (Table S 2) and find that a model in which Mesopotamian samples are a mix of Anatolian PPN Neolithic (Aşıklı Höyük) and Ganj Dareh (p=0.16) and also as a mix of Cyprus PPN and Ganj Dareh (p=0.194); we remarked above on the similarity between the Cyprus PPN and the Central Anatolian PPN, so it makes sense that its population can also be used as a genetic source stand-in although this scenario is less plausible geographically. North Mesopotamia is geographically intermediate between Anatolia and Iran, so this model is more plausible, although by no means definite, given the uncertainty about the genetic composition of PPN populations elsewhere in the ancient Near East between Central Anatolia and the Zagros.

We note that an Anatolian Neolithic+CHG model fails (p<1e-9) as does a Levantine+Ganj Dareh one (p<1e-9), as does a Barcın Anatolian Neolithic+Ganj Dareh one (p=0.002), as does a Levantine Neolithic+CHG one (p=0.008) thus excluding these other possible pairwise combinations for which Mesopotamia is geographically intermediate.

The LBA individual from Nemrik9 fits as a clade with the Mesopotamian PPN (p=0.27) and with Azerbaijan Neolithic (p=0.25) and with Masis Blur (p=0.026) providing some evidence for long-term continuity of the population of Mesopotamia and its environs, a pattern that must be verified with more individuals at both ends of the time span between the PPN period and the Late Bronze Age. Given that it is of higher data quality than the other samples from Mesopotamia we group it with them in a Mesopotamian meta-population which we use in our analyses of the rest of the paper.

Neolithic Anatolia (TUR_Marmara_Barcın_N(2), TUR_C_Boncuklu_PPN_Feldman(6), TUR_C_AşıklıHöyük_PPN(8), TUR_C_Çatalhöyük_N(8))

Finally, we turn to Neolithic Central/Western Anatolia; we remarked above on the similarity between it and the PPN population of Cyprus, and this is the only population that can be used as a source for the Neolithic NW Anatolia; however, it would seem unlikely that the Neolithic population of the geographically large region of Anatolia would be descended from that of the small island to its south, especially since the 2-way models involve the Epipaleolithic sample from Pınarbaşı as one of the two sources, suggesting a rooting of Neolithic Anatolian populations on local (pre-Neolithic) hunter-gatherers of the region. The pottery Neolithic from Çatalhöyük are marginally consistent with forming a clade with the PPN of Aşıklı Höyük (p=0.03), but other than that, no pairs of Anatolian Neolithic populations form a clade, suggesting that the PPN and pottery Neolithic groups inhabiting the large Anatolian peninsula did not form a single homogeneous population. Moreover, while Pınarbaşı features prominently in 2-way models for Anatolian Neolithic populations, it does not form a clade with any of them by itself: thus, a general conclusion can be drawn that Anatolian Neolithic populations were descended from local hunter-gatherers but not exclusively so.

For the two PPN populations from Boncuklu and Aşıklı Höyük who both inhabited Central Anatolia during, models of Pınarbaşı + Mesopotamian Neolithic fit with contrasting amounts of Mesopotamian ancestry in the two sites (~26% low at Boncuklu vs. ~70% high at Aşıklı Höyük). The results for point to gene flow from the east (represented by Mesopotamia_PPN) into Anatolia, a conclusion that makes sense given the earlier appearance of agriculture in SE Anatolia and N Mesopotamia and its subsequent spread westward. But, gene flow was potentially bidirectional, as we have seen that Neolithic populations of the South Caucasus can be modeled as admixtures of Anatolian populations with CHG and the Mesopotamian population could be modeled as a mixture of Ganj Dareh + Aşıklı Höyük. Thus, in both locales (Central Anatolia and the South Caucasus) there is persistence of the local hunter-gatherer ancestry (Pınarbaşı and CHG respectively) but with some influence from the other (CHG/Mesopotamian in Anatolia and Anatolian in the South Caucasus). The results on the Anatolian PPN add another cline to the picture: between Anatolia and Mesopotamia in which PPN samples from Boncuklu in Anatolia and Nemrik 9 and Mardin in Mesopotamia occupied opposite ends, with Aşıklı Höyük being intermediate. We cannot speak of persistence of hunter-gatherer ancestry in Mesopotamia itself, as we lack pre-Neolithic individuals; it is possible that the population there was also a Neolithic mixture (as suggested by the 2-way admixture models that fit it), but admixture in this population may also precede the advent of the Neolithic.

For the two pottery Neolithic populations, we observe that the Çatalhöyük population from Central Anatolia can be modeled as mostly (~96%) of Aşıklı Höyük origin (+Pınarbaşı) suggesting continuity with the pre-pottery Neolithic population of the same region. We note, however, that while we were able to model the Aşıklı Höyük population as a mixture of Pınarbaşı and Mesopotamian PPN (p=0.25), the same model fails for Çatalhöyük (p=0.002); we investigate the cause of this disparity below. As for the other pottery Neolithic population (Barcın from NW Anatolia), we can model it well as a mixture of about half Çatalhöyük and half Pınarbaşı ancestry. Thus, the data are consistent with this population from the NW end of the Anatolian peninsula being derived from pottery Neolithic populations of Central Anatolia (closer to the centers of domestication of the Fertile Crescent) but with absorption of Epipaleolithic hunter-gatherer ancestry.

A common 3-way model for the Neolithic Near East

To better understand the origin of Neolithic Near Eastern populations, many of which could be modeled as mixtures of each other we considered them in terms of the 3-way model (CHG +

Pınarbaşı + Natufians) that allow us to compare them using a common set of sources representing the earliest (and pre-Neolithic) populations in the South Caucasus, Anatolia, and the Levant. Thus this model describes the studied populations in terms of ancient Near Eastern populations predating the emergence of agriculture. The results of this model are shown in Table S 3. We summarize them below:

(1) Many of the populations of Table S 3 require ancestry from all 3 sources of the model. Exceptions are the Levantine PPN for which the contribution of the CHG is consistent with zero and the farmers from the Zagros (Bestansur, Shanidar, and Ganj Dareh) for which the contribution of Pınarbaşı is consistent with zero. The PPN farmers from Boncuklu in Central Anatolia have a small and not significantly positive fraction of Natufian ancestry (4.8±6.8%), and this jumps to 40.3±12.1% at Aşıklı Höyük and 51.3±5% at Çatalhöyük. Importantly, none of them have ancestry only from a single pre-Neolithic source.

(2) Anatolian Epipaleolithic ancestry (represented by Pınarbaşı) makes up a major source of ancestry of Neolithic farmers from Central/NW Anatolia; Levantine Epipaleolithic ancestry (represented by Natufians) makes up the major source of ancestry of PPN farmers from the Levant; CHG ancestry is represented across the West Asian highlands but diminishes towards the west (in Anatolia) and the South (into the Levant)

(3) The PPN population of Mesopotamia is intermediate in the context of these three Epipaleolithic sources of ancestry and is modeled as deriving its ancestry from all three. Two possibilities are raised: first, that the PPN population was indeed deeply admixed as its geographically intermediate position would suggest, or, second, that there is another unsampled hunter-gatherer population in the Mesopotamian region from which the PPN population is descended. As an analogy, prior to the sampling of Pınarbaşı(*6*) the Anatolian Neolithic population could be modeled as a 3-way mixture involving Levantine Neolithic, WHG, and CHG sources(*1*), but now can be modeled with Pınarbaşı as its major source on top of which Mesopotamian Neolithic ancestry was added to various degrees

(4) The PPN population of Cyprus and the Neolithic populations of the South Caucasus (Armenia and Azerbaijan) represent similar mixtures as the PPN population of Mesopotamia but with varying proportions of the three components. Cyprus is similar to Anatolia in its lack of substantial CHG ancestry, but its Pınarbaşı/Natufian balance tilted towards the latter, explaining the results of 2-way modeling above. The South Caucasus is similar to Mesopotamia, but with an excess of Pınarbaşı-related ancestry.

These observations are presented visually in Fig.2.

<u>Caucasus hunter-gatherer vs. Iranian Neolithic ancestry</u>

CHG and IRN_Ganj_Dareh_N often appear as interchangeable sources for Neolithic populations and we wanted to determine if we can differentiate between the two. We thus fit the two 3-way models: (CHG or IRN_Ganj_Dareh_N) + Pınarbaşı + Natufians, i.e., setting one of the two populations as a source and including the other in the right set of outgroups (Table S 4).

For many Test populations both models cannot be rejected, and so for them the "Caucasus-Iran" influence does not clearly stem from either the CHG or Neolithic Iran.

For two populations (AZE_N and Mesopotamia_PPN) which neighbor both Iran and the South Caucasus *both* models are rejected, suggesting that while these populations clearly have some "Caucasus-Iran"-related ancestry as suggested by the modeling of Table S 2, they cannot be modeled with only one of the two to the exclusion of the other: a possible interpretation is that these geographically intermediate populations possess ancestry related to both their Caucasus and Iran neighbors.

For the Barcın Neolithic, the CHG model is rejected (1.13E-03) while the Iran one narrowly accepted (0.0142). This population can be modeled to derive some of its ancestry from the east of NW Anatolia, and thus potentially from both CHG- and Iran-related sources.

Finally, for the South Caucasus Neolithic at Aknashen, the CHG model is not rejected (p=0.46) while that with Iran as a source is (p=3.23E-04), suggesting that in the South Caucasus the Neolithic population can be modeled with CHG ancestry alone.

Levantine vs. Mesopotamian influence in Anatolia

Anatolian Neolithic populations cannot be modeled with only ancestry from Pınarbaşı (Epipaleolithic Central Anatolia), but also require Natufian and CHG ancestry (pre-Neolithic sources from the Levant and Caucasus) (Table S 3). In order to identify the proximate source of this ancestry we examined a 3-way model Levant_PPN+Mesopotamia_PPN+ Pınarbaşı (Table S 5).

This model reveals that for the PPN populations from Central Anatolia (Boncuklu and AşıklıHöyük) Mesopotamian PPN ancestry alone can be added to the Pınarbaşı substratum, with the two sites contrasting in their proportions of the two components, with Boncuklu derived more from the substratum and AşıklıHöyük more from a Mesopotamian source.

By contrast, both pottery Neolithic populations (Barcın and Çatalhöyük) from NW and Central Anatolia are modeled not only with Mesopotamian ancestry but with a statistically significant proportions of ~13-17% Levantine PPN ancestry.

(One of the individuals from Aşıklı Höyük (Ash133.SG) is a PCA outlier, Fig. 2, clustering with Çatalhöyük individuals. Out of caution, we refit the model of Table S 5 excluding this individual and obtained an estimate of -1.0±9.8% Levant_PPN, 68.1±13.9% Mesopotamia_PPN, and 32.9±12.5% CHG ancestry, similar to those of Table S 5.)

An interpretation of these results is that the population of Anatolia experienced an influx from North Mesopotamia during the spread of the Pre-Pottery Neolithic while the later spread of the pottery Neolithic was derived from a slightly different population that was intermediate between the sampled Levantine and Mesopotamian PPN populations. Future sampling of the first pottery Neolithic populations of the Near East may reveal whether these could be a source that could account for the westward spread of the extra Levantine ancestry westward into Anatolia.

Test	P-value	Source
ALB_N	0.099	ARM_Masis_Blur_N
ALB_N	0.939	CYP_PPNB
ALB_N	0.253	TUR_C_AşıklıHöyük_PPN
ALB_N	0.430	TUR_C_Çatalhöyük_N
ALB_N	0.167	TUR_Marmara_Barcın_N
ALB_N	0.015	TUR_Pınarbaşı_EpiP
ARM_Aknashen_N	0.059	ARM_Masis_Blur_N
ARM_Aknashen_N	0.039	AZE_N
ARM_Aknashen_N	0.894	Mesopotamia_PPN
ARM_Aknashen_N	0.018	TUR_C_AşıklıHöyük_PPN
ARM_Masis_Blur_N	0.059	ARM_Aknashen_N
ARM_Masis_Blur_N	0.348	AZE_N
ARM_Masis_Blur_N	0.103	Mesopotamia_PPN
ARM_Masis_Blur_N	0.563	TUR_C_AşıklıHöyük_PPN
AZE_N	0.039	ARM_Aknashen_N
AZE_N	0.348	ARM_Masis_Blur_N
AZE_N	0.340	Mesopotamia_PPN
CYP_PPNB	0.374	TUR_C_AşıklıHöyük_PPN
CYP_PPNB	0.048	TUR_C_Çatalhöyük_N
CYP_PPNB	0.119	TUR_Marmara_Barcın_N
IRQ_Bestansur_PPN	0.090	ARM_Aknashen_N
IRQ_Bestansur_PPN	0.477	ARM_Masis_Blur_N
IRQ_Bestansur_PPN	0.085	AZE_N
IRQ_Bestansur_PPN	0.064	CHG
IRQ_Bestansur_PPN	0.274	CYP_PPNB
IRQ_Bestansur_PPN	0.092	IRN_Ganj_Dareh_N
IRQ_Bestansur_PPN	0.073	ISR_Natufian_EpiP
IRQ_Bestansur_PPN	0.658	Mesopotamia_PPN
IRQ_Bestansur_PPN	0.105	TUR_C_AşıklıHöyük_PPN
IRQ_Bestansur_PPN	0.373	TUR_C_Çatalhöyük_N
IRQ_Shanidar_N	0.239	ARM_Aknashen_N
IRQ_Shanidar_N	0.082	ARM_Masis_Blur_N
IRQ_Shanidar_N	0.257	Mesopotamia_PPN
IRQ_Shanidar_N	0.030	TUR_C_AşıklıHöyük_PPN
Mesopotamia_PPN	0.894	ARM_Aknashen_N
Mesopotamia_PPN	0.103	ARM_Masis_Blur_N
Mesopotamia_PPN	0.340	AZE_N
Mesopotamia_LBA	0.026	ARM_Masis_Blur_N
Mesopotamia_LBA	0.245	AZE_N
Mesopotamia_LBA	0.269	Mesopotamia_PPN
TUR_C_AşıklıHöyük_PPN	0.018	ARM_Aknashen_N
TUR_C_AşıklıHöyük_PPN	0.563	ARM_Masis_Blur_N
TUR_C_AşıklıHöyük_PPN	0.374	CYP_PPNB
TUR_C_AşıklıHöyük_PPN	0.030	TUR_C_Çatalhöyük_N
TUR_C_Çatalhöyük_N	0.048	CYP_PPNB
TUR_C_Çatalhöyük_N	0.030	TUR_C_AşıklıHöyük_PPN
TUR_Marmara_Barcın_N	0.119	CYP_PPNB

Table S 1 Test populations that fit as simple clades of Source populations

				Mixture proportions		Standard Errors	
Test	**P-value**	**A**	**B**	**A**	**B**	**Test**	**P-value**
ALB_N	0.898	ARM_Aknashen_N	CYP_PPNB	0.031	0.969	0.098	0.098
ALB_N	0.314	ARM_Aknashen_N	TUR_C_Boncuklu_PPN	0.475	0.525	0.112	0.112
ALB_N	0.728	ARM_Aknashen_N	TUR_Marmara_Barcın_N	0.372	0.628	0.121	0.121
ALB_N	0.514	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.543	0.457	0.107	0.107
ALB_N	0.894	ARM_Masis_Blur_N	CYP_PPNB	0.063	0.937	0.241	0.241
ALB_N	0.037	ARM_Masis_Blur_N	EHG	0.998	0.002	0.032	0.032
ALB_N	0.063	ARM_Masis_Blur_N	ISR_Natufian_EpiP	0.901	0.099	0.294	0.294
ALB_N	0.095	ARM_Masis_Blur_N	Levant_PPN	0.910	0.090	0.085	0.085
ALB_N	0.043	ARM_Masis_Blur_N	MAR_Taforalt_EpiP	0.988	0.012	0.025	0.025
ALB_N	0.070	ARM_Masis_Blur_N	SRB_Iron_Gates_HG	0.989	0.011	0.019	0.019
ALB_N	0.306	ARM_Masis_Blur_N	TUR_C_AşıklıHöyük_PPN	0.459	0.541	0.718	0.718
ALB_N	0.560	ARM_Masis_Blur_N	TUR_C_Boncuklu_PPN	0.645	0.355	0.136	0.136
ALB_N	0.677	ARM_Masis_Blur_N	TUR_Marmara_Barcın_N	0.519	0.481	0.174	0.174
ALB_N	0.629	ARM_Masis_Blur_N	TUR_Pınarbaşı_EpiP	0.716	0.284	0.121	0.121
ALB_N	0.069	ARM_Masis_Blur_N	WHG	0.980	0.020	0.016	0.016
ALB_N	0.893	AZE_N	CYP_PPNB	0.009	0.991	0.066	0.066
ALB_N	0.608	AZE_N	TUR_C_Boncuklu_PPN	0.362	0.638	0.091	0.091
ALB_N	0.341	AZE_N	TUR_C_Çatalhöyük_N	0.054	0.946	0.130	0.130
ALB_N	0.795	AZE_N	TUR_Marmara_Barcın_N	0.264	0.736	0.096	0.096
ALB_N	0.520	AZE_N	TUR_Pınarbaşı_EpiP	0.454	0.546	0.111	0.111
ALB_N	0.397	CHG	TUR_C_AşıklıHöyük_PPN	0.063	0.937	0.038	0.038
ALB_N	0.158	CHG	TUR_C_Boncuklu_PPN	0.236	0.764	0.072	0.072
ALB_N	0.994	CHG	TUR_C_Çatalhöyük_N	0.114	0.886	0.065	0.065
ALB_N	0.760	CHG	TUR_Marmara_Barcın_N	0.189	0.811	0.068	0.068
ALB_N	0.033	CHG	TUR_Pınarbaşı_EpiP	0.217	0.783	0.139	0.139
ALB_N	0.914	CYP_PPNB	ISR_Natufian_EpiP	0.919	0.081	0.108	0.108
ALB_N	0.966	CYP_PPNB	Levant_PPN	0.949	0.051	0.050	0.050
ALB_N	0.895	CYP_PPNB	Mesopotamia_PPN	0.983	0.017	0.080	0.080
ALB_N	0.900	CYP_PPNB	MAR_Taforalt_EpiP	0.998	0.002	0.016	0.016
ALB_N	0.950	CYP_PPNB	TUR_C_AşıklıHöyük_PPN	0.696	0.304	0.262	0.262
ALB_N	0.916	CYP_PPNB	TUR_C_Çatalhöyük_N	0.857	0.143	0.291	0.291
ALB_N	0.892	CYP_PPNB	TUR_Marmara_Barcın_N	0.990	0.010	0.180	0.180
ALB_N	0.614	EHG	TUR_C_AşıklıHöyük_PPN	0.025	0.975	0.017	0.017
ALB_N	0.413	EHG	TUR_C_Çatalhöyük_N	0.038	0.962	0.032	0.032
ALB_N	0.208	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.010	0.990	0.024	0.024
ALB_N	0.309	IRN_Ganj_Dareh_N	TUR_C_Boncuklu_PPN	0.182	0.818	0.051	0.051
ALB_N	0.356	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.029	0.971	0.050	0.050
ALB_N	0.879	IRN_Ganj_Dareh_N	TUR_Marmara_Barcın_N	0.144	0.856	0.049	0.049
ALB_N	0.095	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.202	0.798	0.074	0.074
ALB_N	0.134	ISR_Natufian_EpiP	TUR_C_Boncuklu_PPN	0.471	0.529	0.129	0.129
ALB_N	0.353	ISR_Natufian_EpiP	TUR_C_Çatalhöyük_N	0.204	0.796	0.159	0.159
ALB_N	0.086	ISR_Natufian_EpiP	TUR_Marmara_Barcın_N	0.170	0.830	0.248	0.248
ALB_N	0.034	ISR_Natufian_EpiP	TUR_Pınarbaşı_EpiP	0.428	0.572	0.186	0.186
ALB_N	0.160	Levant_PPN	TUR_C_Boncuklu_PPN	0.261	0.739	0.081	0.081
ALB_N	0.442	Levant_PPN	TUR_C_Çatalhöyük_N	0.088	0.912	0.078	0.078
ALB_N	0.168	Levant_PPN	TUR_Marmara_Barcın_N	0.098	0.902	0.090	0.090
ALB_N	0.071	Levant_PPN	TUR_Pınarbaşı_EpiP	0.244	0.756	0.095	0.095
ALB_N	0.478	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.429	0.571	0.101	0.101
ALB_N	0.710	Mesopotamia_PPN	TUR_Marmara_Barcın_N	0.318	0.682	0.114	0.114
ALB_N	0.479	Mesopotamia_PPN	TUR_Pınarbaşı_EpiP	0.502	0.498	0.113	0.113
ALB_N	0.357	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.006	0.994	0.013	0.013
ALB_N	0.106	MAR_Taforalt_EpiP	TUR_C_Boncuklu_PPN	0.093	0.907	0.031	0.031
ALB_N	0.661	MAR_Taforalt_EpiP	TUR_C_Çatalhöyük_N	0.045	0.955	0.023	0.023
ALB_N	0.372	MAR_Taforalt_EpiP	TUR_Marmara_Barcın_N	0.063	0.937	0.029	0.029
ALB_N	0.018	MAR_Taforalt_EpiP	TUR_Pınarbaşı_EpiP	0.049	0.951	0.042	0.042
ALB_N	0.690	RUS_AfontovaGora3	TUR_C_AşıklıHöyük_PPN	0.091	0.909	0.037	0.037
ALB_N	0.018	RUS_AfontovaGora3	TUR_C_Boncuklu_PPN	0.164	0.836	0.087	0.087
ALB_N	0.512	RUS_AfontovaGora3	TUR_C_Çatalhöyük_N	0.121	0.879	0.070	0.070
ALB_N	0.379	RUS_AfontovaGora3	TUR_Marmara_Barcın_N	0.174	0.826	0.070	0.070
ALB_N	0.491	RUS_MA1_HG	TUR_C_AşıklıHöyük_PPN	0.039	0.961	0.021	0.021
ALB_N	0.018	RUS_MA1_HG	TUR_C_Boncuklu_PPN	0.083	0.917	0.044	0.044
ALB_N	0.705	RUS_MA1_HG	TUR_C_Çatalhöyük_N	0.070	0.930	0.036	0.036
ALB_N	0.305	RUS_MA1_HG	TUR_Marmara_Barcın_N	0.076	0.924	0.041	0.041
ALB_N	0.281	SRB_Iron_Gates_HG	TUR_C_AşıklıHöyük_PPN	0.006	0.994	0.009	0.009
ALB_N	0.383	SRB_Iron_Gates_HG	TUR_C_Çatalhöyük_N	0.025	0.975	0.019	0.019
ALB_N	0.204	TUR_C_AşıklıHöyük_PPN	TUR_C_Boncuklu_PPN	0.949	0.051	0.175	0.175
ALB_N	0.311	TUR_C_AşıklıHöyük_PPN	TUR_Marmara_Barcın_N	0.803	0.197	1.208	1.208
ALB_N	0.241	TUR_C_AşıklıHöyük_PPN	TUR_Pınarbaşı_EpiP	0.932	0.068	0.114	0.114
ALB_N	0.414	TUR_C_AşıklıHöyük_PPN	WHG	0.986	0.014	0.009	0.009
ALB_N	0.332	TUR_C_Boncuklu_PPN	TUR_C_Çatalhöyük_N	0.093	0.907	0.299	0.299
ALB_N	0.378	TUR_C_Çatalhöyük_N	TUR_Marmara_Barcın_N	0.621	0.379	0.485	0.485
ALB_N	0.601	TUR_C_Çatalhöyük_N	TUR_Pınarbaşı_EpiP	0.785	0.215	0.157	0.157
ALB_N	0.325	TUR_C_Çatalhöyük_N	WHG	0.985	0.015	0.017	0.017
ARM_Aknashen_N	0.207	ARM_Masis_Blur_N	CHG	0.827	0.173	0.165	0.165
ARM_Aknashen_N	0.067	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.904	0.096	0.069	0.069
ARM_Aknashen_N	0.048	ARM_Masis_Blur_N	RUS_MA1_HG	0.970	0.030	0.031	0.031
ARM_Aknashen_N	0.619	AZE_N	CHG	0.780	0.220	0.150	0.150
ARM_Aknashen_N	0.184	AZE_N	CYP_PPNB	0.808	0.192	1.856	1.856
ARM_Aknashen_N	0.013	AZE_N	EHG	1.000	0.000	0.029	0.029
ARM_Aknashen_N	0.083	AZE_N	IRN_Ganj_Dareh_N	0.839	0.161	0.082	0.082
ARM_Aknashen_N	0.031	AZE_N	RUS_MA1_HG	0.967	0.033	0.038	0.038
ARM_Aknashen_N	0.459	CHG	CYP_PPNB	0.393	0.607	0.116	0.116
ARM_Aknashen_N	**0.065**	**CHG**	**Levant_PPN**	**0.729**	**0.271**	**0.057**	**0.057**
ARM_Aknashen_N	0.878	CHG	TUR_C_AşıklıHöyük_PPN	0.229	0.771	0.072	0.072
ARM_Aknashen_N	0.225	CHG	TUR_C_Boncuklu_PPN	0.700	0.300	0.057	0.057
ARM_Aknashen_N	0.973	CHG	TUR_C_Çatalhöyük_N	0.438	0.562	0.075	0.075
ARM_Aknashen_N	**0.704**	**CHG**	**TUR_Marmara_Barcın_N**	**0.659**	**0.341**	**0.059**	**0.059**
ARM_Aknashen_N	0.218	CHG	TUR_Pınarbaşı_EpiP	0.675	0.325	0.085	0.085
ARM_Aknashen_N	0.017	CYP_PPNB	IRN_Ganj_Dareh_N	0.773	0.227	0.053	0.053
ARM_Aknashen_N	0.831	CYP_PPNB	Mesopotamia_PPN	0.038	0.962	0.233	0.233

ARM_Aknashen_N	0.740	EHG	Mesopotamia_PPN	0.003	0.997	0.025	0.025
ARM_Aknashen_N	0.757	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.134	0.866	0.037	0.037
ARM_Aknashen_N	0.038	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.327	0.673	0.051	0.051
ARM_Aknashen_N	0.881	Mesopotamia_PPN	TUR_C_AşıklıHöyük_PPN	0.596	0.404	0.353	0.353
ARM_Aknashen_N	0.840	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.979	0.021	0.056	0.056
ARM_Aknashen_N	0.829	Mesopotamia_PPN	TUR_C_Çatalhöyük_N	0.980	0.020	0.161	0.161
ARM_Aknashen_N	0.830	Mesopotamia_PPN	TUR_Marmara_Barcın_N	0.990	0.010	0.060	0.060
ARM_Aknashen_N	0.010	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.011	0.989	0.011	0.011
ARM_Aknashen_N	0.011	RUS_AfontovaGora3	TUR_C_AşıklıHöyük_PPN	0.014	0.986	0.029	0.029
ARM_Aknashen_N	0.019	RUS_MA1_HG	TUR_C_AşıklıHöyük_PPN	0.017	0.983	0.018	0.018
ARM_Masis_Blur_N	0.263	ARM_Aknashen_N	AZE_N	0.217	0.783	0.564	0.564
ARM_Masis_Blur_N	0.076	ARM_Aknashen_N	CYP_PPNB	0.684	0.316	0.210	0.210
ARM_Masis_Blur_N	0.021	ARM_Aknashen_N	EHG	0.998	0.002	0.024	0.024
ARM_Masis_Blur_N	0.316	ARM_Aknashen_N	ISR_Natufian_EpiP	0.762	0.238	0.081	0.081
ARM_Masis_Blur_N	**0.328**	**ARM_Aknashen_N**	**Levant_PPN**	**0.864**	**0.136**	**0.051**	**0.051**
ARM_Masis_Blur_N	0.102	ARM_Aknashen_N	Mesopotamia_PPN	0.085	0.915	0.674	0.674
ARM_Masis_Blur_N	0.071	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.970	0.030	0.019	0.019
ARM_Masis_Blur_N	0.035	ARM_Aknashen_N	SRB_Iron_Gates_HG	0.987	0.013	0.014	0.014
ARM_Masis_Blur_N	0.485	ARM_Aknashen_N	TUR_C_AşıklıHöyük_PPN	0.078	0.922	0.256	0.256
ARM_Masis_Blur_N	0.068	ARM_Aknashen_N	TUR_C_Boncuklu_PPN	0.906	0.094	0.072	0.072
ARM_Masis_Blur_N	0.093	ARM_Aknashen_N	TUR_C_Çatalhöyük_N	0.642	0.358	0.333	0.333
ARM_Masis_Blur_N	0.168	ARM_Aknashen_N	TUR_Marmara_Barcın_N	0.825	0.175	0.083	0.083
ARM_Masis_Blur_N	0.168	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.844	0.156	0.068	0.068
ARM_Masis_Blur_N	0.037	ARM_Aknashen_N	WHG	0.983	0.017	0.013	0.013
ARM_Masis_Blur_N	0.314	AZE_N	CYP_PPNB	0.827	0.173	0.234	0.234
ARM_Masis_Blur_N	0.185	AZE_N	EHG	0.992	0.008	0.030	0.030
ARM_Masis_Blur_N	0.228	AZE_N	ISR_Natufian_EpiP	0.867	0.133	0.152	0.152
ARM_Masis_Blur_N	0.343	AZE_N	Levant_PPN	0.921	0.079	0.075	0.075
ARM_Masis_Blur_N	0.394	AZE_N	SRB_Iron_Gates_HG	0.968	0.032	0.020	0.020
ARM_Masis_Blur_N	0.718	AZE_N	TUR_C_AşıklıHöyük_PPN	0.069	0.931	0.243	0.243
ARM_Masis_Blur_N	0.943	AZE_N	TUR_C_Boncuklu_PPN	0.802	0.198	0.073	0.073
ARM_Masis_Blur_N	0.684	AZE_N	TUR_C_Çatalhöyük_N	0.594	0.406	0.185	0.185
ARM_Masis_Blur_N	0.930	AZE_N	TUR_Marmara_Barcın_N	0.763	0.237	0.087	0.087
ARM_Masis_Blur_N	0.881	AZE_N	TUR_Pınarbaşı_EpiP	0.842	0.158	0.085	0.085
ARM_Masis_Blur_N	0.403	AZE_N	WHG	0.985	0.015	0.017	0.017
ARM_Masis_Blur_N	0.018	CHG	CYP_PPNB	0.219	0.781	0.058	0.058
ARM_Masis_Blur_N	0.600	CHG	TUR_C_AşıklıHöyük_PPN	0.041	0.959	0.044	0.044
ARM_Masis_Blur_N	0.028	CHG	TUR_C_Boncuklu_PPN	0.489	0.511	0.054	0.054
ARM_Masis_Blur_N	0.360	CHG	TUR_C_Çatalhöyük_N	0.203	0.797	0.063	0.063
ARM_Masis_Blur_N	**0.625**	**CHG**	**TUR_Marmara_Barcın_N**	**0.420**	**0.580**	**0.054**	**0.054**
ARM_Masis_Blur_N	0.019	CHG	TUR_Pınarbaşı_EpiP	0.478	0.522	0.078	0.078
ARM_Masis_Blur_N	0.159	CYP_PPNB	Mesopotamia_PPN	0.318	0.682	0.206	0.206
ARM_Masis_Blur_N	0.060	EHG	Mesopotamia_PPN	0.029	0.971	0.028	0.028
ARM_Masis_Blur_N	0.683	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.037	0.963	0.028	0.028
ARM_Masis_Blur_N	0.075	IRN_Ganj_Dareh_N	TUR_C_Boncuklu_PPN	0.411	0.589	0.040	0.040
ARM_Masis_Blur_N	0.083	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.132	0.868	0.047	0.047
ARM_Masis_Blur_N	0.482	IRN_Ganj_Dareh_N	TUR_Marmara_Barcın_N	0.362	0.638	0.041	0.041
ARM_Masis_Blur_N	0.062	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.423	0.577	0.048	0.048
ARM_Masis_Blur_N	0.055	ISR_Natufian_EpiP	Mesopotamia_PPN	0.033	0.967	0.151	0.151
ARM_Masis_Blur_N	0.073	Levant_PPN	Mesopotamia_PPN	0.041	0.959	0.068	0.068
ARM_Masis_Blur_N	0.109	Mesopotamia_PPN	SRB_Iron_Gates_HG	0.973	0.027	0.016	0.016
ARM_Masis_Blur_N	0.815	Mesopotamia_PPN	TUR_C_AşıklıHöyük_PPN	0.193	0.807	0.145	0.145
ARM_Masis_Blur_N	0.982	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.779	0.221	0.061	0.061
ARM_Masis_Blur_N	0.478	Mesopotamia_PPN	TUR_C_Çatalhöyük_N	0.567	0.433	0.170	0.170
ARM_Masis_Blur_N	0.916	Mesopotamia_PPN	TUR_Marmara_Barcın_N	0.742	0.258	0.074	0.074
ARM_Masis_Blur_N	0.924	Mesopotamia_PPN	TUR_Pınarbaşı_EpiP	0.819	0.181	0.073	0.073
ARM_Masis_Blur_N	0.105	Mesopotamia_PPN	WHG	0.978	0.022	0.016	0.016
ARM_Masis_Blur_N	0.429	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.005	0.995	0.010	0.010
ARM_Masis_Blur_N	0.041	RUS_AfontovaGora3	TUR_C_Çatalhöyük_N	0.110	0.890	0.043	0.043
ARM_Masis_Blur_N	0.442	SRB_Iron_Gates_HG	TUR_C_AşıklıHöyük_PPN	0.001	0.999	0.008	0.008
AZE_N	**0.598**	**ARM_Aknashen_N**	**ARM_Masis_Blur_N**	**0.355**	**0.645**	**0.199**	**0.199**
AZE_N	0.287	ARM_Aknashen_N	CYP_PPNB	0.707	0.293	0.090	0.090
AZE_N	0.014	ARM_Aknashen_N	EHG	0.992	0.008	0.019	0.019
AZE_N	0.322	ARM_Aknashen_N	ISR_Natufian_EpiP	0.848	0.152	0.050	0.050
AZE_N	0.401	ARM_Aknashen_N	Levant_PPN	0.891	0.109	0.035	0.035
AZE_N	0.102	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.965	0.035	0.015	0.015
AZE_N	0.052	ARM_Aknashen_N	RUS_AfontovaGora3	0.997	0.003	0.028	0.028
AZE_N	0.023	ARM_Aknashen_N	SRB_Iron_Gates_HG	0.988	0.012	0.010	0.010
AZE_N	0.054	ARM_Aknashen_N	TUR_C_AşıklıHöyük_PPN	0.611	0.389	0.258	0.258
AZE_N	0.085	ARM_Aknashen_N	TUR_C_Boncuklu_PPN	0.921	0.079	0.040	0.040
AZE_N	0.210	ARM_Aknashen_N	TUR_C_Çatalhöyük_N	0.768	0.232	0.082	0.082
AZE_N	0.190	ARM_Aknashen_N	TUR_Marmara_Barcın_N	0.883	0.117	0.044	0.044
AZE_N	0.151	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.888	0.112	0.041	0.041
AZE_N	0.026	ARM_Aknashen_N	WHG	0.986	0.014	0.010	0.010
AZE_N	0.613	ARM_Masis_Blur_N	CHG	0.895	0.105	0.061	0.061
AZE_N	0.957	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.885	0.115	0.040	0.040
AZE_N	0.985	ARM_Masis_Blur_N	Mesopotamia_PPN	0.522	0.478	0.151	0.151
AZE_N	0.210	ARM_Masis_Blur_N	MAR_Taforalt_EpiP	0.989	0.011	0.014	0.014
AZE_N	0.198	ARM_Masis_Blur_N	RUS_AfontovaGora3	0.989	0.011	0.026	0.026
AZE_N	0.266	ARM_Masis_Blur_N	RUS_MA1_HG	0.993	0.007	0.020	0.020
AZE_N	0.010	CHG	CYP_PPNB	0.282	0.718	0.054	0.054
AZE_N	0.010	CHG	TUR_C_AşıklıHöyük_PPN	0.159	0.841	0.043	0.043
AZE_N	0.272	CHG	TUR_C_Çatalhöyük_N	0.333	0.667	0.041	0.041
AZE_N	0.740	CYP_PPNB	Mesopotamia_PPN	0.231	0.769	0.096	0.096
AZE_N	0.287	EHG	Mesopotamia_PPN	0.013	0.987	0.018	0.018
AZE_N	0.091	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.134	0.866	0.028	0.028
AZE_N	0.024	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.289	0.711	0.030	0.030
AZE_N	0.223	ISR_Natufian_EpiP	Mesopotamia_PPN	0.047	0.953	0.063	0.063
AZE_N	0.431	Levant_PPN	Mesopotamia_PPN	0.057	0.943	0.039	0.039
AZE_N	0.264	Mesopotamia_PPN	RUS_AfontovaGora3	0.973	0.027	0.029	0.029
AZE_N	0.270	Mesopotamia_PPN	RUS_MA1_HG	0.989	0.011	0.021	0.021
AZE_N	0.410	Mesopotamia_PPN	SRB_Iron_Gates_HG	0.981	0.019	0.011	0.011

AZE_N	0.728	Mesopotamia_PPN	TUR_C_AşıklıHöyük_PPN	0.617	0.383	0.144	0.144
AZE_N	0.884	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.901	0.099	0.039	0.039
AZE_N	0.778	Mesopotamia_PPN	TUR_C_Çatalhöyük_N	0.785	0.215	0.087	0.087
AZE_N	0.937	Mesopotamia_PPN	TUR_Marmara_Barcın_N	0.877	0.123	0.045	0.045
AZE_N	0.823	Mesopotamia_PPN	TUR_Pınarbaşı_EpiP	0.899	0.101	0.045	0.045
AZE_N	0.317	Mesopotamia_PPN	WHG	0.988	0.012	0.010	0.010
CYP_PPNB	0.353	ARM_Masis_Blur_N	Mesopotamia_PPN	0.284	0.716	4.460	4.460
CYP_PPNB	0.303	AZE_N	TUR_C_AşıklıHöyük_PPN	0.005	0.995	0.048	0.048
CYP_PPNB	0.022	AZE_N	TUR_Pınarbaşı_EpiP	0.358	0.642	0.119	0.119
CYP_PPNB	0.375	CHG	TUR_C_AşıklıHöyük_PPN	0.008	0.992	0.030	0.030
CYP_PPNB	0.302	EHG	TUR_C_AşıklıHöyük_PPN	0.012	0.988	0.016	0.016
CYP_PPNB	0.044	EHG	TUR_C_Çatalhöyük_N	0.046	0.954	0.029	0.029
CYP_PPNB	0.601	ISR_Natufian_EpiP	TUR_C_AşıklıHöyük_PPN	0.098	0.902	0.059	0.059
CYP_PPNB	0.305	ISR_Natufian_EpiP	TUR_C_Boncuklu_PPN	0.388	0.612	0.081	0.081
CYP_PPNB	0.778	ISR_Natufian_EpiP	TUR_Marmara_Barcın_N	0.144	0.856	0.124	0.124
CYP_PPNB	0.157	ISR_Natufian_EpiP	TUR_Pınarbaşı_EpiP	0.418	0.582	0.093	0.093
CYP_PPNB	**0.550**	**Levant_PPN**	**TUR_C_AşıklıHöyük_PPN**	**0.068**	**0.932**	**0.042**	**0.042**
CYP_PPNB	0.112	Levant_PPN	TUR_C_Boncuklu_PPN	0.350	0.650	0.074	0.074
CYP_PPNB	0.213	Levant_PPN	TUR_Marmara_Barcın_N	0.160	0.840	0.091	0.091
CYP_PPNB	0.096	Levant_PPN	TUR_Pınarbaşı_EpiP	0.346	0.654	0.088	0.088
CYP_PPNB	0.027	Mesopotamia_PPN	TUR_Pınarbaşı_EpiP	0.482	0.518	0.148	0.148
CYP_PPNB	0.443	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.014	0.986	0.012	0.012
CYP_PPNB	0.080	MAR_Taforalt_EpiP	TUR_Marmara_Barcın_N	0.028	0.972	0.024	0.024
CYP_PPNB	0.018	MAR_Taforalt_EpiP	TUR_Pınarbaşı_EpiP	0.094	0.906	0.031	0.031
CYP_PPNB	0.306	RUS_MA1_HG	TUR_C_AşıklıHöyük_PPN	0.003	0.997	0.018	0.018
CYP_PPNB	0.358	SRB_Iron_Gates_HG	TUR_C_Çatalhöyük_N	0.023	0.977	0.017	0.017
CYP_PPNB	0.335	TUR_C_AşıklıHöyük_PPN	TUR_C_Çatalhöyük_N	0.708	0.292	0.524	0.524
CYP_PPNB	0.326	TUR_C_AşıklıHöyük_PPN	WHG	0.992	0.008	0.009	0.009
CYP_PPNB	0.118	TUR_C_Boncuklu_PPN	TUR_C_Çatalhöyük_N	0.268	0.732	0.150	0.150
CYP_PPNB	0.149	TUR_C_Çatalhöyük_N	TUR_Marmara_Barcın_N	0.527	0.473	0.412	0.412
CYP_PPNB	0.415	TUR_C_Çatalhöyük_N	TUR_Pınarbaşı_EpiP	0.686	0.314	0.114	0.114
CYP_PPNB	0.266	TUR_C_Çatalhöyük_N	WHG	0.956	0.044	0.016	0.016
IRQ_Bestansur_PPN	0.038	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.967	0.033	0.065	0.065
IRQ_Bestansur_PPN	0.066	ARM_Aknashen_N	RUS_AfontovaGora3	0.776	0.224	0.247	0.247
IRQ_Bestansur_PPN	0.066	ARM_Aknashen_N	RUS_MA1_HG	0.945	0.055	0.114	0.114
IRQ_Bestansur_PPN	0.462	ARM_Aknashen_N	TUR_C_AşıklıHöyük_PPN	0.998	0.002	2.030	2.030
IRQ_Bestansur_PPN	0.337	ARM_Masis_Blur_N	CHG	0.865	0.135	0.712	0.712
IRQ_Bestansur_PPN	0.382	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.877	0.123	0.416	0.416
IRQ_Bestansur_PPN	0.517	ARM_Masis_Blur_N	RUS_AfontovaGora3	0.779	0.221	0.142	0.142
IRQ_Bestansur_PPN	0.384	ARM_Masis_Blur_N	RUS_MA1_HG	0.979	0.021	0.087	0.087
IRQ_Bestansur_PPN	0.203	AZE_N	IRN_Ganj_Dareh_N	0.465	0.535	0.302	0.302
IRQ_Bestansur_PPN	0.040	AZE_N	MAR_Taforalt_EpiP	0.928	0.072	0.089	0.089
IRQ_Bestansur_PPN	0.045	AZE_N	RUS_AfontovaGora3	0.708	0.292	0.339	0.339
IRQ_Bestansur_PPN	0.278	CHG	ISR_Natufian_EpiP	0.357	0.643	0.211	0.211
IRQ_Bestansur_PPN	0.104	CHG	Levant_PPN	0.594	0.406	0.285	0.285
IRQ_Bestansur_PPN	0.144	CHG	MAR_Taforalt_EpiP	0.965	0.035	0.121	0.121
IRQ_Bestansur_PPN	0.026	CHG	TUR_Pınarbaşı_EpiP	0.990	0.010	0.657	0.657
IRQ_Bestansur_PPN	0.249	CYP_PPNB	IRN_Ganj_Dareh_N	0.833	0.167	0.634	0.634
IRQ_Bestansur_PPN	0.392	CYP_PPNB	RUS_AfontovaGora3	0.787	0.213	0.122	0.122
IRQ_Bestansur_PPN	0.225	CYP_PPNB	RUS_MA1_HG	0.961	0.039	0.065	0.065
IRQ_Bestansur_PPN	0.207	CYP_PPNB	WHG	0.999	0.001	0.021	0.021
IRQ_Bestansur_PPN	0.039	EHG	IRN_Ganj_Dareh_N	0.002	0.998	0.088	0.088
IRQ_Bestansur_PPN	0.110	EHG	ISR_Natufian_EpiP	0.089	0.911	0.050	0.050
IRQ_Bestansur_PPN	0.365	IRN_Ganj_Dareh_N	ISR_Natufian_EpiP	0.375	0.625	0.228	0.228
IRQ_Bestansur_PPN	0.290	IRN_Ganj_Dareh_N	Levant_PPN	0.664	0.336	0.164	0.164
IRQ_Bestansur_PPN	0.256	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.188	0.812	0.220	0.220
IRQ_Bestansur_PPN	0.106	IRN_Ganj_Dareh_N	TUR_C_Boncuklu_PPN	0.844	0.156	0.129	0.129
IRQ_Bestansur_PPN	0.335	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.049	0.951	0.836	0.836
IRQ_Bestansur_PPN	**0.136**	**IRN_Ganj_Dareh_N**	**TUR_Marmara_Barcın_N**	**0.782**	**0.218**	**0.143**	**0.143**
IRQ_Bestansur_PPN	0.085	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.790	0.210	0.166	0.166
IRQ_Bestansur_PPN	0.208	IRN_Ganj_Dareh_N	WHG	0.973	0.027	0.044	0.044
IRQ_Bestansur_PPN	0.554	ISR_Natufian_EpiP	Mesopotamia_PPN	0.410	0.590	1.203	1.203
IRQ_Bestansur_PPN	0.440	ISR_Natufian_EpiP	RUS_AfontovaGora3	0.662	0.338	0.118	0.118
IRQ_Bestansur_PPN	0.174	ISR_Natufian_EpiP	RUS_MA1_HG	0.852	0.148	0.078	0.078
IRQ_Bestansur_PPN	0.054	ISR_Natufian_EpiP	SRB_Iron_Gates_HG	0.988	0.012	0.032	0.032
IRQ_Bestansur_PPN	0.045	ISR_Natufian_EpiP	TUR_Marmara_Barcın_N	0.978	0.022	0.151	0.151
IRQ_Bestansur_PPN	0.036	ISR_Natufian_EpiP	TUR_Pınarbaşı_EpiP	0.915	0.085	0.188	0.188
IRQ_Bestansur_PPN	0.063	ISR_Natufian_EpiP	WHG	0.965	0.035	0.029	0.029
IRQ_Bestansur_PPN	0.086	Levant_PPN	RUS_AfontovaGora3	0.430	0.570	0.129	0.129
IRQ_Bestansur_PPN	0.440	Mesopotamia_PPN	MAR_Taforalt_EpiP	0.998	0.002	0.085	0.085
IRQ_Bestansur_PPN	0.610	Mesopotamia_PPN	RUS_AfontovaGora3	0.756	0.244	0.180	0.180
IRQ_Bestansur_PPN	0.561	Mesopotamia_PPN	RUS_MA1_HG	0.972	0.028	0.116	0.116
IRQ_Bestansur_PPN	0.188	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.049	0.951	0.031	0.031
IRQ_Bestansur_PPN	0.042	RUS_AfontovaGora3	TUR_C_AşıklıHöyük_PPN	0.060	0.940	0.215	0.215
IRQ_Bestansur_PPN	0.304	RUS_AfontovaGora3	TUR_C_Çatalhöyük_N	0.168	0.832	0.262	0.262
IRQ_Bestansur_PPN	0.206	TUR_C_Çatalhöyük_N	TUR_Pınarbaşı_EpiP	0.971	0.029	0.163	0.163
IRQ_Bestansur_PPN	0.929	TUR_C_Çatalhöyük_N	WHG	0.992	0.008	0.033	0.033
IRQ_Shanidar_N	0.184	ARM_Aknashen_N	CYP_PPNB	0.941	0.059	0.629	0.629
IRQ_Shanidar_N	0.122	ARM_Aknashen_N	EHG	0.996	0.004	0.028	0.028
IRQ_Shanidar_N	0.442	ARM_Aknashen_N	IRN_Ganj_Dareh_N	0.723	0.277	0.155	0.155
IRQ_Shanidar_N	0.140	ARM_Aknashen_N	ISR_Natufian_EpiP	0.938	0.062	0.155	0.155
IRQ_Shanidar_N	0.219	ARM_Aknashen_N	Levant_PPN	0.955	0.045	0.046	0.046
IRQ_Shanidar_N	0.759	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.930	0.070	0.025	0.025
IRQ_Shanidar_N	0.153	ARM_Aknashen_N	RUS_AfontovaGora3	0.932	0.068	0.069	0.069
IRQ_Shanidar_N	0.203	ARM_Aknashen_N	RUS_MA1_HG	0.968	0.032	0.039	0.039
IRQ_Shanidar_N	0.175	ARM_Aknashen_N	TUR_C_Boncuklu_PPN	0.978	0.022	0.053	0.053
IRQ_Shanidar_N	0.170	ARM_Aknashen_N	TUR_C_Çatalhöyük_N	0.998	0.002	0.233	0.233
IRQ_Shanidar_N	0.170	ARM_Aknashen_N	TUR_Marmara_Barcın_N	0.983	0.017	0.058	0.058
IRQ_Shanidar_N	0.113	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.977	0.023	0.068	0.068
IRQ_Shanidar_N	0.112	ARM_Aknashen_N	WHG	0.998	0.002	0.015	0.015
IRQ_Shanidar_N	0.043	ARM_Masis_Blur_N	CHG	0.966	0.034	0.450	0.450
IRQ_Shanidar_N	0.525	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.645	0.355	0.131	0.131

IRQ_Shanidar_N	0.153	ARM_Masis_Blur_N	MAR_Taforalt_EpiP	0.962	0.038	0.027	0.027
IRQ_Shanidar_N	0.051	ARM_Masis_Blur_N	RUS_MA1_HG	0.992	0.008	0.041	0.041
IRQ_Shanidar_N	0.029	AZE_N	CHG	0.441	0.559	0.237	0.237
IRQ_Shanidar_N	0.633	AZE_N	IRN_Ganj_Dareh_N	0.466	0.534	0.101	0.101
IRQ_Shanidar_N	0.096	AZE_N	ISR_Natufian_EpiP	0.982	0.018	2.719	2.719
IRQ_Shanidar_N	0.038	CHG	CYP_PPNB	0.179	0.821	0.309	0.309
IRQ_Shanidar_N	0.028	CHG	ISR_Natufian_EpiP	0.597	0.403	0.142	0.142
IRQ_Shanidar_N	0.039	CHG	Levant_PPN	0.801	0.199	0.085	0.085
IRQ_Shanidar_N	0.018	CHG	MAR_Taforalt_EpiP	0.904	0.096	0.044	0.044
IRQ_Shanidar_N	0.161	CHG	TUR_C_AşıklıHöyük_PPN	0.151	0.849	0.121	0.121
IRQ_Shanidar_N	0.010	CHG	TUR_C_Boncuklu_PPN	0.886	0.114	0.085	0.085
IRQ_Shanidar_N	0.077	CHG	TUR_C_Çatalhöyük_N	0.502	0.498	0.166	0.166
IRQ_Shanidar_N	0.010	CHG	TUR_Marmara_Barcın_N	0.870	0.130	0.096	0.096
IRQ_Shanidar_N	0.557	CYP_PPNB	IRN_Ganj_Dareh_N	0.636	0.364	0.098	0.098
IRQ_Shanidar_N	0.028	IRN_Ganj_Dareh_N	ISR_Natufian_EpiP	0.594	0.406	0.103	0.103
IRQ_Shanidar_N	0.032	IRN_Ganj_Dareh_N	Levant_PPN	0.829	0.171	0.054	0.054
IRQ_Shanidar_N	**0.441**	**IRN_Ganj_Dareh_N**	**Mesopotamia_PPN**	**0.284**	**0.716**	**0.155**	**0.155**
IRQ_Shanidar_N	0.917	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.252	0.748	0.073	0.073
IRQ_Shanidar_N	0.656	IRN_Ganj_Dareh_N	TUR_C_Boncuklu_PPN	0.777	0.223	0.047	0.047
IRQ_Shanidar_N	0.768	IRN_Ganj_Dareh_N	TUR_C_Çatalhöyük_N	0.519	0.481	0.087	0.087
IRQ_Shanidar_N	**0.578**	**IRN_Ganj_Dareh_N**	**TUR_Marmara_Barcın_N**	**0.758**	**0.242**	**0.051**	**0.051**
IRQ_Shanidar_N	0.664	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.801	0.199	0.059	0.059
IRQ_Shanidar_N	0.128	Mesopotamia_PPN	MAR_Taforalt_EpiP	0.988	0.012	0.032	0.032
IRQ_Shanidar_N	0.013	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.012	0.988	0.015	0.015
IRQ_Shanidar_N	0.017	RUS_AfontovaGora3	TUR_C_AşıklıHöyük_PPN	0.042	0.958	0.038	0.038
IRQ_Shanidar_N	0.024	RUS_MA1_HG	TUR_C_AşıklıHöyük_PPN	0.017	0.983	0.023	0.023
Levant_PPN	**0.453**	**CYP_PPNB**	**ISR_Natufian_EpiP**	**0.541**	**0.459**	**0.049**	**0.049**
Levant_PPN	**0.949**	**ISR_Natufian_EpiP**	**TUR_C_AşıklıHöyük_PPN**	**0.482**	**0.518**	**0.044**	**0.044**
Levant_PPN	**0.358**	**ISR_Natufian_EpiP**	**TUR_C_Boncuklu_PPN**	**0.806**	**0.194**	**0.023**	**0.023**
Levant_PPN	**0.333**	**ISR_Natufian_EpiP**	**TUR_C_Çatalhöyük_N**	**0.659**	**0.341**	**0.037**	**0.037**
Levant_PPN	**0.441**	**ISR_Natufian_EpiP**	**TUR_Marmara_Barcın_N**	**0.771**	**0.229**	**0.026**	**0.026**
Levant_PPN	**0.053**	**ISR_Natufian_EpiP**	**TUR_Pınarbaşı_EpiP**	**0.799**	**0.201**	**0.027**	**0.027**
Mesopotamia_PPN	0.891	ARM_Aknashen_N	ARM_Masis_Blur_N	0.973	0.027	0.676	0.676
Mesopotamia_PPN	0.849	ARM_Aknashen_N	AZE_N	0.852	0.148	0.333	0.333
Mesopotamia_PPN	0.875	ARM_Aknashen_N	CHG	0.952	0.048	0.072	0.072
Mesopotamia_PPN	0.870	ARM_Aknashen_N	IRN_Ganj_Dareh_N	0.958	0.042	0.062	0.062
Mesopotamia_PPN	0.845	ARM_Aknashen_N	ISR_Natufian_EpiP	0.941	0.059	0.073	0.073
Mesopotamia_PPN	0.860	ARM_Aknashen_N	Levant_PPN	0.977	0.023	0.039	0.039
Mesopotamia_PPN	0.965	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.974	0.026	0.017	0.017
Mesopotamia_PPN	0.793	ARM_Aknashen_N	RUS_AfontovaGora3	0.989	0.011	0.038	0.038
Mesopotamia_PPN	0.840	ARM_Aknashen_N	RUS_MA1_HG	0.992	0.008	0.025	0.025
Mesopotamia_PPN	0.767	ARM_Aknashen_N	SRB_Iron_Gates_HG	0.996	0.004	0.011	0.011
Mesopotamia_PPN	0.881	ARM_Aknashen_N	TUR_C_AşıklıHöyük_PPN	0.987	0.013	0.632	0.632
Mesopotamia_PPN	0.830	ARM_Aknashen_N	TUR_C_Çatalhöyük_N	0.986	0.014	0.113	0.113
Mesopotamia_PPN	0.823	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.991	0.009	0.045	0.045
Mesopotamia_PPN	0.766	ARM_Aknashen_N	WHG	0.999	0.001	0.011	0.011
Mesopotamia_PPN	0.134	ARM_Masis_Blur_N	CHG	0.892	0.108	0.068	0.068
Mesopotamia_PPN	0.767	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.833	0.167	0.050	0.050
Mesopotamia_PPN	0.089	ARM_Masis_Blur_N	MAR_Taforalt_EpiP	0.975	0.025	0.016	0.016
Mesopotamia_PPN	0.042	ARM_Masis_Blur_N	RUS_AfontovaGora3	0.986	0.014	0.036	0.036
Mesopotamia_PPN	0.065	ARM_Masis_Blur_N	RUS_MA1_HG	0.996	0.004	0.024	0.024
Mesopotamia_PPN	0.490	AZE_N	CHG	0.936	0.064	0.084	0.084
Mesopotamia_PPN	0.707	AZE_N	IRN_Ganj_Dareh_N	0.863	0.137	0.061	0.061
Mesopotamia_PPN	0.202	AZE_N	MAR_Taforalt_EpiP	0.986	0.014	0.021	0.021
Mesopotamia_PPN	0.031	CHG	CYP_PPNB	0.236	0.764	0.057	0.057
Mesopotamia_PPN	**0.194**	**CYP_PPNB**	**IRN_Ganj_Dareh_N**	**0.772**	**0.228**	**0.038**	**0.038**
Mesopotamia_PPN	**0.160**	**IRN_Ganj_Dareh_N**	**TUR_C_AşıklıHöyük_PPN**	**0.132**	**0.868**	**0.035**	**0.035**
Mesopotamia_LBA	0.229	ARM_Aknashen_N	ISR_Natufian_EpiP	0.802	0.198	0.055	0.055
Mesopotamia_LBA	0.031	ARM_Aknashen_N	Levant_PPN	0.882	0.118	0.041	0.041
Mesopotamia_LBA	0.037	ARM_Aknashen_N	MAR_Taforalt_EpiP	0.951	0.049	0.016	0.016
Mesopotamia_LBA	0.468	ARM_Masis_Blur_N	AZE_N	0.536	0.464	2.355	2.355
Mesopotamia_LBA	0.022	ARM_Masis_Blur_N	CHG	0.876	0.124	0.097	0.097
Mesopotamia_LBA	0.109	ARM_Masis_Blur_N	IRN_Ganj_Dareh_N	0.873	0.127	0.052	0.052
Mesopotamia_LBA	0.015	ARM_Masis_Blur_N	ISR_Natufian_EpiP	0.901	0.099	0.073	0.073
Mesopotamia_LBA	0.195	ARM_Masis_Blur_N	Mesopotamia_PPN	0.141	0.859	0.501	0.501
Mesopotamia_LBA	0.049	ARM_Masis_Blur_N	MAR_Taforalt_EpiP	0.973	0.027	0.016	0.016
Mesopotamia_LBA	0.844	ARM_Masis_Blur_N	TUR_C_AşıklıHöyük_PPN	0.822	0.178	3.428	3.428
Mesopotamia_LBA	0.206	AZE_N	CHG	0.998	0.002	0.102	0.102
Mesopotamia_LBA	0.201	AZE_N	CYP_PPNB	0.901	0.099	0.117	0.117
Mesopotamia_LBA	0.174	AZE_N	IRN_Ganj_Dareh_N	0.995	0.005	0.066	0.066
Mesopotamia_LBA	0.621	AZE_N	ISR_Natufian_EpiP	0.828	0.172	0.082	0.082
Mesopotamia_LBA	0.345	AZE_N	Levant_PPN	0.911	0.089	0.055	0.055
Mesopotamia_LBA	0.639	AZE_N	MAR_Taforalt_EpiP	0.946	0.054	0.022	0.022
Mesopotamia_LBA	0.134	AZE_N	SRB_Iron_Gates_HG	0.999	0.001	0.016	0.016
Mesopotamia_LBA	0.610	CHG	Levant_PPN	0.549	0.451	0.037	0.037
Mesopotamia_LBA	0.792	CHG	Mesopotamia_PPN	0.041	0.959	0.090	0.090
Mesopotamia_LBA	0.202	CYP_PPNB	Mesopotamia_PPN	0.062	0.938	0.140	0.140
Mesopotamia_LBA	0.180	EHG	Mesopotamia_PPN	0.007	0.993	0.022	0.022
Mesopotamia_LBA	0.580	ISR_Natufian_EpiP	Mesopotamia_PPN	0.166	0.834	0.065	0.065
Mesopotamia_LBA	0.506	Levant_PPN	Mesopotamia_PPN	0.091	0.909	0.046	0.046
Mesopotamia_LBA	0.455	Mesopotamia_PPN	MAR_Taforalt_EpiP	0.968	0.032	0.018	0.018
Mesopotamia_LBA	0.196	Mesopotamia_PPN	RUS_AfontovaGora3	0.958	0.042	0.035	0.035
Mesopotamia_LBA	0.290	Mesopotamia_PPN	RUS_MA1_HG	0.971	0.029	0.024	0.024
Mesopotamia_LBA	0.253	Mesopotamia_PPN	SRB_Iron_Gates_HG	0.985	0.015	0.013	0.013
Mesopotamia_LBA	0.195	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.988	0.012	0.045	0.045
Mesopotamia_LBA	0.211	Mesopotamia_PPN	TUR_C_Çatalhöyük_N	0.926	0.074	0.119	0.119
Mesopotamia_LBA	0.210	Mesopotamia_PPN	TUR_Marmara_Barcın_N	0.968	0.032	0.054	0.054
Mesopotamia_LBA	0.203	Mesopotamia_PPN	TUR_Pınarbaşı_EpiP	0.938	0.062	0.058	0.058
Mesopotamia_LBA	0.186	Mesopotamia_PPN	WHG	0.996	0.004	0.013	0.013
TUR_C_AşıklıHöyük_PPN	0.790	ARM_Aknashen_N	ARM_Masis_Blur_N	0.043	0.957	1.195	1.195
TUR_C_AşıklıHöyük_PPN	0.273	ARM_Aknashen_N	CYP_PPNB	0.028	0.972	0.246	0.246
TUR_C_AşıklıHöyük_PPN	0.011	ARM_Aknashen_N	SRB_Iron_Gates_HG	0.992	0.008	0.015	0.015

TUR_C_AşıklıHöyük_PPN	0.217	ARM_Aknashen_N	TUR_C_Boncuklu_PPN	0.715	0.285	0.134	0.134
TUR_C_AşıklıHöyük_PPN	0.105	ARM_Aknashen_N	TUR_Marmara_Barcın_N	0.671	0.329	0.187	0.187
TUR_C_AşıklıHöyük_PPN	0.910	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.752	0.248	0.086	0.086
TUR_C_AşıklıHöyük_PPN	0.345	ARM_Masis_Blur_N	EHG	0.998	0.002	0.027	0.027
TUR_C_AşıklıHöyük_PPN	0.500	ARM_Masis_Blur_N	TUR_C_Boncuklu_PPN	0.891	0.109	0.126	0.126
TUR_C_AşıklıHöyük_PPN	0.417	ARM_Masis_Blur_N	TUR_Marmara_Barcın_N	0.925	0.075	0.219	0.219
TUR_C_AşıklıHöyük_PPN	0.690	ARM_Masis_Blur_N	TUR_Pınarbaşı_EpiP	0.885	0.115	0.106	0.106
TUR_C_AşıklıHöyük_PPN	0.444	ARM_Masis_Blur_N	WHG	0.996	0.004	0.013	0.013
TUR_C_AşıklıHöyük_PPN	0.292	AZE_N	TUR_Pınarbaşı_EpiP	0.716	0.284	0.132	0.132
TUR_C_AşıklıHöyük_PPN	0.246	CHG	TUR_Pınarbaşı_EpiP	0.305	0.695	0.091	0.091
TUR_C_AşıklıHöyük_PPN	0.231	CYP_PPNB	TUR_C_Boncuklu_PPN	1.000	0.000	0.126	0.126
TUR_C_AşıklıHöyük_PPN	0.317	CYP_PPNB	TUR_C_Çatalhöyük_N	0.329	0.671	0.720	0.720
TUR_C_AşıklıHöyük_PPN	0.010	IRN_Ganj_Dareh_N	TUR_C_Boncuklu_PPN	0.160	0.840	0.061	0.061
TUR_C_AşıklıHöyük_PPN	0.150	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.294	0.706	0.061	0.061
TUR_C_AşıklıHöyük_PPN	0.016	Levant_PPN	TUR_C_Çatalhöyük_N	0.003	0.997	0.080	0.080
TUR_C_AşıklıHöyük_PPN	0.038	Mesopotamia_PPN	TUR_C_Boncuklu_PPN	0.659	0.341	0.175	0.175
TUR_C_AşıklıHöyük_PPN	**0.251**	**Mesopotamia_PPN**	**TUR_Pınarbaşı_EpiP**	**0.699**	**0.301**	**0.108**	**0.108**
TUR_C_AşıklıHöyük_PPN	0.015	MAR_Taforalt_EpiP	TUR_C_Boncuklu_PPN	0.051	0.949	0.027	0.027
TUR_C_AşıklıHöyük_PPN	0.015	TUR_C_Boncuklu_PPN	TUR_C_Çatalhöyük_N	0.089	0.911	0.561	0.561
TUR_C_AşıklıHöyük_PPN	0.311	TUR_C_Çatalhöyük_N	TUR_Pınarbaşı_EpiP	0.992	0.008	0.175	0.175
TUR_C_AşıklıHöyük_PPN	0.165	TUR_Marmara_Barcın_N	TUR_Pınarbaşı_EpiP	0.936	0.064	2.286	2.286
TUR_C_Boncuklu_PPN	0.625	ARM_Aknashen_N	TUR_Pınarbaşı_EpiP	0.336	0.664	0.066	0.066
TUR_C_Boncuklu_PPN	0.554	ARM_Masis_Blur_N	TUR_Pınarbaşı_EpiP	0.416	0.584	0.081	0.081
TUR_C_Boncuklu_PPN	0.459	AZE_N	TUR_Pınarbaşı_EpiP	0.245	0.755	0.051	0.051
TUR_C_Boncuklu_PPN	0.823	CHG	TUR_Pınarbaşı_EpiP	0.112	0.888	0.045	0.045
TUR_C_Boncuklu_PPN	0.030	EHG	TUR_C_AşıklıHöyük_PPN	0.036	0.964	0.013	0.013
TUR_C_Boncuklu_PPN	0.207	IRN_Ganj_Dareh_N	TUR_Pınarbaşı_EpiP	0.122	0.878	0.031	0.031
TUR_C_Boncuklu_PPN	**0.424**	**Mesopotamia_PPN**	**TUR_Pınarbaşı_EpiP**	**0.263**	**0.737**	**0.055**	**0.055**
TUR_C_Boncuklu_PPN	0.429	SRB_Iron_Gates_HG	TUR_C_AşıklıHöyük_PPN	0.022	0.978	0.007	0.007
TUR_C_Boncuklu_PPN	0.223	TUR_C_AşıklıHöyük_PPN	TUR_Pınarbaşı_EpiP	0.622	0.378	0.141	0.141
TUR_C_Boncuklu_PPN	0.296	TUR_C_AşıklıHöyük_PPN	WHG	0.968	0.032	0.008	0.008
TUR_C_Boncuklu_PPN	0.042	TUR_C_Çatalhöyük_N	TUR_Pınarbaşı_EpiP	0.309	0.691	0.091	0.091
TUR_C_Çatalhöyük_N	0.324	ARM_Aknashen_N	CYP_PPNB	0.214	0.786	0.079	0.079
TUR_C_Çatalhöyük_N	0.286	ARM_Aknashen_N	TUR_C_AşıklıHöyük_PPN	0.221	0.779	0.078	0.078
TUR_C_Çatalhöyük_N	0.145	ARM_Masis_Blur_N	CYP_PPNB	0.284	0.716	0.219	0.219
TUR_C_Çatalhöyük_N	0.012	ARM_Masis_Blur_N	Levant_PPN	0.903	0.097	0.058	0.058
TUR_C_Çatalhöyük_N	0.374	ARM_Masis_Blur_N	TUR_C_AşıklıHöyük_PPN	0.320	0.680	0.116	0.116
TUR_C_Çatalhöyük_N	0.070	ARM_Masis_Blur_N	TUR_Pınarbaşı_EpiP	0.973	0.027	0.073	0.073
TUR_C_Çatalhöyük_N	0.174	AZE_N	CYP_PPNB	0.114	0.886	0.048	0.048
TUR_C_Çatalhöyük_N	0.275	AZE_N	TUR_C_AşıklıHöyük_PPN	0.134	0.866	0.050	0.050
TUR_C_Çatalhöyük_N	0.143	CHG	CYP_PPNB	0.042	0.958	0.033	0.033
TUR_C_Çatalhöyük_N	0.331	CHG	TUR_C_AşıklıHöyük_PPN	0.082	0.918	0.026	0.026
TUR_C_Çatalhöyük_N	0.251	CYP_PPNB	IRN_Ganj_Dareh_N	0.944	0.056	0.021	0.021
TUR_C_Çatalhöyük_N	0.028	CYP_PPNB	ISR_Natufian_EpiP	0.925	0.075	0.071	0.071
TUR_C_Çatalhöyük_N	0.028	CYP_PPNB	Levant_PPN	0.987	0.013	0.040	0.040
TUR_C_Çatalhöyük_N	0.282	CYP_PPNB	Mesopotamia_PPN	0.849	0.151	0.056	0.056
TUR_C_Çatalhöyük_N	0.023	CYP_PPNB	MAR_Taforalt_EpiP	0.992	0.008	0.010	0.010
TUR_C_Çatalhöyük_N	0.017	CYP_PPNB	RUS_AfontovaGora3	0.988	0.012	0.029	0.029
TUR_C_Çatalhöyük_N	0.029	CYP_PPNB	RUS_MA1_HG	0.997	0.003	0.017	0.017
TUR_C_Çatalhöyük_N	0.057	CYP_PPNB	TUR_C_AşıklıHöyük_PPN	0.372	0.628	0.379	0.379
TUR_C_Çatalhöyük_N	0.294	EHG	TUR_C_AşıklıHöyük_PPN	0.036	0.964	0.012	0.012
TUR_C_Çatalhöyük_N	0.140	IRN_Ganj_Dareh_N	TUR_C_AşıklıHöyük_PPN	0.050	0.950	0.022	0.022
TUR_C_Çatalhöyük_N	0.103	Mesopotamia_PPN	TUR_C_AşıklıHöyük_PPN	0.134	0.866	0.068	0.068
TUR_C_Çatalhöyük_N	0.031	MAR_Taforalt_EpiP	TUR_C_AşıklıHöyük_PPN	0.006	0.994	0.009	0.009
TUR_C_Çatalhöyük_N	0.155	RUS_AfontovaGora3	TUR_C_AşıklıHöyük_PPN	0.047	0.953	0.025	0.025
TUR_C_Çatalhöyük_N	0.286	RUS_MA1_HG	TUR_C_AşıklıHöyük_PPN	0.038	0.962	0.013	0.013
TUR_C_Çatalhöyük_N	0.066	SRB_Iron_Gates_HG	TUR_C_AşıklıHöyük_PPN	0.014	0.986	0.006	0.006
TUR_C_Çatalhöyük_N	0.024	TUR_C_AşıklıHöyük_PPN	TUR_Marmara_Barcın_N	0.931	0.069	0.150	0.150
TUR_C_Çatalhöyük_N	**0.423**	**TUR_C_AşıklıHöyük_PPN**	**TUR_Pınarbaşı_EpiP**	**0.961**	**0.039**	**0.048**	**0.048**
TUR_C_Çatalhöyük_N	0.066	TUR_C_AşıklıHöyük_PPN	WHG	0.986	0.014	0.007	0.007
TUR_Marmara_Barcın_N	0.083	ARM_Aknashen_N	CYP_PPNB	0.025	0.975	0.044	0.044
TUR_Marmara_Barcın_N	0.089	ARM_Masis_Blur_N	CYP_PPNB	0.056	0.944	0.079	0.079
TUR_Marmara_Barcın_N	0.074	AZE_N	CYP_PPNB	0.000	1.000	0.031	0.031
TUR_Marmara_Barcın_N	0.060	CHG	CYP_PPNB	0.004	0.996	0.021	0.021
TUR_Marmara_Barcın_N	0.136	CYP_PPNB	EHG	0.983	0.017	0.011	0.011
TUR_Marmara_Barcın_N	0.083	CYP_PPNB	RUS_AfontovaGora3	0.981	0.019	0.014	0.014
TUR_Marmara_Barcın_N	0.112	CYP_PPNB	RUS_MA1_HG	0.989	0.011	0.011	0.011
TUR_Marmara_Barcın_N	0.164	CYP_PPNB	SRB_Iron_Gates_HG	0.989	0.011	0.006	0.006
TUR_Marmara_Barcın_N	0.132	CYP_PPNB	TUR_C_Boncuklu_PPN	0.907	0.093	0.068	0.068
TUR_Marmara_Barcın_N	0.081	CYP_PPNB	TUR_Pınarbaşı_EpiP	0.908	0.092	0.083	0.083
TUR_Marmara_Barcın_N	0.129	CYP_PPNB	WHG	0.993	0.007	0.006	0.006
TUR_Marmara_Barcın_N	0.052	EHG	TUR_C_AşıklıHöyük_PPN	0.025	0.975	0.011	0.011
TUR_Marmara_Barcın_N	0.190	SRB_Iron_Gates_HG	TUR_C_AşıklıHöyük_PPN	0.013	0.987	0.006	0.006
TUR_Marmara_Barcın_N	**0.050**	**TUR_C_AşıklıHöyük_PPN**	**TUR_Pınarbaşı_EpiP**	**0.833**	**0.167**	**0.077**	**0.077**
TUR_Marmara_Barcın_N	0.108	TUR_C_AşıklıHöyük_PPN	WHG	0.975	0.025	0.007	0.007
TUR_Marmara_Barcın_N	**0.164**	**TUR_C_Çatalhöyük_N**	**TUR_Pınarbaşı_EpiP**	**0.553**	**0.447**	**0.056**	**0.056**

Table S 2 Test populations that fit as 2-way mixtures of the Source populations. Models discussed in the text are highlighted in bold.

		Mixture Proportions			Standard Errors		
	P-value	CHG	Natufian	Pınarbaşı	CHG	Natufian	Pınarbaşı
ALB_N	0.412	0.182	0.431	0.386	0.087	0.129	0.124
ARM_Aknashen_N	0.512	0.54	0.243	0.217	0.115	0.116	0.084
ARM_Masis_Blur_N	0.977	0.346	0.36	0.294	0.067	0.088	0.077
AZE_N	0.194	0.438	0.32	0.241	0.05	0.05	0.046
CYP_PPNB	0.320	0.062	0.423	0.515	0.074	0.092	0.09
IRN_Ganj_Dareh_N	1.44E-04	1.113	0.262	-0.375	0.087	0.082	0.062
IRN_Ganj_Dareh_N	1.77E-15	1.079	-0.079	0	0.094	0.094	0
IRQ_Bestansur_PPN	0.122	0.401	0.668	-0.069	0.334	0.211	0.248
IRQ_Bestansur_PPN	0.278	0.357	0.643	0	0.211	0.211	0
IRQ_Shanidar_N	0.172	0.67	0.506	-0.176	0.133	0.155	0.117
IRQ_Shanidar_N	0.028	0.597	0.403	0	0.142	0.142	0
Levant_PPN	0.424	-0.012	0.812	0.2	0.038	0.026	0.044
Levant_PPN	0.053	0	0.799	0.201	0	0.027	0.027
Mesopotamia_LBA	0.670	0.419	0.423	0.158	0.058	0.054	0.054
Mesopotamia_PPN	0.022	0.413	0.441	0.146	0.057	0.060	0.051
I6445:IRQ_Nemrik9_PPN	0.020	0.443	0.448	0.109	0.076	0.078	0.066
I6457:IRQ_Nemrik9_PPN	0.016	0.294	0.642	0.064	0.140	0.107	0.102
I8432:TUR_SE_Mardin_PPN	0.255	0.277	0.532	0.191	0.076	0.080	0.072
TUR_C_AşıklıHöyük_PPN	0.801	0.138	0.403	0.460	0.078	0.121	0.097
TUR_C_Boncuklu_PPN_Feldman	0.795	0.109	0.048	0.843	0.05	0.068	0.064
TUR_C_Çatalhöyük_N	0.756	0.164	0.513	0.323	0.045	0.050	0.048
TUR_Marmara_Barcın_N	0.549	0.071	0.258	0.671	0.037	0.045	0.048

Table S 3 A common 3-way model for Neolithic Near Eastern populations. For model fits with a negative admixture proportion, we also show the simpler 2-way model in which the negative source is omitted and marked in grey. For the Mesopotamia_PPN population we also show the model fits for the 3 sampled individuals. These proportions are visualized in Fig. 3A.

	X=CHG							X=IRN_Ganj_Dareh_N						
		Proportions			Standard Errors				Proportions			Standard Errors		
	P-value	X	Natufian	Pınarbaşı	X	Natufian	Pınarbaşı	P-value	X	Natufian	Pınarbaşı	X	Natufian	Pınarbaşı
ALB_N	5.79E-01	0.187	0.428	0.386	0.047	0.126	0.115	3.65E-01	0.157	0.362	0.481	0.061	0.157	0.136
ARM_Aknashen_N	4.63E-01	0.649	0.196	0.154	0.082	0.120	0.067	3.23E-04	0.601	-0.050	0.448	0.121	0.218	0.122
ARM_Masis_Blur_N	5.21E-01	0.430	0.346	0.224	0.052	0.098	0.069	9.21E-02	0.357	0.209	0.434	0.060	0.122	0.089
AZE_N	5.05E-03	0.562	0.279	0.159	0.037	0.053	0.040	6.31E-05	0.471	0.156	0.374	0.037	0.065	0.047
CYP_PPNB	3.28E-01	0.125	0.392	0.484	0.043	0.090	0.084	4.81E-01	0.096	0.362	0.541	0.046	0.096	0.086
IRQ_Bestansur_PPN	1.07E-01	0.616	0.708	-0.324	0.380	0.282	0.193	1.94E-01	0.335	0.615	0.050	0.219	0.257	0.128
IRQ_Shanidar_N	2.28E-01	0.720	0.534	-0.253	0.134	0.160	0.072	4.43E-01	0.721	0.135	0.144	0.129	0.203	0.102
Levant_PPN	1.93E-02	0.077	0.807	0.115	0.022	0.026	0.032	1.22E-01	0.041	0.791	0.168	0.021	0.026	0.031
Mesopotamia_LBA	9.37E-02	0.538	0.390	0.073	0.041	0.058	0.045	8.73E-02	0.414	0.302	0.284	0.039	0.057	0.045
Mesopotamia_PPN	6.81E-07	0.651	0.355	-0.006	0.053	0.091	0.058	6.33E-04	0.530	0.159	0.311	0.052	0.085	0.051
TUR_C_AşıklıHöyük_PPN	8.99E-01	0.125	0.412	0.463	0.045	0.108	0.096	1.62E-01	0.224	0.214	0.562	0.072	0.177	0.139
TUR_C_Boncuklu_PPN	8.42E-01	0.133	0.034	0.833	0.031	0.065	0.061	1.25E-01	0.135	-0.031	0.896	0.037	0.075	0.066
TUR_C_Çatalhöyük_N	8.65E-01	0.176	0.508	0.316	0.025	0.048	0.043	1.97E-02	0.209	0.412	0.379	0.032	0.064	0.050
TUR_Marmara_Barcın_N	1.13E-03	0.176	0.212	0.612	0.023	0.045	0.042	1.42E-02	0.113	0.191	0.696	0.026	0.049	0.046

Table S 4 Differentiating between CHG and IRN_Ganj_Dareh_N ancestry. The two models are fit with one of CHG, IRN_Ganj_Dareh_N as a source and the other as an outgroup.

		Proportions			Standard Errors		
Test	P-value	Levant_PPN	Mesopotamia_PPN	Pınarbaşı	Levant_PPN	Mesopotamia_PPN	Pınarbaşı
ALB_N	6.24E-01	0.12	0.424	0.456	0.084	0.122	0.108
ARM_Aknashen_N	8.27E-01	-0.051	1.033	0.019	0.066	0.069	0.081
ARM_Masis_Blur_N	9.10E-01	-0.042	0.846	0.196	0.068	0.084	0.077
AZE_N	7.37E-01	0.016	0.891	0.093	0.043	0.049	0.05
CYP_PPNB	1.18E-01	0.229	0.252	0.519	0.116	0.186	0.122
IRN_Ganj_Dareh_N	1.68E-06	-0.133	1.488	-0.355	0.06	0.063	0.073
IRQ_Bestansur_PPN	6.10E-01	-0.25	1.23	0.02	0.534	0.374	0.304
IRQ_Shanidar_N	8.66E-01	-0.007	1.205	-0.198	0.096	0.095	0.127
Mesopotamia_LBA	3.98E-01	0.096	0.887	0.017	0.052	0.06	0.061
TUR_C_AşıklıHöyük_PPN	**1.62E-01**	**0**	**0.697**	**0.303**	**0.085**	**0.132**	**0.108**
TUR_C_Boncuklu_PPN	**4.56E-01**	**-0.047**	**0.296**	**0.751**	**0.043**	**0.064**	**0.058**
TUR_C_Çatalhöyük_N	**1.55E-01**	**0.166**	**0.559**	**0.275**	**0.046**	**0.059**	**0.05**
TUR_Marmara_Barcın_N	**2.71E-01**	**0.128**	**0.268**	**0.604**	**0.033**	**0.045**	**0.042**

Table S 5 Differentiating between Levantine and Mesopotamian PPN ancestry in Anatolia. These proportions are visualized in Fig. 3D

References and Notes

1. I. Lazaridis, D. Nadel, G. Rollefson, D. C. Merrett, N. Rohland, S. Mallick, D. Fernandes, M. Novak, B. Gamarra, K. Sirak, S. Connell, K. Stewardson, E. Harney, Q. Fu, G. Gonzalez-Fortes, E. R. Jones, S. A. Roodenberg, G. Lengyel, F. Bocquentin, B. Gasparian, J. M. Monge, M. Gregg, V. Eshed, A.-S. Mizrahi, C. Meiklejohn, F. Gerritsen, L. Bejenaru, M. Blüher, A. Campbell, G. Cavalleri, D. Comas, P. Froguel, E. Gilbert, S. M. Kerr, P. Kovacs, J. Krause, D. McGettigan, M. Merrigan, D. A. Merriwether, S. O'Reilly, M. B. Richards, O. Semino, M. Shamoon-Pour, G. Stefanescu, M. Stumvoll, A. Tönjes, A. Torroni, J. F. Wilson, L. Yengo, N. A. Hovhannisyan, N. Patterson, R. Pinhasi, D. Reich, Genomic insights into the origin of farming in the ancient Near East. *Nature* **536**, 419–424 (2016). doi:10.1038/nature19310 Medline

2. I. Mathieson, I. Lazaridis, N. Rohland, S. Mallick, N. Patterson, S. A. Roodenberg, E. Harney, K. Stewardson, D. Fernandes, M. Novak, K. Sirak, C. Gamba, E. R. Jones, B. Llamas, S. Dryomov, J. Pickrell, J. L. Arsuaga, J. M. B. de Castro, E. Carbonell, F. Gerritsen, A. Khokhlov, P. Kuznetsov, M. Lozano, H. Meller, O. Mochalov, V. Moiseyev, M. A. R. Guerra, J. Roodenberg, J. M. Vergès, J. Krause, A. Cooper, K. W. Alt, D. Brown, D. Anthony, C. Lalueza-Fox, W. Haak, R. Pinhasi, D. Reich, Genome-wide patterns of selection in 230 ancient Eurasians. *Nature* **528**, 499–503 (2015). doi:10.1038/nature16152 Medline

3. F. Broushaki, M. G. Thomas, V. Link, S. López, L. van Dorp, K. Kirsanow, Z. Hofmanová, Y. Diekmann, L. M. Cassidy, D. Díez-Del-Molino, A. Kousathanas, C. Sell, H. K. Robson, R. Martiniano, J. Blöcher, A. Scheu, S. Kreutzer, R. Bollongino, D. Bobo, H. Davudi, O. Munoz, M. Currat, K. Abdi, F. Biglari, O. E. Craig, D. G. Bradley, S. Shennan, K. Veeramah, M. Mashkour, D. Wegmann, G. Hellenthal, J. Burger, Early Neolithic genomes from the eastern Fertile Crescent. *Science* **353**, 499–503 (2016). doi:10.1126/science.aaf7943 Medline

4. Z. Hofmanová, S. Kreutzer, G. Hellenthal, C. Sell, Y. Diekmann, D. Díez-Del-Molino, L. van Dorp, S. López, A. Kousathanas, V. Link, K. Kirsanow, L. M. Cassidy, R. Martiniano, M. Strobel, A. Scheu, K. Kotsakis, P. Halstead, S. Triantaphyllou, N. Kyparissi-Apostolika, D. Urem-Kotsou, C. Ziota, F. Adaktylou, S. Gopalan, D. M. Bobo, L. Winkelbach, J. Blöcher, M. Unterländer, C. Leuenberger, Ç. Çilingiroğlu, B. Horejs, F. Gerritsen, S. J. Shennan, D. G. Bradley, M. Currat, K. R. Veeramah, D. Wegmann, M. G. Thomas, C. Papageorgopoulou, J. Burger, Early farmers from across Europe directly descended from Neolithic Aegeans. *Proc. Natl. Acad. Sci. U.S.A.* **113**, 6886–6891 (2016). doi:10.1073/pnas.1523951113 Medline

5. G. M. Kılınç, A. Omrak, F. Özer, T. Günther, A. M. Büyükkarakaya, E. Bıçakçı, D. Baird, H. M. Dönertaş, A. Ghalichi, R. Yaka, D. Koptekin, S. C. Açan, P. Parvizi, M. Krzewińska, E. A. Daskalaki, E. Yüncü, N. D. Dağtaş, A. Fairbairn, J. Pearson, G. Mustafaoğlu, Y. S. Erdal, Y. G. Çakan, İ. Togan, M. Somel, J. Storå, M. Jakobsson, A. Götherström, The demographic development of the first farmers in Anatolia. *Curr. Biol.* **26**, 2659–2666 (2016). doi:10.1016/j.cub.2016.07.057 Medline

6. M. Feldman, E. Fernández-Domínguez, L. Reynolds, D. Baird, J. Pearson, I. Hershkovitz, H. May, N. Goring-Morris, M. Benz, J. Gresky, R. A. Bianco, A. Fairbairn, G. Mustafaoğlu, P. W. Stockhammer, C. Posth, W. Haak, C. Jeong, J. Krause, Late Pleistocene human

genome suggests a local origin for the first farmers of central Anatolia. *Nat. Commun.* **10**, 1218 (2019). doi:10.1038/s41467-019-09209-7 Medline

7. E. Skourtanioti, Y. S. Erdal, M. Frangipane, F. Balossi Restelli, K. A. Yener, F. Pinnock, P. Matthiae, R. Özbal, U.-D. Schoop, F. Guliyev, T. Akhundov, B. Lyonnet, E. L. Hammer, S. E. Nugent, M. Burri, G. U. Neumann, S. Penske, T. Ingman, M. Akar, R. Shafiq, G. Palumbi, S. Eisenmann, M. D'Andrea, A. B. Rohrlach, C. Warinner, C. Jeong, P. W. Stockhammer, W. Haak, J. Krause, Genomic history of Neolithic to Bronze Age Anatolia, Northern Levant, and Southern Caucasus. *Cell* **181**, 1158–1175.e28 (2020). doi:10.1016/j.cell.2020.04.044 Medline

8. R. Yaka, I. Mapelli, D. Kaptan, A. Doğu, M. Chyleński, Ö. D. Erdal, D. Koptekin, K. B. Vural, A. Bayliss, C. Mazzucato, E. Fer, S. S. Çokoğlu, V. K. Lagerholm, M. Krzewińska, C. Karamurat, H. C. Gemici, A. Sevkar, N. D. Dağtaş, G. M. Kılınç, D. Adams, A. R. Munters, E. Sağlıcan, M. Milella, E. M. J. Schotsmans, E. Yurtman, M. Çetin, S. Yorulmaz, N. E. Altınışık, A. Ghalichi, A. Juras, C. C. Bilgin, T. Günther, J. Storå, M. Jakobsson, M. de Kleijn, G. Mustafaoğlu, A. Fairbairn, J. Pearson, İ. Togan, N. Kayacan, A. Marciniak, C. S. Larsen, I. Hodder, Ç. Atakuman, M. Pilloud, E. Sürer, F. Gerritsen, R. Özbal, D. Baird, Y. S. Erdal, G. Duru, M. Özbaşaran, S. D. Haddow, C. J. Knüsel, A. Götherström, F. Özer, M. Somel, Variable kinship patterns in Neolithic Anatolia revealed by ancient genomes. *Curr. Biol.* **31**, 2455–2468.e18 (2021). doi:10.1016/j.cub.2021.03.050 Medline

9. M. Gallego-Llorente, S. Connell, E. R. Jones, D. C. Merrett, Y. Jeon, A. Eriksson, V. Siska, C. Gamba, C. Meiklejohn, R. Beyer, S. Jeon, Y. S. Cho, M. Hofreiter, J. Bhak, A. Manica, R. Pinhasi, The genetics of an early Neolithic pastoralist from the Zagros, Iran. *Sci. Rep.* **6**, 31326 (2016). doi:10.1038/srep31326 Medline

10. E. R. Jones, G. Gonzalez-Fortes, S. Connell, V. Siska, A. Eriksson, R. Martiniano, R. L. McLaughlin, M. Gallego Llorente, L. M. Cassidy, C. Gamba, T. Meshveliani, O. Bar-Yosef, W. Müller, A. Belfer-Cohen, Z. Matskevich, N. Jakeli, T. F. G. Higham, M. Currat, D. Lordkipanidze, M. Hofreiter, A. Manica, R. Pinhasi, D. G. Bradley, Upper Palaeolithic genomes reveal deep roots of modern Eurasians. *Nat. Commun.* **6**, 8912 (2015). doi:10.1038/ncomms9912 Medline

11. V. M. Narasimhan, N. Patterson, P. Moorjani, N. Rohland, R. Bernardos, S. Mallick, I. Lazaridis, N. Nakatsuka, I. Olalde, M. Lipson, A. M. Kim, L. M. Olivieri, A. Coppa, M. Vidale, J. Mallory, V. Moiseyev, E. Kitov, J. Monge, N. Adamski, N. Alex, N. Broomandkhoshbacht, F. Candilio, K. Callan, O. Cheronet, B. J. Culleton, M. Ferry, D. Fernandes, S. Freilich, B. Gamarra, D. Gaudio, M. Hajdinjak, É. Harney, T. K. Harper, D. Keating, A. M. Lawson, M. Mah, K. Mandl, M. Michel, M. Novak, J. Oppenheimer, N. Rai, K. Sirak, V. Slon, K. Stewardson, F. Zalzala, Z. Zhang, G. Akhatov, A. N. Bagashev, A. Bagnera, B. Baitanayev, J. Bendezu-Sarmiento, A. A. Bissembaev, G. L. Bonora, T. T. Chargynov, T. Chikisheva, P. K. Dashkovskiy, A. Derevianko, M. Dobeš, K. Douka, N. Dubova, M. N. Duisengali, D. Enshin, A. Epimakhov, A. V. Fribus, D. Fuller, A. Goryachev, A. Gromov, S. P. Grushin, B. Hanks, M. Judd, E. Kazizov, A. Khokhlov, A. P. Krygin, E. Kupriyanova, P. Kuznetsov, D. Luiselli, F. Maksudov, A. M. Mamedov, T. B. Mamirov, C. Meiklejohn, D. C. Merrett, R. Micheli, O. Mochalov, S. Mustafokulov, A. Nayak, D. Pettener, R. Potts, D. Razhev, M. Rykun, S. Sarno, T. M. Savenkova, K. Sikhymbaeva, S. M. Slepchenko, O. A. Soltobaev, N. Stepanova, S.

Svyatko, K. Tabaldiev, M. Teschler-Nicola, A. A. Tishkin, V. V. Tkachev, S. Vasilyev, P. Velemínský, D. Voyakin, A. Yermolayeva, M. Zahir, V. S. Zubkov, A. Zubova, V. S. Shinde, C. Lalueza-Fox, M. Meyer, D. Anthony, N. Boivin, K. Thangaraj, D. J. Kennett, M. Frachetti, R. Pinhasi, D. Reich, The formation of human populations in South and Central Asia. *Science* **365**, eaat7487 (2019). doi:10.1126/science.aat7487 Medline

12. I. Lazaridis, S. Alpaslan-Roodenberg, A. Acar, A. Açıkkol, A. Agelarakis, L. Aghikyan, U. Akyüz, D. Andreeva, G. Andrijašević, D. Antonović, I. Armit, A. Atmaca, P. Avetisyan, A. İ. Aytek, K. Bacvarov, R. Badalyan, S. Bakardzhiev, J. Balen, L. Bejko, R. Bernardos, A. Bertsatos, H. Biber, A. Bilir, M. Bodružić, M. Bonogofsky, C. Bonsall, D. Borić, N. Borovinić, G. Bravo Morante, K. Buttinger, K. Callan, F. Candilio, M. Carić, O. Cheronet, S. Chohadzhiev, M.-E. Chovalopoulou, S. Chryssoulaki, I. Ciobanu, N. Čondić, M. Constantinescu, E. Cristiani, B. J. Culleton, E. Curtis, J. Davis, T. I. Demcenco, V. Dergachev, Z. Derin, S. Deskaj, S. Devejyan, V. Djordjević, K. S. Duffett Carlson, L. R. Eccles, N. Elenski, A. Engin, N. Erdoğan, S. Erir-Pazarcı, D. M. Fernandes, M. Ferry, S. Freilich, A. Frînculeasa, M. L. Galaty, B. Gamarra, B. Gasparyan, B. Gaydarska, E. Genç, T. Gültekin, S. Gündüz, T. Hajdu, V. Heyd, S. Hobosyan, N. Hovhannisyan, I. Iliev, L. Iliev, S. Iliev, İ. İvgin, I. Janković, L. Jovanova, P. Karkanas, B. Kavaz-Kındığılı, E. Hilal Kaya, D. Keating, D. J. Kennett, S. Deniz Kesici, A. Khudaverdyan, K. Kiss, S. Kılıç, P. Klostermann, S. Kostak Boca Negra Valdes, S. Kovačević, M. Krenz-Niedbała, M. Krznarić Škrivanko, R. Kurti, P. Kuzman, A. M. Lawson, C. Lazar, K. Leshtakov, T. E. Levy, I. Liritzis, K. O. Lorentz, S. Łukasik, M. Mah, S. Mallick, K. Mandl, K. Martirosyan-Olshansky, R. Matthews, W. Matthews, K. McSweeney, V. Melikyan, A. Micco, M. Michel, L. Milašinović, A. Mittnik, J. M. Monge, G. Nekhrizov, R. Nicholls, A. G. Nikitin, V. Nikolov, M. Novak, I. Olalde, J. Oppenheimer, A. Osterholtz, C. Özdemir, K. T. Özdoğan, N. Öztürk, N. Papadimitriou, N. Papakonstantinou, A. Papathanasiou, L. Paraman, E. G. Paskary, N. Patterson, I. Petrakiev, L. Petrosyan, V. Petrova, A. Philippa-Touchais, A. Piliposyan, N. Pocuca Kuzman, H. Potrebica, B. Preda-Bălănică, Z. Premužić, T. D. Price, L. Qiu, S. Radović, K. Raeuf Aziz, P. Rajić Šikanjić, K. Rasheed Raheem, S. Razumov, A. Richardson, J. Roodenberg, R. Ruka, V. Russeva, M. Şahin, A. Şarbak, E. Savaş, C. Schattke, L. Schepartz, T. Selçuk, A. Sevim-Erol, M. Shamoon-Pour, H. M. Shephard, A. Sideris, A. Simalcsik, H. Simonyan, V. Sinika, K. Sirak, G. Sirbu, M. Šlaus, A. Soficaru, B. Söğüt, A. Sołtysiak, Ç. Sönmez-Sözer, M. Stathi, M. Steskal, K. Stewardson, S. Stocker, F. Suata-Alpaslan, A. Suvorov, A. Szécsényi-Nagy, T. Szeniczey, N. Telnov, S. Temov, N. Todorova, U. Tota, G. Touchais, S. Triantaphyllou, A. Türker, M. Ugarković, T. Valchev, F. Veljanovska, Z. Videvski, C. Virag, A. Wagner, S. Walsh, P. Włodarczak, J. N. Workman, A. Yardumian, E. Yarovoy, A. Y. Yavuz, H. Yılmaz, F. Zalzala, A. Zettl, Z. Zhang, R. Çavuşoğlu, N. Rohland, R. Pinhasi, D. Reich, The genetic history of the Southern Arc: A bridge between West Asia and Europe. *Science* **377**, eabm4247 (2022). doi:10.1126/science.abm4247

13. E. Asouti, Beyond the Pre-Pottery Neolithic B interaction sphere. *J. World Prehist.* **20**, 87–126 (2006). doi:10.1007/s10963-007-9008-1

14. J. Cauvin, *Naissance des divinités, naissance de l'agriculture: la révolution des symboles au néolithique* (Empreintes de l'homme, CNRS Éditions, 1997).

15. E. Peltenburg, Ed., *The Colonisation and Settlement of Cyprus: Investigations at Kissonerga-Mylouthkia, 1976-1996* (Paul Åströms Förlag, 2003).

16. N. Patterson, A. L. Price, D. Reich, Population structure and eigenanalysis. *PLOS Genet.* **2**, e190 (2006). doi:10.1371/journal.pgen.0020190 Medline

17. I. Lazaridis, N. Patterson, A. Mittnik, G. Renaud, S. Mallick, K. Kirsanow, P. H. Sudmant, J. G. Schraiber, S. Castellano, M. Lipson, B. Berger, C. Economou, R. Bollongino, Q. Fu, K. I. Bos, S. Nordenfelt, H. Li, C. de Filippo, K. Prüfer, S. Sawyer, C. Posth, W. Haak, F. Hallgren, E. Fornander, N. Rohland, D. Delsate, M. Francken, J.-M. Guinet, J. Wahl, G. Ayodo, H. A. Babiker, G. Bailliet, E. Balanovska, O. Balanovsky, R. Barrantes, G. Bedoya, H. Ben-Ami, J. Bene, F. Berrada, C. M. Bravi, F. Brisighelli, G. B. J. Busby, F. Cali, M. Churnosov, D. E. C. Cole, D. Corach, L. Damba, G. van Driem, S. Dryomov, J.-M. Dugoujon, S. A. Fedorova, I. Gallego Romero, M. Gubina, M. Hammer, B. M. Henn, T. Hervig, U. Hodoglugil, A. R. Jha, S. Karachanak-Yankova, R. Khusainova, E. Khusnutdinova, R. Kittles, T. Kivisild, W. Klitz, V. Kučinskas, A. Kushniarevich, L. Laredj, S. Litvinov, T. Loukidis, R. W. Mahley, B. Melegh, E. Metspalu, J. Molina, J. Mountain, K. Näkkäläjärvi, D. Nesheva, T. Nyambo, L. Osipova, J. Parik, F. Platonov, O. Posukh, V. Romano, F. Rothhammer, I. Rudan, R. Ruizbakiev, H. Sahakyan, A. Sajantila, A. Salas, E. B. Starikovskaya, A. Tarekegn, D. Toncheva, S. Turdikulova, I. Uktveryte, O. Utevska, R. Vasquez, M. Villena, M. Voevoda, C. A. Winkler, L. Yepiskoposyan, P. Zalloua, T. Zemunik, A. Cooper, C. Capelli, M. G. Thomas, A. Ruiz-Linares, S. A. Tishkoff, L. Singh, K. Thangaraj, R. Villems, D. Comas, R. Sukernik, M. Metspalu, M. Meyer, E. E. Eichler, J. Burger, M. Slatkin, S. Pääbo, J. Kelso, D. Reich, J. Krause, Ancient human genomes suggest three ancestral populations for present-day Europeans. *Nature* **513**, 409–413 (2014). doi:10.1038/nature13673 Medline

18. W. Haak, I. Lazaridis, N. Patterson, N. Rohland, S. Mallick, B. Llamas, G. Brandt, S. Nordenfelt, E. Harney, K. Stewardson, Q. Fu, A. Mittnik, E. Bánffy, C. Economou, M. Francken, S. Friederich, R. G. Pena, F. Hallgren, V. Khartanovich, A. Khokhlov, M. Kunst, P. Kuznetsov, H. Meller, O. Mochalov, V. Moiseyev, N. Nicklisch, S. L. Pichler, R. Risch, M. A. Rojo Guerra, C. Roth, A. Szécsényi-Nagy, J. Wahl, M. Meyer, J. Krause, D. Brown, D. Anthony, A. Cooper, K. W. Alt, D. Reich, Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature* **522**, 207–211 (2015). doi:10.1038/nature14317 Medline

19. I. Mathieson, S. Alpaslan-Roodenberg, C. Posth, A. Szécsényi-Nagy, N. Rohland, S. Mallick, I. Olalde, N. Broomandkhoshbacht, F. Candilio, O. Cheronet, D. Fernandes, M. Ferry, B. Gamarra, G. G. Fortes, W. Haak, E. Harney, E. Jones, D. Keating, B. Krause-Kyora, I. Kucukkalipci, M. Michel, A. Mittnik, K. Nägele, M. Novak, J. Oppenheimer, N. Patterson, S. Pfrengle, K. Sirak, K. Stewardson, S. Vai, S. Alexandrov, K. W. Alt, R. Andreescu, D. Antonović, A. Ash, N. Atanassova, K. Bacvarov, M. B. Gusztáv, H. Bocherens, M. Bolus, A. Boroneanţ, Y. Boyadzhiev, A. Budnik, J. Burmaz, S. Chohadzhiev, N. J. Conard, R. Cottiaux, M. Čuka, C. Cupillard, D. G. Drucker, N. Elenski, M. Francken, B. Galabova, G. Ganetsovski, B. Gély, T. Hajdu, V. Handzhyiska, K. Harvati, T. Higham, S. Iliev, I. Janković, I. Karavanić, D. J. Kennett, D. Komšo, A. Kozak, D. Labuda, M. Lari, C. Lazar, M. Leppek, K. Leshtakov, D. L. Vetro, D. Los, I. Lozanov, M. Malina, F. Martini, K. McSweeney, H. Meller, M. Menđušić, P. Mirea, V. Moiseyev, V. Petrova, T. D. Price, A. Simalcsik, L. Sineo, M. Šlaus, V. Slavchev, P. Stanev, A. Starović, T. Szeniczey, S. Talamo, M. Teschler-Nicola, C. Thevenet, I. Valchev, F. Valentin, S. Vasilyev, F. Veljanovska, S. Venelinova, E. Veselovskaya, B. Viola, C. Virag, J. Zaninović, S. Zäuner, P. W. Stockhammer, G. Catalano, R. Krauß, D.

Caramelli, G. Zariņa, B. Gaydarska, M. Lillie, A. G. Nikitin, I. Potekhina, A. Papathanasiou, D. Borić, C. Bonsall, J. Krause, R. Pinhasi, D. Reich, The genomic history of southeastern Europe. *Nature* **555**, 197–203 (2018). doi:10.1038/nature25778 Medline

20. A. H. Simmons, R. D. Mandel, How old is the human presence on Cyprus? *Science* **317**, 1679–1679 (2007). doi:10.1126/science.317.5845.1679 Medline

21. D. Stordeur, in *Bulletin de Correspondance Hellenique* (Ecole française d'Athènes, 2003), pp. 353–371.

22. Detailed information is provided in the supplementary materials.

23. E. Fernández, A. Pérez-Pérez, C. Gamba, E. Prats, P. Cuesta, J. Anfruns, M. Molist, E. Arroyo-Pardo, D. Turbón, Ancient DNA analysis of 8000 B.C. near eastern farmers supports an early neolithic pioneer maritime colonization of Mainland Europe through Cyprus and the Aegean Islands. *PLOS Genet.* **10**, e1004401 (2014). doi:10.1371/journal.pgen.1004401 Medline

24. N. Patterson, M. Isakov, T. Booth, L. Büster, C.-E. Fischer, I. Olalde, H. Ringbauer, A. Akbari, O. Cheronet, M. Bleasdale, N. Adamski, E. Altena, R. Bernardos, S. Brace, N. Broomandkhoshbacht, K. Callan, F. Candilio, B. Culleton, E. Curtis, L. Demetz, K. S. D. Carlson, C. J. Edwards, D. M. Fernandes, M. G. B. Foody, S. Freilich, H. Goodchild, A. Kearns, A. M. Lawson, I. Lazaridis, M. Mah, S. Mallick, K. Mandl, A. Micco, M. Michel, G. B. Morante, J. Oppenheimer, K. T. Özdoğan, L. Qiu, C. Schattke, K. Stewardson, J. N. Workman, F. Zalzala, Z. Zhang, B. Agustí, T. Allen, K. Almássy, L. Amkreutz, A. Ash, C. Baillif-Ducros, A. Barclay, L. Bartosiewicz, K. Baxter, Z. Bernert, J. Blažek, M. Bodružić, P. Boissinot, C. Bonsall, P. Bradley, M. Brittain, A. Brookes, F. Brown, L. Brown, R. Brunning, C. Budd, J. Burmaz, S. Canet, S. Carnicero-Cáceres, M. Čaušević-Bully, A. Chamberlain, S. Chauvin, S. Clough, N. Čondić, A. Coppa, O. Craig, M. Črešnar, V. Cummings, S. Czifra, A. Danielisová, R. Daniels, A. Davies, P. de Jersey, J. Deacon, C. Deminger, P. W. Ditchfield, M. Dizdar, M. Dobeš, M. Dobisíková, L. Domboróczki, G. Drinkall, A. Đukić, M. Ernée, C. Evans, J. Evans, M. Fernández-Götz, S. Filipović, A. Fitzpatrick, H. Fokkens, C. Fowler, A. Fox, Z. Gallina, M. Gamble, M. R. González Morales, B. González-Rabanal, A. Green, K. Gyenesei, D. Habermehl, T. Hajdu, D. Hamilton, J. Harris, C. Hayden, J. Hendriks, B. Hernu, G. Hey, M. Horňák, G. Ilon, E. Istvánovits, A. M. Jones, M. B. Kavur, K. Kazek, R. A. Kenyon, A. Khreisheh, V. Kiss, J. Kleijne, M. Knight, L. M. Kootker, P. F. Kovács, A. Kozubová, G. Kulcsár, V. Kulcsár, C. Le Pennec, M. Legge, M. Leivers, L. Loe, O. López-Costas, T. Lord, D. Los, J. Lyall, A. B. Marín-Arroyo, P. Mason, D. Matošević, A. Maxted, L. McIntyre, J. McKinley, K. McSweeney, B. Meijlink, B. G. Mende, M. Menđušić, M. Metlička, S. Meyer, K. Mihovilić, L. Milasinovic, S. Minnitt, J. Moore, G. Morley, G. Mullan, M. Musilová, B. Neil, R. Nicholls, M. Novak, M. Pala, M. Papworth, C. Paresys, R. Patten, D. Perkić, K. Pesti, A. Petit, K. Petriščáková, C. Pichon, C. Pickard, Z. Pilling, T. D. Price, S. Radović, R. Redfern, B. Resutík, D. T. Rhodes, M. B. Richards, A. Roberts, J. Roefstra, P. Sankot, A. Šefčáková, A. Sheridan, S. Skae, M. Šmolíková, K. Somogyi, Á. Somogyvári, M. Stephens, G. Szabó, A. Szécsényi-Nagy, T. Szeniczey, J. Tabor, K. Tankó, C. T. Maria, R. Terry, B. Teržan, M. Teschler-Nicola, J. F. Torres-Martínez, J. Trapp, R. Turle, F. Ujvári, M. van der Heiden, P. Veleminsky, B. Veselka, Z. Vytlačil, C. Waddington, P. Ware, P. Wilkinson, L. Wilson, R. Wiseman, E. Young, J. Zaninović, A.

Žitňan, C. Lalueza-Fox, P. de Knijff, I. Barnes, P. Halkon, M. G. Thomas, D. J. Kennett, B. Cunliffe, M. Lillie, N. Rohland, R. Pinhasi, I. Armit, D. Reich, Large-scale migration into Britain during the Middle to Late Bronze Age. *Nature* **601**, 588–594 (2022). doi:10.1038/s41586-021-04287-4 Medline

25. I. Lazaridis, S. Alpaslan-Roodenberg, A. Acar, A. Açıkkol, A. Agelarakis, L. Aghikyan, U. Akyüz, D. Andreeva, G. Andrijašević, D. Antonović, I. Armit, A. Atmaca, P. Avetisyan, A. İ. Aytek, K. Bacvarov, R. Badalyan, S. Bakardzhiev, J. Balen, L. Bejko, R. Bernardos, A. Bertsatos, H. Biber, A. Bilir, M. Bodružić, M. Bonogofsky, C. Bonsall, D. Borić, N. Borovinić, G. Bravo Morante, K. Buttinger, K. Callan, F. Candilio, M. Carić, O. Cheronet, S. Chohadzhiev, M.-E. Chovalopoulou, S. Chryssoulaki, I. Ciobanu, N. Čondić, M. Constantinescu, E. Cristiani, B. J. Culleton, E. Curtis, J. Davis, T. I. Demcenco, V. Dergachev, Z. Derin, S. Deskaj, S. Devejyan, V. Djordjević, K. S. Duffett Carlson, L. R. Eccles, N. Elenski, A. Engin, N. Erdoğan, S. Erir-Pazarcı, D. M. Fernandes, M. Ferry, S. Freilich, A. Frînculeasa, M. L. Galaty, B. Gamarra, B. Gasparyan, B. Gaydarska, E. Genç, T. Gültekin, S. Gündüz, T. Hajdu, V. Heyd, S. Hobosyan, N. Hovhannisyan, I. Iliev, L. Iliev, S. Iliev, İ. İvgin, I. Janković, L. Jovanova, P. Karkanas, B. Kavaz-Kındığılı, E. Hilal Kaya, D. Keating, D. J. Kennett, S. Deniz Kesici, A. Khudaverdyan, K. Kiss, S. Kılıç, P. Klostermann, S. Kostak Boca Negra Valdes, S. Kovačević, M. Krenz-Niedbała, M. Krznarić Škrivanko, R. Kurti, P. Kuzman, A. M. Lawson, C. Lazar, K. Leshtakov, T. E. Levy, I. Liritzis, K. O. Lorentz, S. Łukasik, M. Mah, S. Mallick, K. Mandl, K. Martirosyan-Olshansky, R. Matthews, W. Matthews, K. McSweeney, V. Melikyan, A. Micco, M. Michel, L. Milašinović, A. Mittnik, J. M. Monge, G. Nekhrizov, R. Nicholls, A. G. Nikitin, V. Nikolov, M. Novak, I. Olalde, J. Oppenheimer, A. Osterholtz, C. Özdemir, K. T. Özdoğan, N. Öztürk, N. Papadimitriou, N. Papakonstantinou, A. Papathanasiou, L. Paraman, E. G. Paskary, N. Patterson, I. Petrakiev, L. Petrosyan, V. Petrova, A. Philippa-Touchais, A. Piliposyan, N. Pocuca Kuzman, H. Potrebica, B. Preda-Bălănică, Z. Premužić, T. D. Price, L. Qiu, S. Radović, K. Raeuf Aziz, P. Rajić Šikanjić, K. Rasheed Raheem, S. Razumov, A. Richardson, J. Roodenberg, R. Ruka, V. Russeva, M. Şahin, A. Şarbak, E. Savaş, C. Schattke, L. Schepartz, T. Selçuk, A. Sevim-Erol, M. Shamoon-Pour, H. M. Shephard, A. Sideris, A. Simalcsik, H. Simonyan, V. Sinika, K. Sirak, G. Sirbu, M. Šlaus, A. Soficaru, B. Söğüt, A. Sołtysiak, Ç. Sönmez-Sözer, M. Stathi, M. Steskal, K. Stewardson, S. Stocker, F. Suata-Alpaslan, A. Suvorov, A. Szécsényi-Nagy, T. Szeniczey, N. Telnov, S. Temov, N. Todorova, U. Tota, G. Touchais, S. Triantaphyllou, A. Türker, M. Ugarković, T. Valchev, F. Veljanovska, Z. Videvski, C. Virag, A. Wagner, S. Walsh, P. Włodarczak, J. N. Workman, A. Yardumian, E. Yarovoy, A. Y. Yavuz, H. Yılmaz, F. Zalzala, A. Zettl, Z. Zhang, R. Çavuşoğlu, N. Rohland, R. Pinhasi, D. Reich, A genetic probe into the ancient and medieval history of Southern Europe and West Asia. *Science* **377**, 940–951 (2022). doi:10.1126/science.abq0755

26. É. Harney, H. May, D. Shalem, N. Rohland, S. Mallick, I. Lazaridis, R. Sarig, K. Stewardson, S. Nordenfelt, N. Patterson, I. Hershkovitz, D. Reich, Ancient DNA from Chalcolithic Israel reveals the role of population mixture in cultural transformation. *Nat. Commun.* **9**, 3336 (2018). doi:10.1038/s41467-018-05649-9 Medline27. S. Alpaslan-Roodenberg, D. Anthony, H. Babiker, E. Bánffy, T. Booth, P. Capone, A. Deshpande-Mukherjee, S. Eisenmann, L. Fehren-Schmitz, M. Frachetti, R. Fujita, C. J. Frieman, Q. Fu, V. Gibbon, W. Haak, M. Hajdinjak, K. P. Hofmann, B. Holguin, T. Inomata, H. Kanzawa-Kiriyama, W. Keegan, J. Kelso, J. Krause, G. Kumaresan, C. Kusimba, S.

Kusimba, C. Lalueza-Fox, B. Llamas, S. MacEachern, S. Mallick, H. Matsumura, A. Y. Morales-Arce, G. M. Matuzeviciute, V. Mushrif-Tripathy, N. Nakatsuka, R. Nores, C. Ogola, M. Okumura, N. Patterson, R. Pinhasi, S. P. R. Prasad, M. E. Prendergast, J. L. Punzo, D. Reich, R. Sawafuji, E. Sawchuk, S. Schiffels, J. Sedig, S. Shnaider, K. Sirak, P. Skoglund, V. Slon, M. Snow, M. Soressi, M. Spriggs, P. W. Stockhammer, A. Szécsényi-Nagy, K. Thangaraj, V. Tiesler, R. Tobler, C.-C. Wang, C. Warinner, S. Yasawardene, M. Zahir, Ethics of DNA research on human remains: Five globally applicable guidelines. *Nature* **599**, 41–46 (2021). doi:10.1038/s41586-021-04008-x Medline

28. S. Mallick, H. Li, M. Lipson, I. Mathieson, M. Gymrek, F. Racimo, M. Zhao, N. Chennagiri, S. Nordenfelt, A. Tandon, P. Skoglund, I. Lazaridis, S. Sankararaman, Q. Fu, N. Rohland, G. Renaud, Y. Erlich, T. Willems, C. Gallo, J. P. Spence, Y. S. Song, G. Poletti, F. Balloux, G. van Driem, P. de Knijff, I. G. Romero, A. R. Jha, D. M. Behar, C. M. Bravi, C. Capelli, T. Hervig, A. Moreno-Estrada, O. L. Posukh, E. Balanovska, O. Balanovsky, S. Karachanak-Yankova, H. Sahakyan, D. Toncheva, L. Yepiskoposyan, C. Tyler-Smith, Y. Xue, M. S. Abdullah, A. Ruiz-Linares, C. M. Beall, A. Di Rienzo, C. Jeong, E. B. Starikovskaya, E. Metspalu, J. Parik, R. Villems, B. M. Henn, U. Hodoglugil, R. Mahley, A. Sajantila, G. Stamatoyannopoulos, J. T. S. Wee, R. Khusainova, E. Khusnutdinova, S. Litvinov, G. Ayodo, D. Comas, M. F. Hammer, T. Kivisild, W. Klitz, C. A. Winkler, D. Labuda, M. Bamshad, L. B. Jorde, S. A. Tishkoff, W. S. Watkins, M. Metspalu, S. Dryomov, R. Sukernik, L. Singh, K. Thangaraj, S. Pääbo, J. Kelso, N. Patterson, D. Reich, The Simons Genome Diversity Project: 300 genomes from 142 diverse populations. *Nature* **538**, 201–206 (2016). doi:10.1038/nature18964 Medline

29. M. van de Loosdrecht, A. Bouzouggar, L. Humphrey, C. Posth, N. Barton, A. Aximu-Petri, B. Nickel, S. Nagel, E. H. Talbi, M. A. El Hajraoui, S. Amzazi, J.-J. Hublin, S. Pääbo, S. Schiffels, M. Meyer, W. Haak, C. Jeong, J. Krause, Pleistocene North African genomes link Near Eastern and sub-Saharan African human populations. *Science* **360**, 548–552 (2018). doi:10.1126/science.aar8380 Medline

30. Q. Fu, C. Posth, M. Hajdinjak, M. Petr, S. Mallick, D. Fernandes, A. Furtwängler, W. Haak, M. Meyer, A. Mittnik, B. Nickel, A. Peltzer, N. Rohland, V. Slon, S. Talamo, I. Lazaridis, M. Lipson, I. Mathieson, S. Schiffels, P. Skoglund, A. P. Derevianko, N. Drozdov, V. Slavinsky, A. Tsybankov, R. G. Cremonesi, F. Mallegni, B. Gély, E. Vacca, M. R. G. Morales, L. G. Straus, C. Neugebauer-Maresch, M. Teschler-Nicola, S. Constantin, O. T. Moldovan, S. Benazzi, M. Peresani, D. Coppola, M. Lari, S. Ricci, A. Ronchitelli, F. Valentin, C. Thevenet, K. Wehrberger, D. Grigorescu, H. Rougier, I. Crevecoeur, D. Flas, P. Semal, M. A. Mannino, C. Cupillard, H. Bocherens, N. J. Conard, K. Harvati, V. Moiseyev, D. G. Drucker, J. Svoboda, M. P. Richards, D. Caramelli, R. Pinhasi, J. Kelso, N. Patterson, J. Krause, S. Pääbo, D. Reich, The genetic history of Ice Age Europe. *Nature* **534**, 200–205 (2016). doi:10.1038/nature17993 Medline

31. I. Olalde, M. E. Allentoft, F. Sánchez-Quinto, G. Santpere, C. W. K. Chiang, M. DeGiorgio, J. Prado-Martinez, J. A. Rodríguez, S. Rasmussen, J. Quilez, O. Ramírez, U. M. Marigorta, M. Fernández-Callejo, M. E. Prada, J. M. V. Encinas, R. Nielsen, M. G. Netea, J. Novembre, R. A. Sturm, P. Sabeti, T. Marquès-Bonet, A. Navarro, E. Willerslev, C. Lalueza-Fox, Derived immune and ancestral pigmentation alleles in a

7,000-year-old Mesolithic European. *Nature* **507**, 225–228 (2014). doi:10.1038/nature12960 Medline

32. M. Raghavan, P. Skoglund, K. E. Graf, M. Metspalu, A. Albrechtsen, I. Moltke, S. Rasmussen, T. W. Stafford Jr., L. Orlando, E. Metspalu, M. Karmin, K. Tambets, S. Rootsi, R. Mägi, P. F. Campos, E. Balanovska, O. Balanovsky, E. Khusnutdinova, S. Litvinov, L. P. Osipova, S. A. Fedorova, M. I. Voevoda, M. DeGiorgio, T. Sicheritz-Ponten, S. Brunak, S. Demeshchenko, T. Kivisild, R. Villems, R. Nielsen, M. Jakobsson, E. Willerslev, Upper Palaeolithic Siberian genome reveals dual ancestry of Native Americans. *Nature* **505**, 87–91 (2014). doi:10.1038/nature12736 Medline