Paper 5.9. Haplogroup I Report.

Abstract: I-M170, C-M130, NO-M214 and H2-P56 are potential genetic relics of *Homo sapiens* who initially colonized the European continent. Only I-M170 survived and thrived. C-M130, NO-M214 and H2-P56 disappeared as the result of several demographic processes that included the Last Glacial Maximum, the Holocene expansion of hunter-gatherers, and the Neolithic revolution. Within the contemporary European linguistic tapestry, I-M170 and its downstream variants are especially useful for deciphering the evolutionary history of Germanic languages and the Basque language isolate. Their evolutionary history illustrates the considerable time depth that some languages have. Additionally, the prehistoric evolution of language sometimes reflects successful adaptation to climate change, the isolation of populations from each other, and early farming expansions.

Posted April 20, 2018
Genetic-Linguistic Interface
Dr. Michael St. Clair
Stuttgart, Germany
mstclair@genlinginterface.com

Please cite as: St. Clair, Michael R. 2018c. "Paper 5.9: haplogroup I report." *The Genetic-Linguistic Interface.* Series 5 Papers: language prehistory from a Y-Chromosome perspective. Posted April 20, 2018. https://genlinginterface.com/

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Paper 5.9. Haplogroup I-M170.

The Genetic-Linguistic Interface.

Section 1. Introduction.

The reader is directed to Figure 5.1.1, which depicts the important evolutionary steps between Y-Chromosome Adam and the main haplogroups. According to Poznik et al. (2016), haplogroups I-M170 and J-M304 separated from IJ-M429 about 41 thousand years ago. The reader is now directed to Figure 5.9.1, which presents the internal phylogeny of haplogroup I-M170. Within this main haplogroup, I1-M253 and I2-M438 represent the two main internal clades. Both mutations separated from I-M170 about 28 thousand years ago (Underhill et al. 2007). I1-M253 attains a significant frequency among the Germanic and Uralic-speaking populations of Scandinavia. Within I2-M438, three mutations represent the most significant variants: I2a1b-M423, I2a2a-M223, and I2a1a1-M26. Among the populations of the Balkans region of Europe, I2a1b-M423 attains an especially high frequency. Similarly, I2a1a1-M26 attains a significant frequency on the island of Sardinia in the Mediterranean. I2a2a-M223, on the other hand, attains low frequency numbers throughout Europe.

At this point the reader is directed to Table 5.9.1 which provides a survey of haplogroup M170 frequencies across Eurasia. While the haplogroup appears sporadically among some populations in western and central Asia, I-M170 represents the genetic signature of European populations. According to Underhill et al (2007), about twenty percent of European men have the I-M170 mutation. The same study also suggests that I-M170 is the only main Y-chromosome haplogroup that arose on the European continent. The remainder of European Y chromosome variation (e.g. R1b-343, R1a-M420, J2-M172, E1b-V13, G2a-P15, and N1a-Tat) arose from haplogroups that evolved in Asia.

The age of I-M170 (again, 41 thousand years) supports consensus as found among the geneticists. They identify this mutation as the genetic relic of *Homo sapiens* who initially colonized the European continent during Marine Isotope Stage 3 (Sarac et al. 2016; Regueiro et al. 2012**;** Underhill et al. 2007; Rootsi et al. 2004). Additionally, I-M170 stand as the genetic relic of European populations that survived the last Ice Age. By the beginning of Marine Isotope Stage 2, advancing glacial ice had forced human populations to seek refuge in the southern part of this continent. Beginning about 14 thousand years ago, which roughly corresponds to the beginning of Marine Isotope Stage 1 and the Holocene, warmer weather and retreating ice glaciers allowed human populations to re-colonize the depopulated regions of central and northern Europe.

The reader is now reminded that three different time perspectives are utilized to carry the prehistory of *Homo sapiens*. Thus, the reader is invited, once again, to examine Table 5.4.1 (Paper 5.4, Hg. D) for a summary and comparison of the paleoclimatological, geological and technological perspectives. Focusing now on the paleoclimatological perspectives, the choice to deliver human prehistory in Europe using Marine Isotope Stages reflects the huge significance that climate change has exerted in shaping the contemporary genetic landscape of the European continent. Similarly, climate change has also influenced linguistic variation not only in Europe, but elsewhere in the world.

In order to provide important background information, the next section explores the climate of prehistoric Europe in greater detail. Additionally, Section 2 presents important ancient DNA data from the archaeological record. The sections that follow explore, in greater detail, the contemporary distribution of I-M170 variants: I2a1b-M423 (Section 3) I1-M253 (Section 4); I2a1a1-M26 (Section 5); I2a2a-M223 (Section 6). Then, in Section 7, we explore the significance of I-M170 for linguists.

Section 2. Artifacts, Bones, Climate Change and Ancient DNA.

The initial human colonization of Europe is explained by the paleoclimatological record, human artifacts, skeletal remains, and ancient DNA. The paleoclimatological data was previously introduced in Section 5.4, Hg. D, Section 1. During Marine Isotope Stage 3 warmer weather facilitated an expansion of *Homo sapiens*. This expansion began in Southwest Asia and resulted not only in the initial colonization of Asia (Pope and Terrell 2008), but also Europe (Müller et al. 2011). The timing of this expansion into Europe began with onset of Greenland Interstadial 12, a temporary period of warmer weather during the last Ice Age.

Turning now to the archaeological record, Hoffecker (2009) reports the discovery of artifacts found in Eastern Europe and in Mediterranean region of the continent. These artifacts include spear points and scrappers made from stone. These tools were dated to about 48 thousand years. As such, they correlate well with the beginning of the Aurignacian archeological tradition and the initial colonization of Europe by modern humans.

At this point the reader is directed to Table 5.9.2, which provides a survey of ancient DNA results taken from prehistoric human remains found in Europe. As reflected by Reference Sample Nos. 1 through 6 in the table, haplogroups I-M170, C-M130, and NO M214 were part of the genetic inventory (gene pool) of Europe's first *Homo sapiens*. The distribution of Reference Sample Nos. 1 through 6 further suggests two different migration routes into Europe during Marine Isotope Stage 3: One route encompasses central Europe and the north European coastal plain. The other route follows the Mediterranean Sea. Those that migrated through central Europe probably followed and hunted the large herds of mammals, such as reindeer, mammoths and horses that once roamed the European plain. Those that migrated along the Mediterranean probably exploited marine resources.

During Marine Isotope Stage 2 the weather became colder in Europe. The ice glaciers then reached their maximum southern expansion in Eurasia about 26 thousand years ago, a period that is often referred to as the Last Glacial Maximum (LGM). During the LGM, the ice sheets extended to roughly the fortieth northern parallel (e.g. Gavashelishvili and Tarkhnishvili 2016; Clark 2009). In order to survive, human populations in Europe retreated to refugia in the southern part of the continent.

According to Binney et al. (2016), after the ice sheet had started to contract around 21 thousand years ago, the European landscape above the fortieth northern parallel was a treeless region of tundra. Around fourteen thousand years ago, as the climate warmed, the European tundra also began to contract northwards, leaving behind areas of forest. Around eleven thousand years ago, the tundra reached Scandinavia. Finally, about four thousand years ago, the tundra reached its current location along the Arctic Circle. The contraction of ice and

tundra during the Holocene partially explains why the human migrated out of southern European refugia during Holocene. Additionally, it helps to explain how central Europe and Scandinavia were repopulated. Tundra is the preferred habitat for reindeer. As the ice retreated, people migrated northwards to hunt the large mammals, especially the reindeer, which roamed the central European tundra. Turning now to Table 5.9.2, Reference Sample Nos. 7, 8, 10, 13, 14, 15, and 16 reflect that haplogroup I-M170 survived the last Ice Age and then expanded into previously depopulated regions once the ice glaciers had retreated. See, also, the discussion in Paper 5.17, Hg. R, and Section 6).

Section 3. Frequency and Distribution of I-M423.

As previously detailed in Section 1 (above), I1-M253 and I2-M438 evolved roughly 28 thousand years ago. The mutations evolved a point in the prehistory that is defined by the paleoclimatologists as the Last Glacial Maximum. Thus, the evolution of both mutations reflects genetic diversification that occurred in southern European Ice Age refugia.

The I2a1b-M423 mutation is a downstream variant of I2-M438. At this point the reader is directed to Table 5.9.3, which provides a survey of population with the I2a1b-M423 mutation. This mutation attains a high frequency among several populations of the Balkans region of Eastern Europe, such as Serbs, Croats, and Bosniacs. More moderate frequencies are reported for Albanians, Moldavians, Bulgarians, Ukrainians and Czechs. Genetic studies (e.g. Regueiro et al. 2012; Battaglia et al. 2009) suggest that I2a-M423 evolved roughly eight to nine thousand years ago during the Eastern European Mesolithic. Thus based on the frequency data alone, it would appear that the I2-M438 upstream mutation evolved in a Balkan refugium, and that the I2a-M423 marker reflects later genetic diversification. See, also, Rootsi et al. 2004.

Two studies (Sarac et al. 2016 and Karachanak et al 2013) explain the evolutionary history of I2a-M423 by defining Paleolithic, Mesolithic and Neolithic components of the contemporary Croatian and Bulgarian gene pools. I2a-M423 represents the Paleolithic component. E1a-V13, R1b-343 and R1a-M420 are potential Mesolithic relics. Neolithic farmers contributed J2-M172 and G2a-P15. Accordingly, the Neolithic transition in Eastern Europe involved a population expansion that originated outside the region and adaptation of a new technology by people already living in the region. Taking this a step further, the demographic effects of the Neolithic transition were probably very complex and unpredictable. Sometimes, the Paleolithic component survived and thrived, as in the case of I-M170. However, C-M130, another relic of the European Paleolithic has disappeared.

Section 4. Frequency and Distribution of I1-M253.

As noted earlier, haplogroup I-M170 bifurcated into two main variants about 28 thousand years ago, I2-M438 and I1-M253. According to Rootsi et al (2004), after the Last Glacial Maximum, I1-M253 expanded northwards from a refugium on the Iberian Peninsula. As shown by the Table 5.9.4, I1-M253 attains frequencies between thirty and forty percent in Scandinavia. In this region, the mutation is found among Germanic-speaking Danes, Swedes and Norwegian, as well as Uralic-speaking Finns and Sami. Further south, I-M253 attains more moderate but significant frequencies among the Dutch, Germans, Karelians and

Estonians.

The reader's attention is now directed to Table 5.9.2 and the survey of ancient DNA results. As shown by the table, some may argue that I1-M253 was not included in the genetic inventory of prehistoric Scandinavia. Four ancient DNA samples were harvested from remains from a burial site in the Östergötland province of southeastern Sweden (see Reference Sample Nos. 13 through 16). According to the researchers, Reference Sample No. 13 belongs to I-M170. Molecular damage, on the other hand, restricts the ability of geneticist to identify the I-M170 variant to which Reference Sample No. 15 belongs. However, it is not I1-M253. Interestingly, Reference Sample Nos. 14 and 16 belong to I2a-M423, the haplogroup I variant discussed in the previous section (3). Again, I2a-M423 attains a heavy frequency in the Balkans. However, it is virtually absent among contemporary Scandinavians.

A salient point for understanding ancient and contemporary genetic variation in Scandinavia emphasizes that the present-day land crossing from central Europe into the region has just one route. It involves a journey through Denmark and across the Öresund Straight via bridge and tunnel into Sweden. However, as explained and illustrated by Sporrong (2003), the landscape in Scandinavian was far different twelve thousand years ago. The water level was around much lower and a larger landmass connected central Europe with Scandinavia. Additionally, the present-day Baltic Sea was a smaller freshwater lake. Consequently, during the early Holocene several different routes presented an opportunity for human settlement in Scandinavia via a land crossing or a short water crossing. The Paleolithic founding populations of Scandinavia probably had I1-M253 and I2a-M423. As suggested by Underhill et al. (2007), I1-M253 entered Denmark via northwestern Europe. Those with I2a-M423 probably entered Scandinavia through another route further east.

The demise of I-M423 and predominance of I-M253 in contemporary Scandinavia is probably the result of demographic processes that occurred in Scandinavia beginning five thousand years ago during the Neolithic transition. Agriculture was first adopted in Denmark, and over time the technology spread northwards into the rest of Scandinavia (e.g. Siiräinen 2003). Rapid population growth occurred because agriculture supports higher population density. Thus, a sudden and rapid increase of men with the I-M253 mutation in Denmark, beginning four for five thousand years ago, and their subsequent migration into northern Scandinavia, may well have changed the distribution and frequency of I-M170 variation in the region.

The historical expansions of the Germanic tribes and ethnic Germans may partially explain the presence of I1-M253 in Eastern Europe. Taking this a step further, St. Clair 2014 examined the unexpected frequency of I1-M253 found among several Romani populations in Europe. These populations include Slovak Romani (Petrejčíková et al. 2009), Hungarian Romani (Pamjav et al. 2011) and Iberian Romani (Gusmão et al. 2008). The report suggests that I1-M253 among the European Romani may have been the result of admixture with Crimean Goths.

Section 5. Frequency and Distribution of I2a1a1-M26.

The reader is now directed to Table 5.9.5, which presents the frequency and distribution of the I2a-M26 mutation. On the Mediterranean island of Sardinia the frequency of this mutation hovers around forty percent. The high frequency of I2a-M26 among Sardinians certainly supports the idea that this island was one of the Ice Age refugia. Additional support for this position stems from the estimated age of the mutation. Morelli et al. (2010) report that I2a-M26 evolved around 18 thousand years ago. Finally, Sondaar et al. (1995) report the discovery of a human phalanx found at the Corbeddu cave on Sardinia, the remains of someone who died about 20 thousand years ago.

The frequency of I2a-M26 ranges from three to sixteen percent among some populations of the Iberian Peninsula. The frequency then drops to around two percent in Ireland. Based on this frequency cline as well as the climatological and archaeological evidence, it appears as though Sardinia was a source population of the Holocene hunter-gatherers that migrated out from the Mediterranean into central and northern Europe. Part of the expansion route from the Mediterranean into central and northern Europe probably involved a journey through the Pyrenees, a mountain range along the contemporary Franco-Spanish border. It should be noted that this remote area of Europe may well have been an Ice Age refugium.

Section 6. Frequency and Distribution of I2a2a-M223.

The reader may want to examine Table 5.9.6 which provides a survey of populations with the I2a2a-M223 mutation. The frequency and distribution data for the mutation are interesting. Unlike the other three I-M170 variants that have been surveyed (I1-M253, I2a-M423 and I2a-M26), a frequency cline for I2a-M223 is not observed. I1-M253 frequencies diminish north to south. I2a-M423 and I2a-M26 diminish south to north. I2a-M223, on the other hand, is scattered throughout Europe at frequencies of less than ten percent.

According to Rootsi et al. (2004), I2a-M223 evolved during the early Holocene about 11 thousand years ago. The distribution and frequency patterns of the mutation are such that is difficult to determine exactly where the mutation arose. Nevertheless, the age of the mutation, along with its distribution, suggests that it is a genetic relic of Holocene hunter-gathers that migrated northwards as the tundra contracted. Interestingly, I2a-M223 was detected in remains found at a Neolithic burial site at Atapuerca in Spain. See Reference Sample No. 25 from Table 5.9.2.

Section 7. Significance of I-M170 for Linguists.

7.1. Slavic.

Referring once again to Table 5.9.3, the I2a-M423 mutation appears to be an important marker for deciphering the origin and spread of Slavic languages. However, such a position is inconsistent with mainstream linguistic opinion that dates the spread of Slavic to historical times, perhaps the fifth century (see Brackney 2007 and discussion in Paper 5.17, Hg. R, Section 9).

7.2. Basque.

Researchers have long suspected that the populations of the Pyrenees are a relic of pre-Neolithic Europe. Partial support for this position stems from the Basque people who speak a language isolate, which is unusual as most European speak an Indo-European language. Since Indo-European languages potentially came to Europe during the Neolithic, roughly eight thousand years ago, one could argue that the Basque languages reflects linguistic diversity from the Mesolithic or earlier.

Additionally, the expansion of I2a-M26 from Sardinia to the Iberian Peninsula during the early Holocene suggests a pre-Neolithic origin for Pyrenees populations, and with that, the Basque language. Rootsi et al. (2004) reports that about six percent of the Basques have the I2a-M26 mutation. Another report, López-Parra et al. (2009), sampled populations from five remote villages along the Franco-Spanish border and the Pyrenees Mountains region. The frequency of I2a-M26 ranged from three to sixteen percent in the villages. Furthermore, the researchers found C-M130 in two individuals. Given the location of the surveyed population and the fact that C-M130 is rarely found among contemporary Europeans, this was a rather unexpected discovery. Thus provides additional data which reinforce the idea that the Basque language is a pre-Neolithic relic.

At this point the reader is directed to Reference Sample Nos. 2, 3 and 6 from Table 5.9.2, which provides a survey of ancient DNA results from Europe. The reader is also directed to Paper 5.6, Hg. C, Section 4. Based on ancient DNA remains that are between 33 and 39 thousand years old, haplogroups C1b-F1370 and C1a-CTS11043 appear to be part of the gene pool of Paleolithic European. Taking this a step further, perhaps the haplogroup C-M130 mutations found among contemporary populations in the Pyrenees are also potential genetic relics of Paleolithic Europe. This is a topic worthy of additional research.

As noted previously (Section 2), climate change during Marine Isotope Stage 3 caused the ice glaciers in central Europe to temporarily retreat, and this facilitated the temporary Paleolithic colonization of the region by *Homo sapiens*. It should be noted that the ancient Paleolithic C-M130 remains from Europe were found in southwestern Russia, the Czech Republic and Belgium. Based on this distribution pattern and the paleo-climatic weather conditions, it appears that Paleolithic hunter-gathers with C-M130 may have migrated westwards from Central Asia into Europe in pursuit of large mammals that roamed the central European tundra during Marine Isotope Stage 3. Eventually, perhaps within a few thousand years, the human migration hit a geographic dead-end at the Atlantic Ocean. C-M130 eventually disappeared from the European genome as the result of demographic changes that occurred during and following the Last Glacial Maximum.

H2-P56 is a rare genetic mutation that also reinforces the pre-Neolithic origins of the Basque language. The reader is now asked, once again, to examine Table 5.9.2 and in particular Reference Sample No. 22. Neolithic remains in northern Spain belong to haplogroup H2-P56. Interestingly, a small percentage of contemporary Sardinians (less than one percent) also have the mutation (Francalacci et al. 2015). Perhaps, then, the H2-P56 remains found at Atapuerca, as well as the presence of I-M26 among contemporary Iberian populations, are the genetic relics of a northward expansion out of Sardinia during the early Holocene.

Given the age of H2-P56, perhaps this mutation is also among the founding lineages of Europe along with C-M130 and I-M170. As previously discussed in Paper 5.8, Hg. H, Section 1, the H2-P56 mutation evolved roughly 37 thousand years ago. This is about four thousand years after the I-M170 mutation evolved. Thus, based on dating estimates, phylogenetic relationships, and the contemporary distribution of mutations, it appears as though H2-P56 and I-M170 represent a Paleolithic migration from Southwest Asia to Sardinia. On the island, the I2a-M26 variant evolved from I-M170.

I2a-M26, H2-P56 and C-M130 all point to pre-Neolithic origins of Basque languages. Another crucial piece of evidence is the R1b-S116 mutation. Accordingly, this discussion continues in Paper 5.17, Hg. R, Section 6.

7.3. Germanic.

A discussion of the origins of Germanic concedes, based on long-standing consensus among linguists that the putative homeland of Germanic languages is Denmark. Based on the frequency data, haplogroup I-M253 is obviously a significant evolutionary marker for understanding the linguistic prehistory of Germanic languages. St. Clair (2012), a PhD dissertation from the University of California, explored the origins of Germanic languages from a Y-chromosome perspective. One very controversial idea stemming from the dissertation is that Germanic languages evolved as the result of language contact between speakers of proto-Basque, proto-Indo-European and proto-Afro-Asiatic. Perhaps less controversial would be the idea that Germanic languages have considerable time depth. The prehistoric evolution of Germanic partially reflects response to climate change, the isolation of populations from each other, and the Neolithic revolution.

Tundra is the preferred habitat of reindeer. For at least a million years, starting with archaic human such as Neanderthals, and continuing among present-day modern humans, such as the Sami, reindeer meat has provided and important source of food (see discussion in 5.15.4 for additional details). Siiräinen (2003) suggests that the human colonization of Scandinavia during the Holocene was facilitated northward contraction of the ice glaciers and tundra. As the tundra contracted, large herds of Paleolithic reindeer migrated out of Central Europe and eventually reached Scandinavia about 12 thousand years ago. Close behind were people that hunted these animals, the so-called Ahrensburg culture, who eventually settled in the region.

Around ten thousand years ago another cultural transition occurred in Scandinavia, the so-called Maglemose people. This cultural transition signaled the arrival of the Holocene, and with that, the landscape transitioned from tundra to forests. This transition forced a change in subsistence strategy. As the result of climate change, people in the region became dependent on marine resources, such as mussels (e.g. Lewis et al. 2016). Inland resources, such as elk, were also an important source of food (e.g. Jessen 2015).

The Ertebølle culture marks the end of the Mesolithic in Scandinavia. As previously detailed in Paper 5.7, Hg. G, Section 2, agriculture expanded across Europe during the Neolithic. The same expansion probably disseminated Indo-European languages throughout the continent. About 7.5 thousand years ago the expansion of the so-called Linear Pottery Culture (LBK) terminated at the Northern European coastal plain. However, agriculture was not embraced by Mesolithic Scandinavians. Rather, the terminal point of the LBK expansion became a cultural boundary that lasted about two thousand years until around 3500 BC and the evolution of the Neolithic Funnel-Beaker culture in Scandinavia.

The reasons for the slow transition to agriculture in Scandinavia remain very much a mystery. One possible explanation assumes that the LBK expansion probably carried agriculture though areas of central Europe that was uninhabited or sparsely inhabited by nomadic foragers. In contrast to central Europe, the Mesolithic peoples of contemporary Denmark lived in permanent or semi-permanent settlements. As such the region probably had large population density relative to that of central Europe. Conditions were different in Mesolithic Denmark because of the abundance of marine resources, and with that, the availability of a year-round source of very nutritious food. In other words, the food supply remained stationary and the land supported more people per square kilometer. Taking this a step further, Mesolithic Scandinavians did not need agriculture.

As noted earlier, the Neolithic began in Scandinavia around five thousand years ago. Three different models have surfaced for explaining this transition: human migration, a food shortage, or socio-economic change (Fischer 2002). The idea of human migration deserves particular attention because it undermines or supports the role of language contact theory in shaping the evolution of Germanic languages. Here, genetic data can be an informative for assessing Paleolithic, Mesolithic and Neolithic components of the contemporary Scandinavian gene pool. Karlsson et al. (2006) analyzed almost four hundred DNA samples collected from men in Sweden. With their analysis, they found that the arrival of agriculture in Scandinavia occurred as the result of the adoption of a new technology by people already living in the region rather than an influx of central European farmers. Their conclusion partially follows the heavy frequency of I-M253 mutations in the region, and the low frequency of central European Neolithic markers, especially J2-M172 and G2a-P15. Thus, the Paleolithic component is substantial, and a Neolithic component is minimal.

R1b-343, R1a-M420 and N1a-Tat mutations among modern-day Scandinavians represent potential Mesolithic components. Accordingly, further discussion of language and genes within this region continues in Paper 5.14, Hg. N, Section 4.4 and Paper 5.17, Hg. R, Section 6. Nevertheless, at that this point it should be noted that the origins of Germanic languages provides valuable insight into the evolution of language variation in Europe. Indigenous pre-Neolithic languages probably shaped the evolution of contemporary European linguistic diversity. Interestingly, linguists have long noted that perhaps a third of the Modern German lexicon lacks an Indo-European cognate (e.g. Vennemann 2000: 241; Waterman 1976:36; Schirmer and Mitzka 1969). Perhaps part of the Germanic lexicon is a relic of the Mesolithic. Furthermore, Mailhammer (2007) suggests that the systematic pattern of ablaut for Germanic strong verbs may have been a featured borrowed from Afro-Asiatic languages. As previously suggested in Paper 5.5, Hg. E, Section 5, the E1b-V13 mutation may signal the presence of proto-Afro-Asiatic languages in Mesolithic Europe. However, the mutation is mainly found in the Mediterranean and Balkans. Thus, prehistoric contact between Scandinavia and southeastern Europe seem to be topic worthy of additional research.

Section 8. Conclusions.

Haplogroups I-M170, C-M130, H2-P56 and NO-M214 were part of the gene pool of Paleolithic Europe. Only I-M170 thrived and survived. This mutation helps to illustrate that some languages have roots extending deep into the human prehistory. Furthermore, the evolution of some languages reflects successful adaptation to climate change, the prolonged isolation of some populations, and the Neolithic revolution. For example, the evolution of Germanic languages began at the beginning of the Holocene. The landscape transitioned from tundra to forest in Scandinavia, and the reindeer disappeared. People adapted to climate change by harvesting marine resources. The Basque language, on the other hand, is a relic of a prehistoric population that remained isolated in a remote area of Europe.

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Paper 5.9. Haplogroup I.

The Genetic-Linguistic Interface.

Figure 5.9.1. Phylogenetic Overview of I-M170 and its Important Variants.

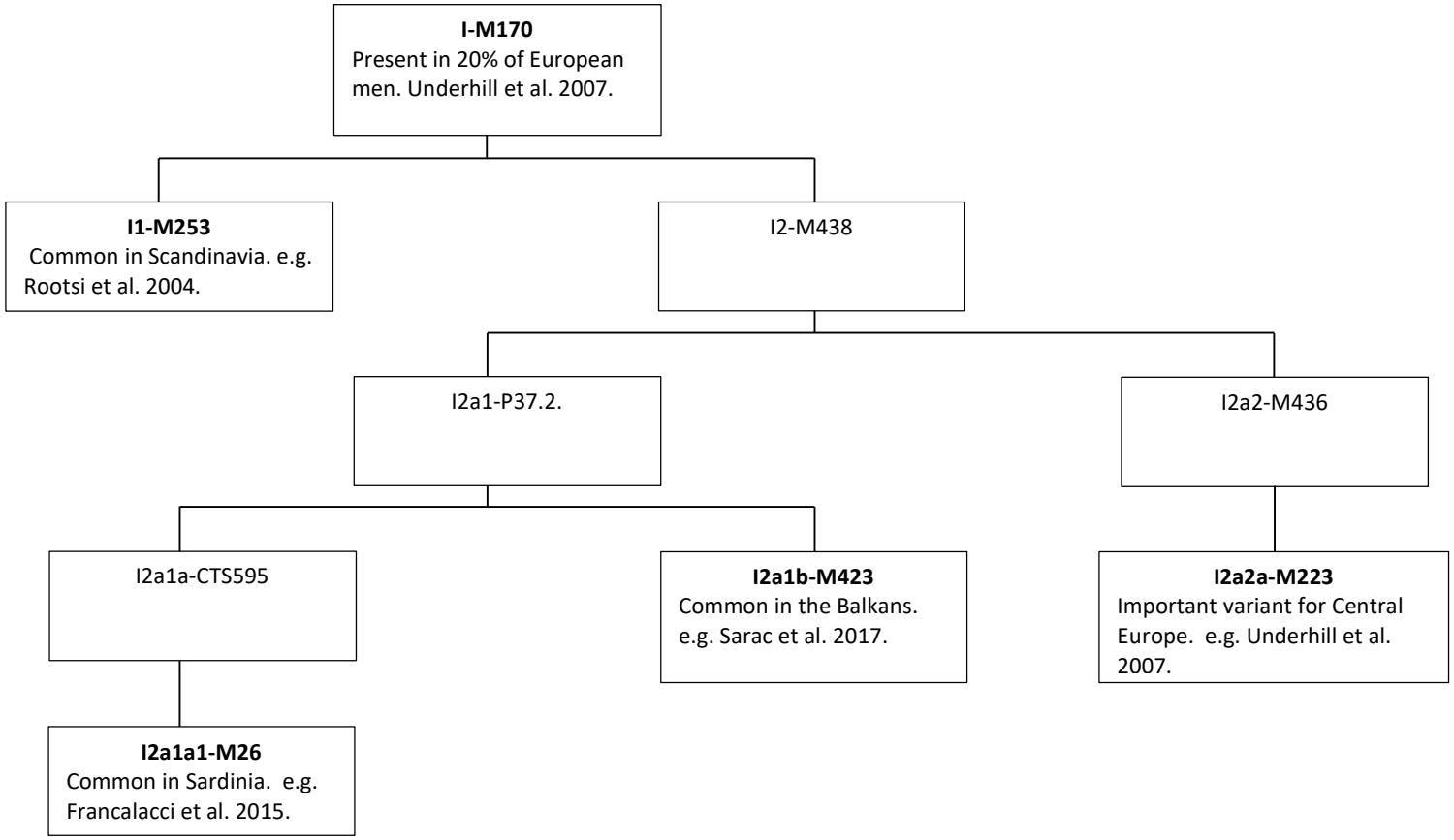

Diagram follows ISOGG 2017.

Table 5.9.1. Frequency and Distribution of Haplogroup I.

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Eastern Europe	Bosnia-Herzegovina	Croats	Indo-European	90	0.73	Battaglia et al. 2009
Eastern Europe	Northwestern Russia	Arkangelsk	Indo-European	28	0.50	Mirabal et al. 2009
Eastern Europe	Bosnia-Herzegovina	Bosniacs	Indo-European	84	0.50	Battaglia et al. 2009
Eastern Europe	Croatia	Croats	Indo-European	89	0.44	Battaglia et al. 2009
Scandinavia	Sweden	Swedes	Indo-European	305	0.42	Karlsson et al. 2006
Eastern Europe	Bosnia	Bosniacs	Indo-European	100	0.42	Underhill et al. 2007
Mediterranean	Sardinia	Sardinians	Indo-European	1194	0.41	Francalacci et al. 2015
Eastern Europe	Bosnia-Herzegovina	Serbs	Indo-European	81	0.41	Battaglia et al. 2009
Scandinavia	Finland	Western Finland	Uralic	230	0.41	Lappalainen et al. 2008
Scandinavia	Finland	Sami	Uralic	69	0.41	Tambets et al. 2004
Scandinavia	Norway	Norwegians	Indo-European	72	0.40	Rootsi et al. 2004
Eastern Europe	Croatia	Croats	Indo-European	720	0.39	Sarac et al. 2016
Scandinavia	Denmark	Danes	Indo-European	122	0.39	Underhill et al. 2007
Scandinavia	Sweden	Swedes	Indo-European	160	0.38	Lappalainen et al. 2008
Eastern Europe	Serbia	Serbs	Indo-European	102	0.38	Regueiro et al. 2012.
Scandinavia	Denmark	Danes	Indo-European	241	0.38	Olofsson et al. 2015
Mediterranean	Sardinia	Cagliari, Sorgono, Tempio	Indo-European	930	0.37	Contu et al. 2008
Scandinavia	Sweden	Sami	Uralic	38	0.32	Karlsson et al. 2006
Eastern Europe	Czech Republic	Czechs	Indo-European	47	0.32	Underhill et al. 2007
Eastern Europe	Slovenia	Slovenes	Indo-European	75	0.31	Battaglia et al. 2009
Scandinavia	Sweden	Sami	Uralic	35	0.31	Tambets et al. 2004
Mediterranean	Italy	Arbereshe	Indo-European	150	0.30	Sarno et al. 2016

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Eastern Europe	Macedonia	Greeks	Indo-European	57	0.30	Battaglia et al. 2009
Eastern Europe	Moldova	Moldavians	Indo-European	125	0.29	Varzari et al. 2013
Eastern Europe	Hungary	Hungarians	Uralic	215	0.28	Völgyi et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	75	0.28	Battaglia et al. 2009
Eastern Europe	Croatia	Croats, Osijek	Indo-European	29	0.28	Battaglia et al. 2009
Caucasus	Caucasus Russia	Lezgians	North Caucasian	31	0.27	Yunusbayev et al. 2012
Caucasus	Caucasus Russia	Andis	North Caucasian	49	0.27	Yunusbayev et al. 2012
Eastern Europe	Kostroma, Russia	Russians	Indo-European	53	0.26	Underhill et al. 2007
Eastern Europe	Hungary	Hungarians	Uralic	113	0.26	Underhill et al. 2007
Eastern Europe	Slovenia	Slovenes	Indo-European	95	0.26	Underhill et al. 2007
Eastern Europe	Ukraine	Ukrainians	Indo-European	506	0.26	Underhill et al. 2007
Eastern Europe	Bulgaria	Bulgarians	Indo-European	808	0.26	Karachanak et al. 2013
Eastern Europe	Slovenia	Slovenes	Indo-European	399	0.25	Zupan et al. 2013
Eastern Europe	Russia	Cossac	Indo-European	89	0.25	Underhill et al. 2007
Eastern Europe	Hungary	Hungarians	Uralic	100	0.24	Csányi et al 2008
Western Europe	Germany	Germans	Indo-European	125	0.24	Underhill et al. 2007
Eastern Europe	Belarus	Belarusians	Indo-European	565	0.23	Kushniarevich et al. 2013
Eastern Europe	Slovakia	Slovaks	Indo-European	156	0.23	Novackova et al. 2015
Mediterranean	Albania	Albanians	Indo-European	55	0.22	Battaglia et al. 2009
Eastern Europe	Corund, Romania	Szeklers	Uralic	97	0.22	Csányi et al 2008
Western Europe	France	Normandy	Indo-European	42	0.21	Underhill et al. 2007
Mediterranean	Greece	Lerna/Franchthi Cave	Indo-European	57	0.21	King et al. 2011
Scandinavia	Osterbotten	Swedes	Indo-European	40	0.20	Karlsson et al. 2006
Eastern Europe	Voronez, Russia	Russians	Indo-European	96	0.20	Underhill et al. 2007

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Scandinavia	Finland	Eastern Finland	Uralic	306	0.20	Lappalainen et al. 2008
Western Europe	Netherlands	Dutch	Indo-European	93	0.20	Underhill et al. 2007
Western Europe	Flanders Region, Netherlands and Belgium	Flemish	Indo-European	773	0.20	Larmuseau et al 2014.
Mediterranean	Northeastern Italy	Italians	Indo-European	67	0.20	Battaglia et al. 2009
Eastern Europe	Southern Russia	Russians	Indo-European	484	0.20	Balanovsky et al. 2008
Eastern Europe	Eastern Europe	Mordvin	Uralic	83	0.19	Rootsi et al. 2004
Baltic	Estonia	Estonians	Uralic	210	0.19	Underhill et al. 2007
Western Europe	United Kingdom	English	Indo-European	104	0.19	Underhill et al. 2007
Caucasus	Daghestan	Laks	North Caucasian	22	0.18	Karafet et al. 2016
Eastern Europe	Central Russia	Russians	Indo-European	364	0.18	Balanovsky et al. 2008
Eastern Europe	Hungary	Hungarians	Uralic	53	0.18	Battaglia et al. 2009
Eastern Europe	Northwestern Russia	Tver	Indo-European	38	0.18	Mirabal et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	257	0.18	Luca et al. 2007
Baltic	Russia	Karelians	Uralic	132	0.17	Lappalainen et al. 2008
Western Europe	France	French	Indo-European	58	0.17	Underhill et al. 2007
Baltic	Kola Peninsula	Sami	Uralic	23	0.17	Tambets et al. 2004
Baltic	Estonia	Estonians	Uralic	118	0.17	Lappalainen et al. 2008
Northern Eurasia	Pskov, Russia	Russians	Indo-European	130	0.17	Underhill et al. 2007
Eastern Europe	Czech Republic	Czechs	Indo-European	53	0.17	Underhill et al. 2007
Eastern Europe	Macedonia	Albanians	Indo-European	64	0.17	Battaglia et al. 2009
Mediterranean	Greece	Greeks	Indo-European	171	0.16	Underhill et al. 2007
Western Europe	Southern France	French	Indo-European	38	0.16	Rootsi et al. 2004
Northern Eurasia	Arkhangelsk, Russia	Russians	Indo-European	145	0.16	Underhill et al. 2007

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Western Europe	Pyrenees Mountains, Spain and France	Jacetania	Indo-European	31	0.16	López-Parra et al. 2009
Mediterranean	Greece	Phokaia	Indo-European	31	0.16	King et al. 2011
Eastern Europe	Slovakia	Romani	Indo-European	200	0.15	Petrejčíková et al. 2009
Western Europe	Pyrenees Mountains, Spain and France	Cinco Villas	Indo-European	42	0.14	López-Parra et al. 2009
Mediterranean	Greece	Seskio/Dimini	Indo-European	57	0.14	King et al. 2011
Mediterranean	Albania	Albanians	Indo-European	223	0.14	Sarno et al. 2016
Eastern Europe	Slovakia	Slovaks	Indo-European	70	0.14	Underhill et al. 2007
Eastern Europe	Volga-Ural Region, Russia	Kazan Tatars	Turkic	53	0.13	Trofimova et al. 2015
Eastern Europe	Smolensk, Russia	Russians	Indo-European	103	0.13	Underhill et al. 2007
Caucasus	Caucasus Russia	Nogais, Kara	Turkic	76	0.13	Yunusbayev et al. 2012
Eastern Europe	Northwestern Russia	Kursk	Indo-European	40	0.13	Mirabal et al. 2009
Northern Eurasia	Northern Russia	Russians	Indo-European	380	0.13	Balanovsky et al. 2008
Mediterranean	Greece	Nea Nikomedeia	Indo-European	57	0.12	King et al. 2011
Middle East	Turkey	Northwest Anatolia	Turkic	52	0.12	King et al. 2011
Western Europe	Pyrenees Mountains, Spain and France	Valle de Aran	Indo-European	25	0.12	López-Parra et al. 2009
Caucasus	Russia. Adygea. Maikop district	Armenians Adigei	Indo-European	49	0.12	Balanovsky et al. 2017
Baltic	Lithuania	Lithuanians	Indo-European	164	0.12	Lappalainen et al. 2008
Eastern Europe	Volga-Ural Region, Russia	Tuymazinsky Tatars	Turkic	50	0.12	Trofimova et al. 2015
Mediterranean	Greece	Smyrna	Indo-European	58	0.12	King et al. 2011
Eastern Europe	Volga-Ural Region, Russia	Chuvash	Turkic	44	0.11	Trofimova et al. 2015
Western Europe	Ireland	Irish	Indo-European	100	0.11	Underhill et al. 2007
Western Europe	Scotland	Scots	Indo-European	178	0.11	Rootsi et al. 2004
Eastern Europe	Eastern Europe	Chuvash	Turkic	80	0.11	Rootsi et al. 2004

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Western Europe	Portugal	Romani	Indo-European	126	0.10	Gusmão et al. 2008
Mediterranean	Crete	Cretans	Indo-European	168	0.10	Martinez et al. 2007
Western Europe	Galicia	Galicians	Indo-European	44	0.10	Santos et al. 2014a
Baltic	Russia	Karelians	Uralic	140	0.10	Underhill et al. 2007
Mediterranean	Greece	Greeks	Indo-European	92	0.10	Battaglia et al. 2009
Caucasus	Russia. Krasnodar region	Armenians Hemshin	Indo-European	89	0.09	Balanovsky et al. 2017
Western Europe	Austria	Austrians	Indo-European	43	0.09	Underhill et al. 2007
Caucasus	Caucasus Russia	Karachays	Turkic	69	0.09	Yunusbayev et al. 2012
Caucasus	Russia. Krasnodar region	Armenians Krasnodar	Indo-European	117	0.09	Balanovsky et al. 2017
Western Europe	Valencia	Valencians	Indo-European	59	0.09	Santos et al. 2014a
Western Europe	Catalan	Catalonians	Indo-European	111	0.09	Santos et al. 2014a
Western Europe	Zamora Province	Spanish	Indo-European	235	0.08	Alvarez et al. 2014.
Western Europe	Bernais	French	Indo-European	26	0.08	Rootsi et al. 2004
Western Europe	Switzerland	Swiss	Indo-European	144	0.08	Underhill et al. 2007
Northern Eurasia	Volga-Ural Region, Russia	Komi	Uralic	40	0.08	Trofimova et al. 2015
Western Europe	Pyrenees Mountains, Spain and France	Cerdana	Indo-European	37	0.08	López-Parra et al. 2009
Mediterranean	Sicily	Sicilians	Indo-European	236	0.08	Di Gaetano et al. 2009
Caucasus	Armenia	Armenians Gardman	Indo-European	96	0.08	Herrera et al. 2012
Baltic	Latvia	Latvians	Indo-European	113	0.07	Lappalainen et al. 2008
Mediterranean	Central Italy	Italians	Indo-European	196	0.07	Rootsi et al. 2004
Baltic	Latvia	Latvians	Indo-European	86	0.07	Rootsi et al. 2004
Middle East	Turkey	Western Anatolia	Turkic	30	0.07	King et al. 2011
Caucasus	Daghestan	Avar	North Caucasian	33	0.06	Karafet et al. 2016
Eastern Europe	Volga-Ural Region, Russia	Besermyan	Uralic	53	0.06	Trofimova et al. 2015

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Western Europe	France	Provence	Indo-European	51	0.06	King et al. 2011
Western Europe	France and Spain	Basques	Isolate	100	0.06	Rootsi et al. 2004
Central Asia	Kazakhstan-Zhanakorgan District	Kazakh	Turkic	94	0.06	Zhabagin et al. 2017
Middle East	Turkey	Turks	Turkic	523	0.05	Underhill et al. 2007
Eastern Europe	Volga-Ural Region, Russia	Mordvins	Uralic	59	0.05	Trofimova et al. 2015
Mediterranean	Northern Italy	Italians	Indo-European	194	0.05	Rootsi et al. 2004
Northern Eurasia	Northern Eurasia	Komi	Uralic	110	0.05	Rootsi et al. 2004
Caucasus	Russia. Rostov region. Myasnikovsky district	Armenians Don	Indo-European	92	0.05	Balanovsky et al. 2017
Central Asia	Uzbekistan-Xorezm Region	Uzbek	Turkic	98	0.05	Zhabagin et al. 2017
Western Europe	Portugal	Portuguese	Indo-European	303	0.05	Rootsi et al. 2004
Central Asia	Uzbekistan-Karakalpakstan	Karakalpak	Turkic	100	0.05	Zhabagin et al. 2017
Caucasus	Georgia	South Ossetians	Indo-European	21	0.05	Yunusbayev et al. 2012
Baltic	Baltic	Veps	Uralic	39	0.05	Underhill et al. 2007
Middle East	Turkey	Turks	Turkic	523	0.05	Cinnioğlu et al. 2004
Caucasus	Caucasus Russia	Adyghe	North Caucasian	154	0.05	Yunusbayev et al. 2012
Caucasus	Caucasus Russia	Kabardians	North Caucasian	140	0.04	Yunusbayev et al. 2012
Middle East	Iran	Kurds	Indo-European	25	0.04	Malyarchuk et al. 2013
South Asia	Pakistan	Hazara	Indo-European	25	0.04	Di Cristofaro et al. 2013
Middle East	Lebanon	Armenians Western Historical	Indo-European	148	0.04	Hovhannisyan et. al 2014
Caucasus	Georgia. Samtskhe-Javakheti|	Aremenians Erzurum	Indo-European	99	0.04	Balanovsky et al. 2017
Middle East	Turkey	Central Anatolia	Turkic	90	0.04	King et al. 2011
Western Europe	Lyon and Portier, France	French	Indo-European	99	0.04	Rootsi et al. 2004

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Central Asia	Afghanistan	Tajiks Balkh	Indo-European	54	0.04	Di Cristofaro et al. 2013
Western Europe	Andalusia	Andalusians	Indo-European	103	0.04	Rootsi et al. 2004
Caucasus	Armenia	Armenians Alashkert and Bayazet	Indo-European	200	0.04	Hovhannisyan et. al 2014
Eastern Europe	Poland	Poles	Indo-European	99	0.04	Battaglia et al. 2009
Caucasus	Armenia. Ararat Valley, v. Oshakan	Armenians Ararat	Indo-European	110	0.03	Herrera et al. 2012
Mediterranean	Cyprus	Greek Cypriots	Indo-European	629	0.03	Voskarides et al. 2016.
Caucasus	Caucasus	Abazins	North Caucasian	88	0.03	Yunusbayev et al. 2012
Middle East	Iran	Persians	Indo-European	77	0.03	Malyarchuk et al. 2013
Middle East	Turkey	Mediterranean Anatolia	Turkic	33	0.03	King et al. 2011
Central Asia	Afghanistan	Hazara	Indo-European	60	0.03	Haber et al. 2012
Caucasus	Caucasus	Balkars	Turkic	38	0.03	Battaglia et al. 2009
Western Europe	Pyrenees Mountains, Spain and France	Alto Urgel	Indo-European	34	0.03	López-Parra et al. 2009
Central Asia	Afghanistan	Tajiks Takhar	Indo-European	35	0.03	Di Cristofaro et al. 2013
Middle East	Iran	Hazara	Indo-European	69	0.03	Di Cristofaro et al. 2013
Central Asia	Tajikistan	Tajiks	Indo-European	40	0.03	Malyarchuk et al. 2013
Caucasus	Georgia	Abkhaz	North Caucasian	162	0.03	Yunusbayev et al. 2012
Caucasus	Georgia	Georgians	Kartvelian	65	0.03	Yunusbayev et al. 2012
Central Asia	Afghanistan	Tajiks	Indo-European	56	0.02	Haber et al. 2012
Middle East	Iran	Gilaki	Indo-European	64	0.02	Grugni et al. 2012
Eastern Europe	Eastern Europe	Udmurt	Uralic	132	0.02	Rootsi et al. 2004
Caucasus	Armenia	Armenians Van	Indo-European	103	0.02	Herrera et al. 2012
Caucasus	Karabakh, Armenia and Azerbaijan	Armenians Karabakh	Indo-European	105	0.02	Hovhannisyan et. al 2014

Region	Location	Population	Lang Fam	Sample Size	Freq Hg I	Reference
Caucasus	Armenia	Armenians Salmast	Indo-European	199	0.02	Hovhannisyan et. al 2014
Eastern Europe	Northwestern Russia	Komi	Uralic	54	0.02	Mirabal et al. 2009
Caucasus	Georgia	Georgians	Kartvelian	66	0.02	Battaglia et al. 2009
Eastern Europe	Ukraine	Ukrainians	Indo-European	92	0.02	Battaglia et al. 2009
East Asia	Mongolia	Mongols	Mongolic	97	0.01	Di Cristofaro et al. 2013
Caucasus	Armenia	Armenians Syunik	Indo-European	105	0.01	Hovhannisyan et. al 2014

Table 5.9.2. Survey of Ancient DNA Results from Europe.

Reference Sample No.	Description of Remains	Y-SNP	Death	Earth Sciences Period	Geological Period	Technological Period	Reference
1	Oase1. Peştera cu Oase cave in Romania	NO-M214	37-42 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Trinkaus et al. 2003; Fu et al. 2014; Fu et al. 2015; Poznik et al. 2016.
2	Kostenki14. Found at Markina Gora, Voronezh Oblast, Southwest Russia	C1b-F1370	36-39 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Fu et al. 2016.
3	GoyetQ116-1. Found at Troisième Caverne in Belgium.	C1a-CTS11043	34-35 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Fu et al. 2016.
4	Paglicci133. Found at the Paglicci Cave, Apulia region, Southeast Italy.	I-M170	About 33 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Fu et al. 2016.
5	Pavlov1. Found in the Pavlovské Hills in the Czech Republic.	I-M170	29-30 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Fu et al. 2016.
6	Vestonice16. Found in the Pavlovské Hills in the Czech Republic	C1a2-V20	29-30 thousand years ago.	Marine Isotope Stage Three.	Pleistocene	Paleolithic	Fu et al. 2016.
7	HohleFels49 Found in the Ach Valley, Schelklingen, southwestern Germany	I-M170	14-16 thousand years ago,	Marine Isotope Stage Two.	Pleistocene	Paleolithic	Fu et al. 2016.
8	Burkhardtshöhle remains. Found near Westerheim in southwestern Germany.	I-M170	14-15 thousand years ago.	Marine Isotope Stage Two.	Pleistocene	Paleolithic	Fu et al. 2016.

Reference Sample No.	Description of Remains	Y-SNP	Death	Earth Sciences Period	Geological Period	Technological Period	Reference
9	Villabruna remains. Found in the Dolomite Mountains, northern Italy.	R1b1-L278	About 14 thousand years ago.	Marine Isotope Stage Two.	Pleistocene	Paleolithic	Fu et al. 2016.
10	Rochedane remains. Found near Villars-sous-Dampjoux in eastern France.	I-M170	About 14 thousand years ago.	Marine Isotope Stage Two.	Pleistocene	Paleolithic	Fu et al. 2016.
11	Cuiry les Chaudardes 1 remains. Located 25 km northwest of Reims, France	I-M170	About eight thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Fu et al. 2016.
12	Latvia_Hg2. Found at Zvejnieki in Latvia.	R1b1b-M335	About eight thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Jones et al. 2017.
13	Motala 2 remains. Found at the Kanaljorden site, Motala, Östergötland, Sweden.	I-M170	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Lazaridis et al. 2014.
14	Motala 3 remains. Found at the Kanaljorden site, Motala, Östergötland, Sweden.	I2a1b-M423	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Lazaridis et al. 2014.
15	Motala 9 remains. Found at the Kanaljorden site, Motala, Östergötland, Sweden.	I-M170 (not I1a-M253)	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Lazaridis et al. 2014.

Reference Sample No.	Description of Remains	Y-SNP	Death	Earth Sciences Period	Geological Period	Technological Period	Reference
16	Motala 12 remains. Found at the Kanaljorden site, Motala, Östergötland, Sweden.	I2a1b-M423	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Lazaridis et al. 2014.
17	Latvia_HG3. Found at Zvejnieki, Latvia.	R1b1b-M335.	About seven thousand years ago	Marine Isotope Stage One	Holocene	Neolithic	Jones et al. 2017.
18	Berry au Bac remains. Found in northern France.	I-M170	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Fu et al. 2016.
19	Loschbour rock shelter remains found near Heffingen in Luxembourg.	I2a1b-M423	About seven thousand years ago.	Marine Isotope Stage One	Holocene	Mesolithic	Lazaridis et al. 2014.
20	VINJ 4. Remains found at the Vinkovci Jugobanka site at Croatia.	I2a1-P37.2	Between six and seven thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Szecsenyi-Nagy et al. 2015.
21	10174 Starcevo_EN. Remains found in Hungary.	H2-P56	About six thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Haak et al. 2015.

Reference Sample No.	Description of Remains	Y-SNP	Death	Earth Sciences Period	Geological Period	Technological Period	Reference
22	ATP2. Remains at the El Portalón cave at Atapuerca in Northern Spain	H2-P56	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Günther et al. 2015.
23	ATP12-1420. Remains at the El Portalón cave at Atapuerca in Northern Spain	I2a2a-M223	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Günther et al. 2015.
24	Ajvide58 remains. Burial found in Gotland, Sweden.	I2a1-P37.2	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Skoglund et al. 2014.
25	BAB 5 remains. Balatonszemes-Bagódomb, Hungary	I1-M253	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Szecsenyi-Nagy et al. 2015.
26	Sample 577. Cave I of Treilles, Grands Causses region, at Saint-Jean-et-Saint-Paul, Aveyron, France.	I2a1-P37.2	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Lacan et al. 2011.
27	Sample 596. Sample 577. Cave I of Treilles, Grands Causses region, at Saint-Jean-et-Saint-Paul, Aveyron, France.	I2a1-P37.2	About five thousand years ago.	Marine Isotope Stage One	Holocene	Neolithic	Lacan et al. 2011.

Table 5.9.3. Distribution of I-M423.

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M423	Reference
Eastern Europe	Bosnia-Herzegovina	Croats	Indo-European	South Slavic	90	0.73	Battaglia et al. 2009
Eastern Europe	Bosnia-Herzegovina	Bosniacs	Indo-European	South Slavic	84	0.43	Battaglia et al. 2009
Eastern Europe	Bosnia	Bosniacs	Indo-European	South Slavic	100	0.40	Underhill et al. 2007
Eastern Europe	Bosnia-Herzegovina	Serbs	Indo-European	South Slavic	81	0.35	Battaglia et al. 2009
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	720	0.33	Sarac et al. 2016
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	89	0.33	Battaglia et al. 2009
Eastern Europe	Serbia	Serbs	Indo-European	South Slavic	102	0.29	Regueiro et al. 2012.
Eastern Europe	Croatia	Croats, Osijek	Indo-European	South Slavic	29	0.28	Battaglia et al. 2009
Eastern Europe	Moldova	Moldavians	Indo-European	Italic	125	0.21	Varzari et al. 2013
Eastern Europe	Ukraine	Ukrainians	Indo-European	East Slavic	506	0.20	Underhill et al. 2007
Eastern Europe	Bulgaria	Bulgarians	Indo-European	South Slavic	808	0.20	Karachanak et al. 2013
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	75	0.20	Battaglia et al. 2009
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	95	0.19	Underhill et al. 2007
Eastern Europe	Macedonia	Greeks	Indo-European	Greek	57	0.18	Battaglia et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	75	0.17	Battaglia et al. 2009
Eastern Europe	Russia	Cossac	Indo-European	East Slavic	89	0.17	Underhill et al. 2007
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	47	0.17	Underhill et al. 2007
Eastern Europe	Voronez, Russia	Russians	Indo-European	East Slavic	96	0.16	Underhill et al. 2007
Mediterranean	Albania	Albanians	Indo-European	Albanian	55	0.15	Battaglia et al. 2009
Eastern Europe	Hungary	Hungarians	Uralic		53	0.14	Battaglia et al. 2009
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	399	0.13	Zupan et al. 2013

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M423	Reference
Mediterranean	Greece	Lerna/Franchthi Cave	Indo-European	Greek	57	0.12	King et al. 2011
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	53	0.11	Underhill et al. 2007
Eastern Europe	Hungary	Hungarians	Uralic		113	0.11	Underhill et al. 2007
Eastern Europe	Kostroma, Russia	Russians	Indo-European	East Slavic	53	0.11	Underhill et al. 2007
Eastern Europe	Smolensk, Russia	Russians	Indo-European	East Slavic	103	0.11	Underhill et al. 2007
Northern Eurasia	Pskov, Russia	Russians	Indo-European	East Slavic	130	0.10	Underhill et al. 2007
Eastern Europe	Slovakia	Slovaks	Indo-European	West Slavic	70	0.10	Underhill et al. 2007
Eastern Europe	Macedonia	Albanians	Indo-European	Albanian	64	0.09	Battaglia et al. 2009
Mediterranean	Greece	Nea Nikomedeia	Indo-European	Greek	57	0.09	King et al. 2011
Mediterranean	Northeastern Italy	Italians	Indo-European	Italic	67	0.09	Battaglia et al. 2009
Eastern Europe	Eastern Europe	Chuvash	Turkic		80	0.08	Rootsi et al. 2004
Mediterranean	Greece	Greeks	Indo-European	Greek	92	0.07	Battaglia et al. 2009
Middle East	Turkey	Western Anatolia	Turkic		30	0.07	King et al. 2011
Mediterranean	Greece	Seskio/Dimini	Indo-European	Greek	57	0.07	King et al. 2011
Northern Eurasia	Arkhangelsk, Russia	Russians	Indo-European	East Slavic	145	0.06	Underhill et al. 2007
Western Europe	Austria	Austrians	Indo-European	West Germanic	43	0.05	Underhill et al. 2007
Mediterranean	Greece	Smyrna	Indo-European	Greek	58	0.05	King et al. 2011
Mediterranean	Greece	Greeks	Indo-European	Greek	171	0.03	Underhill et al. 2007
Baltic	Estonia	Estonians	Uralic		210	0.03	Underhill et al. 2007
Baltic	Baltic	Veps	Uralic		39	0.03	Underhill et al. 2007
Mediterranean	Greece	Phokaia	Indo-European	Greek	31	0.03	King et al. 2011
Western Europe	Ireland	Irish	Indo-European	Italic	100	0.02	Underhill et al. 2007
Middle East	Turkey	Turks	Turkic		523	0.02	Underhill et al. 2007
Middle East	Turkey	Northwest Anatolia	Turkic		52	0.02	King et al. 2011

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M423	Reference
Mediterranean	Cyprus	Greek Cypriots	Indo-European	Greek	629	0.02	Voskarides et al. 2016.
Western Europe	United Kingdom	English	Indo-European	West Germanic	104	0.01	Underhill et al. 2007
Middle East	Turkey	Central Anatolia	Turkic		90	0.01	King et al. 2011
Baltic	Russia	Karelians	Uralic		140	0.01	Underhill et al. 2007

Table 5.9.4. Distribution of I-M253.

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M253	Reference
Scandinavia	Finland	Western Finland	Uralic		230	0.40	Lappalainen et al. 2008
Scandinavia	Norway	Norwegians	Indo-European	North Germanic	72	0.39	Rootsi et al. 2004
Scandinavia	Sweden	Swedes	Indo-European	North Germanic	305	0.37	Karlsson et al. 2006
Scandinavia	Sweden	Swedes	Indo-European	North Germanic	160	0.36	Lappalainen et al. 2008
Scandinavia	Denmark	Danes	Indo-European	North Germanic	122	0.33	Underhill et al. 2007
Scandinavia	Denmark	Danes	Indo-European	North Germanic	241	0.33	Olofsson et al. 2015
Scandinavia	Sweden	Sami	Uralic		38	0.32	Karlsson et al. 2006
Scandinavia	Osterbotten	Swedes	Indo-European	North Germanic	40	0.20	Karlsson et al. 2006
Scandinavia	Finland	Eastern Finland	Uralic		306	0.19	Lappalainen et al. 2008
Western Europe	France	French	Indo-European	Italic	58	0.17	Underhill et al. 2007
Eastern Europe	Corund, Romania	Szeklers	Uralic		97	0.17	Csányi et al 2008
Western Europe	Netherlands	Dutch	Indo-European	West Germanic	93	0.15	Underhill et al. 2007
Western Europe	United Kingdom	English	Indo-European	West Germanic	104	0.15	Underhill et al. 2007
Western Europe	Germany	Germans	Indo-European	West Germanic	125	0.15	Underhill et al. 2007
Baltic	Russia	Karelians	Uralic		132	0.15	Lappalainen et al. 2008
Baltic	Estonia	Estonians	Uralic		210	0.15	Underhill et al. 2007
Eastern Europe	Slovakia	Romani	Indo-European	Indo-Aryan	200	0.14	Petrejčíková et al. 2009
Eastern Europe	Northwestern Russia	Arkangelsk	Indo-European	East Slavic	28	0.14	Mirabal et al. 2009
Eastern Europe	Hungary	Hungarians	Uralic		113	0.13	Underhill et al. 2007
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	399	0.12	Zupan et al. 2013

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M253	Reference
Western Europe	France	Normandy	Indo-European	Italic	42	0.12	Underhill et al. 2007
Baltic	Estonia	Estonians	Uralic		118	0.12	Lappalainen et al. 2008
Western Europe	Flanders Region, Netherlands and Belgium	Flemish	Indo-European	West Germanic	773	0.12	Larmuseau et al 2014.
Eastern Europe	Eastern Europe	Mordvin	Uralic		83	0.12	Rootsi et al. 2004
Eastern Europe	Kostroma, Russia	Russians	Indo-European	East Slavic	53	0.11	Underhill et al. 2007
Mediterranean	Northeastern Italy	Italians	Indo-European	Italic	67	0.09	Battaglia et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	47	0.09	Underhill et al. 2007
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	75	0.09	Battaglia et al. 2009
Baltic	Russia	Karelians	Uralic		140	0.09	Underhill et al. 2007
Western Europe	Galicia	Galicians	Indo-European	Italic	44	0.09	Santos et al. 2014a
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	89	0.08	Battaglia et al. 2009
Eastern Europe	Serbia	Serbs	Indo-European	South Slavic	102	0.08	Regueiro et al. 2012.
Eastern Europe	Hungary	Hungarians	Uralic		100	0.08	Csányi et al 2008
Eastern Europe	Northwestern Russia	Tver	Indo-European	East Slavic	38	0.08	Mirabal et al. 2009
Eastern Europe	Hungary	Hungarians	Uralic		215	0.08	Völgyi et al. 2009
Northern Eurasia	Arkhangelsk, Russia	Russians	Indo-European	East Slavic	145	0.08	Underhill et al. 2007
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	75	0.07	Battaglia et al. 2009
Western Europe	Valencia	Valencians	Indo-European	Italic	59	0.07	Santos et al. 2014a
Eastern Europe	Macedonia	Greeks	Indo-European	Greek	57	0.07	Battaglia et al. 2009
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	95	0.07	Underhill et al. 2007
Northern Eurasia	Northern Russia	Russians	Indo-European	East Slavic	380	0.06	Balanovsky et al. 2008

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M253	Reference
Mediterranean	Greece	Phokaia	Indo-European	Greek	31	0.06	King et al. 2011
Western Europe	Switzerland	Swiss	Indo-European		144	0.06	Underhill et al. 2007
Middle East	Turkey	Northwest Anatolia	Turkic		52	0.06	King et al. 2011
Western Europe	Ireland	Irish	Indo-European	Italic	100	0.06	Underhill et al. 2007
Eastern Europe	Russia	Cossac	Indo-European	East Slavic	89	0.05	Underhill et al. 2007
Mediterranean	Sicily	Sicilians	Indo-European	Italic	236	0.05	Di Gaetano et al. 2009
Mediterranean	Italy	Arbereshe	Indo-European	Albanian	150	0.05	Sarno et al. 2016
Eastern Europe	Northwestern Russia	Kursk	Indo-European	East Slavic	40	0.05	Mirabal et al. 2009
Baltic	Latvia	Latvians	Indo-European	Baltic	86	0.05	Rootsi et al. 2004
Eastern Europe	Moldova	Moldavians	Indo-European	Italic	125	0.05	Varzari et al. 2013
Western Europe	Southern France	French	Indo-European	Italic	38	0.05	Rootsi et al. 2004
Mediterranean	Greece	Smyrna	Indo-European	Greek	58	0.05	King et al. 2011
Western Europe	Catalan	Catalonians	Indo-European	Italic	111	0.05	Santos et al. 2014a
Eastern Europe	Macedonia	Albanians	Indo-European	Albanian	64	0.05	Battaglia et al. 2009
Eastern Europe	Belarus	Belarusians	Indo-European	East Slavic	565	0.05	Kushniarevich et al. 2013
Northern Eurasia	Pskov, Russia	Russians	Indo-European	East Slavic	130	0.05	Underhill et al. 2007
Eastern Europe	Ukraine	Ukrainians	Indo-European	East Slavic	506	0.05	Underhill et al. 2007
Eastern Europe	Central Russia	Russians	Indo-European	East Slavic	364	0.05	Balanovsky et al. 2008
Baltic	Lithuania	Lithuanians	Indo-European	Baltic	164	0.05	Lappalainen et al. 2008
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	257	0.05	Luca et al. 2007
Eastern Europe	Bulgaria	Bulgarians	Indo-European	South Slavic	808	0.04	Karachanak et al. 2013

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M253	Reference
Eastern Europe	Hungary	Hungarians	Uralic		53	0.04	Battaglia et al. 2009
Western Europe	Zamora Province	Spanish	Indo-European	Italic	235	0.04	Alvarez et al. 2014.
Eastern Europe	Poland	Poles	Indo-European	West Slavic	99	0.04	Battaglia et al. 2009
Mediterranean	Greece	Seskio/Dimini	Indo-European	Greek	57	0.04	King et al. 2011
Eastern Europe	Bosnia-Herzegovina	Bosniacs	Indo-European	South Slavic	84	0.04	Battaglia et al. 2009
Mediterranean	Albania	Albanians	Indo-European	Albanian	223	0.04	Sarno et al. 2016
Mediterranean	Albania	Albanians	Indo-European	Albanian	55	0.04	Battaglia et al. 2009
Northern Eurasia	Northern Eurasia	Komi	Uralic		110	0.04	Rootsi et al. 2004
Baltic	Latvia	Latvians	Indo-European	Baltic	113	0.04	Lappalainen et al. 2008
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	720	0.04	Sarac et al. 2016
Eastern Europe	Slovakia	Slovaks	Indo-European	West Slavic	70	0.04	Underhill et al. 2007
Eastern Europe	Southern Russia	Russians	Indo-European	East Slavic	484	0.04	Balanovsky et al. 2008
Mediterranean	Crete	Cretans	Indo-European	Greek	168	0.03	Martinez et al. 2007
Eastern Europe	Voronez, Russia	Russians	Indo-European	East Slavic	96	0.03	Underhill et al. 2007
Eastern Europe	Bosnia-Herzegovina	Serbs	Indo-European	South Slavic	81	0.03	Battaglia et al. 2009
Middle East	Turkey	Mediterranean Anatolia	Turkic		33	0.03	King et al. 2011
Baltic	Baltic	Veps	Uralic		39	0.03	Underhill et al. 2007
Caucasus	Caucasus Russia	Lezgians	North Caucasian		31	0.03	Yunusbayev et al. 2012
Mediterranean	Northern Italy	Italians	Indo-European	Italic	194	0.03	Rootsi et al. 2004
Eastern Europe	Bosnia	Bosniacs	Indo-European	South Slavic	100	0.02	Underhill et al. 2007
Mediterranean	Central Italy	Italians	Indo-European	Italic	196	0.02	Rootsi et al. 2004
Western Europe	Lyon and Portier, France	French	Indo-European	Italic	99	0.02	Rootsi et al. 2004

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M253	Reference
Mediterranean	Greece	Nea Nikomedeia	Indo-European	Greek	57	0.02	King et al. 2011
Mediterranean	Greece	Lerna/Franchthi Cave	Indo-European	Greek	57	0.02	King et al. 2011
Eastern Europe	Smolensk, Russia	Russians	Indo-European	East Slavic	103	0.02	Underhill et al. 2007
Middle East	Iran	Gilaki	Indo-European	Iranian	64	0.02	Grugni et al. 2012
Western Europe	France	Provence	Indo-European	Italic	51	0.02	King et al. 2011
Eastern Europe	Northwestern Russia	Komi	Uralic		54	0.02	Mirabal et al. 2009
Mediterranean	Greece	Greeks	Indo-European	Greek	92	0.02	Battaglia et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	53	0.02	Underhill et al. 2007
Mediterranean	Greece	Greeks	Indo-European	Greek	171	0.02	Underhill et al. 2007
Western Europe	Austria	Austrians	Indo-European	West Germanic	43	0.02	Underhill et al. 2007
Caucasus	Caucasus Russia	Andis	North Caucasian		49	0.02	Yunusbayev et al. 2012
Caucasus	Georgia	Georgians	Kartvelian		66	0.02	Battaglia et al. 2009
Middle East	Turkey	Turks	Turkic		523	0.01	Underhill et al. 2007
Western Europe	Portugal	Portuguese	Indo-European	Italic	303	0.01	Rootsi et al. 2004
Caucasus	Caucasus Russia	Kabardians	North Caucasian		140	0.01	Yunusbayev et al. 2012
Eastern Europe	Ukraine	Ukrainians	Indo-European	East Slavic	92	0.01	Battaglia et al. 2009
Middle East	Turkey	Turks	Turkic		523	0.01	Cinnioğlu et al. 2004
Middle East	Turkey	Central Anatolia	Turkic		90	0.01	King et al. 2011

Table 5.9.5. Distribution of I-M26.

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M26	Reference
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	0.40	Francalacci et al. 2015
Mediterranean	Sardinia	Cagliari, Sorgono, Tempio	Indo-European	Italic	930	0.37	Contu et al. 2008
Western Europe	Pyrenees Mountains, Spain and France	Cerdana	Indo-European	Italic	37	0.16	López-Parra et al. 2009
Western Europe	Pyrenees Mountains, Spain and France	Jacetania	Indo-European	Italic	31	0.10	López-Parra et al. 2009
Western Europe	Pyrenees Mountains, Spain and France	Cinco Villas	Indo-European	Italic	42	0.10	López-Parra et al. 2009
Western Europe	Bernais	French	Indo-European	Italic	26	0.08	Rootsi et al. 2004
Western Europe	Pyrenees Mountains, Spain and France	Valle de Aran	Indo-European	Italic	25	0.08	López-Parra et al. 2009
Western Europe	France and Spain	Basques	Isolate		100	0.06	Rootsi et al. 2004
Western Europe	Catalan	Catalonians	Indo-European	Italic	111	0.04	Santos et al. 2014a
Western Europe	France	Normandy	Indo-European	Italic	42	0.03	Underhill et al. 2007
Western Europe	Pyrenees Mountains, Spain and France	Alto Urgel	Indo-European	Italic	34	0.03	López-Parra et al. 2009
Western Europe	Ireland	Irish	Indo-European	Italic	100	0.02	Underhill et al. 2007
Mediterranean	Italy	Arbereshe	Indo-European	Albanian	150	0.02	Sarno et al. 2016
Eastern Europe	Macedonia	Albanians	Indo-European	Albanian	64	0.02	Battaglia et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	257	0.01	Luca et al. 2007

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M26	Reference
Western Europe	Portugal	Romani	Indo-European	Indo-Aryan	126	0.01	Gusmão et al. 2008
Mediterranean	Central Italy	Italians	Indo-European	Italic	196	0.01	Rootsi et al. 2004
Western Europe	Lyon and Portier, France	French	Indo-European	Italic	99	0.01	Rootsi et al. 2004
Western Europe	Valencia	Valencians	Indo-European	Italic	59	0.01	Santos et al. 2014a
Western Europe	Galicia	Galicians	Indo-European	Italic	44	0.01	Santos et al. 2014a

Table 5.9.6. Distribution of I-M223.

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M223	Reference
Mediterranean	Italy	Arbereshe	Indo-European	Albanian	150	0.10	Sarno et al. 2016
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	47	0.06	Underhill et al. 2007
Mediterranean	Greece	Phokaia	Indo-European	Greek	31	0.06	King et al. 2011
Western Europe	Germany	Germans	Indo-European	West Germanic	125	0.06	Underhill et al. 2007
Scandinavia	Denmark	Danes	Indo-European	North Germanic	122	0.05	Underhill et al. 2007
Western Europe	Netherlands	Dutch	Indo-European	West Germanic	93	0.05	Underhill et al. 2007
Western Europe	France	Normandy	Indo-European	Italic	42	0.05	Underhill et al. 2007
Scandinavia	Sweden	Swedes	Indo-European	North Germanic	305	0.05	Karlsson et al. 2006
Western Europe	Southern France	French	Indo-European	Italic	38	0.05	Rootsi et al. 2004
Eastern Europe	Eastern Europe	Mordvin	Uralic		83	0.05	Rootsi et al. 2004
Mediterranean	Greece	Seskio/Dimini	Indo-European	Greek	57	0.04	King et al. 2011
Mediterranean	Albania	Albanians	Indo-European	Albanian	55	0.04	Battaglia et al. 2009
Eastern Europe	Kostroma, Russia	Russians	Indo-European	East Slavic	53	0.04	Underhill et al. 2007
South Asia	Pakistan	Hazara	Indo-European	Iranian	25	0.04	Di Cristofaro et al. 2013
Western Europe	Flanders Region, Netherlands and Belgium	Flemish	Indo-European	West Germanic	773	0.03	Larmuseau et al 2014.
Eastern Europe	Eastern Europe	Chuvash	Turkic		80	0.03	Rootsi et al. 2004
Eastern Europe	Hungary	Hungarians	Uralic		215	0.03	Völgyi et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	257	0.03	Luca et al. 2007
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	75	0.03	Battaglia et al. 2009
Western Europe	Zamora Province	Spanish	Indo-European	Italic	235	0.03	Alvarez et al. 2014.
Mediterranean	Central Italy	Italians	Indo-European	Italic	196	0.03	Rootsi et al. 2004
Central Asia	Afghanistan	Hazara	Indo-European	Iranian	60	0.03	Haber et al. 2012

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M223	Reference
Baltic	Lithuania	Lithuanians	Indo-European	Baltic	164	0.02	Lappalainen et al. 2008
Mediterranean	Northeastern Italy	Italians	Indo-European	Italic	67	0.02	Battaglia et al. 2009
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	56	0.02	Haber et al. 2012
Middle East	Turkey	Northwest Anatolia	Turkic		52	0.02	King et al. 2011
Mediterranean	Greece	Lerna/Franchthi Cave	Indo-European	Greek	57	0.02	King et al. 2011
Eastern Europe	Central Russia	Russians	Indo-European	East Slavic	364	0.02	Balanovsky et al. 2008
Mediterranean	Greece	Nea Nikomedeia	Indo-European	Greek	57	0.02	King et al. 2011
Eastern Europe	Bulgaria	Bulgarians	Indo-European	South Slavic	808	0.02	Karachanak et al. 2013
Scandinavia	Sweden	Swedes	Indo-European	North Germanic	160	0.02	Lappalainen et al. 2008
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	53	0.02	Underhill et al. 2007
Eastern Europe	Hungary	Hungarians	Uralic		113	0.02	Underhill et al. 2007
Eastern Europe	Russia	Cossac	Indo-European	East Slavic	89	0.02	Underhill et al. 2007
Western Europe	Portugal	Portuguese	Indo-European	Italic	303	0.02	Rootsi et al. 2004
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	0.02	Francalacci et al. 2015
Mediterranean	Albania	Albanians	Indo-European	Albanian	223	0.02	Sarno et al. 2016
Mediterranean	Greece	Greeks	Indo-European	Greek	171	0.02	Underhill et al. 2007
Middle East	Turkey	Central Anatolia	Turkic		90	0.01	King et al. 2011
Eastern Europe	Belarus	Belarusians	Indo-European	East Slavic	565	0.01	Kushniarevich et al. 2013
Eastern Europe	Bosnia-Herzegovina	Serbs	Indo-European	South Slavic	81	0.01	Battaglia et al. 2009
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	89	0.01	Battaglia et al. 2009
Eastern Europe	Czech Republic	Czechs	Indo-European	West Slavic	75	0.01	Battaglia et al. 2009
Middle East	Iran	Hazara	Indo-European	Iranian	69	0.01	Di Cristofaro et al. 2013
Scandinavia	Norway	Norwegians	Indo-European	North Germanic	72	0.01	Rootsi et al. 2004
Western Europe	Lyon and Portier, France	French	Indo-European	Italic	99	0.01	Rootsi et al. 2004

Region	Location	Population	Lang Fam	Branch	Sample Size	Freq I-M223	Reference
Western Europe	Andalusia	Andalusians	Indo-European	Italic	103	0.01	Rootsi et al. 2004
Mediterranean	Northern Italy	Italians	Indo-European	Italic	194	0.01	Rootsi et al. 2004
Mediterranean	Crete	Cretans	Indo-European	Greek	168	0.01	Martinez et al. 2007
Baltic	Estonia	Estonians	Uralic		210	0.01	Underhill et al. 2007
Western Europe	Switzerland	Swiss	Indo-European		144	0.01	Underhill et al. 2007
Middle East	Turkey	Turks	Turkic		523	0.01	Underhill et al. 2007
Scandinavia	Finland	Eastern Finland	Uralic		306	0.01	Lappalainen et al. 2008
Western Europe	Ireland	Irish	Indo-European	Italic	100	0.01	Underhill et al. 2007
Eastern Europe	Serbia	Serbs	Indo-European	South Slavic	102	0.01	Regueiro et al. 2012.
Eastern Europe	Slovenia	Slovenes	Indo-European	West Slavic	399	0.01	Zupan et al. 2013
Eastern Europe	Croatia	Croats	Indo-European	South Slavic	720	0.01	Sarac et al. 2016
Eastern Europe	Southern Russia	Russians	Indo-European	East Slavic	484	0.01	Balanovsky et al. 2008
Baltic	Latvia	Latvians	Indo-European	Baltic	86	0.01	Rootsi et al. 2004
Scandinavia	Finland	Western Finland	Uralic		230	0.01	Lappalainen et al. 2008
Western Europe	United Kingdom	English	Indo-European	West Germanic	104	0.01	Underhill et al. 2007
Baltic	Latvia	Latvians	Indo-European	Baltic	113	0.01	Lappalainen et al. 2008
Baltic	Estonia	Estonians	Uralic		118	0.01	Lappalainen et al. 2008
Eastern Europe	Moldova	Moldavians	Indo-European	Italic	125	0.01	Varzari et al. 2013
Middle East	Turkey	Turks	Turkic		523	0.01	Cinnioğlu et al. 2004

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