Paper 5.7: Haplogroup G Report.

Abstract: Haplogroup G-M201 and its variants facilitate a discussion of the spread of Indo-European languages and the theoretical approaches to this problem. The current distribution of Indo-European languages follows the initial expansion of early agriculture from Southwest Asia. The role of steppe nomads, on the other hand, is minimal. The G-M201 mutation also facilitates an examination of the complex tapestry of language variation in the Caucasus region. Based on the genetic evidence, cultural and geographic isolation play a role in defining the position of North Caucasian and Kartvelian languages within the global linguistic tapestry. Finally, the genetic evidence points to the Indus Valley of Pakistan and India as the point of dispersal for Dravidian languages.

Posted: February 12, 2018
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Please cite as: St. Clair, Michael R. 2018a. “Paper 5.7: haplogroup G report.” *The Genetic-Linguistic Interface.* Series 5 Papers: language prehistory from a Y-Chromosome perspective. Posted February 12, 2018. https://genlinginterface.com

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Paper 5.7. Haplogroup G-M201.

The Genetic-Linguistic Interface.

Section 1. Overview of G-M201.

At this point the reader is directed to Figure 5.1.1 from Paper 5.1. DR-M168 represents all Y-chromosome mutations that evolved outside of Africa. As previously detailed in Papers 5.4-5.6, Haplogroups D-M174, E-M96 and C-M130 initially evolved in the Middle East. The sister clade of C-M130, the FR-M89 mutation, eventually evolved into G-M201 and HR-M578 around forty-six thousand years ago (Poznik et al. 2016: Supplementary Table 10). G-M201 also evolved in the Middle East (e.g. Rootsi et al. 2012), like D-M174, E-M96 and C-M130. However, D-M174, E-M96 and C-M130 underwent major expansions out of Southwest Asia beginning in the Pleistocene about fifty thousand years go. G-M201, on the other hand, began to expand out of this region much later, roughly ten to twelve thousand years ago, a period that coincides with the evolution of agriculture in Southwest Asia (See Rootsi et al 2012: Main Report and Supplementary Table 4).

As shown by Table 5.7.1, the frequency of the G-M201 peaks in Caucasus and then tapers off to less than ten percent elsewhere. It should be noted that although G-M201 attains a heavy frequency among some of the Kazakh tribes, overall G-M201 frequencies in Central Asia are, nevertheless, low (i.e. Zhabagin et al. 2017). Turning to the internal phylogeny of G-M201, within this mutation one finds two main branches, G1-M285 and G2-P287 (see, also, Figure 5.7.1). As shown by Table 5.7.2, the distribution of G1-M285 is rather limited and is confined almost exclusively to populations in Asia. Table 5.7.3, on the other hand, indicates that the distribution of G2-P287 is much broader, having a range that extends from Western Europe to Central Asia.

As noted previously, G-M201 and its variants expanded out of Southwest Asia during the Neolithic. The evolution of agriculture in Southwest Asia was previously introduced in Paper 5.5, Hg. E, Section 2. As detailed in this discussion, the literature often pinpoints the so-called "Fertile Crescent" as the homeland of agriculture within this region. About fourteen thousand years ago people initially harvested wild cereals. This led to a series of innovations that included the development of pottery, the genetic modification of cereals and legumes for cultivation, and the domestication of goats and sheep. As detailed in Paper 5.5, agriculture in Southwest Asia eventually spread into North and East Africa roughly 6.4 thousand years ago. Furthermore, as mentioned in Paper 5.6, Hg. C, Section 7.3, about 4.5 thousand years ago, elements of Southwest Asia agricultural package also spread to the Central Asian steppes.

Turning now to Europe, South Asia, Central Asia, and the Caucasus, the Neolithic transformation in all four regions resulted from an expansion of agriculture from Southwest Asia. Within these regions, downstream variants of G-M201 now stand as the genetic relic of this transformation. For linguists this observation facilitates three different discussions. First, G-M201 variation supports the *early farming dispersal hypothesis* (Bellwood 2005:1-11). According to the hypothesis the current distribution of many language families throughout the world follows the initial expansion of early agriculture, an innovation that evolved independently in several regions of the world. Taking this a step further, within the context of Indo-European languages, the initial expansion of this language family from the Middle East to Western Europe and India follows the westward and eastward Neolithic expansion of agriculture from Southwest Asia that began about nine thousand years ago (Bellwood 2005: 67-97; 201-207). Surprisingly, within a South Asian context, the *early farming dispersal*

hypothesis may also explain the expansion of Dravidian languages from Pakistan to southern India. This is based on the observed frequency of G-M201 as found in the Brahui of Pakistan and that found among the Dravidian-speaking farmers of Southern India.

The second discussion raised by the distribution of G-M201 variation is that these data undermine a longstanding hypothesis that associates the spread of Indo-European with an expansion of steppe nomads from Eastern Europe or Central Asia (e.g. Gimbutas 1997; Ringe and Anthony 2015). More specifically, G-M201 demonstrates the absence of a major demographic Bronze Age migration from the steppes as advocated by proponents of this hypothesis. Of course, a major demographic expansion is not a prerequisite for language expansion as was the case with Turkish after the fall of the Byzantine Empire. However, such a scenario, especially for Indo-European, would imply that people over a vast expansion, from Western Europe to India, switched languages as the result of language contact with steppe nomads. In fact, Anthony (2008) proposes the status and prestige of steppe nomad culture mediated this switch in languages.

The *early farming dispersal hypothesis* (Bellwood 2005), on the other hand, provides a much more empirical explanation of how Indo-European spread over a vast geographical expanse. Europe and South Asia underwent the exact same cultural transformation at almost exactly the same time, the adoption of the Southwest Asian agricultural package beginning eight to nine thousand years ago. Of course, another persuasive aspect of the *early farming dispersal hypothesis* is that it follows a trend observed throughout the world. In other words, Indo-European is just one of several different language families that co-expanded with the spread of early agriculture. The other language families include Arawak, Niger-Congo, Afro-Asiatic, Sino-Tibetan, Trans-New Guinea, Uralic, Austro-Asiatic and Austronesian. Thus, proponents of the *Kurgan hypothesis* must ask themselves the following question: Why should Indo-European be an exception?

Finally, the G-M201 mutation facilitates an examination of the complex tapestry of language variation in the Caucasus region. Within this compact region four different languages are represented: Indo-European, North Caucasian, Kartvelian, and Turkic. Haplogroup G-M201 helps to provide an explanation because the mutation attains an astonishingly high frequency among several populations in the region. As shown by Table 5.7.1, among Indo-European-speaking Ossetians the frequency is about seventy percent. Among Georgians (Kartvelian languages) the frequency is around fifty percent. Among the Abkhaz (North Caucasian) the mutation attains a similar frequency. Finally, among Turkic-speaking populations, such as Balkars and Karachays, the frequency is also significant, close to thirty percent. These data clearly suggest the cultural effects of endogamy and the associated genetic phenomenon of drift. For linguists, this reinforces the idea that cultural and geographic isolation can play a role in defining linguistic variation.

Section 2. The Neolithic in Europe.

Agriculture and Indo-European languages may well have co-expanded across Europe during the Neolithic. According to Bellwood (2005: 67-84), the expansion of agriculture from Southwest Asia to Europe follows three different trajectories. The first trajectory involves the maritime colonization of the Mediterranean islands. About ten thousand years, farmers from Anatolia (modern-day Turkey) settled on the island of Cyprus. Then, farmers migrated to Crete, Corsica and Sardinia. From a Y-chromosome perspective, the G2-L91

mutation is a particularly strong genetic relic of these maritime expansions (See Table 5.7.8; Rootsi et al. 2012; Francalacci et al. 2015; Voskarides et al. 2016).

The second trajectory involves the expansion of farming along the southern Mediterranean coast of mainland Europe, from Western Turkey to Portugal. This began about 8.5 thousand years ago and required about a thousand years. The third and final trajectory involves an expansion of farming that also began from Western Turkey. Here, farming expanded northwards through the Balkans and then westwards across Central Europe. This expansion also required about a thousand years and is often identified in the literature as an expansion of the Linear Pottery Culture (LBK). A particularly strong genetic relic of the LBK expansion is the G2-L497 mutation (See Table 574). Other genetic relics include the G2-M406 mutation (see Table 5.7.7) and G2-M527 (See Table 5.6.6). See, also, Rootsi et al. (2012) and Berger et al. (2013).

Three additional points concerning the European Neolithic are worth mentioning. First, Europe received the full Neolithic package from Southwest Asia, which included pottery, cereals such as einkorn and emmer wheat, legumes such as lentils, and farm animals, such as sheep, goats, and pigs. Second, by 5400 BC the Linear Pottery Culture expansion had terminated at the coastal plain of Northern Germany and the English Channel in the Low Countries. The Neolithic transition in the British Isles required about another thousand years, and Scandinavia required an even longer period of time. Finally, variants of haplogroup G-M201 have been found in ancient DNA samples taken from human remains found in Europe at archeological sited dated to the Neolithic period (e.g. Haak et al. 2010; Lacan et al. 2011; Szecsenyi-Nagy et al. 2015; Fregel et al. 2017).

Section 3. The Neolithic in South Asia.

According to the *early farming dispersal hypothesis* (Bellwood 2005), the arrival of Indo-European Languages in Southern Asia follows the spread of agriculture from Southwest Asia during the Neolithic. It should be noted that the Neolithic in South Asia (contemporary Pakistan and India) saw the adoption of Southwest Asian crops such as wheat, barley, lentils, chickpeas, flax and linseed (e.g. Fuller 2006: 20). However, linguists should also note that besides a Southwest Asian component, the Neolithic transition in India also saw the adoption of crops from Africa, such as sorghum and cowpeas (e.g. Crowther et al. 2017), as well as rice from East Asia (see Paper 5.15, Hg. O, Sections 2 and 11).

Focusing now on just the Southwest Asian component of the South Asian Neolithic, Bellwood (2005: 86-95) is not exactly clear as to the timing of an eastward expansion of agriculture from the Fertile Crescent to South Asia. The most likely path would have probably traversed the southern shore of Caspian Sea rather than traversing through the Iranian deserts. What is more certain is that by around nine thousand years ago numerous farming settlements appeared in Mehrgarh, which is found in the Balochistan region of Pakistan. Shortly thereafter, farmers penetrated the Indus Valley of Pakistan and western India. The Neolithic transition in the Indus Valley is often attributed to the Harappan culture in the literature. Over the course of several thousand years, elements of the Southwest Asian agricultural package eventually migrated eastwards from the Indus Valley into the Ganges Valley and southwards into southern India and Sri Lanka.

Haplogroup G-M201 records a weak but important signal of the Southwest Asian agricultural expansion among Pakistani and Indian populations. For Pakistan as a whole Sengupta et al (2006) report a frequency of around 4.6 percent. However, G-M201 frequencies appear somewhat stronger among Indo-Iranian speaking populations in Pakistan, such as the Kalash and Pashtuns (Di Cristofaro et al. 2013, Lee et al 2014). Turning now to India, Sengupta et al. (2006) report that G-M201 represents less than one percent of the population. Interestingly, the figure stands at around five percent in the Tamil Nadu region at the southern tip of India. This was reported in a study (Arunkumar et al. 2012) presenting data for over sixteen hundred men, many of whom are Dravidian-speaking farmers.

The unexpected frequency of G-M201 among the Dravidian farmers of Tamil Nadu, as reported by Arunkumar (2012) certainly reflects the potential of this haplogroup as an informative mutation for deciphering the evolution of Dravidian languages. The Dravidian language consists of eighty-five languages spoken by around 228 million people (*Ethnologue* 2017). Examples include Tamil, Malayalam, Kannada, and Telugu.

It should be noted that Dravidian-speakers are mostly found in southern India. However, the Brahui people and language of Pakistan represent a distant linguistic island of two million Dravidian speakers in a sea of Indo-European-speakers. Like the Dravidian populations of southern India, haplogroup G-M201 also surfaces among the Brahui at a frequency of sixteen percent (see Di Cristofaro et al. 2013 and Table 5.7.11). This raises an interesting question, whether the Indus Valley defines the putative source of Dravidian. The status of haplogroup G-M201 as a genetic marker of the South Asian Neolithic, the location of Brahui within the territory once held by Harappan culture, and the spread of the agriculture from this area into southern India, as told by the archaeological record, seem to support this position. Perhaps the Brahui are descendants of hunter-gatherers that admixed with Southwest Asian farmers during the Neolithic and adopted agriculture as a subsistence strategy while retaining Dravidian. The admixed population then migrated out of the Indus Valley along with Indo-European speaking populations. Such a scenario is akin to what is seen in African population with the E-M293 mutation. This mutation follows the southward migration of Nilo-Saharan farmers from East Africa, some of whom joined hunter-gatherer societies such as the Hadza and or Sandawe (See Paper 5.5, Hg. E, Section 4 and Henn et al. 2008).

It should be noted that variants of the J2-M172 mutation provide a stronger signal for the South Asian Neolithic. Accordingly, the discussion of language variation in South Asia continues in Paper 5.10.

Section 4. The Neolithic in Central Asia.

The Central Asian Neolithic was previously introduced in Paper 5.6, Section 9. On the Central Asian steppes, which stretch from Eastern Europe to Mongolia, mobile pastoralism has been the survival strategy for thousands of years. Agriculture in this region began about 5.5 thousand years ago in north-central Kazakhstan with the domestication of the horse. About a thousand years later, cattle, goats and sheep appeared on the steppes and became part of the pastoral food economy. Finally, about four thousand years ago, mobile pastoralists began to cultivate crops such as millet, barley and wheat. China was the source of millet. Barley, wheat, goats and sheep, came from Southwest Asia.

The evolution of mobile pastoralism on the Central Asian steppes represents a significant development for linguists as many believe that steppe nomads were responsible for initial dispersal of Indo-European languages (e.g. Anthony and Ringe 2015). Their position advocates a southward expansion of steppe nomads as the source of Indo-Iranian languages as found in Iran and South Asia. However, the archaeological record fails to support a mass southward migration of steppe nomads. Rather, mobile pastoralism in Central Asia represents a one-way expansion of farming from Southwest Asia. Additional archeological support for this position comes from Jeitun, an archaeological site in Turkmenistan near the Iranian border. This site represents the earliest expansion of agriculture from Southwest Asia into Central Asia, dating to about eight thousand years ago (Bellwood 2005: 84-86). Soon thereafter, agriculture appeared among the Hissar culture of Tadjikistan, at Kel'teminar in Kazakhstan, within the Ferghana Valley of Uzbekistan, and at Oshkona in Tadjikistan (Fuller 2006). Being that Jeitun lies a considerable distance south of where steppe pastoralism arose, researchers have evidence of a slow northward advance of the Southwest Asian agricultural package onto the Central Eurasian steppes.

In the Central Asian country of Afghanistan the frequency of G-M201 among Indo-Iranian speaking Pashtuns and Tajiks suggests that this marker might record the history of Indo-European population expansions in this region (Lacau et al. 2012; Di Cristofaro et al. 2013; Lee et al. 2014). Furthermore, among the Pashtuns the G-M377 mutation stands as a particularly strong G-M201 variant (see Table 5.7.9). Thus, Indo-Iranian populations in Central Asia may have descended from the Neolithic farmers that settled in Jeitun and the Indus Valley. Additional support for this position comes from Balanovsky et al. (2015). This study focused on the distribution of G1-M287 variation in Asia. Based on their analysis of the data they found that the expansion of Indo-Iranian languages correlates well with an expansion of agriculture from Southwest Asia, rather than a southward migration of steppe nomads. Furthermore, in Iran, which represents a transit point for the expansion of Indo-Iranian populations into Central and South Asia, G-M201 attains a frequency of almost twelve percent (Grugni et al 2012). Finally, within the Central Asian region of Transoxiana the G-M201 mutation has an overall frequency of about three percent and stands as the genetic relic of farmers that entered the region from the south during the Neolithic (Zhabagin et al. 2017).

Section 5. The Neolithic in the Caucasus.

The G2-P16 and G2-U1 mutations represent most of the G-M201 variants in the Caucasus (Rootsi et al. 2012). See, also, Tables 5.7.5 and 5.7.10. The Caucasus region lies between the Black and Caspian Seas, and includes parts of Russia as well as Armenia, Azerbaijan, and Georgia. The Southwest Asian agricultural package arrived in the Caucasus region about 8.5 thousand years ago (Bellwood 2005: 85). Geneticists suggest that the arrival of agriculture in the region also brought populations with the haplogroup G-M201 mutation (e.g. Herrera et al. 2012; Rootsi et al 2012; Yunusbayev et al. 2012; Hovhannisyan et al. 2014; Karafet et al. 2016). However, the Caucasus region may well have been an Ice Age refugium populations with G-M201 (Gavashelishvili and Tarkhnishvili 2016), and as such, the original source population for the mutation potentially came from this region.

One interesting question that has surfaced from genetic studies of the Caucasus involves Indo-European languages. A recent study (Balanovsky et al. 2017) extended the Caucasus region out onto the Armenian plateau of eastern Turkey, the homeland of the Armenian people. The study asserts that genetic variation in Southwest Asia follows a

lowland/upland contrast. In the lowland, which the study defines as the Levant, Mesopotamia and the Arabian Peninsula, one finds Afro-Asiatic. In the uplands, which the researchers define as the Anatolian, Armenian and Iranian plateaus, one finds Turkic and Indo-European. Turkic, of course, later migrated into the region. Indo-European, on the other hand, potentially originated in the Southwest Asian highlands. Given the close proximity of Armenians to this purported Indo-European homeland, and given the elevated frequency of G-M201 within this population, Armenians and haplogroup G-M201 seem to be part of the equation that defines the origins and spread of the Indo-European language family. On the other hand, in the Caucasus one also finds populations that speak North Caucasian and Kartvelian languages. Perhaps these languages are indigenous, and Indo-European represents languages that were imported into the Caucasus from Anatolia or the Levant. Furthermore, among North Caucasian and Kartvelian populations, haplogroup G also attains a substantial frequency similar to what is seen among Indo-European-speaking populations.

In an interesting paper from 2008 the linguist Bernard Comrie suggested that extreme linguistic variation found in the Caucasus reflects populations that have remained isolated because of topography and strict adherence to endogamy (marriage within the same group). From a genetics perspective, this isolation would suggest that genetic drift in the region has limited genetic variation, and as such has produced the high frequency of G-M201 among many of the populations of the region. Following now the cultural and geographic isolation as seen in the Caucasus, it would appear that such isolation defines the position of several language families within the global tapestry of languages, families that include North Caucasian and Kartvelian.

Section 6. Conclusions for G-M201.

Haplogroup G-M201 and its variants facilitate a discussion of the spread of Indo-European languages and the theoretical approaches to this problem. Another important marker for this discussion is J2-M172. Accordingly, this discussion continues in Paper 5.10. However, a preliminary remark is in order here: wherever you find J2-M172, G-M201 is close behind. The distribution of G-M201 variation is, indeed, rather interesting and at times puzzling. For example, the G2-L30 variant is found in Judeo Tats, Bagvalal, and Nogais of the Caucasus region (Karafet et al. 2016). However, the same mutation is also found in Flanders (Larmuseau et al. 2014). Given the distances involved, G-M201 must have expanded very rapidly during the Neolithic, and this expansion suddenly stopped.

Besides Indo-European, G-M201 variation helps to decipher the prehistory of the Dravidian, Kartvelian, and North Caucasian language families. Potentially, the putative homeland of Dravidian languages is the Indus Valley. Kartvelian and North Caucasian represent indigenous languages of the Caucasus that never expanded out of this region due to cultural and geographic isolation.

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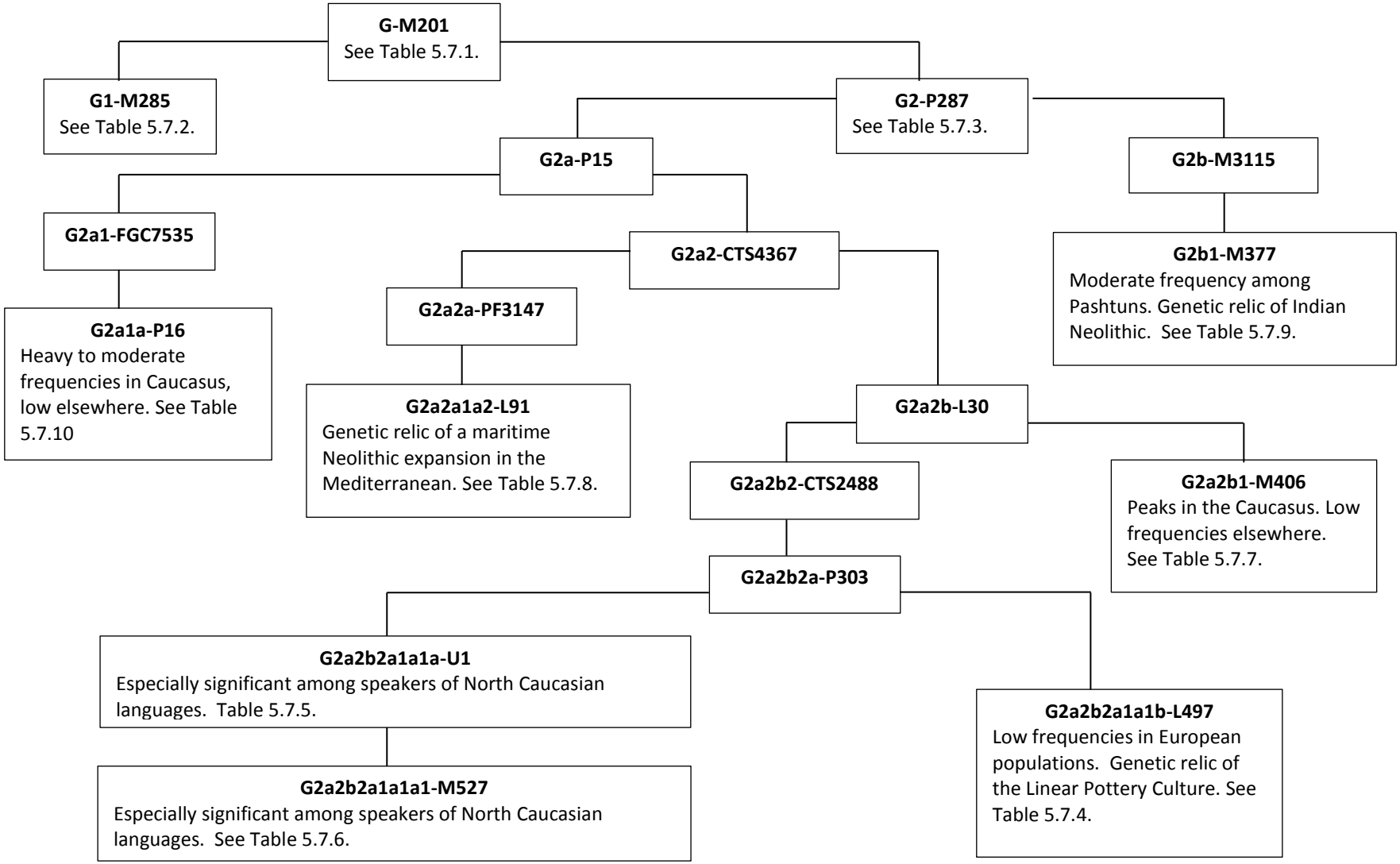
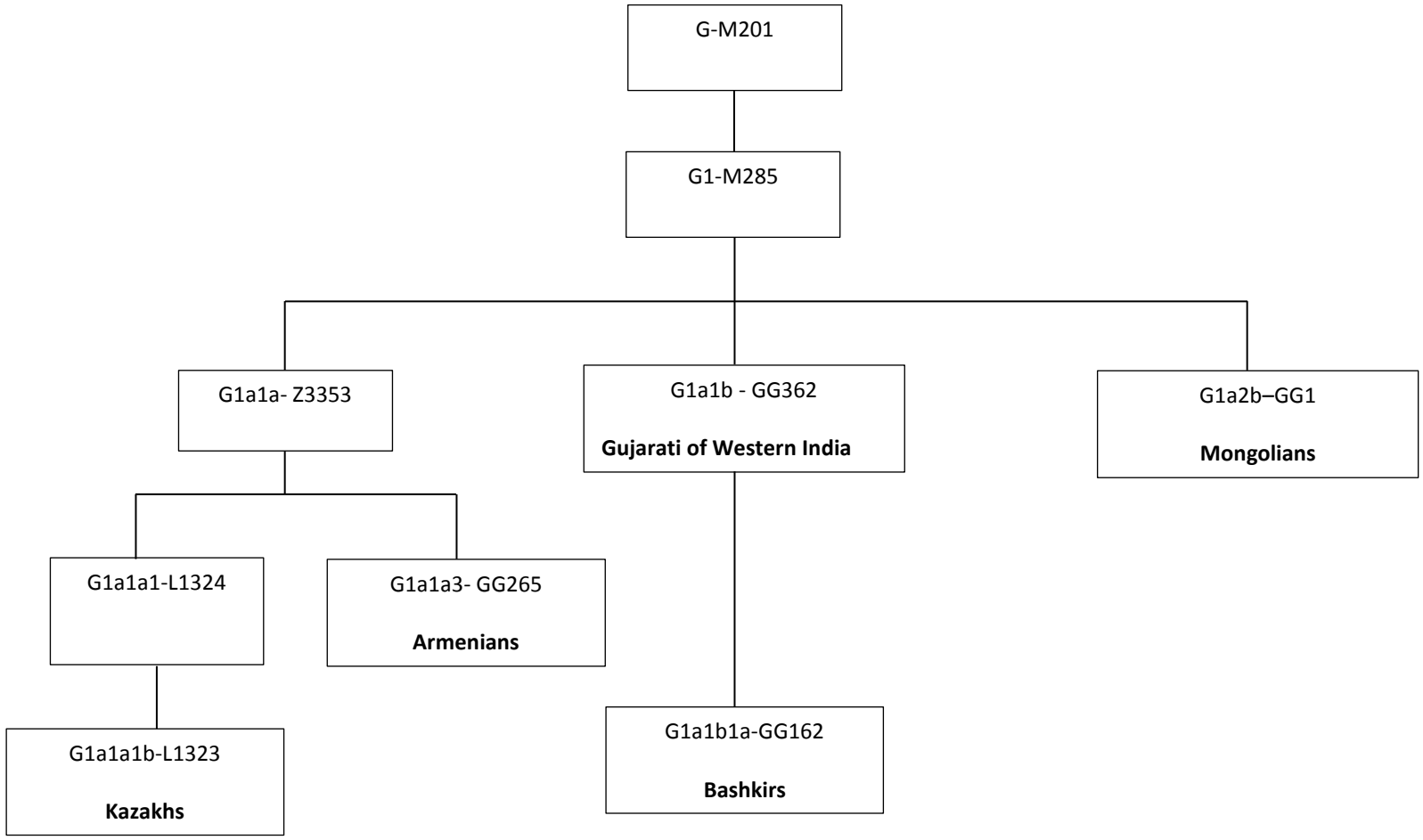
Figure 5.7.1. Overview of G2-P287 and its Internal Phylogeny.



Nomenclature generally conforms to ISOGG 2017.

Figure 5.7.2. Informative Variants Overview of G1-M285 as Suggested by Balanovsky et al. (2015).



Nomenclature generally conforms to ISOGG 2017.

Table 5.7.1. Overview of G-M201.

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Central Asia	Kazakhs Madjar	Turkic		86.7	Balanovski et al. 2015
Caucasus	North Ossetians	Indo-European	Indo-Iranian	69.7	Yunubayev et al. 2012
Caucasus	North Ossetians	Indo-European	Indo-Iranian	69.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Central Asia	Kazakhs (Akzharsky)	Turkic		55.6	Balanovski et al. 2015
Central Asia	Kazakhs (Karkaralinsky)	Turkic		52.8	Balanovski et al. 2015
Caucasus	Georgians	Kartvelian		50.8	Yunubayev et al. 2012
Caucasus	Georgians	Kartvelian		50.0	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	South Ossetians	Indo-European	Indo-Iranian	47.6	Yunubayev et al. 2012
Caucasus	Abkhaz	North Caucasian		47.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abkhaz	North Caucasian		47.5	Yunubayev et al. 2012
Caucasus	Adyghe	North Caucasian		47.4	Yunubayev et al. 2012
Caucasus	Cherkessians	North Caucasian		45.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Cherkessians	North Caucasian		45.2	Yunubayev et al. 2012
Caucasus	Adyghe	North Caucasian		44.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Armenians Hemsheni	Indo-European	Armenian	44.4	Balanovski et al. 2017
Caucasus	Kabardians	North Caucasian		43.6	Yunubayev et al. 2012
Caucasus	Imereti	Kartvelian		43.6	Balanovski et al. 2017
Caucasus	South Ossetians	Indo-European	Indo-Iranian	43.5	Rootsi et al. 2012, Yunusbaev et al. 2001

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Caucasus	Kabardians	North Caucasian		43.3	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Armenians Hamshenis	Indo-European	Armenian	42.2	Balanovski et al. 2015
Caucasus	Abazins	North Caucasian		41.0	Yunubayev et al. 2012
Caucasus	Abazins	North Caucasian		40.0	Rootsi et al. 2012, Yunusbaev et al. 2001
Central Asia	Kazakhs Magzhan Zhumabaev)	Turkic		34.5	Balanovski et al. 2015
Caucasus	Balkars	Turkic		32.6	Yunubayev et al. 2012
Caucasus	Balkars	Turkic		32.4	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Karachays	Turkic		31.9	Yunubayev et al. 2012
Caucasus	Karachays	Turkic		31.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Central Asia	Kazakhs (Amangeldinsky)	Turkic		25.5	Balanovski et al. 2015
Caucasus	Armenians Adygei	Indo-European	Armenian	22.4	Balanovski et al. 2017
Middle East	Palestinians	Afro-Asiatic	Semitic	22.2	Rootsi et al. 2012, Behar et al. 2010
Mediterranean	Corsicans	Indo-European	Italic	21.5	Rootsi et al. 2012
Caucasus	Armenians Krasnodar	Indo-European	Armenian	21.4	Balanovski et al. 2017
Middle East	Mazandarani	Indo-European	Indo-Iranian	20.8	Grugni et al. 2012
Middle East	Armenians	Indo-European	Armenian	20.6	Grugni et al. 2012
South Asia	Kalash	Indo-European	Indo-Iranian	20.0	Di Cristofaro et al. 2013
Middle East	Laz	Kartvelian		19.4	Balanovski et al. 2017
Caucasus	Chamalals	North Caucasian		18.5	Rootsi et al. 2012, Yunusbaev et al. 2001

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Caucasus	Chamalals	North Caucasian		18.5	Yunubayev et al. 2012
Central Asia	Pashtun-Baghlan	Indo-European	Indo-Iranian	17.6	Di Cristofaro et al. 2013
Caucasus	Armenians Erzurum	Indo-European	Armenian	16.2	Balanovski et al. 2017
Middle East	Armenians Central	Indo-European	Armenian	16.0	Hovhannisyan et al. 2014
South Asia	Brahui	Dravidian		16.0	Di Cristofaro et al. 2013
Middle East	Gilaki	Indo-European	Indo-Iranian	15.6	Grugni et al. 2012
Caucasus	Nogais, Kuban	Turkic		13.8	Yunubayev et al. 2012
Caucasus	Nogais	Turkic		13.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kumyks	Turkic		13.7	Yunubayev et al. 2012
Middle East	Armenians, Western	Indo-European	Armenian	13.5	Hovhannisyan et al. 2014
Caucasus	Kumyks	Turkic		13.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Mediterranean	Sardinians	Indo-European	Italic	13.1	Rootsi et al. 2012
Middle East	Azerbaijani	Turkic		12.8	Rootsi et al. 2012
Mediterranean	Greek Cypriots	Indo-European	Greek	12.7	Voskarides et al. 2017
Middle East	Armenians Sasun	Indo-European	Armenian	12.5	Hovhannisyan et al. 2014
Middle East	Turks	Turkic		12.5	Rootsi et al. 2012, Cinnioglu et al. 2004
Caucasus	Armenians	Indo-European	Armenian	12.3	Balanovski et al. 2015
Middle East	Turks	Turkic		12.2	Rootsi et al. 2012, Cinnioglu et al. 2004, Myres et al. 2010
Eastern Europe	Bashkirs (Kipchak tribes)	Turkic		12.0	Balanovski et al. 2015
Caucasus	Armenians	Indo-European	Armenian	12.0	Rootsi et al. 2012, Yunusbaev et al. 2011
Middle East	Kurds	Indo-European	Indo-Iranian	11.9	Grugni et al. 2012

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Middle East	Israel	Afro-Asiatic	Semitic	11.7	Rootsi et al. 2012, Behar et al. 2010
Western Europe	Tyroloeans	Indo-European	Germanic	11.3	Berger et al. 2013
Central Asia	Pashtun-Kunduz	Indo-European	Indo-Iranian	11.3	Di Cristofaro et al. 2013
Middle East	Iranians, set2	Indo-European	Indo-Iranian	11.1	Rootsi et al. 2012
Central Asia	Tajik-Badakhshan	Indo-European	Indo-Iranian	10.8	Di Cristofaro et al. 2013
Mediterranean	Sicilians	Indo-European	Italic	10.5	Rootsi et al. 2012
Caucasus	Armenians	Indo-European	Armenian	10.5	Yunubayev et al. 2012
South Asia	Pashtuns (Pathans)	Indo-European	Indo-Iranian	10.0	Di Cristofaro et al. 2013
Middle East	Iranians, set1	Indo-European	Indo-Iranian	9.9	Rootsi et al. 2012, Reguero et al. 2006
Caucasus	Armenians Don	Indo-European	Armenian	9.8	Balanovski et al. 2017
Mediterranean	Italians	Indo-European	Italic	9.7	Rootsi et al. 2012
Caucasus	Lezgians	North Caucasian		9.7	Yunubayev et al. 2012
Caucasus	Lezgians	North Caucasian		9.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kumyks	Turkic		9.5	Karafet et al. 2016
Middle East	Azerbaijani East	Turkic		9.5	Di Cristofaro et al. 2013
Middle East	Turks	Turkic		9.2	Rootsi et al. 2012, Cinnioglu et al. 2004
South Asia	Nadar Cape	Dravidian		9.2	Arunkumar et al. 2012
Mediterranean	Cretans	Indo-European	Greek	9.1	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Caucasus	Nogais	Turkic		9.1	Karafet et al. 2016
Central Asia	Laks	North Caucasian		9.1	Karafet et al. 2016
North Africa	Egyptians	Afro-Asiatic	Semitic	8.8	Rootsi et al. 2012, Luis et al. 2004
South Asia	Maravar	Dravidian		8.8	Arunkumar et al. 2012

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Caucasus	Armenians, Eastern	Indo-European	Armenian	8.7	Hovhannisyan et al. 2014
Mediterranean	Greeks	Indo-European	Greek	8.6	Rootsi et al. 2012, King et al. 2011
Central Asia	Tajik-Takhar	Indo-European	Indo-Iranian	8.6	Di Cristofaro et al. 2013
Western Europe	Swiss	Indo-European	Multiple	8.5	Rootsi et al. 2012
South Asia	Nadar TNV	Dravidian		8.5	Arunkumar et al. 2012
South Asia	Parayar	Dravidian		8.3	Arunkumar et al. 2012
Central Asia	Pashtuns (Pathans	Indo-European	Indo-Iranian	7.9	Lacau et al. 2012
Middle East	Azerbaijani	Turkic		7.9	Grugni et al. 2012
South Asia	Pallar	Dravidian		7.8	Arunkumar et al. 2012
Middle East	Armenians, Van	Indo-European	Armenian	7.8	Hovhannisyan et al. 2014
Middle East	Assyrians	Afro-Asiatic	Semitic	7.7	Grugni et al. 2012
Middle East	Armenians, Salmast	Indo-European	Armenian	7.5	Hovhannisyan et al. 2014
Caucasus	Georgians, Eastern	Kartvelian		7.4	Balanovski et al. 2017
Central Asia	Uzbeks-Sar-e-Pol	Turkic		7.1	Di Cristofaro et al. 2013
Middle East	Assyrians	Afro-Asiatic	Semitic	6.8	Rootsi et al. 2012, Chiaroni et al. 2010
Central Asia	Kazakhs (Arysky)	Turkic		6.8	Balanovski et al. 2015
Central Asia	Kazakhs	Turkic		6.7	Zhabagin et al. 2017
Mediterranean	Greeks	Indo-European	Greek	6.5	Rootsi et al. 2012, King et al. 2011
Middle East	Turks	Turkic		6.3	Balanovski et al. 2015
South Asia	Pakistani	Indo-European	Indo-Iranian	6.3	Rootsi et al. 2012, Sengupta et al. 2006
Caucasus	Andis	North Caucasian		6.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Andis	North Caucasian		6.1	Yunubayev et al. 2012

Region	Population	Lang Family	Branch	G-M201 (%)	Reference
Western Europe	Iberians	Indo-European	Italic	6.0	Rootsi et al. 2012, Flores et al. 2004
Middle East	Turkmen	Turkic		5.9	Grugni et al. 2012
Central Asia	Hazara-Bamiyan	Indo-European	Indo-Iranian	5.8	Di Cristofaro et al. 2013
Central Asia	Kyrgyz-East	Turkic		5.7	Di Cristofaro et al. 2013
East Asia	Mongols Dariganga	Mongolic		5.5	Balanovski et al. 2015
Central Asia	Arabs (Kasashtan)	Afro-Asiatic	Semitic	5.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Iranians (south-east)	Indo-European	Indo-Iranian	5.1	Balanovski et al. 2015
South Asia	Burusho	Isolate		5.0	Di Cristofaro et al. 2013
Indo-European	Azerbaijani	Turkic		5.0	Balanovski et al. 2015

Table 5.7.2. Survey of G1-M285 Diversity.

Region	Population	Lang Family	G1-M285 (%)	Reference
Central Asia	Kazakhs Madjar	Turkic	86.7	Balanovski et al. 2015
Central Asia	Kazakhs (Akzharsky)	Turkic	55.6	Balanovski et al. 2015
Central Asia	Kazakhs (Karkaralinsky)	Turkic	52.8	Balanovski et al. 2015
Caucasus	Armenians Hemsheni	Indo-European	42.2	Balanovski et al. 2017
Middle East	Armenians Hamshenis	Indo-European	42.2	Balanovski et al. 2015
Central Asia	Kazakhs Magzhan Zhumabaev)	Turkic	34.5	Balanovski et al. 2015
Central Asia	Kazakhs (Amangeldinsky)	Turkic	25.5	Balanovski et al. 2015
Caucasus	Armenians Krasnodar	Indo-European	13.7	Balanovski et al. 2017
Caucasus	Armenians	Indo-European	12.3	Balanovski et al. 2015
Eastern Europe	Bashkirs (Kipchak tribes)	Turkic	12.0	Balanovski et al. 2015
Central Asia	Kazakhs (Arysky)	Turkic	6.8	Balanovski et al. 2015
Central Asia	Kazakhs	Turkic	6.7	Zhabagin et al. 2017
Middle East	Turks	Turkic	6.3	Balanovski et al. 2015
Caucasus	Armenians Adygei	Indo-European	6.1	Balanovski et al. 2017
East Asia	Mongols Dariganga	Mongolic	5.5	Balanovski et al. 2015
Middle East	Assyrians	Afro-Asiatic	5.1	Grugni et al. 2012
Middle East	Iranians (south-east)	Indo-European	5.1	Balanovski et al. 2015
Indo-European	Azerbaijani	Turkic	5.0	Balanovski et al. 2015

Table 5.7.3. Survey of G2-P287 Diversity.

Region	Population	Lang Family	G2-M287 (%)	Reference
Caucasus	North Ossetians	Indo-European	69.7	Yunubayev et al. 2012
Caucasus	North Ossetians	Indo-European	69.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Georgians	Kartvelian	50.8	Yunubayev et al. 2012
Caucasus	Georgians	Kartvelian	50.0	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	South Ossetians	Indo-European	47.6	Yunubayev et al. 2012
Caucasus	Abkhaz	North Caucasian	47.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abkhaz	North Caucasian	47.5	Yunubayev et al. 2012
Caucasus	Adyghe	North Caucasian	46.8	Yunubayev et al. 2012
Caucasus	Cherkessians	North Caucasian	45.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Cherkessians	North Caucasian	45.2	Yunubayev et al. 2012
Caucasus	Adyghe	North Caucasian	44.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	South Ossetians	Indo-European	43.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kabardians	North Caucasian	42.9	Yunubayev et al. 2012
Caucasus	Kabardians	North Caucasian	42.6	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abazins	North Caucasian	41.0	Yunubayev et al. 2012
Caucasus	Imereti	Kartvelian	40.4	Balanovski et al. 2017
Caucasus	Abazins	North Caucasian	40.0	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Balkars	Turkic	32.6	Yunubayev et al. 2012
Caucasus	Balkars	Turkic	32.4	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Karachays	Turkic	31.9	Yunubayev et al. 2012
Caucasus	Karachays	Turkic	31.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Palestinians	Afro-Asiatic	22.2	Rootsi et al. 2012, Behar et al. 2010
Mediterranean	Corsicans	Indo-European	21.5	Rootsi et al. 2012

Region	Population	Lang Family	G2-M287 (%)	Reference
South Asia	Kalash	Indo-European	20.0	Di Cristofaro et al. 2013
Caucasus	Chamalals	North Caucasian	18.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Chamalals	North Caucasian	18.5	Yunubayev et al. 2012
Middle East	Armenians	Indo-European	17.7	Grugni et al. 2012
Middle East	Mazandarani	Indo-European	16.6	Grugni et al. 2012
Middle East	Laz	Kartvelian	16.6	Balanovski et al. 2017
Caucasus	Armenians Adygei	Indo-European	16.3	Balanovski et al. 2017
Middle East	Armenians Central	Indo-European	16.0	Hovhannisyan et al. 2014
Central Asia	Pashtun-Baghlan	Indo-European	14.7	Di Cristofaro et al. 2013
Middle East	Gilaki	Indo-European	14.0	Grugni et al. 2012
Caucasus	Nogais, Kuban	Turkic	13.8	Yunubayev et al. 2012
Caucasus	Nogais	Turkic	13.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kumyks	Turkic	13.7	Yunubayev et al. 2012
Middle East	Armenians, Western	Indo-European	13.5	Hovhannisyan et al. 2014
Caucasus	Armenians Erzurum	Indo-European	13.2	Balanovski et al. 2017
Caucasus	Kumyks	Turkic	13.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Mediterranean	Sardinians	Indo-European	13.1	Rootsi et al. 2012
Mediterranean	Greek Cypriots	Indo-European	12.7	Voskarides et al. 2017
Middle East	Armenians Sasun	Indo-European	12.5	Hovhannisyan et al. 2014
Middle East	Azerbaijani	Turkic	12.5	Rootsi et al. 2012
Middle East	Turks	Turkic	12.2	Rootsi et al. 2012, Cinnioglu et al. 2004, Myres et al. 2010

Region	Population	Lang Family	G2-M287 (%)	Reference
Middle East	Turks	Turkic	12.0	Rootsi et al. 2012, Cinnioglu et al. 2004
South Asia	Brahui	Dravidian	12.0	Di Cristofaro et al. 2013
Middle East	Israel	Afro-Asiatic	11.4	Rootsi et al. 2012, Behar et al. 2010
Central Asia	Pashtun-Kunduz	Indo-European	11.3	Di Cristofaro et al. 2013
Western Europe	Tyroloeans	Indo-European	11.3	Berger et al. 2013
Mediterranean	Sicilians	Indo-European	10.5	Rootsi et al. 2012
Caucasus	Armenians	Indo-European	10.5	Yunubayev et al. 2012
Caucasus	Armenians	Indo-European	10.3	Rootsi et al. 2012, Yunusbaev et al. 2011
South Asia	Pashtuns (Pathans)	Indo-European	10.0	Di Cristofaro et al. 2013
Caucasus	Armenians Don	Indo-European	9.8	Balanovski et al. 2017
Mediterranean	Italians	Indo-European	9.7	Rootsi et al. 2012
Caucasus	Lezgians	North Caucasian	9.7	Yunubayev et al. 2012
Caucasus	Lezgians	North Caucasian	9.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kumyks	Turkic	9.5	Karafet et al. 2016
Middle East	Iranians, set2	Indo-European	9.3	Rootsi et al. 2012
Middle East	Turks	Turkic	9.2	Rootsi et al. 2012, Cinnioglu et al. 2004
Mediterranean	Cretans	Indo-European	9.1	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Central Asia	Laks	North Caucasian	9.1	Karafet et al. 2016
Caucasus	Nogais	Turkic	9.1	Karafet et al. 2016
North Africa	Egyptians	Afro-Asiatic	8.8	Rootsi et al. 2012, Luis et al. 2004
Caucasus	Armenians, Eastern	Indo-European	8.7	Hovhannisyan et al. 2014
Mediterranean	Greeks	Indo-European	8.6	Rootsi et al. 2012, King et al. 2011
Western Europe	Swiss	Indo-European	8.5	Rootsi et al. 2012

Region	Population	Lang Family	G2-M287 (%)	Reference
Middle East	Kurds	Indo-European	8.5	Grugni et al. 2012
Central Asia	Tajik-Badakhshan	Indo-European	8.1	Di Cristofaro et al. 2013
Middle East	Azerbaijani	Turkic	7.9	Grugni et al. 2012
Central Asia	Pashtuns (Pathans	Indo-European	7.9	Lacau et al. 2012
Middle East	Armenians, Van	Indo-European	7.8	Hovhannisyan et al. 2014
Caucasus	Armenians Krasnodar	Indo-European	7.7	Balanovski et al. 2017
Middle East	Armenians, Salmast	Indo-European	7.5	Hovhannisyan et al. 2014
Caucasus	Georgians, Eastern	Kartvelian	7.4	Balanovski et al. 2017
Central Asia	Uzbeks-Sar-e-Pol	Turkic	7.1	Di Cristofaro et al. 2013
Mediterranean	Greeks	Indo-European	6.5	Rootsi et al. 2012, King et al. 2011
Caucasus	Andis	North Caucasian	6.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Andis	North Caucasian	6.1	Yunubayev et al. 2012
Western Europe	Iberians	Indo-European	6.0	Rootsi et al. 2012, Flores et al. 2004
Middle East	Iranians, set1	Indo-European	6.0	Rootsi et al. 2012, Reguero et al. 2006
Middle East	Turkmen	Turkic	5.9	Grugni et al. 2012
Central Asia	Hazara-Bamiyan	Indo-European	5.8	Di Cristofaro et al. 2013
Central Asia	Kyrgyz-East	Turkic	5.7	Di Cristofaro et al. 2013
Central Asia	Tajik-Takhar	Indo-European	5.7	Di Cristofaro et al. 2013
South Asia	Pakistani	Indo-European	5.7	Rootsi et al. 2012, Sengupta et al. 2006
Central Asia	Arabs (Kasashtan)	Afro-Asiatic	5.1	Rootsi et al. 2012, Yunusbaev et al. 2001

Region	Population	Lang Family	G2-M287 (%)	Reference
South Asia	Burusho	Isolate	5.0	Di Cristofaro et al. 2013
Middle East	Azerbaijani East	Turkic	4.7	Di Cristofaro et al. 2013
Middle East	Assyrians	Afro-Asiatic	4.5	Rootsi et al. 2012, Chiaroni et al. 2010
Middle East	Assyrians	Afro-Asiatic	2.6	Grugni et al. 2012
Caucasus	Armenians Hemsheni	Indo-European	2.2	Balanovski et al. 2017

Table 5.7.4. Survey of G2-L497 Diversity.

Region	Population	Lang Family	G2-L497 (%)	Reference
Western Europe	Tyroloeans	Indo-European	8.6	Berger et al. 2013
Mediterranean	Corsicans	Indo-European	5.2	Rootsi et al. 2012
Western Europe	Swiss	Indo-European	5.1	Rootsi et al. 2012
Caucasus	Kumyks	Turkic	4.8	Karafet et al. 2016
Western Europe	Germans	Indo-European	3.4	Rootsi et al. 2012
Eastern Europe	Moldovans	Indo-European	3.4	Rootsi et al. 2012
Mediterranean	Italians	Indo-European	2.8	Rootsi et al. 2012
Western Europe	French	Indo-European	2.2	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	2.0	Rootsi et al. 2012, Flores et al. 2004
Western Europe	Iberians	Indo-European	1.9	Rootsi et al. 2012, Flores et al. 2004
Eastern Europe	Bulgarians	Indo-European	1.9	Rootsi et al. 2012
Scandinavia	Danes	Indo-European	1.8	Rootsi et al. 2012
Eastern Europe	Romanians	Indo-European	1.8	Rootsi et al. 2012
Western Europe	French	Indo-European	1.6	Rootsi et al. 2012
Eastern Europe	Croatians	Indo-European	1.6	Rootsi et al. 2012, Barac et al. 2003
Mediterranean	Sicilians	Indo-European	1.3	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	1.2	Rootsi et al. 2012, Flores et al. 2004
Western Europe	Iberians	Indo-European	1.0	Rootsi et al. 2012, Flores et al. 2004
Eastern Europe	Hungarians	Uralic	0.9	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.8	Rootsi et al. 2012, Flores et al. 2004
Middle East	Turks	Turkic	0.6	Rootsi et al. 2012, Cinnioglu et al. 2004
Eastern Europe	Chuvashes	Turkic	0.5	Rootsi et al. 2012
Eastern Europe	Ukrainians	Indo-European	0.5	Rootsi et al. 2012

Region	Population	Lang Family	G2-L497 (%)	Reference
Mediterranean	Sardinians	Indo-European	0.4	Rootsi et al. 2012
Eastern Europe	Slovaks	Indo-European	0.4	Rootsi et al. 2012
Mediterranean	Greek Cypriots	Indo-European	0.3	Voskarides et al. 2017
Mediterranean	Cretans	Indo-European	0.3	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Eastern Europe	Russians	Indo-European	0.3	Rootsi et al. 2012
Eastern Europe	Russians	Indo-European	0.2	Rootsi et al. 2012, Balanovsky et al. 2008

Table 5.7.5. Survey of G2-U1 Diversity.

Region	Population	Lang Family	G2-U1 (%)	Reference
Caucasus	Adyghe	North Caucasian	39.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Cherkessians	North Caucasian	36.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kabardians	North Caucasian	29.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abazins	North Caucasian	23.3	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abkhaz	North Caucasian	22.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Palestinians	Afro-Asiatic	16.7	Rootsi et al. 2012, Behar et al. 2010
Central Asia	Laks	North Caucasian	9.1	Karafet et al. 2016
Caucasus	Kumyks	Turkic	7.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Karachays	Turkic	7.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Nogais	Turkic	6.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Balkars	Turkic	6.6	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Georgians	Kartvelian	6.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Nogais	Turkic	4.5	Karafet et al. 2016
Mediterranean	Greeks	Indo-European	3.4	Rootsi et al. 2012, King et al. 2011
Middle East	Armenians	Indo-European	2.9	Grugni et al. 2012
Middle East	Turks	Turkic	2.4	Rootsi et al. 2012, Cinnioglu et al. 2004, Myres et al. 2010
Caucasus	North Ossetians	Indo-European	2.3	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Armenians	Indo-European	1.4	Rootsi et al. 2012, Yunusbaev et al. 2011
Middle East	Mazandarani	Indo-European	1.4	Grugni et al. 2012
Eastern Europe	Bashkirs	Turkic	1.1	Rootsi et al. 2012
Central Asia	Kazakhs	Turkic	1.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Mediterranean	Italians	Indo-European	1.0	Rootsi et al. 2012
Eastern Europe	Slovenes	Indo-European	1.0	Rootsi et al. 2012

Region	Population	Lang Family	G2-U1 (%)	Reference
Middle East	Turks	Turkic	1.0	Rootsi et al. 2012, Cinnioglu et al. 2004
Baltic	Estonians	Uralic	0.8	Rootsi et al. 2012
Middle East	Azerbaijani	Turkic	0.7	Rootsi et al. 2012
Central Asia	Kyrgyz	Turkic	0.7	Rootsi et al. 2012
Middle East	Turks	Turkic	0.6	Rootsi et al. 2012, Cinnioglu et al. 2004
Eastern Europe	Ukrainians	Indo-European	0.5	Rootsi et al. 2012
Eastern Europe	Bulgarians	Indo-European	0.5	Rootsi et al. 2012
Middle East	Iranians, set1	Indo-European	0.4	Rootsi et al. 2012, Reguero et al. 2006
Middle East	Iranians, set2	Indo-European	0.4	Rootsi et al. 2012
Eastern Europe	Belarusians	Indo-European	0.3	Rootsi et al. 2012
Mediterranean	Cretans	Indo-European	0.3	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Mediterranean	Greek Cypriots	Indo-European	0.2	Voskarides et al. 2017
Mediterranean	Sardinians	Indo-European	0.2	Rootsi et al. 2012

Table 5.7.6. Survey of G2-M527 Diversity.

Region	Population	Lang Family	G2-M527 (%)	Reference
Mediterranean	Greeks	Indo-European	3.2	Rootsi et al. 2012, King et al. 2011
Caucasus	Abazins	North Caucasian	2.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Azerbaijani	Turkic	2.0	Rootsi et al. 2012
Mediterranean	Greeks	Indo-European	1.6	Rootsi et al. 2012, King et al. 2008
Caucasus	Georgians	Kartvelian	1.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abkhaz	North Caucasian	1.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Nogais	Turkic	1.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Palestinians	Afro-Asiatic	1.1	Rootsi et al. 2012, Behar et al. 2010
Western Europe	French	Indo-European	1.1	Rootsi et al. 2012
Mediterranean	Italians	Indo-European	1.0	Rootsi et al. 2012
Middle East	Israel	Afro-Asiatic	1.0	Rootsi et al. 2012, Behar et al. 2010
Eastern Europe	Ukrainians	Indo-European	0.7	Rootsi et al. 2012
Middle East	Tatars	Turkic	0.6	Rootsi et al. 2012
Western Europe	Swiss	Indo-European	0.6	Rootsi et al. 2012
Mediterranean	Cretans	Indo-European	0.6	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Western Europe	French	Indo-European	0.5	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.5	Rootsi et al. 2012, Flores et al. 2004
Baltic	Estonians	Uralic	0.4	Rootsi et al. 2012
Western Europe	Germans	Indo-European	0.3	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.3	Rootsi et al. 2012, Flores et al. 2004
Mediterranean	Greek Cypriots	Indo-European	0.3	Voskarides et al. 2017
Mediterranean	Corsicans	Indo-European	0.3	Rootsi et al. 2012

Region	Population	Lang Family	G2-M527 (%)	Reference
Caucasus	Armenians	Indo-European	0.2	Rootsi et al. 2012, Yunusbaev et al. 2011
Eastern Europe	Russians	Indo-European	0.2	Rootsi et al. 2012, Balanovsky et al. 2008
Mediterranean	Sardinians	Indo-European	0.2	Rootsi et al. 2012
Middle East	Iranians, set2	Indo-European	0.2	Rootsi et al. 2012
Eastern Europe	Belarusians	Indo-European	0.2	Rootsi et al. 2012
Eastern Europe	Bulgarians	Indo-European	0.1	Rootsi et al. 2012

Table 5.7.7. Survey of G2-M406 Diversity.

Region	Population	Lang Family	G2-M406 (%)	Reference
Caucasus	Chamalals	North Caucasian	18.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Middle East	Israel	Afro-Asiatic	8.1	Rootsi et al. 2012, Behar et al. 2010
Caucasus	Armenians Adygei	Indo-European	6.1	Balanovski et al. 2017
South Asia	Pashtuns (Pathans)	Indo-European	5.0	Di Cristofaro et al. 2013
Caucasus	Armenians Erzurum	Indo-European	4.0	Balanovski et al. 2017
Mediterranean	Greeks	Indo-European	3.4	Rootsi et al. 2012, King et al. 2011
Caucasus	Armenians Krasnodar	Indo-European	3.4	Balanovski et al. 2017
Mediterranean	Greeks	Indo-European	3.2	Rootsi et al. 2012, King et al. 2011
Central Asia	Tajik-Badakhshan	Indo-European	2.7	Di Cristofaro et al. 2013
Mediterranean	Sicilians	Indo-European	2.6	Rootsi et al. 2012
Middle East	Turks	Turkic	2.5	Rootsi et al. 2012, Cinnioglu et al. 2004
Middle East	Turks	Turkic	2.4	Rootsi et al. 2012, Cinnioglu et al. 2004, Myres et al. 2010
Mediterranean	Italians	Indo-European	2.4	Rootsi et al. 2012
Middle East	Turks	Turkic	2.4	Rootsi et al. 2012, Cinnioglu et al. 2004
Mediterranean	Greek Cypriots	Indo-European	2.4	Voskarides et al. 2017
Caucasus	Armenians Don	Indo-European	2.2	Balanovski et al. 2017
Caucasus	Armenians	Indo-European	2.1	Rootsi et al. 2012, Yunusbaev et al. 2011
Middle East	Azerbaijani	Turkic	2.0	Rootsi et al. 2012
Eastern Europe	Slovenes	Indo-European	2.0	Rootsi et al. 2012
Mediterranean	Cretans	Indo-European	1.9	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Mediterranean	Greeks	Indo-European	1.6	Rootsi et al. 2012, King et al. 2008

Region	Population	Lang Family	G2-M406 (%)	Reference
Middle East	Yemeni	Afro-Asiatic	1.6	Rootsi et al. 2012, Luis et al. 2004
Caucasus	Imereti	Kartvelian	1.6	Balanovski et al. 2017
Middle East	Turkmen	Turkic	1.4	Grugni et al. 2012
North Africa	Egyptians	Afro-Asiatic	1.4	Rootsi et al. 2012, Luis et al. 2004
Western Europe	Iberians	Indo-European	1.3	Rootsi et al. 2012, Flores et al. 2004
Middle East	Jordanians	Afro-Asiatic	1.3	Rootsi et al. 2012
Caucasus	Kumyks	Turkic	1.3	Rootsi et al. 2012, Yunusbaev et al. 2001
Western Europe	French	Indo-European	1.1	Rootsi et al. 2012
Central Asia	Uzbeks	Turkic	1.0	Zhabagin et al. 2017
Eastern Europe	Hungarians	Uralic	0.9	Rootsi et al. 2012
Middle East	Iranians, set1	Indo-European	0.9	Rootsi et al. 2012, Reguero et al. 2006
Mediterranean	Sardinians	Indo-European	0.8	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.8	Rootsi et al. 2012, Flores et al. 2004
Caucasus	Kabardians	North Caucasian	0.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Western Europe	Iberians	Indo-European	0.7	Rootsi et al. 2012, Flores et al. 2004
Middle East	Emirati	Afro-Asiatic	0.6	Rootsi et al. 2012, Cadenas et al. 2008
Western Europe	Swiss	Indo-European	0.6	Rootsi et al. 2012
South Asia	Pakistani	Indo-European	0.6	Rootsi et al. 2012, Sengupta et al. 2006
Middle East	Iranians, set2	Indo-European	0.5	Rootsi et al. 2012
Eastern Europe	Poles	Indo-European	0.5	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.5	Rootsi et al. 2012, Flores et al. 2004
Western Europe	Germans	Indo-European	0.3	Rootsi et al. 2012
Mediterranean	Corsicans	Indo-European	0.3	Rootsi et al. 2012
Eastern Europe	Ukrainians	Indo-European	0.2	Rootsi et al. 2012
Eastern Europe	Bulgarians	Indo-European	0.1	Rootsi et al. 2012

Table 5.7.8. Survey of G2-L91 Diversity.

Region	Population	Lang Family	G2-L91 (%)	Reference
Mediterranean	Corsicans	Indo-European	11.2	Rootsi et al. 2012
Mediterranean	Sardinians	Indo-European	6.0	Rootsi et al. 2012
North Africa	Egyptians	Afro-Asiatic	4.1	Rootsi et al. 2012, Luis et al. 2004
Eastern Europe	Czechs	Indo-European	2.9	Rootsi et al. 2012
Mediterranean	Greek Cypriots	Indo-European	1.3	Voskarides et al. 2017
Western Europe	Iberians	Indo-European	1.0	Rootsi et al. 2012, Flores et al. 2004
Middle East	Azerbaijani	Turkic	1.0	Rootsi et al. 2012
Caucasus	Armenians	Indo-European	0.9	Rootsi et al. 2012, Yunusbaev et al. 2011
Eastern Europe	Bulgarians	Indo-European	0.9	Rootsi et al. 2012
Mediterranean	Cretans	Indo-European	0.8	Rootsi et al. 2012, King et al. 2008, Martinez et al. 2007
Western Europe	French	Indo-European	0.8	Rootsi et al. 2012
North Africa	Berbers	Afro-Asiatic	0.8	Rootsi et al. 2012, Flores et al. 2004
Western Europe	Iberians	Indo-European	0.7	Rootsi et al. 2012, Flores et al. 2004
Mediterranean	Italians	Indo-European	0.3	Rootsi et al. 2012
Middle East	Israel	Afro-Asiatic	0.3	Rootsi et al. 2012, Behar et al. 2010
Western Europe	Germans	Indo-European	0.3	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.3	Rootsi et al. 2012, Flores et al. 2004
Middle East	Iranians, set2	Indo-European	0.1	Rootsi et al. 2012

Table 5.7.9. Survey of G2-M377 Diversity.

Region	Population	Lang Family	G2-M377 (%)	Reference
Central Asia	Pashtun-Baghlan	Indo-European	14.7	Di Cristofaro et al. 2013
Central Asia	Pashtun-Kunduz	Indo-European	11.3	Di Cristofaro et al. 2013
Central Asia	Pashtuns (Pathans	Indo-European	5.3	Lacau et al. 2012
South Asia	Pashtuns (Pathans)	Indo-European	5.0	Di Cristofaro et al. 2013
South Asia	Burusho	Isolate	5.0	Di Cristofaro et al. 2013
Central Asia	Tajik-Balkh	Indo-European	3.7	Di Cristofaro et al. 2013
Central Asia	Tajik-Badakhshan	Indo-European	2.7	Di Cristofaro et al. 2013
Middle East	Azerbaijani	Turkic	1.6	Grugni et al. 2012
South Asia	Pakistani	Indo-European	1.1	Rootsi et al. 2012, Sengupta et al. 2006
Eastern Europe	Poles	Indo-European	1.0	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.8	Rootsi et al. 2012, Flores et al. 2004
Central Asia	Kyrgyz	Turkic	0.7	Rootsi et al. 2012
Middle East	Turks	Turkic	0.5	Rootsi et al. 2012, Cinnioglu et al. 2004
Eastern Europe	Russians	Indo-European	0.5	Rootsi et al. 2012, Balanovsky et al. 2008
Eastern Europe	Belarusians	Indo-European	0.2	Rootsi et al. 2012
Middle East	Iranians, set2	Indo-European	0.1	Rootsi et al. 2012

Table 5.7.10. Survey of G2-P16 Diversity.

Region	Population	Lang Family	G2a-P16 (%)	Reference
Caucasus	North Ossetians	Indo-European	63.6	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	South Ossetians	Indo-European	43.5	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Georgians	Kartvelian	34.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Karachays	Turkic	23.2	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Balkars	Turkic	20.6	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Abkhaz	North Caucasian	19.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Imereti	Kartvelian	11.3	Balanovski et al. 2017
Middle East	Laz	Kartvelian	11.1	Balanovski et al. 2017
Caucasus	Abazins	North Caucasian	10.0	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kabardians	North Caucasian	9.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Lezgians	North Caucasian	9.7	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Cherkessians	North Caucasian	7.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Andis	North Caucasian	6.1	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Georgians, Eastern	Kartvelian	5.6	Balanovski et al. 2017
Caucasus	Ingush	North Caucasian	4.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Kumyks	Turkic	3.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Adyghe	North Caucasian	3.8	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Nogais	Turkic	3.4	Rootsi et al. 2012, Yunusbaev et al. 2001
Caucasus	Dargins (Dargwa)	North Caucasian	2.9	Rootsi et al. 2012, Yunusbaev et al. 2001
Central Asia	Kyrgyz-East	Turkic	2.9	Di Cristofaro et al. 2013
Middle East	Turks	Turkic	2.5	Rootsi et al. 2012, Cinnioglu et al. 2004
Middle East	Gilaki	Indo-European	1.6	Grugni et al. 2012

Region	Population	Lang Family	G2a-P16 (%)	Reference
Mediterranean	Sicilians	Indo-European	1.3	Rootsi et al. 2012
Eastern Europe	Kalmyks	Mongolic	1.3	Rootsi et al. 2012
Middle East	Tatars	Turkic	1.2	Rootsi et al. 2012
Middle East	Turks	Turkic	1.2	Rootsi et al. 2012, Cinnioglu et al. 2004, Myres et al. 2010
Caucasus	Armenians	Indo-European	1.2	Rootsi et al. 2012, Yunusbaev et al. 2011
Middle East	Turks	Turkic	1.0	Rootsi et al. 2012, Cinnioglu et al. 2004
Central Asia	Kyrgyz	Turkic	0.7	Rootsi et al. 2012
Mediterranean	Corsicans	Indo-European	0.6	Rootsi et al. 2012
Caucasus	Chechens	North Caucasian	0.6	Rootsi et al. 2012, Yunusbaev et al. 2001
Eastern Europe	Romanians	Indo-European	0.6	Rootsi et al. 2012
Central Asia	Pashtuns (Pathans	Indo-European	0.5	Lacau et al. 2012
Eastern Europe	Russians	Indo-European	0.5	Rootsi et al. 2012, Balanovsky et al. 2008
Eastern Europe	Russians	Indo-European	0.5	Rootsi et al. 2012, Balanovsky et al. 2008
Middle East	Azerbaijani	Turkic	0.3	Rootsi et al. 2012
Western Europe	Iberians	Indo-European	0.3	Rootsi et al. 2012, Flores et al. 2004
Middle East	Iranians, set2	Indo-European	0.2	Rootsi et al. 2012
Eastern Europe	Ukrainians	Indo-European	0.2	Rootsi et al. 2012
Eastern Europe	Bulgarians	Indo-European	0.1	Rootsi et al. 2012

Table 5.7.11. Survey of Dravidian-Speaking Populations

Region	Population	Lang Family	Sample Size	G-M201 (%)	Reference
South Asia	Brahui	Dravidian	25	16.0	Di Cristofaro et al. 2013
South Asia	Nadar Cape	Dravidian	98	9.2	Arunkumar et al. 2012
South Asia	Maravar	Dravidian	80	8.8	Arunkumar et al. 2012
South Asia	Nadar TNV	Dravidian	59	8.5	Arunkumar et al. 2012
South Asia	Parayar	Dravidian	24	8.3	Arunkumar et al. 2012
South Asia	Pallar	Dravidian	51	7.8	Arunkumar et al. 2012
South Asia	Kanikaran	Dravidian	17	5.9	Arunkumar et al. 2012
South Asia	Vanniyar	Dravidian	21	4.8	Arunkumar et al. 2012
South Asia	Piramalai Kallar	Dravidian	53	3.8	Arunkumar et al. 2012
South Asia	Ezhava	Dravidian	95	3.2	Arunkumar et al. 2012
South Asia	Valayar	Dravidian	95	2.1	Arunkumar et al. 2012
South Asia	Paliyan	Dravidian	95	2.1	Arunkumar et al. 2012
South Asia	Tamil Jains	Dravidian	100	2.0	Arunkumar et al. 2012
South Asia	Yadhava	Dravidian	107	1.9	Arunkumar et al. 2012

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