Paper 5.11: Report for Haplogroups L and T.

Abstract: LR-M9 and its downstream mutations have been difficult to position within the Y-chromosome phylogeny. Data for T-M184 must be gleaned from pre-2011 studies that report data for K2-M70 and T-M70. L-M20 and T-M184, when viewed as subclades of a new LT-L298 mutation, become an important component in understanding the correlation between genetic and linguistic diversity. The distribution pattern of LT-L298 is strikingly similar to J-M304. Moreover, like J1-M267 and J2-M172, L-M20 and T-M184 probably co-evolved in Southwest Asia co-expanded into adjacent regions during the Neolithic. It should be noted that the evolution of L-M20 in South Asia, as suggested by some studies, is inconsistent with the genetic and archaeological evidence. Rather, the data suggest that the Neolithic farmers of Southwest Asia must have been a population in Anatolia having Haplogroups E-M96, G-M201, J-M304 and LT-L298. When these farmers expanded out of Anatolia, their genes and languages followed. The linguistic relics of this expansion include Afro-Asiatic, Indo-European and Dravidian languages. As such, the *early farming dispersal hypothesis* provides a robust model of prehistoric language dispersals. From a big picture genetic perspective, LT-L298, G-M201, E-M96 played important supporting roles in the Southwest Asian Neolithic expansion, whereas the main actor was clearly J-M304.

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

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Table of Contents for Paper 5.11 (Haplogroups L and T).

Paper 5.11. Haplogroups L-M20 and T-M184.

The Genetic-Linguistic Interface.

Section 1. Overview of LT-L298 Variation.

At this point the reader is invited to review Figure 5.1.1 from Paper 5.1. As shown by Figure 5.1.1, the LR-M9 mutation bifurcates into LT-L298 and KR-M526. L-M20 and T-M184 then diverge from LT-L298. According to Poznik et al. (2016: Supplementary Table 10), LT-L298 evolved about 44 thousand years ago. Additionally, the same study suggests the divergence of haplogroups L-M20 and T-M184 from LT-L298 occurred about 41 thousand years ago.

Historically, researchers have experienced difficulty in identifying the position occupied by L-M20 and T-M70 within the overall Y-chromosome phylogeny. The first Y-chromosome mutation was identified in 1985. By 2002, advances in sequencing technology allowed researchers to identify over two hundred Y chromosome markers. However, at this point geneticists were utilizing at least seven different nomenclature systems to label these mutations, which in turn, hindered the potential of the Y-chromosome as a research tool. Clearly, standardization was needed and that year the Y-Chromosome Commission (YCC 2002) issued what is still the standard nomenclature for Y-chromosome mutations.

L-M20 and K2-M70 both appeared in YCC 2002, downrange from K-M9. Karafet et al. (2008) then re-labeled K2-M70 as T-M70 and placed this mutation along with L-M20 downstream from K-M9. Chiaroni et al. (2009) later identified the M526 mutation as a downstream variant of M9. Shortly thereafter, Mendez et al (2011) reported the discovery of the M184 mutation, which became main haplogroup T-M184. The M70 mutation, in turn, became T1-M70. The same study also identified LT-L298 as a sister clade of M526. Finally, the study reported that LT-L298 unites T-M184 and L-M20. In 2012, the International Society of Genetic Genealogy (ISOGG) repositioned the M70 mutation within the Y-chromosome phylogeny, and T1-M70 became T1a-M70.

The above discussion of the L-M20, T-M184 and T1a-M70 mutations is provided to emphasize three main points. First, LR-M9 and its downstream mutations have been difficult to position within the Y-chromosome phylogeny. This is an important point that will resurface in Paper 5.12 and the discussion of unclassified LR-M9 mutations. Secondly, researchers should know that data for T-M184 must be gleaned from pre-2011 studies that report data for K2-M70 and T-M70. Finally, Section 2 (below) presents arguments that favor the treatment of LT-L298 as a main haplogroup within the Y-chromosome phylogeny. As such, L-M20 and T-M184 should be viewed as its two main downstream variants.

Section 2. Phylogenetic Relationships.

The reader is asked to note that L-M20 and T-M184 are comparatively rare mutations. They appear sporadically among the populations in several different regions of Eurasia, as well as in North and Sub-Saharan Africa. Furthermore, when detected, L-M20 and T-M184 generally attain a frequency of less ten percent. Nevertheless, when viewed as subclades of a new LT-L298 mutation, they become an important component in understanding the correlation between genetic and linguistic diversity. Accordingly, this present discussion of phylogenetic relationships for LT-298, L-M20, and T-M184 serves a linguistic purpose, which is to defend the *early farming dispersal hypothesis*. Here, an argument is presented that defines LT-L298 as a useful marker for deciphering the evolutionary history of the Afro-

Asiatic, Indo-European and Dravidian language families. Similar arguments were previously made for haplogroups E-M96, G-M201 and J-M304 (see Papers 5.5, 5.7 and 5.10).

Additionally, re-analysis of phylogenetic relationships for LT-L298, L-M20 and T-M184 seems in order because of following development: the position of the T1a-M70 mutation within the Y-chromosome phylogeny was not resolved until 2012, a decade after the publication of YCC 2002. This development revealed something unknown in 2002, that L-M20 has a sister clade, which is T-M184. This resolution of phylogenetic relationships, in turn, potentially undermines the 2002 position that L-M20 is a haplogroup. Here, the analysis requires researchers to evaluate if L-M20 and T-M184 carry the same segment of Y-chromosome diversity or, alternatively, if they independently carry a unique segment. In other words, is the "behavior" of L-M20 and T-M184 more similar to subclades like J1-M267 and J2-M172, or do they behave like haplogroups such as I-M170 and J-M304?

At this point it is important to review the concept of haplogroups. As noted previously in Section 2, the standard Y-chromosome nomenclature in 2002 places Y-chromosome mutations, and more specifically, single nucleotide polymorphism, within a tree-like hierarchical structure. The theoretical Y-Chromosome Adam represents the root of a tree that eventually branches into nineteen haplogroups, such as J-M304. The haplogroups, in turn, diverge into sub-clades, e.g. J1-M267 and J2-M172. Between Adam and the haplogroups are important mutational steps (e.g. IJ-M429) that YCC 2002 identifies as "paragroups."

Focusing now on the nineteen YCC 2002 haplogroups, the label "haplogroup" denotes a single nucleotide polymorphism (or mutation) that, in turn, represents a major division within the diversity of Y-chromosome variation, or more specifically, diversity within the non-recombining region of the Y-Chromosome. YCC 2002, in their discussion of the standard nomenclature, further noted that the label "haplogroup" is "arbitrary." Nevertheless, in practice, the YCC 2002 nomenclature works surprising well. For the most part, each of the YCC 2002 haplogroups represents a unique segment of Y-chromosome diversity.

Analysis of unique segments of Y-chromosome diversity considers phylogenetic relationships. Evolutionary distance between haplogroups is often, but not always, distant. For example, D-M174 and J-M304 are separated by at least eight mutational steps. Haplogroups also carry unique segments of human evolutionary history. B-M60, for example, evolved in Africa (see Paper 5.3), whereas O-M175 evolved in East Asia (see Paper 5.15). Another distinction between haplogroups involves expansion history, both temporal and geographical. D-M174 (Paper 5.4) represents a Paleolithic human expansion from Southwest Asia to East Asia during Marine Isotope Stage 3. I-M170 (Paper 5.9) represents Holocene expansions in Europe from southern Ice Age refugia on the continent. Finally, the archaeological record often supports major divisions within the diversity of Y-chromosome variation. Y-chromosome Adam (Paper 5.2), for example, follows the evolution of *Homo sapiens*. J-M304 (Paper 5.10) follows the expansion of the Southwest Asian Neolithic. O-M175 (Paper 5.10) follows the expansion of the East Asian Neolithic.

Based on the above paragraph, haplogroups are defined by a complex interplay of phylogenetic distance, evolutionary history, expansion history, and the archaeological record. The data for L-M20 and T-M184 indicate that their evolutionary and expansion history mimic that of the J1-M267 and J2-M172. As such, they should be considered subclades of a new LT-L298 haplogroup. Furthermore, the data suggest that although the archeological,

evolutionary, and expansion history of haplogroups J-M304, G-M201 and LT-L298 are strikingly similar, they are, nevertheless, defined as haplogroups because of phylogenetic distance.

Data, upon which the above position is taken, partially flows from Tables 5.11.1 and 5.11.2, which provide a survey of populations with the L-M20 and T-M184 mutations. As shown by these data, L-M20 and T-M184 surface together in several different regions: Europe, Southwest Asia, the Caucasus, and South Asia. Additionally, L-M20 is absent or virtually absent in North and Sub-Saharan Africa, whereas T-M184 has been detected in both regions. Similarly, T-M184 is absent or virtually absent in Central and East Asia, whereas L-M20 has been detected in both regions. Thus, the data suggest that L-M20 and T-M184 evolved in a single region and subsequently co-expanded into adjacent regions. A similar pattern is observed for J1-M267 and J2-M172 (see Paper 5.10, Hg. J, and Tables 5.10.2 and 5.10.3).

In order to further explore the co-evolution and co-expansion of L-M20 and T-M184, the reader is now directed to Table 5.11.3. This table combines published data for L-M20 and T-M184 to illustrate the overall pattern of LT-L298 variation. An important observation comes from these data: the distribution pattern of LT-L298 is strikingly similar to J-M304 (see Paper 5.10 and Table 5.10.1). Populations with LT-L298 and J-M304 are found in the Southwest Asia, the Caucasus, North Africa, Sub-Saharan Africa, Europe, South Asia, Central Asia, and East Asia. Thus, the data point to a prehistoric population in Anatolia with variants of haplogroups E-M96, G-M201, J-M204 and LT-L298. Then, during the Southwest Asian Neolithic, something occurred that resulted in a very rapid star-like dispersal of both genes and farming from the Black Sea.

It should be emphasized that the co-evolution of L-M20 and T-M184 in Southwest Asia, and their Neolithic expansion from this region, are supported by ancient DNA data. Lazaridis et al. (2016) reported the discovery of L1a-M27 from three ancient DNA samples taken from Areni cave in southern Armenia. These samples are about six thousand years old, and as such, date to the Neolithic. Additionally, the same study reports the discovery of a T-M184 sample from an individual that died almost ten thousand years ago at Ain Ghazal settlement in Jordan, remains that also date to the Neolithic. Finally, a T1a-M70 sample was found at a Neolithic Linearbandkeramik site in Karsdorf, Germany, which dates to about seven thousand years ago (Haak et al. 2015).

Dating estimates also support the position that L-M20 and T-M184 are signature markers of the Southwest Asian Neolithic. At this point the reader is directed to Figure 5.11.1 which illustrates important phylogenetic relationships that are downstream from LT-L298. Additionally the reader is asked to locate the L1b1-M349, T1a1-L162 and T1a2-L131 mutations. Dating results for L1b-M349 are reported by Karmin et al. (2015). According to the study, the marker evolved roughly 7.5 thousand years ago. By extension, L1a-M27 and L1a-M357 should also reflect Neolithic diversification of L-M20 variation. Turning now to T-M184, Mendez et al. (2011) provide dating results for T-L162 and T-L131, which point to the evolution of these markers roughly 11 to 14 thousand years ago. As such, they are potential Neolithic markers, like L1a-M27, L1a-M357 and L1b-M349.

Section 3. Resolving the Origins of T-M184 and L-M20.

Geneticists seem to agree that T-M184 evolved in the Middle East and expanded out of the region during the Neolithic (i.e. Mendez et al. 2011). However, the literature is much vaguer in defining where L-M20 evolved. Thus, it is necessary to further discuss the evolution of L-M20 in order to defend the position taken in Section 2 (above). Specifically, L-M20 and T-M184 co-evolved in Southwest Asia and co-expanded out of the region during the Neolithic.

Among the published reports, Lacau et al. (2012) suggest that L-M20 evolved in South Asia, and more specifically, in Pakistan. Another study, Karmin et al. (2015) report that L1-M22 evolved in South Asia and the very rare L2-L595 mutation evolved in Europe. Such a scenario seems to conform to the observed frequency and distribution of both mutations. L2-L595 has only been found in Europe (i.e. Francalacci et al. 2015). L1-M22 mutations, on the other hand, appear to have a higher frequency in South Asia relative to the frequency of the same mutations in other regions. However, it should be emphasized that even in South Asia, the frequency of L-M20 is low and hovers just around ten percent (i.e. Sengupta et al 2006; Firasat et al. 2007). As such, single region frequency data for South Asia fails to provide a convincing argument as to geographic origins of the L-M20.

In order to identify the region where L-M20 evolved, researchers should consider the overall distribution of LT-L298 variation. L-M20 and T-M184 mutations (see Tables 5.11.1 and 5.11.2) are found in Turkey, Lebanon, and in the Caucasus, and as such, in close geographical proximity to the source population that expanded during the Southwest Asian Neolithic. Furthermore, as explained previously in Section 2 (this paper), the distribution of LT-L298 in Eurasia and Africa roughly follows that of J-M304. Finally, as previously noted (Section 2), much of the L-M20 and T-M184 diversification occurred during the Neolithic. This is supported by ancient DNA data as well dating estimates from contemporary samples. Given these observations, the data seem more consistent with a Neolithic expansion from Southwest Asia rather than from South Asia. Otherwise, one must somehow explain a Neolithic expansion of L-M20 from South Asia to Europe, which is inconsistent with the archeological record.

Section 4. Usefulness of LT-L298 for Linguists.

In order to demonstrate the usefulness of LT-L298 as a marker for linguistic research, it is necessary to deviate slightly from the standard Y-chromosome nomenclature. Contrary to the standard nomenclature, the data suggest that LT-L298 represents a haplogroup rather than higher level paragroup mutation. Furthermore, contrary to the standard YCC 2002 nomenclature, L-M20 and T-M184 are not haplogroups. Rather, the data suggest that they are subclades within a new LT-L298 haplogroup.

At this point the reader is invited to review previous discussions of the genetic, linguistic and archaeological data as provide in Papers 5.5 (Hg. E), 5.7 (Hg. G), and 5.10 (Hg. J). Additionally, the reader is invited to review Tables 5.11.4, 5.11.5, and 5.11.6 from this present paper. Table 5.11.4 sorts the L-M20 data according to language family. A similar sorting of the data is provided for T-M184 in Table 5.11.5 and for LT-L298 in Table 5.11.6.

The usefulness of LT-L298 as a marker for linguistic research stems from the position that this is one of four different markers that help to decipher the Neolithic expansion of agriculture from Southwest Asia, which began roughly nine thousand years ago. The Neolithic farmers of Southwest Asia must have been a population in Anatolia that had variants of haplogroups E-M96, G-M201, J-M304 and LT-L298. When these farmers expanded out of Anatolia, their genes and languages followed. The linguistic relics of this expansion include Afro-Asiatic and Indo-European language families. As such, the *early farming dispersal hypothesis* provides a robust model of prehistoric language dispersals.

Data for T-M184 and L-M20 also help to evaluate a study published by Winters in 2010. According to the report, Dravidian languages evolved in East Africa and co-expanded with the cultivation of finger millet to India. Winters (2010) cites similarities in terminology among "Africans and Dravidians" for crops. He also supports his position by claiming that the T-M70 mutation is found in the people of East Africa and Dravidian speakers of India.

Support for the position taken by Winters (2010) potentially comes from the archaeological record. The Neolithic in South Asia has, indeed, an East African component. Furthermore, the East African Neolithic has a South Asian component. This is explained by prehistoric traders who sailed between Africa and India. As a result of this exchange, farmers in India began to cultivate finger millet and pulses such as cowpeas, crops that they had received from Africa. East Africans, in turn, received chickens as well as Asian crops such as bananas, yams and taro (see Fuller 2006; Crowther et al 2017).

According to the genetic data (see Tables 5.11.4 and 5.11.5), both T-M184 and L-M20 have been detected in Dravidian-speaking populations. However, L-M20 appears much more frequently in these populations. L-M20, on the other hand, does not appear in Africa, whereas T-M184 occasionally surfaces in some populations of North and East Africa. However, contrary to what is asserted by Winters (2010), it seems unlikely that South Asia was the source of T-M70 variation in Africa, or that Africa was the source of the same mutation in South Asia. Again, a tremendous amount of genetic, linguistic and archaeological data, as presented here in this paper (5.11), and previously in Papers 5.5, 5.7, and 5.10, all point to Southwest Asia as the source of T-M184 variation. Furthermore, these data place the likely origins of Dravidian languages in Pakistan.

Section 5. Conclusions.

LT-L298 has not received much attention because L-M20 and T-M184 generally attain a low frequency among the surveyed populations. Accordingly, the distribution of internal variation within LT-L298 is poorly understood because researchers tent to devote more time to unraveling the phylogeny of high frequency mutations. More data would be helpful. For example, future exploration of LT-L298 variations should examine the rare L2-L595 mutation in Europe. Is this a Paleolithic or Neolithic relic?

Another problem with deciphering LT-L298 variation is also associated with LR-M9 mutations as a whole, and with this, how to classify the phylogeny of this paragroup. Nevertheless, based on the limited available data, L-M20 and T-M184 probably co-evolved in Southwest Asia and expanded out of the region during the Neolithic. Thus, from a big picture genetic perspective, LT-L298, G-M201, E-M96 played important supporting roles in the Southwest Asian Neolithic expansion, whereas the main actor was clearly J-M304.

Bibliography

Chiaroni, Jacques et al. 2009. "Y-chromosome diversity, human expansion, drift, and cultural evolution." *Proceeding of the National Academy of Sciences of the United States of America* 106(48): 20174-20179.

Crowther, Alison et al. 2017. "Subsistence mosaics, forager-farmer interactions, and the transition to food production in eastern Africa." *Quaternary International*. In Press.

Firasat, Sadaf et al. 2007. "Y-chromosomal evidence for a limited Greek contribution to the Pathan population of Pakistan." *European Journal of Human Genetics* 15: 121-126.

Fuller, Dorian Q. 2006. "Agricultural origins and frontiers in South Asia: a working synthesis." *Journal of World Prehistory* 20: 1-86.

Francalacci, Paolo et al. 2015. "Detection of Phylogenetically informative polymorphisms in the entire euchromatic portion of human Y chromosome from a Sardinian sample." *BioMed Central Research Notes* 8:174

Haak, Wolfgang et al. 2015. "Massive migration from the steppe was a source for Indo-European languages in Europe." *Nature* 522: 207-211.

International Society of Genetic Genealogy (2012). *Y-DNA Haplogroup Tree 2012*. Version: 7.65. Date: December 5, 2012. http://www.isogg.org/tree/ Accessed: July 10, 2018.

Karafet, Tatiana et al. 2008. "New binary polymorphisms reshape and increase resolution of the human Y chromosomal haplogroup tree." *Genome Research* 18: 830-838.

Karmin, Monika et al. 2015. "A recent bottleneck of Y chromosome diversity coincides with a global change in culture." *Genome Research* 25: 459-466.

Lazaridis, Iosif et al. 2016. "Genomic insights into the origin of farming in the ancient Near East." *Nature* 25: 536 (7617): 419-424.

Mendez, Fernando L. et al. 2011. "Increased resolution of Y chromosome haplogroup T defines relationships among populations of the Near East, Europe, and Africa." *Human Biology* 83(1): 39-53.

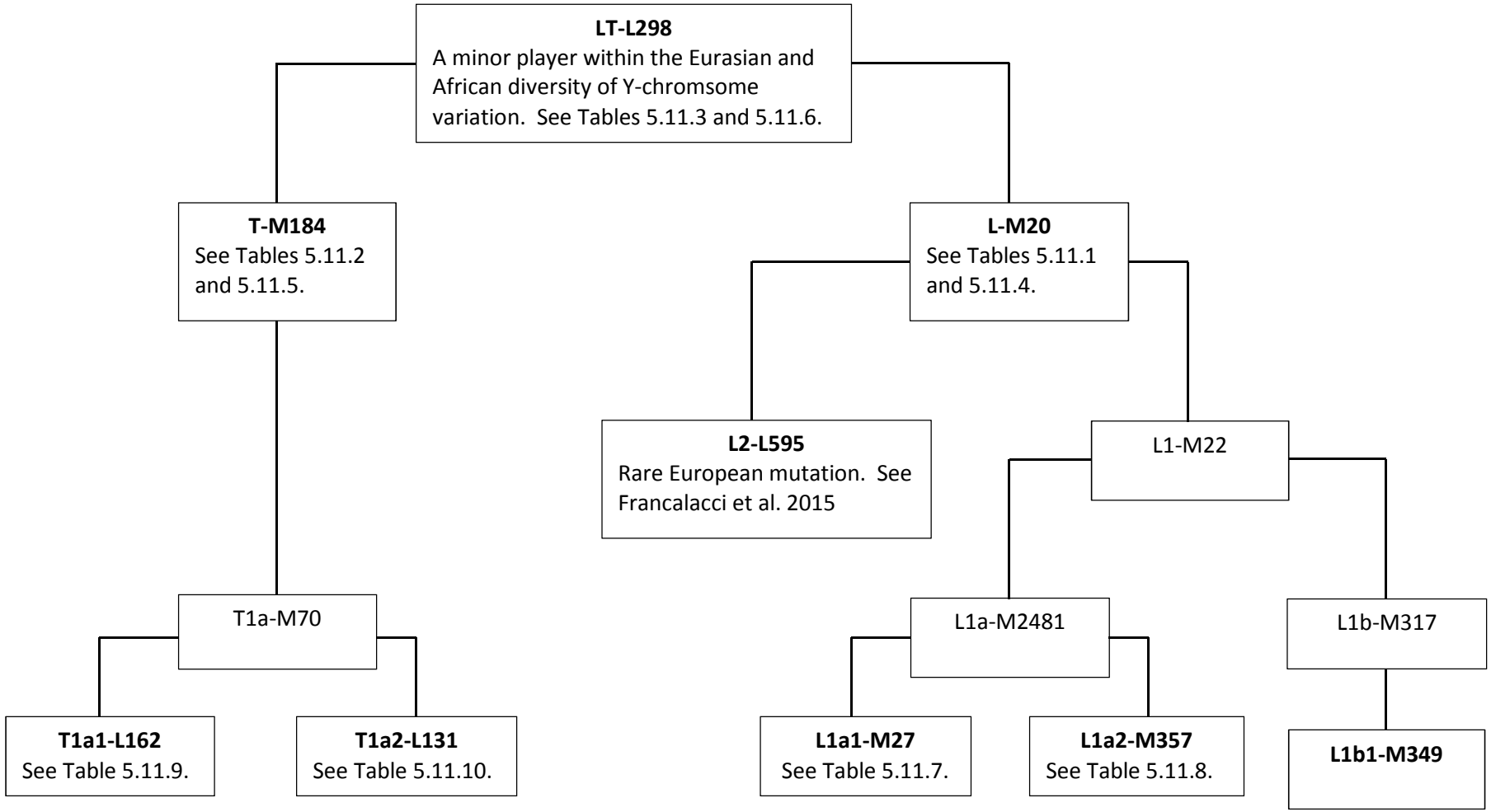
Poznik, G. David et al. 2016. "Punctuated bursts in human male demography inferred from 1,244 worldwide Y-chromosome sequences." *Nature Genetics* 48(6): 593-600.

Sengupta, Sanghamitra et al. 2006. "Polarity and temporality of high-resolution Y-chromosome distributions in India identify both indigenous and exogenous expansions and reveals minor genetic influence of central Asian pastoralists." *American Journal of Human Genetics* 78: 201-221.

Winters, Clyde 2010. "Y-Chromosome evidence of an African origin of Dravidian agriculture." *International Journal of Genetics and Molecular Biology* 2(3): 30-33.

YCC 2002. "A nomenclature system for the tree of human Y-chromosome binary haplogroups." *Genome Research* 12: 339-348.

Figure 5.11.1. Overview of LT-L298 and its Significant Downstream Mutations.



Nomenclature generally conforms to ISOGG 2017.

Table 5.11.1. Survey of L-M20 Variation (Regional View).

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
Caucasus	Russia	Chechens	North Caucasian		165	17.58%	Yunusbayev et al. 2012
Caucasus	Daghestan	Chechens	North Caucasian		100	14.00%	Balanovsky et al. 2011
Caucasus	Dagestan	Chechens	North Caucasian		20	10.00%	Caciagli et al. 2009
Caucasus	Russia	Avars	North Caucasian		42	9.52%	Yunusbayev et al. 2012
Caucasus	Russia	Ingush	North Caucasian		105	8.57%	Yunusbayev et al. 2012
Caucasus	Daghestan	Tats	Indo-European	Iranian	24	8.33%	Karafet et al. 2016
Caucasus	Russia	Chechens (Chechnya)	North Caucasian		118	7.00%	Balanovsky et al. 2011
Caucasus	Russia: Rostov and Myasnikovsky Regions	Armenians Don	Indo-European	Armenian	92	6.52%	Balanovsky et al. 2017
Caucasus	Georgia	Abkhaz	North Caucasian		162	4.94%	Yunusbayev et al. 2012
Caucasus	Russia	Chamalal	North Caucasian		27	3.70%	Yunusbayev et al. 2012
Caucasus	Russia	Abkhaz	North Caucasian		58	3.40%	Balanovsky et al. 2011
Caucasus	Georgia	Imereti	Kartvelian		62	3.23%	Balanovsky et al. 2017
Caucasus	Georgia	Armenians Erzurum	Indo-European	Armenian	99	3.03%	Balanovsky et al. 2017
Caucasus	Daghestan	Avars	North Caucasian		115	3.00%	Balanovsky et al. 2011
Caucasus	Russia	Ingush	North Caucasian		143	2.80%	Balanovsky et al. 2011
Caucasus	Caucasus	Adyghe	North Caucasian		154	2.60%	Yunusbayev et al. 2012
Caucasus	Russia: Krasnodar	Armenians Krasnodar	Indo-European	Armenian	117	2.56%	Balanovsky et al. 2017
Caucasus	Caucasus	Abazins	North Caucasian		88	2.27%	Yunusbayev et al. 2012
Caucasus	Russia: Krasnodar	Armenians Hemsheni	Indo-European	Armenian	89	2.25%	Balanovsky et al. 2017

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
Caucasus	Russia: Adygea	Armenians Adygei	Indo-European	Armenian	49	2.07%	Balanovsky et al. 2017
Caucasus	Russia	Shapsugs	North Caucasian		100	2.00%	Balanovsky et al. 2011
Caucasus	Armenia	Armenians	Indo-European	Armenian	57	1.75%	Yunusbayev et al. 2012
Caucasus	Russia	Chechens (Ingushetia)	North Caucasian		112	1.70%	Balanovsky et al. 2011
Caucasus	Daghestan	Lezgians	North Caucasian		81	1.20%	Balanovsky et al. 2011
Caucasus	Armenia	Armenians (Eastern)	Indo-European	Armenian	416	0.96%	Hovhannisyan et al. 2014
Caucasus	Russia	North Ossetians	Indo-European	Iranian	132	0.76%	Yunusbayev et al. 2012
Caucasus	Russia	Kabardin	North Caucasian		140	0.71%	Yunusbayev et al. 2012
Caucasus	Russia	Cherkessians	North Caucasian		142	0.70%	Balanovsky et al. 2011
Central Asia	Tajikistan	Tajiks	Indo-European	Iranian	40	22.50%	Malyarchuk et al. 2013
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	49	12.24%	Haber et al. 2012
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	190	9.47%	Lacau et al. 2012
Central Asia	Afghanistan	Uzbeks	Turkic		127	9.45%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	56	8.91%	Haber et al. 2012
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	87	6.90%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	142	6.34%	Di Cristofaro et al. 2013
Central Asia	Uzbekistan (Fergana)	Uzbek	Turkic		67	5.97%	Zhabagin et al. 2017
Central Asia	Uzbekistan (Xorezm)	Uzbek	Turkic		98	5.10%	Zhabagin et al. 2017
Central Asia	Kazakhstan (Zhanakorgan)	Kazakh	Turkic		94	4.26%	Zhabagin et al. 2017
Central Asia	Afghanistan	Turkmen	Turkic		74	4.05%	Di Cristofaro et al. 2013

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
Central Asia	Afghanistan	Hazara	Indo-European	Iranian	77	3.90%	Di Cristofaro et al. 2013
Central Asia	Uzbekistan (Tashkent)	Uzbek	Turkic		52	3.85%	Zhabagin et al. 2017
Central Asia	Uzbekistan	Dungan	Sino-Tibetan	Chinese	31	3.00%	Zhabagin et al. 2017
Central Asia	Afghanistan	Hazara	Indo-European	Iranian	60	1.66%	Haber et al. 2012
Central Asia	Kyrgyzstan	Kyrgyz	Turkic		132	1.52%	Di Cristofaro et al. 2013
Central Asia	Uzbekistan	Karakalpak	Turkic		100	1.00%	Zhabagin et al. 2017
East Asia	Xingjiang, China	Uyghurs	Turkic		48	8.33%	Zhong et al. 2011
East Asia	Xingjiang, China	Uyghurs	Turkic		50	4.00%	Zhong et al. 2011
East Asia	Xingjiang, China	Uyghurs	Turkic		71	2.82%	Zhong et al. 2011
Eastern Europe	Bulgaria	Bulgarians	Indo-European	Slavic	808	0.20%	Karachanak et al. 2013
Mediterranean	Cyprus	Greek Cypriots	Indo-European	Greek	629	1.90%	Voskarides et al. 2017
Mediterranean	Greece	Greeks (Nea Nikomedeia)	Indo-European	Greek	57	1.75%	King et al. 2011
Mediterranean	Italy	Italians	Indo-European	Italic	884	1.47%	Boattini et al. 2013
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	0.84%	Francalacci et al. 2015
South Asia	Southwest India	Vokkaliga	Dravidian		102	32.35%	Chennakrishnaiah et al. 2013
South Asia	Pakistan	Baloch	Indo-European	Iranian	59	28.81%	Qamar et al. 2002
South Asia	Pakistan	Kalash	Indo-European	Indo-Aryan	44	25.00%	Firasat et al. 2007
South Asia	Pakistan	Kalash	Indo-European	Indo-Aryan	44	25.00%	Qamar et al. 2002
South Asia	Pakistan	Kalash	Indo-European	Indo-Aryan	20	25.00%	Di Cristofaro et al. 2013
South Asia	Pakistan	Baloch	Indo-European	Iranian	25	24.00%	Di Cristofaro et al. 2013
South Asia	Orissa	Oriya Brahmin	Indo-European	Indo-Aryan	24	20.84%	Sahoo et al. 2006
South Asia	South India	Ambalakarar	Dravidian		29	20.69%	Sengupta et al. 2006
South Asia	South India	Vanniyar	Dravidian		25	20.00%	Sengupta et al. 2006
South Asia	Bombay	Konkani Brahmins	Indo-European	Indo-Aryan	43	18.60%	Kivisild et al. 2003

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
South Asia	Gujarat	Bhils	Indo-European	Indo-Aryan	22	18.18%	Sharma et al. 2009
South Asia	Sri Lanka	Sinhalese	Indo-European	Indo-Aryan	39	17.95%	Kivisild et al. 2003
South Asia	Southwest India	Lingayat	Dravidian		101	17.82%	Chennakrishnaiah et al. 2013
South Asia	Pakistan	Parsi	Indo-European	Indo-Aryan	90	17.78%	Qamar et al. 2002
South Asia	South India	Pallan	Dravidian		29	17.24%	Sengupta et al. 2006
South Asia	South India	Iyer	Dravidian		29	17.24%	Sengupta et al. 2006
South Asia	Andhra Pradesh	Banjara (Lambadi)	Indo-European	Indo-Aryan	35	17.14%	Kivisild et al. 2003
South Asia	Pakistan	Burusho	Isolate		94	17.02%	Qamar et al. 2002
South Asia	South India	Iyengar	Dravidian		30	16.67%	Sengupta et al. 2006
South Asia	Pakistan	Burusho	Isolate		97	16.50%	Firasat et al. 2007
South Asia	Kashmir	Gujars	Indo-European	Indo-Aryan	49	16.33%	Sharma et al. 2009
South Asia	South India	Vellalar	Dravidian		31	16.13%	Sengupta et al. 2006
South Asia	North Pakistan	Burusho	Isolate		20	15.00%	Sengupta et al. 2006
South Asia	Pakistan	Burusho	Isolate		20	15.00%	Di Cristofaro et al. 2013
South Asia	West India	Maratha	Indo-European	Indo-Aryan	20	15.00%	Sengupta et al. 2006
South Asia	Andra Pradesh	Pardhan	Dravidian		128	14.84%	Thanseem et al. 2006
South Asia	Andhra Pradesh	Chenchu	Dravidian		41	14.63%	Kivisild et al. 2003
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	93	12.90%	Qamar et al. 2002
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	96	12.50%	Firasat et al. 2007
South Asia	Punjab	Punjabi	Indo-European	Indo-Aryan	66	12.12%	Kivisild et al. 2003
South Asia	Bombay	Gujarati	Indo-European	Indo-Aryan	29	10.34%	Kivisild et al. 2003
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	20	10.00%	Di Cristofaro et al. 2013

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
South Asia	Maharashtra	Brahmin	Indo-European	Indo-Aryan	32	10.00%	Sharma et al. 2009
South Asia	South India	Irula	Dravidian		30	10.00%	Sengupta et al. 2006
South Asia	Tamil Nadu	Parayar	Dravidian		24	8.34%	Arunkumar et al. 2012
South Asia	Pakistan	Brahui	Dravidian		25	8.00%	Di Cristofaro et al. 2013
South Asia	Uttar-Pradesh	Tharu	Indo-European	Indo-Aryan	164	7.93%	Chaubey et al. 2014
South Asia	Gujarat	Brahmin	Indo-European	Indo-Aryan	64	7.81%	Sharma et al. 2009
South Asia	Tamil Nadu	Thoda	Dravidian		26	7.70%	Arunkumar et al. 2012
South Asia	Bihar	Paswan	Indo-European	Indo-Aryan	27	7.41%	Sharma et al. 2009
South Asia	Tamil Nadu	Paravar	Dravidian		27	7.41%	Arunkumar et al. 2012
South Asia	Pakistan	Brahui	Dravidian		110	7.27%	Qamar et al. 2002
South Asia	Madhya Pradesh	Brahmin	Indo-European	Indo-Aryan	42	7.14%	Sharma et al. 2009
South Asia	Bangladesh	Tripuri	Sino-Tibetan	Tibeto-Burman	88	7.00%	Gazi et al. 2013
South Asia	Northern India	Rajput	Indo-European	Indo-Aryan	29	6.90%	Sengupta et al. 2006
South Asia	Central India	Kamar	Dravidian		30	6.67%	Sengupta et al. 2006
South Asia	Uttarakhand	Tharu	Indo-European	Indo-Aryan	45	6.67%	Chaubey et al. 2014
South Asia	Pakistan	Sindhi	Indo-European	Indo-Aryan	122	6.56%	Qamar et al. 2002
South Asia	Maharashtra	Mahadeo Koli	Indo-European	Indo-Aryan	50	6.00%	Thangaraj et al. 2010
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	270	5.93%	Lee et al. 2014
South Asia	Kashmir	Pandits	Indo-European	Indo-Aryan	51	5.88%	Sharma et al. 2009
South Asia	Tamil Nadu	Pallar	Dravidian		51	5.88%	Arunkumar et al. 2012
South Asia	Morang, Nepal	Tharu	Indo-European	Indo-Aryan	37	5.40%	Fornarino et al. 2009
South Asia	Himachal	Brahmin	Indo-European	Indo-Aryan	30	5.26%	Sharma et al. 2009
South Asia	Bihar	Brahmin	Indo-European	Indo-Aryan	38	5.26%	Sharma et al. 2009
South Asia	Bangladesh	Marma	Sino-Tibetan	Tibeto-Burman	60	5.00%	Gazi et al. 2013

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
South Asia	Jharkhand	Pahariya	Indo-European	Indo-Aryan	100	5.00%	Borkar et al. 2011
South Asia	Gujarat, India	Dhodia	Indo-European	Indo-Aryan	63	4.76%	Khurana et al. 2014
South Asia	Gujarat, India	Dubla	Indo-European	Indo-Aryan	42	4.76%	Khurana et al. 2014
South Asia	Pakistan	Sindhi	Indo-European	Indo-Aryan	31	4.76%	Di Cristofaro et al. 2013
South Asia	Tamil Nadu	Vadama	Indo-European	Indo-Aryan	63	4.76%	Arunkumar et al. 2012
South Asia	West Bengal	Rajbanshi	Indo-European	Indo-Aryan	45	4.44%	Borkar et al. 2011
South Asia	Tamil Nadu	Vanniyar NTN	Dravidian		96	4.16%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Tamil Jains	Dravidian		100	4.00%	Arunkumar et al. 2012
South Asia	West India	Koknasth Brahmin	Indo-European	Indo-Aryan	25	4.00%	Sengupta et al. 2006
South Asia	West Bengal	Rajbanshi	Indo-European	Indo-Aryan	51	3.92%	Debnath et al. 2011
South Asia	Tamil Nadu	Parayar NTN	Dravidian		52	3.84%	Arunkumar et al. 2012
South Asia	Jharkhand	Ho	Austro-Asiatic		28	3.57%	Borkar et al. 2011
South Asia	Chitwan, Nepal	Tharu	Indo-European	Indo-Aryan	57	3.50%	Fornarino et al. 2009
South Asia	Madhya Pradesh	Saharia	Indo-European	Indo-Aryan	57	3.24%	Sharma et al. 2009
South Asia	Uttar Pradesh	Brahmin	Indo-European	Indo-Aryan	31	3.21%	Sharma et al. 2009
South Asia	Tamil Nadu	Paliyan	Dravidian		95	3.16%	Arunkumar et al. 2012
South Asia	Andra Pradesh	Naikpod	Dravidian		68	2.94%	Thanseem et al. 2006
South Asia	Jharkhand	Oraon	Dravidian		110	2.73%	Borkar et al. 2011
South Asia	Gujarat, India	Chaudhari	Indo-European	Indo-Aryan	113	2.65%	Khurana et al. 2014
South Asia	Jharkhand	Munda	Austro-Asiatic		94	2.13%	Borkar et al. 2011
South Asia	Tamil Nadu	Valayar	Dravidian		95	2.11%	Arunkumar et al. 2012
South Asia	Maharashtra	Thakur	Indo-European	Indo-Aryan	48	2.00%	Thangaraj et al. 2010
South Asia	Jharkhand	Birhor	Austro-Asiatic		100	2.00%	Borkar et al. 2011
South Asia	Tamil Nadu	Piramalai Kallar	Dravidian		53	1.89%	Arunkumar et al. 2012

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
South Asia	Andra Pradesh	Andh	Indo-European	Indo-Aryan	54	1.86%	Thanseem et al. 2006
South Asia	West Bengal	Bengali	Indo-European	Indo-Aryan	54	1.85%	Debnath et al. 2011
South Asia	Tamil Nadu	Pulayar	Dravidian		63	1.59%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Maravar	Dravidian		80	1.25%	Arunkumar et al. 2012
South Asia	Jharkhand	Santhal	Austro-Asiatic		90	1.11%	Borkar et al. 2011
South Asia	Tamil Nadu	Ezhava	Dravidian		95	1.05%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Nadar Cape	Dravidian		98	1.02%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Yadhava	Dravidian		107	0.93%	Arunkumar et al. 2012
Southwest Asia	Turkey	Laz	Kartvelian		36	41.67%	Balanovsky et al. 2017
Southwest Asia	Iran	Baloch	Indo-European	Iranian	24	16.60%	Grugni et al. 2012
Southwest Asia	Lebanon	Lebanese Druze	Afro-Asiatic	Semitic	31	13.00%	Haber et al. 2016
Southwest Asia	Lebanon	Lebanese Christians	Afro-Asiatic	Semitic	52	12.00%	Haber et al. 2016
Southwest Asia	Syria	Syrians	Afro-Asiatic	Semitic	518	10.42%	Haber et al. 2011
Southwest Asia	Eastern Iran	Persians	Indo-European	Iranian	77	9.09%	Malyarchuk et al. 2013
Southwest Asia	Iran	Iranians	Indo-European	Iranian	324	8.33%	Haber et al. 2011
Southwest Asia	Western Iran	Kurds	Indo-European	Iranian	25	8.00%	Malyarchuk et al. 2013
Southwest Asia	Lebanon	Lebanese Muslims	Afro-Asiatic	Semitic	43	7.00%	Haber et al. 2016
Southwest Asia	Iran	Persians Fars	Indo-European	Iranian	44	6.80%	Grugni et al. 2012
Southwest Asia	Iran	Turkmen	Turkic		68	5.80%	Grugni et al. 2012
Southwest Asia	Lebanon	Lebanese	Afro-Asiatic	Semitic	914	5.25%	Zalloua et al. 2008
Southwest Asia	Lebanon	Lebanese	Afro-Asiatic	Semitic	1202	4.99%	Haber et al. 2011
Southwest Asia	Iran	Gilak	Indo-European	Iranian	64	4.80%	Grugni et al. 2012
Southwest Asia	Turkey	Turks	Turkic		523	4.21%	Cinnioglu et al. 2004
Southwest Asia	Iran	Persians Yazd	Indo-European	Iranian	46	4.20%	Grugni et al. 2012

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M20	Reference
Southwest Asia	Turkey	Armenians (Sasun)	Indo-European	Armenian	104	3.85%	Hovhannisyan et al. 2014
Southwest Asia	Iran	Persians Khorasan	Indo-European	Iranian	59	3.40%	Grugni et al. 2012
Southwest Asia	Turkey	Turks (Western Anatolia)	Turkic		30	3.33%	King et al. 2011
Southwest Asia	Turkey	Central Anatolia	Turkic		90	3.33%	King et al. 2011
Southwest Asia	Iran	Azerbaijani	Turkic		63	3.20%	Grugni et al. 2012
Southwest Asia	Turkey	Central Anatolia	Turkic		90	3.00%	Borkar et al. 2011
Southwest Asia	Turkey	Armenians (Western)	Indo-European	Armenian	148	2.03%	Hovhannisyan et al. 2014
Southwest Asia	Iran	Armenians (Salmast)	Indo-European	Armenian	199	2.01%	Hovhannisyan et al. 2014
Southwest Asia	Turkey	Armenians (Van)	Indo-European	Armenian	103	1.94%	Hovhannisyan et al. 2014
Southwest Asia	Saudi Arabia	Saudis	Afro-Asiatic	Semitic	157	1.91%	Abu-Amero et al. 2009
Southwest Asia	Iran	Kurds	Indo-European	Iranian	59	1.70%	Grugni et al. 2012
Southwest Asia	Iran	Ossetians (Iron)	Indo-European	Iranian	230	0.90%	Balanovsky et al. 2011
Southwest Asia	Oman	Arabs	Afro-Asiatic	Semitic	121	0.83%	Luis et al. 2004
Southwest Asia	Iran	Ossetians (Digor)	Indo-European	Iranian	127	0.80%	Balanovsky et al. 2011
Southwest Asia	Turkey	Armenians (Central)	Indo-European	Armenian	200	0.50%	Hovhannisyan et al. 2014
Western Europe	Central Portugal	Portuguese	Indo-European	Italic	46	2.20%	Carvalho et al. 2008
Western Europe	Flanders	Flemish	Indo-European	Germanic	773	0.26%	Larmuseau et al. 2014

Table 5.11.2. Survey of T-M184 Variation (Regional View).

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T-M184	Reference
Caucasus	Georgia	Armenians Erzurum	Indo-European	Armenian	99	9.00%	Balanovsky et al. 2017
Caucasus	Russia	Avars	North Caucasian		42	4.76%	Yunusbayev et al. 2012
Caucasus	Armenia	Armenians (Eastern)	Indo-European	Armenian	416	4.57%	Hovhannisyan et al. 2014
Caucasus	Russia: Rostov and Myasnikovsky Regions	Armenians Don	Indo-European	Armenian	92	4.00%	Balanovsky et al. 2017
Caucasus	Russia: Krasnodar	Armenians Krasnodar	Indo-European	Armenian	117	4.00%	Balanovsky et al. 2017
Caucasus	Russia	Karachays	Turkic		69	2.90%	Yunusbayev et al. 2012
Caucasus	Daghestan	Lezgians	North Caucasian		81	2.50%	Balanovsky et al. 2011
Caucasus	Russia	Andis	North Caucasian		49	2.04%	Yunusbayev et al. 2012
Caucasus	Russia: Adygea	Armenians Adygei	Indo-European	Armenian	49	2.00%	Balanovsky et al. 2017
Caucasus	Russia: Krasnodar	Armenians Hemsheni	Indo-European	Armenian	89	2.00%	Balanovsky et al. 2017
Caucasus	Russia	Abkhaz	North Caucasian		58	1.70%	Balanovsky et al. 2011
Caucasus	Georgia	Imereti	Kartvelian		62	1.60%	Balanovsky et al. 2017
Caucasus	Russia	Kumyks	Turkic		73	1.37%	Yunusbayev et al. 2012
Caucasus	Russia	Nogais, Kuban	Turkic		87	1.15%	Yunusbayev et al. 2012
Caucasus	Russia	Kabardin	North Caucasian		140	0.71%	Yunusbayev et al. 2012
Caucasus	Russia	Chechens (Ingushetia)	North Caucasian		112	0.70%	Balanovsky et al. 2011
Caucasus	Russia	Cherkessians	North Caucasian		142	0.70%	Balanovsky et al. 2011
Caucasus	Georgia	Abkhaz	North Caucasian		162	0.62%	Yunusbayev et al. 2012
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	56	3.57%	Haber et al. 2012

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T-M184	Reference
Central Asia	Uzbekistan	Dungan	Sino-Tibetan	Chinese	31	3.00%	Zhabagin et al. 2017
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	142	1.41%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	87	1.15%	Di Cristofaro et al. 2013
Central Asia	Kazakhstan (Zhanakorgan)	Kazakh	Turkic		94	1.00%	Zhabagin et al. 2017
East Asia	Xingjiang, China	Uyghurs	Turkic		48	2.08%	Zhong et al. 2011
Eastern Europe	Moldova	Gagauz	Turkic		89	3.40%	Varzari et al. 2009
Eastern Europe	Bulgaria	Bulgarians	Indo-European	Slavic	808	1.60%	Karachanak et al. 2013
Eastern Europe	Slovakia	Slovaks	Indo-European	Slavic	164	0.61%	Rebala et al. 2013
Mediterranean	Smyrna, Greece	Greeks	Indo-European	Greek	58	3.45%	King et al. 2011
Mediterranean	Phokaia, Greece	Greeks	Indo-European	Greeks	31	3.23%	King et al. 2011
Mediterranean	Cyprus	Greek Cypriots	Indo-European	Greek	629	2.54%	Voskarides et al. 2017
Mediterranean	Italy	Italians	Indo-European	Italic	884	2.37%	Boattini et al. 2013
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	2.26%	Francalacci et al. 2015
Mediterranean	Lerna/Franchthi Cave, Greece	Greeks	Indo-European	Greek	57	1.75%	King et al. 2011
Mediterranean	Greece	Greeks (Sesklo/Dimini)	Indo-European	Greek	57	1.75%	King et al. 2011
Mediterranean	Greece	Greeks (Nea Nikomedeia)	Indo-European	Greek	57	1.75%	King et al. 2011
North Africa	Egypt	Egyptians	Afro-Asiatic	Semitic	150	6.70%	Mendez et al. 2011
North Africa	Egypt	Arabs	Afro-Asiatic	Semitic	147	5.44%	Luis et al. 2004
North Africa	Sudan	Oromo	Afro-Asiatic	Cushitic	78	5.13%	Hassan et al. 2008
North Africa	Sudan	Amhara	Afro-Asiatic	Semitic	48	4.17%	Hassan et al. 2008
South Asia	Bihar	Brahmin	Indo-European	Indo-Aryan	38	13.16%	Sharma et al. 2009
South Asia	Uttar Pradesh	Gond	Dravidian		38	10.81%	Sharma et al. 2009

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T-M184	Reference
South Asia	Kashmir	Pandits	Indo-European	Indo-Aryan	51	9.80%	Sharma et al. 2009
South Asia	Kashmir	Gujars	Indo-European	Indo-Aryan	49	8.16%	Sharma et al. 2009
South Asia	Madhya Pradesh	Gond	Dravidian		31	6.25%	Sharma et al. 2009
South Asia	Maharashtra	Brahmin	Indo-European	Indo-Aryan	32	3.33%	Sharma et al. 2009
South Asia	Gujarat	Brahmin	Indo-European	Indo-Aryan	64	3.13%	Sharma et al. 2009
South Asia	Western India	Chitpavan Brahmin	Indo-European	Indo-Aryan	66	3.00%	Gaikwad and Kashyap 2005
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	270	1.48%	Lee et al. 2014
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	96	1.00%	Firasat et al. 2007
Southwest Asia	Turkey	Armenians (Sasun)	Indo-European	Armenian	104	20.19%	Hovhannisyan et al. 2014
Southwest Asia	Middle East	Assyrians	Afro-Asiatic	Semitic	31	12.90%	Mendez et al. 2011
Southwest Asia	Iran	Assyrians	Afro-Asiatic	Semitic	39	10.30%	Grugni et al. 2012
Southwest Asia	Iran	Kurds	Indo-European	Iranian	59	8.50%	Grugni et al. 2012
Southwest Asia	Iran	Azerbaijani	Turkic		63	7.90%	Grugni et al. 2012
Southwest Asia	Middle East	Druze	Afro-Asiatic	Semitic	39	7.70%	Mendez et al. 2011
Southwest Asia	Iran	Persians Fars	Indo-European	Iranian	44	6.80%	Grugni et al. 2012
Southwest Asia	Oman	Arabs	Afro-Asiatic	Semitic	121	6.61%	Luis et al. 2004
Southwest Asia	Iran	Persians Yazd	Indo-European	Iranian	46	6.40%	Grugni et al. 2012
Southwest Asia	Turkey	Armenians (Central)	Indo-European	Armenian	200	6.00%	Hovhannisyan et al. 2014
Southwest Asia	Iraq	Iraqis	Afro-Asiatic	Semitic	36	5.60%	Mendez et al. 2011
Southwest Asia	Syria	Syrians	Afro-Asiatic	Semitic	95	5.40%	Mendez et al. 2011
Southwest Asia	Middle East	Palestinians	Afro-Asiatic	Semitic	115	5.30%	Mendez et al. 2011

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T-M184	Reference
Southwest Asia	Iran	Persians Khorasan	Indo-European	Iranian	59	5.10%	Grugni et al. 2012
Southwest Asia	Saudi Arabia	Saudis	Afro-Asiatic	Semitic	157	5.10%	Abu-Amero et al. 2009
Southwest Asia	Turkey	Armenians (Western)	Indo-European	Armenian	148	4.73%	Hovhannisyan et al. 2014
Southwest Asia	Lebanon	Lebanese	Afro-Asiatic	Semitic	914	4.70%	Zalloua et al. 2008
Southwest Asia	Lebanon	Lebanese	Afro-Asiatic	Semitic	1202	4.49%	Haber et al. 2011
Southwest Asia	Eastern Iran	Persians	Indo-European	Iranian	77	3.90%	Malyarchuk et al. 2013
Southwest Asia	Turkey	Armenians (Van)	Indo-European	Armenian	103	3.88%	Hovhannisyan et al. 2014
Southwest Asia	Turkey	Turks (Western Anatolia)	Turkic		30	3.33%	King et al. 2011
Southwest Asia	Turkey	Central Anatolia	Turkic		90	3.33%	King et al. 2011
Southwest Asia	Jordan	Jordanians	Afro-Asiatic	Semitic	187	3.10%	Mendez et al. 2011
Southwest Asia	Turkey	Turks	Turkic		33	3.03%	King et al. 2011
Southwest Asia	Iran	Armenians (Salmast)	Indo-European	Armenian	199	2.51%	Hovhannisyan et al. 2014
Southwest Asia	Turkey	Turks	Turkic		523	2.49%	Cinnioglu et al. 2004
Southwest Asia	Iran	Iranians	Indo-European	Iranian	324	2.16%	Haber et al. 2011
Southwest Asia	Turkey	Turks (Northwest Anatolia)	Turkic		52	1.92%	King et al. 2011
Southwest Asia	Iran	Turkmen	Turkic		68	1.40%	Grugni et al. 2012
Southwest Asia	Iran	Ossetians (Digor)	Indo-European	Iranian	127	0.80%	Balanovsky et al. 2011
Southwest Asia	Syria	Syrians	Afro-Asiatic	Semitic	518	0.77%	Haber et al. 2011
Sub-Saharan Africa	Southern Africa	Lemba	Niger-Congo	Bantoid	34	17.60%	Mendez et al. 2011
Sub-Saharan Africa	Tanzania	Wairak	Niger-Congo	Bantoid	43	11.63%	Luis et al. 2004

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T-M184	Reference
Sub-Saharan Africa	Uganda	Ng'arkarimojong	Nilo-Saharan		118	0.85%	Gomes et al. 2010
Western Europe	Central Portugal	Portuguese	Indo-European	Italic	46	4.30%	Carvalho et al. 2008
Western Europe	Iberia	Iberians	Indo-European	Italic	559	2.86%	Flores et al. 2004
Western Europe	France	French	Indo-European	Italic	558	1.61%	Ramos-Luis et al. 2014
Western Europe	Iberia	Iberians	Indo-European	Italic	1882	1.54%	Santos et al. 2014
Western Europe	Bavaria, Germany	Germans	Indo-European	Germanic	218	0.92%	Rebala et al. 2013
Western Europe	Mecklenburg, Germany	Germans	Indo-European	Germanic	131	0.76%	Rebala et al. 2013
Western Europe	Flanders	Flemish	Indo-European	Germanic	773	0.65%	Larmuseau et al. 2014

Table 5.11.3. Survey of LT-L298 Variation (Regional View).

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
Caucasus	Chechens	North Caucasian		165	17.58%	Yunusbayev et al. 2012
Caucasus	Avars	North Caucasian		42	14.28%	Yunusbayev et al. 2012
Caucasus	Chechens	North Caucasian		100	14.00%	Balanovsky et al. 2011
Caucasus	Armenians Erzurum	Indo-European	Armenian	99	12.03%	Balanovsky et al. 2017
Caucasus	Armenians Don	Indo-European	Armenian	92	10.52%	Balanovsky et al. 2017
Caucasus	Chechens	North Caucasian		20	10.00%	Caciagli et al. 2009
Caucasus	Ingush	North Caucasian		105	8.57%	Yunusbayev et al. 2012
Caucasus	Tats	Indo-European	Iranian	24	8.33%	Karafet et al. 2016
Caucasus	Chechens (Chechnya)	North Caucasian		118	7.00%	Balanovsky et al. 2011
Caucasus	Armenians Krasnodar	Indo-European	Armenian	117	6.56%	Balanovsky et al. 2017
Caucasus	Abkhaz	North Caucasian		162	5.56%	Yunusbayev et al. 2012
Caucasus	Armenians (Eastern)	Indo-European	Armenian	416	5.53%	Hovhannisyan et al. 2014
Caucasus	Abkhaz	North Caucasian		58	5.10%	Balanovsky et al. 2011
Caucasus	Imereti	Kartvelian		62	4.83%	Balanovsky et al. 2017
Caucasus	Armenians Hemsheni	Indo-European	Armenian	89	4.25%	Balanovsky et al. 2017
Caucasus	Armenians Adygei	Indo-European	Armenian	49	4.07%	Balanovsky et al. 2017
Caucasus	Lezgians	North Caucasian		81	3.70%	Balanovsky et al. 2011
Caucasus	Chamalal	North Caucasian		27	3.70%	Yunusbayev et al. 2012
Caucasus	Avars	North Caucasian		115	3.00%	Balanovsky et al. 2011
Caucasus	Karachays	Turkic		69	2.90%	Yunusbayev et al. 2012
Caucasus	Ingush	North Caucasian		143	2.80%	Balanovsky et al. 2011
Caucasus	Adyghe	North Caucasian		154	2.60%	Yunusbayev et al. 2012

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
Caucasus	Chechens (Ingushetia)	North Caucasian		112	2.40%	Balanovsky et al. 2011
Caucasus	Abazins	North Caucasian		88	2.27%	Yunusbayev et al. 2012
Caucasus	Andis	North Caucasian		49	2.04%	Yunusbayev et al. 2012
Caucasus	Shapsugs	North Caucasian		100	2.00%	Balanovsky et al. 2011
Caucasus	Armenians	Indo-European	Armenian	57	1.75%	Yunusbayev et al. 2012
Caucasus	Kabardin	North Caucasian		140	1.42%	Yunusbayev et al. 2012
Caucasus	Cherkessians	North Caucasian		142	1.40%	Balanovsky et al. 2011
Caucasus	Kumyks	Turkic		73	1.37%	Yunusbayev et al. 2012
Caucasus	Nogais, Kuban	Turkic		87	1.15%	Yunusbayev et al. 2012
Caucasus	North Ossetians	Indo-European	Iranian	132	0.76%	Yunusbayev et al. 2012
Central Asia	Tajiks	Indo-European	Iranian	40	22.50%	Malyarchuk et al. 2013
Central Asia	Tajiks	Indo-European	Iranian	56	12.48%	Haber et al. 2012
Central Asia	Pashtuns (Pathans)	Indo-European	Iranian	49	12.24%	Haber et al. 2012
Central Asia	Pashtuns (Pathans)	Indo-European	Iranian	190	9.47%	Lacau et al. 2012
Central Asia	Uzbeks	Turkic		127	9.45%	Di Cristofaro et al. 2013
Central Asia	Pashtuns (Pathans)	Indo-European	Iranian	87	8.05%	Di Cristofaro et al. 2013
Central Asia	Tajiks	Indo-European	Iranian	142	7.75%	Di Cristofaro et al. 2013
Central Asia	Dungan	Sino-Tibetan	Chinese	31	6.00%	Zhabagin et al. 2017
Central Asia	Uzbek	Turkic		67	5.97%	Zhabagin et al. 2017
Central Asia	Kazakh	Turkic		94	5.26%	Zhabagin et al. 2017
Central Asia	Uzbek	Turkic		98	5.10%	Zhabagin et al. 2017
Central Asia	Turkmen	Turkic		74	4.05%	Di Cristofaro et al. 2013
Central Asia	Hazara	Indo-European	Iranian	77	3.90%	Di Cristofaro et al. 2013
Central Asia	Uzbek	Turkic		52	3.85%	Zhabagin et al. 2017

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
Central Asia	Hazara	Indo-European	Iranian	60	1.66%	Haber et al. 2012
Central Asia	Kyrgyz	Turkic		132	1.52%	Di Cristofaro et al. 2013
Central Asia	Karakalpak	Turkic		100	1.00%	Zhabagin et al. 2017
East Asia	Uyghurs	Turkic		48	10.41%	Zhong et al. 2011
East Asia	Uyghurs	Turkic		50	4.00%	Zhong et al. 2011
East Asia	Uyghurs	Turkic		71	2.82%	Zhong et al. 2011
Eastern Europe	Gagauz	Turkic		89	3.40%	Varzari et al. 2009
Eastern Europe	Bulgarians	Indo-European	Slavic	808	1.80%	Karachanak et al. 2013
Eastern Europe	Slovaks	Indo-European	Slavic	164	0.61%	Rebala et al. 2013
Mediterranean	Greek Cypriots	Indo-European	Greek	629	4.44%	Voskarides et al. 2017
Mediterranean	Italians	Indo-European	Italic	884	3.84%	Boattini et al. 2013
Mediterranean	Greeks (Nea Nikomedeia)	Indo-European	Greek	57	3.50%	King et al. 2011
Mediterranean	Greeks	Indo-European	Greek	58	3.45%	King et al. 2011
Mediterranean	Greeks	Indo-European	Greeks	31	3.23%	King et al. 2011
Mediterranean	Sardinians	Indo-European	Italic	1194	3.10%	Francalacci et al. 2015
Mediterranean	Greeks	Indo-European	Greek	57	1.75%	King et al. 2011
Mediterranean	Greeks (Sesklo/Dimini)	Indo-European	Greek	57	1.75%	King et al. 2011
North Africa	Egyptians	Afro-Asiatic	Semitic	150	6.70%	Mendez et al. 2011
North Africa	Arabs	Afro-Asiatic	Semitic	147	5.44%	Luis et al. 2004
North Africa	Oromo	Afro-Asiatic	Cushitic	78	5.13%	Hassan et al. 2008
North Africa	Amhara	Afro-Asiatic	Semitic	48	4.17%	Hassan et al. 2008
South Asia	Vokkaliga	Dravidian		102	32.35%	Chennakrishnaiah et al. 2013
South Asia	Baloch	Indo-European	Iranian	59	28.81%	Qamar et al. 2002
South Asia	Kalash	Indo-European	Indo-Aryan	44	25.00%	Qamar et al. 2002

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
South Asia	Kalash	Indo-European	Indo-Aryan	20	25.00%	Di Cristofaro et al. 2013
South Asia	Kalash	Indo-European	Indo-Aryan	44	25.00%	Firasat et al. 2007
South Asia	Gujars	Indo-European	Indo-Aryan	49	24.49%	Sharma et al. 2009
South Asia	Baloch	Indo-European	Iranian	25	24.00%	Di Cristofaro et al. 2013
South Asia	Oriya Brahmin	Indo-European	Indo-Aryan	24	20.84%	Sahoo et al. 2006
South Asia	Ambalakarar	Dravidian		29	20.69%	Sengupta et al. 2006
South Asia	Vanniyar	Dravidian		25	20.00%	Sengupta et al. 2006
South Asia	Konkani Brahmins	Indo-European	Indo-Aryan	43	18.60%	Kivisild et al. 2003
South Asia	Brahmin	Indo-European	Indo-Aryan	38	18.42%	Sharma et al. 2009
South Asia	Bhils	Indo-European	Indo-Aryan	22	18.18%	Sharma et al. 2009
South Asia	Sinhalese	Indo-European	Indo-Aryan	39	17.95%	Kivisild et al. 2003
South Asia	Lingayat	Dravidian		101	17.82%	Chennakrishnaiah et al. 2013
South Asia	Parsi	Indo-European	Indo-Aryan	90	17.78%	Qamar et al. 2002
South Asia	Iyer	Dravidian		29	17.24%	Sengupta et al. 2006
South Asia	Pallan	Dravidian		29	17.24%	Sengupta et al. 2006
South Asia	Banjara (Lambadi)	Indo-European	Indo-Aryan	35	17.14%	Kivisild et al. 2003
South Asia	Burusho	Isolate		94	17.02%	Qamar et al. 2002
South Asia	Iyengar	Dravidian		30	16.67%	Sengupta et al. 2006
South Asia	Burusho	Isolate		97	16.50%	Firasat et al. 2007
South Asia	Vellalar	Dravidian		31	16.13%	Sengupta et al. 2006
South Asia	Pandits	Indo-European	Indo-Aryan	51	15.68%	Sharma et al. 2009
South Asia	Maratha	Indo-European	Indo-Aryan	20	15.00%	Sengupta et al. 2006
South Asia	Burusho	Isolate		20	15.00%	Di Cristofaro et al. 2013
South Asia	Burusho	Isolate		20	15.00%	Sengupta et al. 2006
South Asia	Pardhan	Dravidian		128	14.84%	Thanseem et al. 2006

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
South Asia	Chenchu	Dravidian		41	14.63%	Kivisild et al. 2003
South Asia	Pashtuns (Pathans)	Indo-European	Iranian	96	13.50%	Firasat et al. 2007
South Asia	Brahmin	Indo-European	Indo-Aryan	32	13.33%	Sharma et al. 2009
South Asia	Pashtuns (Pathans)	Indo-European	Iranian	93	12.90%	Qamar et al. 2002
South Asia	Punjabi	Indo-European	Indo-Aryan	66	12.12%	Kivisild et al. 2003
South Asia	Brahmin	Indo-European	Indo-Aryan	64	10.94%	Sharma et al. 2009
South Asia	Gond	Dravidian		38	10.81%	Sharma et al. 2009
South Asia	Gujarati	Indo-European	Indo-Aryan	29	10.34%	Kivisild et al. 2003
South Asia	Irula	Dravidian		30	10.00%	Sengupta et al. 2006
South Asia	Pashtuns (Pathans)	Indo-European	Iranian	20	10.00%	Di Cristofaro et al. 2013
South Asia	Parayar	Dravidian		24	8.34%	Arunkumar et al. 2012
South Asia	Brahui	Dravidian		25	8.00%	Di Cristofaro et al. 2013
South Asia	Tharu	Indo-European	Indo-Aryan	164	7.93%	Chaubey et al. 2014
South Asia	Thoda	Dravidian		26	7.70%	Arunkumar et al. 2012
South Asia	Paravar	Dravidian		27	7.41%	Arunkumar et al. 2012
South Asia	Pashtuns (Pathans)	Indo-European	Iranian	270	7.41%	Lee et al. 2014
South Asia	Paswan	Indo-European	Indo-Aryan	27	7.41%	Sharma et al. 2009
South Asia	Brahui	Dravidian		110	7.27%	Qamar et al. 2002
South Asia	Brahmin	Indo-European	Indo-Aryan	42	7.14%	Sharma et al. 2009
South Asia	Tripuri	Sino-Tibetan	Tibeto-Burman	88	7.00%	Gazi et al. 2013
South Asia	Rajput	Indo-European	Indo-Aryan	29	6.90%	Sengupta et al. 2006
South Asia	Kamar	Dravidian		30	6.67%	Sengupta et al. 2006
South Asia	Tharu	Indo-European	Indo-Aryan	45	6.67%	Chaubey et al. 2014
South Asia	Sindhi	Indo-European	Indo-Aryan	122	6.56%	Qamar et al. 2002
South Asia	Gond	Dravidian		31	6.25%	Sharma et al. 2009

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
South Asia	Mahadeo Koli	Indo-European	Indo-Aryan	50	6.00%	Thangaraj et al. 2010
South Asia	Pallar	Dravidian		51	5.88%	Arunkumar et al. 2012
South Asia	Tharu	Indo-European	Indo-Aryan	37	5.40%	Fornarino et al. 2009
South Asia	Brahmin	Indo-European	Indo-Aryan	30	5.26%	Sharma et al. 2009
South Asia	Marma	Sino-Tibetan	Tibeto-Burman	60	5.00%	Gazi et al. 2013
South Asia	Pahariya	Indo-European	Indo-Aryan	100	5.00%	Borkar et al. 2011
South Asia	Dhodia	Indo-European	Indo-Aryan	63	4.76%	Khurana et al. 2014
South Asia	Dubla	Indo-European	Indo-Aryan	42	4.76%	Khurana et al. 2014
South Asia	Vadama	Indo-European	Indo-Aryan	63	4.76%	Arunkumar et al. 2012
South Asia	Sindhi	Indo-European	Indo-Aryan	31	4.76%	Di Cristofaro et al. 2013
South Asia	Rajbanshi	Indo-European	Indo-Aryan	45	4.44%	Borkar et al. 2011
South Asia	Vanniyar NTN	Dravidian		96	4.16%	Arunkumar et al. 2012
South Asia	Tamil Jains	Dravidian		100	4.00%	Arunkumar et al. 2012
South Asia	Koknasth Brahmin	Indo-European	Indo-Aryan	25	4.00%	Sengupta et al. 2006
South Asia	Rajbanshi	Indo-European	Indo-Aryan	51	3.92%	Debnath et al. 2011
South Asia	Parayar NTN	Dravidian		52	3.84%	Arunkumar et al. 2012
South Asia	Ho	Austro-Asiatic		28	3.57%	Borkar et al. 2011
South Asia	Tharu	Indo-European	Indo-Aryan	57	3.50%	Fornarino et al. 2009
South Asia	Saharia	Indo-European	Indo-Aryan	57	3.24%	Sharma et al. 2009
South Asia	Brahmin	Indo-European	Indo-Aryan	31	3.21%	Sharma et al. 2009
South Asia	Paliyan	Dravidian		95	3.16%	Arunkumar et al. 2012
South Asia	Chitpavan Brahmin	Indo-European	Indo-Aryan	66	3.00%	Gaikwad and Kashyap 2005
South Asia	Naikpod	Dravidian		68	2.94%	Thanseem et al. 2006
South Asia	Oraon	Dravidian		110	2.73%	Borkar et al. 2011
South Asia	Chaudhari	Indo-European	Indo-Aryan	113	2.65%	Khurana et al. 2014

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
South Asia	Munda	Austro-Asiatic		94	2.13%	Borkar et al. 2011
South Asia	Valayar	Dravidian		95	2.11%	Arunkumar et al. 2012
South Asia	Thakur	Indo-European	Indo-Aryan	48	2.00%	Thangaraj et al. 2010
South Asia	Birhor	Austro-Asiatic		100	2.00%	Borkar et al. 2011
South Asia	Piramalai Kallar	Dravidian		53	1.89%	Arunkumar et al. 2012
South Asia	Andh	Indo-European	Indo-Aryan	54	1.86%	Thanseem et al. 2006
South Asia	Bengali	Indo-European	Indo-Aryan	54	1.85%	Debnath et al. 2011
South Asia	Pulayar	Dravidian		63	1.59%	Arunkumar et al. 2012
South Asia	Maravar	Dravidian		80	1.25%	Arunkumar et al. 2012
South Asia	Santhal	Austro-Asiatic		90	1.11%	Borkar et al. 2011
South Asia	Ezhava	Dravidian		95	1.05%	Arunkumar et al. 2012
South Asia	Nadar Cape	Dravidian		98	1.02%	Arunkumar et al. 2012
South Asia	Yadhava	Dravidian		107	0.93%	Arunkumar et al. 2012
Southwest Asia	Laz	Kartvelian		36	41.67%	Balanovsky et al. 2017
Southwest Asia	Armenians (Sasun)	Indo-European	Armenian	104	24.04%	Hovhannisyan et al. 2014
Southwest Asia	Baloch	Indo-European	Iranian	24	16.60%	Grugni et al. 2012
Southwest Asia	Persians Fars	Indo-European	Iranian	44	13.60%	Grugni et al. 2012
Southwest Asia	Lebanese Druze	Afro-Asiatic	Semitic	31	13.00%	Haber et al. 2016
Southwest Asia	Persians	Indo-European	Iranian	77	12.99%	Malyarchuk et al. 2013
Southwest Asia	Assyrians	Afro-Asiatic	Semitic	31	12.90%	Mendez et al. 2011
Southwest Asia	Lebanese Christians	Afro-Asiatic	Semitic	52	12.00%	Haber et al. 2016
Southwest Asia	Syrians	Afro-Asiatic	Semitic	518	11.19%	Haber et al. 2011
Southwest Asia	Azerbaijani	Turkic		63	11.10%	Grugni et al. 2012
Southwest Asia	Persians Yazd	Indo-European	Iranian	46	10.60%	Grugni et al. 2012
Southwest Asia	Iranians	Indo-European	Iranian	324	10.49%	Haber et al. 2011

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
Southwest Asia	Assyrians	Afro-Asiatic	Semitic	39	10.30%	Grugni et al. 2012
Southwest Asia	Kurds	Indo-European	Iranian	59	10.20%	Grugni et al. 2012
Southwest Asia	Lebanese	Afro-Asiatic	Semitic	914	9.95%	Zalloua et al. 2008
Southwest Asia	Lebanese	Afro-Asiatic	Semitic	1202	9.48%	Haber et al. 2011
Southwest Asia	Persians Khorasan	Indo-European	Iranian	59	8.50%	Grugni et al. 2012
Southwest Asia	Kurds	Indo-European	Iranian	25	8.00%	Malyarchuk et al. 2013
Southwest Asia	Druze	Afro-Asiatic	Semitic	39	7.70%	Mendez et al. 2011
Southwest Asia	Arabs	Afro-Asiatic	Semitic	121	7.44%	Luis et al. 2004
Southwest Asia	Turkmen	Turkic		68	7.20%	Grugni et al. 2012
Southwest Asia	Saudis	Afro-Asiatic	Semitic	157	7.01%	Abu-Amero et al. 2009
Southwest Asia	Lebanese Muslims	Afro-Asiatic	Semitic	43	7.00%	Haber et al. 2016
Southwest Asia	Armenians (Western)	Indo-European	Armenian	148	6.76%	Hovhannisyan et al. 2014
Southwest Asia	Turks	Turkic		523	6.70%	Cinnioglu et al. 2004
Southwest Asia	Central Anatolia	Turkic		90	6.66%	King et al. 2011
Southwest Asia	Turks (Western Anatolia)	Turkic		30	6.66%	King et al. 2011
Southwest Asia	Armenians (Central)	Indo-European	Armenian	200	6.50%	Hovhannisyan et al. 2014
Southwest Asia	Armenians (Van)	Indo-European	Armenian	103	5.82%	Hovhannisyan et al. 2014
Southwest Asia	Iraqis	Afro-Asiatic	Semitic	36	5.60%	Mendez et al. 2011
Southwest Asia	Syrians	Afro-Asiatic	Semitic	95	5.40%	Mendez et al. 2011
Southwest Asia	Palestinians	Afro-Asiatic	Semitic	115	5.30%	Mendez et al. 2011
Southwest Asia	Gilak	Indo-European	Iranian	64	4.80%	Grugni et al. 2012
Southwest Asia	Armenians (Salmast)	Indo-European	Armenian	199	4.52%	Hovhannisyan et al. 2014
Southwest Asia	Jordanians	Afro-Asiatic	Semitic	187	3.10%	Mendez et al. 2011
Southwest Asia	Turks	Turkic		33	3.03%	King et al. 2011

Region	Population	Language Family	Branch	Sample Size	Frequency LT-L298	Reference
Southwest Asia	Central Anatolia	Turkic		90	3.00%	Borkar et al. 2011
Southwest Asia	Turks (Northwest Anatolia)	Turkic		52	1.92%	King et al. 2011
Southwest Asia	Ossetians (Digor)	Indo-European	Iranian	127	1.60%	Balanovsky et al. 2011
Southwest Asia	Ossetians (Iron)	Indo-European	Iranian	230	0.90%	Balanovsky et al. 2011
Sub-Saharan Africa	Lemba	Niger-Congo	Bantoid	34	17.60%	Mendez et al. 2011
Sub-Saharan Africa	Wairak	Niger-Congo	Bantoid	43	11.63%	Luis et al. 2004
Sub-Saharan Africa	Ng'arkarimojong	Nilo-Saharan		118	0.85%	Gomes et al. 2010
Western Europe	Portuguese	Indo-European	Italic	46	6.50%	Carvalho et al. 2008
Western Europe	Iberians	Indo-European	Italic	559	2.86%	Flores et al. 2004
Western Europe	French	Indo-European	Italic	558	1.61%	Ramos-Luis et al. 2014
Western Europe	Iberians	Indo-European	Italic	1882	1.54%	Santos et al. 2014
Western Europe	Germans	Indo-European	Germanic	218	0.92%	Rebala et al. 2013
Western Europe	Flemish	Indo-European	Germanic	773	0.91%	Larmuseau et al. 2014
Western Europe	Germans	Indo-European	Germanic	131	0.76%	Rebala et al. 2013

Table 5.11.4. Survey of L-M20 Variation (Language View).

Language Family	Branch	Region	Location	Population	Sample Size	Frequency L-M20	Reference
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Druze	31	13.00%	Haber et al. 2016
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Christians	52	12.00%	Haber et al. 2016
Afro-Asiatic	Semitic	Southwest Asia	Syria	Syrians	518	10.42%	Haber et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Muslims	43	7.00%	Haber et al. 2016
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese	914	5.25%	Zalloua et al. 2008
Dravidian		South Asia	Southwest India	Vokkaliga	102	32.35%	Chennakrishnaiah et al. 2013
Dravidian		South Asia	South India	Ambalakarar	29	20.69%	Sengupta et al. 2006
Dravidian		South Asia	South India	Vanniyar	25	20.00%	Sengupta et al. 2006
Dravidian		South Asia	Southwest India	Lingayat	101	17.82%	Chennakrishnaiah et al. 2013
Dravidian		South Asia	South India	Pallan	29	17.24%	Sengupta et al. 2006
Dravidian		South Asia	South India	Iyer	29	17.24%	Sengupta et al. 2006
Dravidian		South Asia	South India	Iyengar	30	16.67%	Sengupta et al. 2006
Dravidian		South Asia	South India	Vellalar	31	16.13%	Sengupta et al. 2006
Dravidian		South Asia	Andra Pradesh	Pardhan	128	14.84%	Thanseem et al. 2006
Dravidian		South Asia	Andhra Pradesh	Chenchu	41	14.63%	Kivisild et al. 2003
Dravidian		South Asia	South India	Irula	30	10.00%	Sengupta et al. 2006
Dravidian		South Asia	Tamil Nadu	Parayar	24	8.34%	Arunkumar et al. 2012
Dravidian		South Asia	Pakistan	Brahui	25	8.00%	Di Cristofaro et al. 2013
Dravidian		South Asia	Tamil Nadu	Thoda	26	7.70%	Arunkumar et al. 2012
Dravidian		South Asia	Tamil Nadu	Paravar	27	7.41%	Arunkumar et al. 2012
Dravidian		South Asia	Pakistan	Brahui	110	7.27%	Qamar et al. 2002
Dravidian		South Asia	Central India	Kamar	30	6.67%	Sengupta et al. 2006

Language Family	Branch	Region	Location	Population	Sample Size	Frequency L-M20	Reference
Dravidian		South Asia	Tamil Nadu	Pallar	51	5.88%	Arunkumar et al. 2012
Indo-European	Armenian	Caucasus	Russia: Rostov and Myasnikovsky Regions	Armenians Don	92	6.52%	Balanovsky et al. 2017
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	44	25.00%	Firasat et al. 2007
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	20	25.00%	Di Cristofaro et al. 2013
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	44	25.00%	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Orissa	Oriya Brahmin	24	20.84%	Sahoo et al. 2006
Indo-European	Indo-Aryan	South Asia	Bombay	Konkani Brahmins	43	18.60%	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Gujarat	Bhils	22	18.18%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Sri Lanka	Sinhalese	39	17.95%	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Pakistan	Parsi	90	17.78%	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Andhra Pradesh	Banjara (Lambadi)	35	17.14%	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Kashmir	Gujars	49	16.33%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	West India	Maratha	20	15.00%	Sengupta et al. 2006
Indo-European	Indo-Aryan	South Asia	Punjab	Punjabi	66	12.12%	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Bombay	Gujarati	29	10.34%	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Maharashtra	Brahmin	32	10.00%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Uttar-Pradesh	Tharu	164	7.93%	Chaubey et al. 2014
Indo-European	Indo-Aryan	South Asia	Gujarat	Brahmin	64	7.81%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Bihar	Paswan	27	7.41%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Madhya Pradesh	Brahmin	42	7.14%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Northern India	Rajput	29	6.90%	Sengupta et al. 2006
Indo-European	Indo-Aryan	South Asia	Uttarakhand	Tharu	45	6.67%	Chaubey et al. 2014

Language Family	Branch	Region	Location	Population	Sample Size	Frequency L-M20	Reference
Indo-European	Indo-Aryan	South Asia	Pakistan	Sindhi	122	6.56%	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Maharashtra	Mahadeo Koli	50	6.00%	Thangaraj et al. 2010
Indo-European	Indo-Aryan	South Asia	Kashmir	Pandits	51	5.88%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Morang, Nepal	Tharu	37	5.40%	Fornarino et al. 2009
Indo-European	Indo-Aryan	South Asia	Himachal	Brahmin	30	5.26%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Bihar	Brahmin	38	5.26%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Jharkhand	Pahariya	100	5.00%	Borkar et al. 2011
Indo-European	Iranian	South Asia	Pakistan	Baloch	59	28.81%	Qamar et al. 2002
Indo-European	Iranian	South Asia	Pakistan	Baloch	25	24.00%	Di Cristofaro et al. 2013
Indo-European	Iranian	Central Asia	Tajikistan	Tajiks	40	22.50%	Malyarchuk et al. 2013
Indo-European	Iranian	Southwest Asia	Iran	Baloch	24	16.60%	Grugni et al. 2012
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	93	12.90%	Qamar et al. 2002
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	96	12.50%	Firasat et al. 2007
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	49	12.24%	Haber et al. 2012
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	20	10.00%	Di Cristofaro et al. 2013
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	190	9.47%	Lacau et al. 2012
Indo-European	Iranian	Southwest Asia	Eastern Iran	Persians	77	9.09%	Malyarchuk et al. 2013
Indo-European	Iranian	Central Asia	Afghanistan	Tajiks	56	8.91%	Haber et al. 2012
Indo-European	Iranian	Caucasus	Daghestan	Tats	24	8.33%	Karafet et al. 2016
Indo-European	Iranian	Southwest Asia	Iran	Iranians	324	8.33%	Haber et al. 2011
Indo-European	Iranian	Southwest Asia	Western Iran	Kurds	25	8.00%	Malyarchuk et al. 2013

Language Family	Branch	Region	Location	Population	Sample Size	Frequency L-M20	Reference
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	87	6.90%	Di Cristofaro et al. 2013
Indo-European	Iranian	Southwest Asia	Iran	Persians Fars	44	6.80%	Grugni et al. 2012
Indo-European	Iranian	Central Asia	Afghanistan	Tajiks	142	6.34%	Di Cristofaro et al. 2013
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	270	5.93%	Lee et al. 2014
Isolate		South Asia	Pakistan	Burusho	94	17.02%	Qamar et al. 2002
Isolate		South Asia	Pakistan	Burusho	97	16.50%	Firasat et al. 2007
Isolate		South Asia	North Pakistan	Burusho	20	15.00%	Sengupta et al. 2006
Isolate		South Asia	Pakistan	Burusho	20	15.00%	Di Cristofaro et al. 2013
Kartvelian		Southwest Asia	Turkey	Laz	36	41.67%	Balanovsky et al. 2017
North Caucasian		Caucasus	Russia	Chechens	165	17.58%	Yunusbayev et al. 2012
North Caucasian		Caucasus	Daghestan	Chechens	100	14.00%	Balanovsky et al. 2011
North Caucasian		Caucasus	Dagestan	Chechens	20	10.00%	Caciagli et al. 2009
North Caucasian		Caucasus	Russia	Avars	42	9.52%	Yunusbayev et al. 2012
North Caucasian		Caucasus	Russia	Ingush	105	8.57%	Yunusbayev et al. 2012
North Caucasian		Caucasus	Russia	Chechens (Chechnya)	118	7.00%	Balanovsky et al. 2011
Sino-Tibetan	Tibeto-Burman	South Asia	Bangladesh	Tripuri	88	7.00%	Gazi et al. 2013
Sino-Tibetan	Tibeto-Burman	South Asia	Bangladesh	Marma	60	5.00%	Gazi et al. 2013
Turkic		Central Asia	Afghanistan	Uzbeks	127	9.45%	Di Cristofaro et al. 2013
Turkic		East Asia	Xingjiang, China	Uyghurs	48	8.33%	Zhong et al. 2011
Turkic		Central Asia	Uzbekistan (Fergana)	Uzbek	67	5.97%	Zhabagin et al. 2017
Turkic		Southwest Asia	Iran	Turkmen	68	5.80%	Grugni et al. 2012

Language Family	Branch	Region	Location	Population	Sample Size	Frequency L-M20	Reference
Turkic		Central Asia	Uzbekistan (Xorezm)	Uzbek	98	5.10%	Zhabagin et al. 2017

Table 5.11.5. Survey of T-M184 Variation (Language View).

Language Family	Branch	Region	Location	Population	Sample Size	Frequency T-M184	Reference
Afro-Asiatic	Cushitic	North Africa	Sudan	Oromo	78	5.13%	Hassan et al. 2008
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Assyrians	31	12.90%	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Iran	Assyrians	39	10.30%	Grugni et al. 2012
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Druze	39	7.70%	Mendez et al. 2011
Afro-Asiatic	Semitic	North Africa	Egypt	Egyptians	150	6.70%	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Oman	Arabs	121	6.61%	Luis et al. 2004
Afro-Asiatic	Semitic	Southwest Asia	Iraq	Iraqis	36	5.60%	Mendez et al. 2011
Afro-Asiatic	Semitic	North Africa	Egypt	Arabs	147	5.44%	Luis et al. 2004
Afro-Asiatic	Semitic	Southwest Asia	Syria	Syrians	95	5.40%	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Palestinians	115	5.30%	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Saudi Arabia	Saudis	157	5.10%	Abu-Amero et al. 2009
Dravidian		South Asia	Uttar Pradesh	Gond	38	10.81%	Sharma et al. 2009
Dravidian		South Asia	Madhya Pradesh	Gond	31	6.25%	Sharma et al. 2009
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Sasun)	104	20.19%	Hovhannisyan et al. 2014
Indo-European	Armenian	Caucasus	Georgia	Armenians Erzurum	99	9.00%	Balanovsky et al. 2017
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Central)	200	6.00%	Hovhannisyan et al. 2014
Indo-European	Indo-Aryan	South Asia	Bihar	Brahmin	38	13.16%	Sharma et al. 2009

Language Family	Branch	Region	Location	Population	Sample Size	Frequency T-M184	Reference
Indo-European	Indo-Aryan	South Asia	Kashmir	Pandits	51	9.80%	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Kashmir	Gujars	49	8.16%	Sharma et al. 2009
Indo-European	Iranian	Southwest Asia	Iran	Kurds	59	8.50%	Grugni et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Fars	44	6.80%	Grugni et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Yazd	46	6.40%	Grugni et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Khorasan	59	5.10%	Grugni et al. 2012
Niger-Congo	Bantoid	Sub-Saharan Africa	Southern Africa	Lemba	34	17.60%	Mendez et al. 2011
Niger-Congo	Bantoid	Sub-Saharan Africa	Tanzania	Wairak	43	11.63%	Luis et al. 2004
Turkic		Southwest Asia	Iran	Azerbaijani	63	7.90%	Grugni et al. 2012

Table 5.11.6. Survey of LT-L298 Variation (Language View).

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Afro-Asiatic	Cushitic	North Africa	Sudan	Oromo	78	0.05	Hassan et al. 2008
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Druze	31	0.13	Haber et al. 2016
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Assyrians	31	0.13	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Christians	52	0.12	Haber et al. 2016
Afro-Asiatic	Semitic	Southwest Asia	Syria	Syrians	518	0.11	Haber et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Iran	Assyrians	39	0.10	Grugni et al. 2012
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese	914	0.10	Zalloua et al. 2008
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese	1202	0.09	Haber et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Druze	39	0.08	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Oman	Arabs	121	0.07	Luis et al. 2004
Afro-Asiatic	Semitic	Southwest Asia	Saudi Arabia	Saudis	157	0.07	Abu-Amero et al. 2009
Afro-Asiatic	Semitic	Southwest Asia	Lebanon	Lebanese Muslims	43	0.07	Haber et al. 2016
Afro-Asiatic	Semitic	North Africa	Egypt	Egyptians	150	0.07	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Iraq	Iraqis	36	0.06	Mendez et al. 2011
Afro-Asiatic	Semitic	North Africa	Egypt	Arabs	147	0.05	Luis et al. 2004
Afro-Asiatic	Semitic	Southwest Asia	Syria	Syrians	95	0.05	Mendez et al. 2011
Afro-Asiatic	Semitic	Southwest Asia	Middle East	Palestinians	115	0.05	Mendez et al. 2011
Dravidian		South Asia	Southwest India	Vokkaliga	102	0.32	Chennakrishnaiah et al. 2013
Dravidian		South Asia	South India	Ambalakarar	29	0.21	Sengupta et al. 2006
Dravidian		South Asia	South India	Vanniyar	25	0.20	Sengupta et al. 2006
Dravidian		South Asia	Southwest India	Lingayat	101	0.18	Chennakrishnaiah et al. 2013

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Dravidian		South Asia	South India	Pallan	29	0.17	Sengupta et al. 2006
Dravidian		South Asia	South India	Iyer	29	0.17	Sengupta et al. 2006
Dravidian		South Asia	South India	Iyengar	30	0.17	Sengupta et al. 2006
Dravidian		South Asia	South India	Vellalar	31	0.16	Sengupta et al. 2006
Dravidian		South Asia	Andra Pradesh	Pardhan	128	0.15	Thanseem et al. 2006
Dravidian		South Asia	Andhra Pradesh	Chenchu	41	0.15	Kivisild et al. 2003
Dravidian		South Asia	Uttar Pradesh	Gond	38	0.11	Sharma et al. 2009
Dravidian		South Asia	South India	Irula	30	0.10	Sengupta et al. 2006
Dravidian		South Asia	Tamil Nadu	Parayar	24	0.08	Arunkumar et al. 2012
Dravidian		South Asia	Pakistan	Brahui	25	0.08	Di Cristofaro et al. 2013
Dravidian		South Asia	Tamil Nadu	Thoda	26	0.08	Arunkumar et al. 2012
Dravidian		South Asia	Tamil Nadu	Paravar	27	0.07	Arunkumar et al. 2012
Dravidian		South Asia	Pakistan	Brahui	110	0.07	Qamar et al. 2002
Dravidian		South Asia	Central India	Kamar	30	0.07	Sengupta et al. 2006
Dravidian		South Asia	Madhya Pradesh	Gond	31	0.06	Sharma et al. 2009
Dravidian		South Asia	Tamil Nadu	Pallar	51	0.06	Arunkumar et al. 2012
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Sasun)	104	0.24	Hovhannisyan et al. 2014
Indo-European	Armenian	Caucasus	Georgia	Armenians Erzurum	99	0.12	Balanovsky et al. 2017
Indo-European	Armenian	Caucasus	Russia: Rostov and Myasnikovsky Regions	Armenians Don	92	0.11	Balanovsky et al. 2017
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Western)	148	0.07	Hovhannisyan et al. 2014
Indo-European	Armenian	Caucasus	Russia: Krasnodar	Armenians Krasnodar	117	0.07	Balanovsky et al. 2017

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Central)	200	0.07	Hovhannisyan et al. 2014
Indo-European	Armenian	Southwest Asia	Turkey	Armenians (Van)	103	0.06	Hovhannisyan et al. 2014
Indo-European	Armenian	Caucasus	Armenia	Armenians (Eastern)	416	0.06	Hovhannisyan et al. 2014
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	44	0.25	Firasat et al. 2007
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	20	0.25	Di Cristofaro et al. 2013
Indo-European	Indo-Aryan	South Asia	Pakistan	Kalash	44	0.25	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Kashmir	Gujars	49	0.24	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Orissa	Oriya Brahmin	24	0.21	Sahoo et al. 2006
Indo-European	Indo-Aryan	South Asia	Bombay	Konkani Brahmins	43	0.19	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Bihar	Brahmin	38	0.18	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Gujarat	Bhils	22	0.18	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Sri Lanka	Sinhalese	39	0.18	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Pakistan	Parsi	90	0.18	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Andhra Pradesh	Banjara (Lambadi)	35	0.17	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Kashmir	Pandits	51	0.16	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	West India	Maratha	20	0.15	Sengupta et al. 2006
Indo-European	Indo-Aryan	South Asia	Maharashtra	Brahmin	32	0.13	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Punjab	Punjabi	66	0.12	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Gujarat	Brahmin	64	0.11	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Bombay	Gujarati	29	0.10	Kivisild et al. 2003
Indo-European	Indo-Aryan	South Asia	Uttar-Pradesh	Tharu	164	0.08	Chaubey et al. 2014
Indo-European	Indo-Aryan	South Asia	Bihar	Paswan	27	0.07	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Madhya Pradesh	Brahmin	42	0.07	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Northern India	Rajput	29	0.07	Sengupta et al. 2006

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Indo-European	Indo-Aryan	South Asia	Uttarakhand	Tharu	45	0.07	Chaubey et al. 2014
Indo-European	Indo-Aryan	South Asia	Pakistan	Sindhi	122	0.07	Qamar et al. 2002
Indo-European	Indo-Aryan	South Asia	Maharashtra	Mahadeo Koli	50	0.06	Thangaraj et al. 2010
Indo-European	Indo-Aryan	South Asia	Morang, Nepal	Tharu	37	0.05	Fornarino et al. 2009
Indo-European	Indo-Aryan	South Asia	Himachal	Brahmin	30	0.05	Sharma et al. 2009
Indo-European	Indo-Aryan	South Asia	Jharkhand	Pahariya	100	0.05	Borkar et al. 2011
Indo-European	Iranian	South Asia	Pakistan	Baloch	59	0.29	Qamar et al. 2002
Indo-European	Iranian	South Asia	Pakistan	Baloch	25	0.24	Di Cristofaro et al. 2013
Indo-European	Iranian	Central Asia	Tajikistan	Tajiks	40	0.23	Malyarchuk et al. 2013
Indo-European	Iranian	Southwest Asia	Iran	Baloch	24	0.17	Grugni et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Fars	44	0.14	Grugni et al. 2012
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	96	0.14	Firasat et al. 2007
Indo-European	Iranian	Southwest Asia	Eastern Iran	Persians	77	0.13	Malyarchuk et al. 2013
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	93	0.13	Qamar et al. 2002
Indo-European	Iranian	Central Asia	Afghanistan	Tajiks	56	0.12	Haber et al. 2012
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	49	0.12	Haber et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Yazd	46	0.11	Grugni et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Iranians	324	0.10	Haber et al. 2011
Indo-European	Iranian	Southwest Asia	Iran	Kurds	59	0.10	Grugni et al. 2012
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	20	0.10	Di Cristofaro et al. 2013
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	190	0.09	Lacau et al. 2012
Indo-European	Iranian	Southwest Asia	Iran	Persians Khorasan	59	0.09	Grugni et al. 2012
Indo-European	Iranian	Caucasus	Daghestan	Tats	24	0.08	Karafet et al. 2016
Indo-European	Iranian	Central Asia	Afghanistan	Pashtuns (Pathans)	87	0.08	Di Cristofaro et al. 2013
Indo-European	Iranian	Southwest Asia	Western Iran	Kurds	25	0.08	Malyarchuk et al. 2013

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Indo-European	Iranian	Central Asia	Afghanistan	Tajiks	142	0.08	Di Cristofaro et al. 2013
Indo-European	Iranian	South Asia	Pakistan	Pashtuns (Pathans)	270	0.07	Lee et al. 2014
Indo-European	Italic	Western Europe	Central Portugal	Portuguese	46	0.07	Carvalho et al. 2008
Isolate		South Asia	Pakistan	Burusho	94	0.17	Qamar et al. 2002
Isolate		South Asia	Pakistan	Burusho	97	0.17	Firasat et al. 2007
Isolate		South Asia	Pakistan	Burusho	20	0.15	Di Cristofaro et al. 2013
Isolate		South Asia	North Pakistan	Burusho	20	0.15	Sengupta et al. 2006
Kartvelian		Southwest Asia	Turkey	Laz	36	0.42	Balanovsky et al. 2017
Niger-Congo	Bantoid	Sub-Saharan Africa	Southern Africa	Lemba	34	0.18	Mendez et al. 2011
Niger-Congo	Bantoid	Sub-Saharan Africa	Tanzania	Wairak	43	0.12	Luis et al. 2004
North Caucasian		Caucasus	Russia	Chechens	165	0.18	Yunusbayev et al. 2012
North Caucasian		Caucasus	Russia	Avars	42	0.14	Yunusbayev et al. 2012
North Caucasian		Caucasus	Daghestan	Chechens	100	0.14	Balanovsky et al. 2011
North Caucasian		Caucasus	Dagestan	Chechens	20	0.10	Caciagli et al. 2009
North Caucasian		Caucasus	Russia	Ingush	105	0.09	Yunusbayev et al. 2012
North Caucasian		Caucasus	Russia	Chechens (Chechnya)	118	0.07	Balanovsky et al. 2011
North Caucasian		Caucasus	Georgia	Abkhaz	162	0.06	Yunusbayev et al. 2012
North Caucasian		Caucasus	Russia	Abkhaz	58	0.05	Balanovsky et al. 2011
Sino-Tibetan	Chinese	Central Asia	Uzbekistan	Dungan	31	0.06	Zhabagin et al. 2017
Sino-Tibetan	Tibeto-Burman	South Asia	Bangladesh	Tripuri	88	0.07	Gazi et al. 2013
Sino-Tibetan	Tibeto-Burman	South Asia	Bangladesh	Marma	60	0.05	Gazi et al. 2013
Turkic		Southwest Asia	Iran	Azerbaijani	63	0.11	Grugni et al. 2012
Turkic		East Asia	Xingjiang, China	Uyghurs	48	0.10	Zhong et al. 2011

Language Family	Branch	Region	Location	Population	Sample Size	Frequency LT-L298	Reference
Turkic		Central Asia	Afghanistan	Uzbeks	127	0.09	Di Cristofaro et al. 2013
Turkic		Southwest Asia	Iran	Turkmen	68	0.07	Grugni et al. 2012
Turkic		Southwest Asia	Turkey	Turks	523	0.07	Cinnioglu et al. 2004
Turkic		Southwest Asia	Turkey	Turks (Western Anatolia)	30	0.07	King et al. 2011
Turkic		Southwest Asia	Turkey	Central Anatolia	90	0.07	King et al. 2011
Turkic		Central Asia	Uzbekistan (Fergana)	Uzbek	67	0.06	Zhabagin et al. 2017
Turkic		Central Asia	Kazakhstan (Zhanakorgan)	Kazakh	94	0.05	Zhabagin et al. 2017
Turkic		Central Asia	Uzbekistan (Xorezm)	Uzbek	98	0.05	Zhabagin et al. 2017

Table 5.11.7. Survey of L1a1-M27 Variation.

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M27	Reference
Central Asia	Afghanistan	Uzbeks	Turkic		127	4.72%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	87	4.60%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Turkmen	Turkic		74	4.05%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Hazara	Indo-European	Iranian	77	3.90%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	142	2.82%	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	56	1.78%	Haber et al. 2012
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	190	1.05%	Lacau et al. 2012
South Asia	Southwest India	Vokkaliga	Dravidian		102	28.43%	Chennakrishnaiah et al. 2013
South Asia	South India	Ambalakarar	Dravidian		29	20.69%	Sengupta et al. 2006
South Asia	Pakistan	Baloch	Indo-European	Iranian	25	20.00%	Di Cristofaro et al. 2013
South Asia	South India	Vanniyar	Dravidian		25	20.00%	Sengupta et al. 2006
South Asia	Bombay	Konkani Brahmins	Indo-European	Indo-Aryan	43	18.60%	Kivisild et al. 2003
South Asia	Sri Lanka	Sinhalese	Indo-European	Indo-Aryan	39	17.95%	Kivisild et al. 2003
South Asia	Southwest India	Lingayat	Dravidian		101	17.82%	Chennakrishnaiah et al. 2013
South Asia	South India	Iyer	Dravidian		29	17.24%	Sengupta et al. 2006
South Asia	Andhra Pradesh	Banjara (Lambadi)	Indo-European	Indo-Aryan	35	17.14%	Kivisild et al. 2003
South Asia	South India	Iyengar	Dravidian		30	16.67%	Sengupta et al. 2006
South Asia	South India	Vellalar	Dravidian		31	16.13%	Sengupta et al. 2006
South Asia	West India	Maratha	Indo-European	Indo-Aryan	20	15.00%	Sengupta et al. 2006
South Asia	Andhra Pradesh	Chenchu	Dravidian		41	14.63%	Kivisild et al. 2003
South Asia	South India	Pallan	Dravidian		29	13.79%	Sengupta et al. 2006

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M27	Reference
South Asia	Punjab	Punjabi	Indo-European	Indo-Aryan	66	12.12%	Kivisild et al. 2003
South Asia	Bombay	Gujarati	Indo-European	Indo-Aryan	29	10.34%	Kivisild et al. 2003
South Asia	South India	Irula	Dravidian		30	10.00%	Sengupta et al. 2006
South Asia	Uttar-Pradesh	Tharu	Indo-European	Indo-Aryan	164	7.93%	Chaubey et al. 2014
South Asia	Uttarakhand	Tharu	Indo-European	Indo-Aryan	45	6.67%	Chaubey et al. 2014
South Asia	Central India	Kamar	Dravidian		30	6.67%	Sengupta et al. 2006
South Asia	Tamil Nadu	Pallar	Dravidian		51	5.88%	Arunkumar et al. 2012
South Asia	Morang, Nepal	Tharu	Indo-European	Indo-Aryan	37	5.40%	Fornarino et al. 2009
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	96	5.20%	Firasat et al. 2007
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	20	5.00%	Di Cristofaro et al. 2013
South Asia	Gujarat, India	Dhodia	Indo-European	Indo-Aryan	63	4.76%	Khurana et al. 2014
South Asia	Gujarat, India	Dubla	Indo-European	Indo-Aryan	42	4.76%	Khurana et al. 2014
South Asia	Orissa	Oriya Brahmin	Indo-European	Indo-Aryan	24	4.17%	Sahoo et al. 2006
South Asia	Tamil Nadu	Parayar	Dravidian		24	4.17%	Arunkumar et al. 2012
South Asia	Pakistan	Brahui	Dravidian		25	4.00%	Di Cristofaro et al. 2013
South Asia	West India	Koknasth Brahmin	Indo-European	Indo-Aryan	25	4.00%	Sengupta et al. 2006
South Asia	Tamil Nadu	Thoda	Dravidian		26	3.85%	Arunkumar et al. 2012
South Asia	Chitwan, Nepal	Tharu	Indo-European	Indo-Aryan	57	3.50%	Fornarino et al. 2009
South Asia	Tamil Nadu	Paliyan	Dravidian		95	3.16%	Arunkumar et al. 2012
South Asia	Gujarat, India	Chaudhari	Indo-European	Indo-Aryan	113	2.65%	Khurana et al. 2014
South Asia	Tamil Nadu	Valayar	Dravidian		95	2.11%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Vanniyar NTN	Dravidian		96	2.08%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Tamil Jains	Dravidian		100	2.00%	Arunkumar et al. 2012

Region	Location	Population	Language Family	Branch	Sample Size	Frequency L-M27	Reference
South Asia	West Bengal	Rajbanshi	Indo-European	Indo-Aryan	51	1.96%	Debnath et al. 2011
South Asia	Tamil Nadu	Parayar NTN	Dravidian		52	1.92%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Piramalai Kallar	Dravidian		53	1.89%	Arunkumar et al. 2012
South Asia	West Bengal	Bengali	Indo-European	Indo-Aryan	54	1.85%	Debnath et al. 2011
South Asia	Tamil Nadu	Vadama	Indo-European	Indo-Aryan	63	1.59%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Pulayar	Dravidian		63	1.59%	Arunkumar et al. 2012
South Asia	Tamil Nadu	Ezhava	Dravidian		95	1.05%	Arunkumar et al. 2012
Southwest Asia	Lebanon	Lebanese Druze	Afro-Asiatic	Semitic	31	10.00%	Haber et al. 2016
Southwest Asia	Syria	Syrians	Afro-Asiatic	Semitic	518	9.46%	Haber et al. 2011
Southwest Asia	Iran	Baloch	Indo-European	Iranian	24	8.30%	Grugni et al. 2012
Southwest Asia	Lebanon	Lebanese Muslims	Afro-Asiatic	Semitic	43	7.00%	Haber et al. 2016
Southwest Asia	Iran	Iranians	Indo-European	Iranian	324	6.79%	Haber et al. 2011
Southwest Asia	Iran	Persians Fars	Indo-European	Iranian	44	2.30%	Grugni et al. 2012
Southwest Asia	Iran	Persians Yazd	Indo-European	Iranian	46	2.10%	Grugni et al. 2012
Southwest Asia	Iran	Kurds	Indo-European	Iranian	59	1.70%	Grugni et al. 2012
Southwest Asia	Iran	Gilak	Indo-European	Iranian	64	1.60%	Grugni et al. 2012
Southwest Asia	Lebanon	Lebanese	Afro-Asiatic	Semitic	1202	1.58%	Haber et al. 2011
Southwest Asia	Saudi Arabia	Saudis	Afro-Asiatic	Semitic	157	1.27%	Abu-Amero et al. 2009

Table 5.11.8. Survey of L1a2-M357 Variation.

Region	Location	Population	Language Family	Branch	Frequency L-M357	Reference
Caucasus	Russia	Chechens	North Caucasian		0.16	Yunusbayev et al. 2012
Caucasus	Daghestan	Chechens	North Caucasian		0.14	Balanovsky et al. 2011
Caucasus	Russia	Ingush	North Caucasian		0.09	Yunusbayev et al. 2012
Caucasus	Daghestan	Tats	Indo-European	Iranian	0.08	Karafet et al. 2016
Caucasus	Russia	Chechens (Chechnya)	North Caucasian		0.07	Balanovsky et al. 2011
Caucasus	Russia	Ingush	North Caucasian		0.03	Balanovsky et al. 2011
Caucasus	Russia	Chechens (Ingushetia)	North Caucasian		0.01	Balanovsky et al. 2011
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	0.12	Haber et al. 2012
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	0.08	Lacau et al. 2012
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	0.05	Haber et al. 2012
Central Asia	Afghanistan	Uzbeks	Turkic		0.04	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Tajiks	Indo-European	Iranian	0.04	Di Cristofaro et al. 2013
Central Asia	Afghanistan	Hazara	Indo-European	Iranian	0.02	Haber et al. 2012
Central Asia	Afghanistan	Pashtuns (Pathans)	Indo-European	Iranian	0.01	Di Cristofaro et al. 2013
South Asia	Pakistan	Kalash	Indo-European	Indo-Aryan	0.25	Di Cristofaro et al. 2013
South Asia	Pakistan	Kalash	Indo-European	Indo-Aryan	0.23	Firasat et al. 2007
South Asia	Pakistan	Burusho	Isolate		0.15	Di Cristofaro et al. 2013
South Asia	North Pakistan	Burusho	Isolate		0.15	Sengupta et al. 2006
South Asia	Pakistan	Burusho	Isolate		0.12	Firasat et al. 2007
South Asia	Tamil Nadu	Paravar	Dravidian		0.07	Arunkumar et al. 2012

Region	Location	Population	Language Family	Branch	Frequency L-M357	Reference
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	0.07	Firasat et al. 2007
South Asia	Northern India	Rajput	Indo-European	Indo-Aryan	0.07	Sengupta et al. 2006
South Asia	Pakistan	Pashtuns (Pathans)	Indo-European	Iranian	0.05	Di Cristofaro et al. 2013
South Asia	Pakistan	Sindhi	Indo-European	Indo-Aryan	0.05	Di Cristofaro et al. 2013
South Asia	Tamil Nadu	Parayar	Dravidian		0.04	Arunkumar et al. 2012
South Asia	Pakistan	Brahui	Dravidian		0.04	Di Cristofaro et al. 2013
South Asia	Pakistan	Baloch	Indo-European	Iranian	0.04	Di Cristofaro et al. 2013
South Asia	Southwest India	Vokkaliga	Dravidian		0.04	Chennakrishnaiah et al. 2013
South Asia	Tamil Nadu	Thoda	Dravidian		0.04	Arunkumar et al. 2012
South Asia	South India	Pallan	Dravidian		0.03	Sengupta et al. 2006
South Asia	Tamil Nadu	Vadama	Indo-European	Indo-Aryan	0.03	Arunkumar et al. 2012
South Asia	Tamil Nadu	Vanniyar NTN	Dravidian		0.02	Arunkumar et al. 2012
South Asia	Tamil Nadu	Tamil Jains	Dravidian		0.02	Arunkumar et al. 2012
South Asia	Tamil Nadu	Parayar NTN	Dravidian		0.02	Arunkumar et al. 2012
South Asia	Tamil Nadu	Maravar	Dravidian		0.01	Arunkumar et al. 2012
South Asia	Tamil Nadu	Nadar Cape	Dravidian		0.01	Arunkumar et al. 2012
Southwest Asia	Iran	Baloch	Indo-European	Iranian	0.08	Grugni et al. 2012
Southwest Asia	Iran	Turkmen	Turkic		0.06	Grugni et al. 2012
Southwest Asia	Iran	Persians Fars	Indo-European	Iranian	0.05	Grugni et al. 2012
Southwest Asia	Iran	Persians Khorasan	Indo-European	Iranian	0.03	Grugni et al. 2012

Region	Location	Population	Language Family	Branch	Frequency L-M357	Reference
Southwest Asia	Iran	Persians Yazd	Indo-European	Iranian	0.02	Grugni et al. 2012
Southwest Asia	Iran	Gilak	Indo-European	Iranian	0.02	Grugni et al. 2012
Southwest Asia	Iran	Azerbaijani	Turkic		0.02	Grugni et al. 2012

Table 5.11.9. Survey of T1a1-L162 Variation.

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T1a1-L162	Reference
Mediterranean	Italy	Italians	Indo-European	Italic	884	0.79%	Boattini et al. 2013
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	2.09%	Francalacci et al. 2015
North Africa	Egypt	Egyptians	Afro-Asiatic	Semitic	150	6.70%	Mendez et al. 2011
Southwest Asia	Middle East	Palestinians	Afro-Asiatic	Semitic	115	1.80%	Mendez et al. 2011
Southwest Asia	Jordan	Jordanians	Afro-Asiatic	Semitic	187	2.60%	Mendez et al. 2011
Southwest Asia	Syria	Syrians	Afro-Asiatic	Semitic	95	4.30%	Mendez et al. 2011
Southwest Asia	Iraq	Iraqis	Afro-Asiatic	Semitic	36	5.60%	Mendez et al. 2011
Southwest Asia	Middle East	Druze	Afro-Asiatic	Semitic	39	7.70%	Mendez et al. 2011
Southwest Asia	Middle East	Assyrians	Afro-Asiatic	Semitic	31	12.90%	Mendez et al. 2011
Western Europe	Flanders	Flemish	Indo-European	Germanic	773	0.26%	Larmuseau et al. 2014

Table 5.11.10. Survey of T1a2-L162 Variation.

Region	Location	Population	Language Family	Branch	Sample Size	Frequency T1a2-L131	Reference
Mediterranean	Sardinia	Sardinians	Indo-European	Italic	1194	0.17%	Francalacci et al. 2015
Southwest Asia	Middle East	Palestinians	Afro-Asiatic	Semitic	115	3.50%	Mendez et al. 2011
Southwest Asia	Jordan	Jordanians	Afro-Asiatic	Semitic	187	0.50%	Mendez et al. 2011
Sub-Saharan Africa	Southern Africa	Lemba	Niger-Congo	Bantoid	34	17.60%	Mendez et al. 2011
Western Europe	Flanders	Flemish	Indo-European	Germanic	773	0.39%	Larmuseau et al. 2014

References for Tables

Abu-Amero, Khaled K. et al. 2009. "Saudi Arabian Y-chromosome diversity and its relationship with nearby regions." *BioMed Central Genetics* 10:59.

Arunkumar, Ganesh Prasad et al. 2012. "Population differentiation of southern Indian male lineages correlates with agricultural expansions predating the caste system." *Public Library of Science One* 7(11): e50269.

Balanovsky et al. 2011. "Parallel evolution of genes and languages in the Caucasus region." *Molecular Biology and Evolution* 28(10): 2905-2920.

Balanovsky, O. et al. 2017. "Genetic differentiation between upland and lowland populations shapes the Y‐chromosomal landscape of West Asia." *Human Genetics* 136: 437-450.

Boattini, Alessio et al. 2013. "Uniparental markers in Italy reveal a sex-biased genetic structure and different historical strata." *Public Library of Science One* 8(5): e65441.

Borkar, Minal et al. 2011. "Paleolithic spread of Y-chromosomal lineage of tribes in eastern and northeastern India." *Annals of Human Biology* 38(6): 736-746.

Caciagli, Laura et al. 2009. "The key role of patrilineal inheritance in shaping the genetic variation of Dagestan highlanders." *Journal of Human Genetics* 54: 689-694.

Carvalho, M. et al. 2008. "Y chromosome SNP analysis in a Portuguese population sample using a multiplex PCR and minisequencing strategy." *Forensic Science International: Genetics Supplement Series* 1: 190-191.

Chaubey, Gyaneshwer et al. 2014. "Unravelling the distinct strains of Tharu ancestry." *European Journal of Human Genetics* 22, 1404-1412.

Chennakrishnaiah, et al. 2013. "Indigenous and foreign Y-chromosomes characterize the Lingayat and Vokkaliga populations of Southwest India." *Gene* 526: 96-106.

Cinnioğlu, Cengiz et al. 2004. "Excavating Y-chromosome haplotype strata in Anatolia." *Human Genetics* 114: 127-148.

Debnath, Monojit et al. 2011. "Y-chromosome haplogroup diversity in the sub-Himalayan Terai and Duars populations of East India." *Journal of Human Genetics* 56: 765-771.

Di Cristofaro, Julie et al. 2013. "Afghan Hindu Kush: where Eurasian Sub-Continent gene flows converge." *Public Library of Science One* 8(10): e76748.

Firasat, Sadaf et al. 2007. "Y-chromosomal evidence for a limited Greek contribution to the Pathan population of Pakistan." *European Journal of Human Genetics* 15: 121-126.

Flores, Carlos et al. 2004. "Reduced genetic structure of the Iberian Peninsula revealed by Y-chromosome analysis: implications for population demography." *European Journal of Human Genetics* 12: 855-863.

Fornarino, Simona et al. 2009. "Mitochondria and Y-chromosome diversity of the Tharus (Nepal): a reservoir of genetic variation." *BioMed Central Evolutionary Biology* 9:154.

Francalacci, Paolo et al. 2015. "Detection of Phylogenetically informative polymorphisms in the entire euchromatic portion of human Y chromosome from a Sardinian sample." *BioMed Central Research Notes* 8:174.

Gaikwad, Sonali and VK Kashyap 2005. "Molecular insight into the genesis of ranked caste populations of western India based upon polymorphisms across non-recombinant and recombinant regions in genome." *Genome Biology* 6: P10.

Gazi, Nurun Nahar et al. 2013. "Genetic structure of Tibeto-Burman populations of Bangladesh: evaluating the gene flow along the sides of Bay-of-Bengal." *Public Library of Science One* 8(10): e75064.

Gomes, Verónica et al. 2010. "Digging deeper into East African human Y-chromosome lineages." *Human Genetics* 127: 603-613.

Grugni, Viola et al. 2012. "Ancient migratory events in the Middle East: new clues from the Y-Chromosome variation of modern Iranians." *Public Library of Science One* 7(7): e41252.

Haber, Marc et al. 2011. "Influences of history, geography, and religion on genetic structure: the Maronites in Lebanon." *European Journal of Human Genetics* 19: 334-340.

Haber, Marc et al. 2012. "Afghanistan's ethnic groups share a Y-chromosomal heritage structured by historical events." *Public Library of Science One* 7(3): e34288.

Haber, Marc et al. 2016. "Chad genetic diversity reveals an African history marked by multiple Holocene Eurasian migrations." *American Journal of Human Genetics* 99: 1316–1324.

Hassan, Hisham Y. et al. 2008. "Y-chromosome variation among Sudanese: restricted gene flow, concordance with language, geography and history." *American Journal of Physical Anthropology* 137: 316-323.

Hovhannisyan, Anahit et al. 2014. "Different waves and directions of Neolithic migrations in the Armenian Highland." *Investigative Genetics* 5:15.

Karachanak, Sena et al. 2013. "Y-chromosome diversity in modern Bulgarians: new clues about their ancestry." *Public Library of Science One* 8(3): e56779.

Karafet, Tatiana et al. 2016. "Coevolution of genes and languages and high levels of population structure among the highland populations of Daghestan." *Journal of Human Genetics* (2016) 61: 181–191.

Khurana, Priyanka et al. 2014. "Y Chromosome Haplogroup Distribution in Indo-European Speaking Tribes of Gujarat, Western India." *Public Library of Science One* 9(3): e90414.

King, Roy J. et al. 2011. "The coming of the Greeks to Provence and Corsica: Y chromosome models of archaic Greek colonization of the western Mediterranean." *Evolutionary Biology* 11: 69.

Kivisild, T. et al. 2003. "The genetic heritage of the earliest settlers persists both in Indian tribal and caste populations." *American Journal of Human Genetics* 72: 313-332.

Lacau, Harlette et al. 2012. "Afghanistan from a Y-chromosome perspective." *European Journal of Human Genetics* 20: 1063–1070.

Larmuseau, M.H.D. et al 2014. "Increasing phylogenetic resolution still informative for Y chromosomal studies on West-European populations." *Forensic Science International: Genetics* 9: 179-185.

Lee, Eun Young et al. 2014. "Analysis of 22 Y chromosomal STR haplotypes and Y haplogroup distribution in Pathans of Pakistan." *Forensic Science International: Genetics* 11: 111-116.

Luis, J.R. et al. 2004. "The Levant versus the Horn of Africa: evidence for bidirectional corridors of human migrations." *American Journal of Human Genetics* 74: 532-544.

Malyarchuk, Boris et al. 2013. "Y-chromosome variation in Tajiks and Iranians." *Annals of Human Biology* 40(1): 48-54.

Mendez, Fernando L. et al. 2011. "Increased resolution of Y chromosome haplogroup T defines relationships among populations of the Near East, Europe, and Africa." *Human Biology*, 83(1): 39-53.

Qamar, Raheel et al. 2002. "Y-chromosomal DNA variation in Pakistan." *American Journal of Human Genetics* 70: 1107-1124.

Ramos-Luis, E. et al. 2014. "Y-chromosomal DNA analysis in French male lineages." *Forensic Science International: Genetics* 9: 162-168.

Rębała, Krzysztof et al. 2013. "Contemporary paternal genetic landscape of Polish and German populations: from early medieval Slavic expansion to post-World War II resettlements." *European Journal of Human Genetics* 21: 415-422.

Sahoo, Sanghamitra et al. 2006. "A prehistory of Indian Y-chromosomes: evaluating demic diffusion scenarios." *Proceedings of the National Academy of Sciences of the United States of America* 103(3): 843-848.

Santos, Cristina et al. 2014. "Mitochondrial DNA and Y-Chromosome Structure at the Mediterranean and Atlantic façades of the Iberian Peninsula." *American Journal of Human Biology* 26:130–141.

Sengupta, Sanghamitra et al. 2006. "Polarity and temporality of high-resolution Y-chromosome distributions in India identify both indigenous and exogenous expansions and reveals minor genetic influence of central Asian pastoralists." *American Journal of Human Genetics* 78: 201-221.

Sharma, Swarkar et al. 2009. "The Indian origin of paternal haplogroup R1a1* substantiates the autochthonous origin of Brahmins and the caste system." *Journal of Human Genetics* 54: 47-55.

Thangaraj, Kumarasamy et al. 2010. "The influence of natural barriers in shaping the genetic structure of Maharashtra Populations." *Public Library of Science One* 5(12): e15283.

Thanseem, Ismail et al. 2006. "Genetic affinities among the lower castes and tribal groups of India: inference from Y chromosome and mitochondrial DNA." *BioMed Central Genetics* 7: 42.

Varzari, Alexander et al. 2009. "Searching for the origins of Gagauzes: inferences from Y-chromosome analysis." *American Journal of Human Biology* 21: 326-336.

Voskarides, Konstantinos et al. 2016. "Y-chromosome phylogeographic analysis of the Greek-Cypriot population reveals elements consistent with Neolithic and Bronze Age settlements." *Investigative Genetics* 7:1.

Yunusbayev, Bayazit et al. 2012. "The Caucasus as an asymmetric semipermeable barrier to ancient human migrations." *Molecular Biology and Evolution* 29(1): 359-365.

Zalloua, Pierre A. et al. 2008. "Y-chromosome diversity in Lebanon is structured by recent historical events." *The American Journal of Human Genetics* 82: 873-882.

Zhabagin, Maxat et al. 2017. "The connection of the genetic, cultural and geographic landscapes of Transoxiana." *Scientific Reports* 7: 3085.

Zhong, Hua et al. 2011. "Extended Y-chromosome investigations suggests postglacial migrations of modern humans into East Asia via the northern route." *Molecular Biology and Evolution* 28(1): 717-727.