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Y-CHROMOSOME FREQUENCIES AND THE IMPLICATIONS ON THE THEORIES RELATING TO THE ORIGIN AND SETTLEMENT OF FINNO-UGRIC, PROTO-HUNGARIAN AND SLAVIC POPULATIONS

Abstract

Geneticists interpret the presence of genetic diversity, distribution, frequency and the age of the paternally inherited Y-chromosome genetic markers or haplogroups (HG), as indicators of population movements before and after the Ice Age. In the Slavic speaking population, two paternally inherited genetic markers HG2 and HG3 have a very high total frequency, greater than 50%. HG3 is also very common in India, particularly in the upper castes at ~45%; the frequency is comparable to the Slavic populations, but surprisingly, HG2 is absent there.

HG2 is considered to be the most ancestral lineage in Europe. Geneticists posit that, HG2 spread from northern Balkans, after the Ice Age, across Europe, reached northern Africa and as far to east as Uzbeks in Fergana Valley and also Pakistan. In the northern Europe, another genetic marker HG16 is prevalent among the Finns and frequent among the population in the Baltic States along with HG2 and HG3. Significantly, HG16 is also common in the Slavic populations north and northeast of the Carpathians, but is absent south of the Carpathians. These and other less frequent genetic markers, which are also present in the Slavic populations can be used as indicators of the gene flows i.e., movements of people during historical and pre-historical times. The absence of HG16 in Slovenians and peoples of the Balkans is significant, because it supports the hypothesis that the ancestors of Slovenians and the majority of the populace of the Balkans, did not come as immigrants from beyond the Carpathians, during the historical period, about 1500 years ago, but are indigenous to the lands they still now inhabit.

Introduction

Applying molecular genetics to question of early human population history, and hence to major issues in prehistoric archaeology, is becoming so fruitful an enterprise that a new discipline - *archaeogenetics* - has recently come into being (Renfrew 2001). Ridley (1999 pp. 4, 35) envisions that there are genes that can be used to write the history of human migrations in the last few thousand years. From four billion years ago to just a few hundred years ago, the genome has been a sort of autobiography for our species. Genes, the components of the chromosomes in the genome, have laid down a record of our biography. Thus a record of the human past is etched into our genes.

Utilizing the information from the genetic record, namely the data regarding the Finno-Ugric, paternally inherited genetic marker HG16, which appears at high frequencies in the Uralic speakers of Eurasia as well as in the Baltic region and at lower frequencies in the Slavic speaking populations north and east of the Carpathian Mountains, whereas it has not been detected on the Adriatic coast, the Balkans, Italy or in India, we are challenging and refuting the three hypotheses relating to the pre-history of southern Europe, particularly the Balkans:

1. The conjecture that the Finno-Ugric speaking people from the Baltic were present in the Veneti region of Italy over 2500 years ago to bequeath them an Estonian language (Pääbo 2006).
2. The proposition that the Proto-Hungarian/Uralic/Finno-Ugric populations were present in Etruscan territories and in the present day Hungary more than a thousand years before the arrival of Hungarians in the 9th century, as postulated by Mario Alinei (Vuga 2004).
3. The theory, which is taught in Slovenia as a historical fact, and which alleges that southern Slavs, from Slovenians in the north to Macedonians in the southern Balkans, arrived from beyond the Carpathian Mountains in the 6th century AD (Grafenauer 1979 p. 94, Erzetič 1994 p. 3, Štih 1996 p. 26).

There is, however, a common thread running from the northern Adriatic to the Baltic. This consists of high frequencies of two paternally inherited genetic markers HG2 and HG3 and the use of *Slovene* in the names of peoples from the Baltic coast to the Adriatic: Slovenes of Novgorod, the Slovincy (or Kashubians) of the Baltic area, the Slovaks (adj. slovensky) and the Slovenes of Slovenia, along the Amber Road of the Roman era. This is also the area where ancient historians locate Veneti or Venethi (Šavli 1996 pp. 77–83, Rosser 2000, Curta 2001 p. 344).

Review of literature

Tulaev and Smolej (2000) note that many Russians visiting Finland and Estonia are surprised that Russians are called **vene** or **venelane** in Estonia and **venaja** in Finland. Also, in St. Petersburg, Russia, members of pagan cults still consider themselves as Veneti. The Estonian-English Dictionary (Saagpakk 1992) has a number of entries that are of interest for Slavic-Venetic connection:

vend – brother; on the father's side; fra, brother; monk friar; Christian brother

vend – Wend; **venedid** – Wends

vendkond – fraternity; **vendlik** – brotherly; **vendlus** – brotherhood, fraternity

vene – dugout

vene – Russian; Muscovite; Russian language

veneedid – Wends

veneedid – Veneti

Venetsia – Venice; **venetsia** – Venetian; **venetslane** – Venetian

venelane – Russian; Muscovite; **venelased** – the Russians

venelanna – Russian woman

Venemaa – Russia

venestama – to Russianize, to Russify

venestuma – to become Russian

veneusuline – of the Greek Orthodox faith

venevastane – anti Russian

The *Oxford International Dictionary of the English Language* entries are informative in defining the linguistic affiliation of the Wends:

Wend, *sb.*(substantive) [ad.(adaptation) of G. (German) *Wende*, *Winde* (pl. *Wenden*, *Winden* = OHG. *Winida*, OE. *Winedas*, *Weonodas*), of obs. origin.] A member of the Slavonic race now inhabiting Lusatia in the east of Saxony, but formerly extending over Northern Germany; a Sorb.

Wendic, [f. (formed on) *Wend sb.*+ IC.] **A. adj.** Of or pertaining to the Wends. **B. sb.** The language of the Wends, Sorabian

Wendish, [f. as prec. + ISH, or ad.G. *Wendisch*] **A. adj.** Of or pertaining to the Wends. **B. sb.** The language of the Wends, especially the Sorabian tongue spoken in Saxony 1617.

Wend, (obsolete) **2.** To turn from one condition or form into another; to change *to* or *into* -1579.

The verb “wend” was already obsolete by the year 1579. It is possible to speculate that Latin “vendere” *to sell*, *vend* may be a legacy of the Venetic traders, just as ‘vandalism’ is a reminder of the behavior of Vandals more than 1500 years ago. It was Veneti and their navy on the Atlantic coast that won the admiration of Caesar. We learn from him of their skills as sailors and traders and from their voyages to Britain and of their control of the harbors on the Atlantic coast. In addition to Veneti and Venelli on the Atlantic coast, Caesar also mentions in his accounts Carnutes and Andes where he took his legions for the winter quarters, as he went on his way to Italy and Illyricum (Caesar).

Curta, a mediaeval historian, provides us with some historical references to Venethi: »Jordanes calls one and the same river *Viscla* when referring to *Sclavenes*, and *Vistula*, when speaking of *Venethi*. This was interpreted as an indication of two different sources. In the case of *Venethi*, the source may have been an ancient similar to Ptolemy’s geography. It is equally possible, however, Jordanes was inspired here by Tacitus, for, like him, he constantly associates *Venethi* with *Aesti* Jordanes, as if not willing to repeat himself, sends us back to the “catalogue of nations” for further information on *Venethi* ... In the “catalogue of nations”, we are told that the *Venethi* were “chiefly called *Sclaveni* and *Antes*,” which could only mean that *Venethi* were subdivided into two categories, the *Sclavenes* and the *Antes*« (Curta 2001 pp. 40–41). Despite their common ancestry we learn that: »The *Antes* were constantly allies of the Romans, while *Sclavenes* always appeared on the side of their enemy« (Curta 2001 p. 347). In the footnotes Curta cites *Getica* and we also learn: »Following his victory over *Venethi*, *Ermenaric* subdued the *Aesti*, “who dwell on the farthest shore of the German Ocean”« (Curta 2001 p. 41). This emphasizes that *Aesti* and *Venethi* were different peoples, but were probably neighbors, since they were conquered in the same military campaign.

We also learn from Curta that: »Fredegar had two apparently equivalent terms for the same *ethnie*: *Sclauos coinomento Winedos*. There are variants for both terms, such as *Sclavini* or *Venedi* ... (T)he Wends, and not the Slavs, made Samo their king«. Furthermore he explains that: »'Wends' and 'Slavs' were already in use when Fredegar wrote Book IV. They first appear in Jonas of Bobbio's *Life of St. Columbanus*, written sometime between 639 and 643. According to Jonas, Columbanus had once thought of preaching to the Wends, who were called Slavs (*[termini]Venetiorum qui et Sclavi dicuntur*) (Curta 2001 p. 60).

Curta is also of the opinion that: »Common Slavic itself may have been used as a *lingua franca* within and outside Avar qaganate«. Based on accounts of Paul the Deacon from the *Historia Langobardorum*, he concludes: »... we may presume that duke Raduald learned how to speak Slavic in Friuli. His Slavic neighbors in the north apparently spoke the same language as the Dalmatian Slavs« (Curta 2001 p. 345).

Canadian linguist Tom Priestly in his paper *On the development of the Windischentheorie* concludes that, the root **vind- vend-** in **Windisch** had been used by German-speakers perhaps for two millennia and that it probably originates in the Latin ethnonym **Veneti** and was long used to denote Slavic peoples in general ... Before 1800 **Windisch** seems to have been simple ethnonym, used to refer to Slovene-speakers in Carinthia and Styria in distinction to those in Carniola, who were called **Krainer** (Priestly 1997).

Veneti from other Historical Documents

Canadian anthropologist George Sotiroff cites the data provided by ancient authors such as Pliny the Elder who recorded that **Venetians** occupied a sizable portion of Central Europe, along the Vistula, right up to the spot where the river flows into the Baltic Sea. This is also the area in which Pliny found the **Vandili**, an obvious diminutive of **Vandi**, or **Wends**, as the Germans to this day call the Slavonic minority in Brandenburg and Saxony (Sotiroff 1971).

Other ancient Greek authors such as Homer and Herodotus along with Roman writers such as Tacitus, Pliny the Elder, Caesar, Ptolemy and Casius Dio refer to Veneti in their accounts of the ancient world. From their accounts, it can be seen that their settlements were widespread and were found: on the shores of the Black Sea, the upper Adriatic, the Atlantic coast, the Baltic Sea, and also in other parts of Europe (Šavli 1996).

In addition, Sotiroff summarizes ancient historical data and from his summary of the ancient historical accounts we learn that, on the coast of the Black Sea in the present day Turkey, east of Sinope, in the region once called Paphlagonia, the most conspicuous ethnic group were, according to Homer, called **Eneti**. In the Trojan War, according to Livy, these people fought on the side of the Trojans, against the Greeks. After the Trojan War, the Trojan prince Antenor with the group of friends joined forces with **Eneti**, who had been out of Paphlagonia and, having lost their king Pylamenes, at Troy, wanted someone to lead them as well as somewhere to settle. He penetrated to the coast of the Adriatic and expelled the Euganei, a tribe living between the Alps and the sea, and occupied the territory with a mixed population of Trojans and **Eneti**. The combined peoples came to be known as **Venetians**.

Why **Venetians** and not **Enetians**? Sotiroff provides the explanation. Most of the early and accessible sources of history of these people were written in Greek. This has created many spelling problems with the transliteration of foreign names, since many of the "barbarian" tongues were rich in consonants indistinguishable to Greek ears. One of these consonants was "v", which the Greeks rendered as "ou", as "w" (beta), or as rough breathing (spiritus asper), with whatever vowel came next. Thus the name **Veneti** was bound to appear, in Greek books, as **Oueneti**, as **Beneti**, or as **Heneti**, i.e. **Eneti**, where the initial "e" is aspirate. The name actually appears in all three forms. In Homer, the initial "e" is an aspirate, so the name should be romanized as **Heneti**. Polybius spells the name, **Ouenetoi** - we would say **Veneti**. Strabo and Julian the Apostate stick to the Homeric form. In Procopius, the name appears as **Beneti**. John the Lydian hesitates between **Heneti** and **Beneti** (Sotiroff 1971).

Alinei's Paleolithic Continuity Theory

Vuga presents a brief outline of Alinei's Paleolithic Continuity Theory (PCT), which posits that the present day inhabitants of Europe have lived in the same territories since Neolithic, possibly since Mesolithic ages i.e., for at least 10,000 years. As part of PCT, Alinei also includes Proto-Hungarians as having arrived in Europe in the Neolithic and to have remained in Europe since then, without hiatus. The first wave was to have taken place during the Neolithic and was then followed, much later, by the second invasion of Pannonia in the 9th century; ostensibly still occupied by the Proto-Hungarians. However, Vuga, on the basis of linguistics, disputes Alinei's hypothesis regarding the autochthonous presence of Proto-Hungarians in Pannonia, prior to the arrival of Hungarians in the 9th century (Vuga 2004). Furthermore, from the genetic perspective, Y-chromosome HG1, HG2, HG3 frequencies and absence of HG16 in extant Hungarian populations makes them similar to the surrounding Slavic populations, although they speak Uralic language, an 'elite dominance' legacy of the invading Magyars in the 9th century (Rosser 2000).

The presence, high frequency and distribution of Y-chromosome genetic markers HG2 and HG3 generally support Alinei's Continuity Theory with respect to Slavic speakers in Europe. At the same time the high frequency of HG16 in the Finno-Ugric populations in the Baltic area also supports his hypothesis regarding the autochthonous presence of Uralic populations north of the Carpathian Mountains. The supporters of the Continuity Theory believe that the Baltic area, perhaps even the whole of northern Europe, was inhabited by Uralic-speaking people for at least the past ~10,000 years (Laitinen 2002).

The frequency and the distribution of Y-chromosome genetic marker HG16 gives credence to the hypothesis that historically, the settlement area of Proto-Finno-Ugric speaking populations may have been much more widespread than is the situation now. This is evident from the high frequencies of this genetic marker, amongst the populations inhabiting eastern Baltic and Eastern European Plain including Poland, Russia and Ukraine (Rosser 2000). However, it should be emphasized, that this genetic marker has not been detected in the populations of Romania, Serbia, Bulgaria, Macedonia, Kosovo, Slovenia,

Bavaria and Italy. It is also noteworthy, that Rosser et al. have not detected HG16 in the population of Budapest (Rosser 2000, Marjanovic 2005, Perićić 2005). It should be noted that Guglielmino et al., on the basis of gene frequencies, show that the extant population of Budapest is genetically much closer to the Slavs than to Hungarian ethnic groups such as Kiskun, Csango, Szekely, Matyo, Paloc, Nagykun and Orseg. They estimate that the Uralic admixture rate in the Hungarians is ~13%, but only one Hungarian ethnic group Orseg resembles the Uralic populations (Guglielmino 2000).

The frequency of HG16 in Bratislava, Slovakia is 3% (Rosser 2000). This may be attributed to the aftermath of the battle of Mohacs in 1526, when King Louis, most of the Hungarian nobility and thousands of soldiers were killed. After the battle, the Hungarian nobility, artisans and merchants moved to Bratislava and it became the capital of Hungarian Kingdom for almost 300 years. It is thus possible that the Hungarian nobility and their elites brought the HG16 Uralic marker to Bratislava from Hungary.

Nevertheless, the absence of the HG16 genetic marker in Hungary, Italy and all of the Balkans, casts doubts upon Alinei's hypothesis that Hungarians were autochthonous in Pannonia prior to their invasion in the 9th century. Had they been there for millennia, one would expect that the frequency of Uralic genetic marker would be approaching that of the Baltic populations, or at least the Slavic populations north of the Carpathian Mountains.

It appears that the Carpathian Mountains demarcate the southern boundary of the HG16; and Bratislava, Slovakia is the most southerly location of HG16 in central Europe. Based on genetic evidence, it is very unlikely that Finno-Ugric speaking populations are autochthonous south of Carpathian Mountains and that they share a common origin with the Etruscan populations of Italy.

Enigmatically, Italians and Turkish speaking Chuvash share HG26, at 6% and 18% respectively. HG26 has been found at the highest frequency in Altaic language family Chuvash at 18% and Turks at 5%; HG26 is widely distributed and is also found in Estonians at 5%, Ossetians and Cypriots at 4%, Portuguese and Greeks at 3%, Romanians, Georgians, Armenians, Norwegians at 2%, Slovaks, Yugoslavs [Serbs], East Anglians and Russians at 1% (Rosser 2000).

Estonian

Estonian belongs to the Finno-Ugric branch of the Uralic languages, together with Finnish. Livonian, Votic, and a part of western Finnish, forms the southwestern branch of the Balto-Finnic languages. The other, the northeastern branch of Finnic consists of the greater part of Finnish and of Ingrian, Karelian, Olonetsian, Ludic and Vepsian. Other more distantly related Finno-Ugric languages comprise the Saami languages, Mari, Moksha, Komi and Hungarian (Raun & Saareste 1965, Laitinen 2002).

According to the prevailing assumptions, the Finno-Ugric people lived together in the neighborhood of the Volga prior to the Proto-Finnic period. During the Proto-Finnic period Baltic-Finnic contacts began. Those Balts were the relatives of the present-day Lithuanians and Latvians. At that time the Finnic peoples must have spread over a large

area comprising parts of the present-day Latvia, all of Estonia, Karelia and parts of Finland (Raun & Saareste 1965). In Europe, the genetic data shows even wider influence of the Finnic peoples. This is based on Y-chromosome genetic marker HG16, which is a signature of the Finnic populations in Europe. The highest frequency of HG16 is found in Finland, the Baltic countries and among Saami, but it is also found in significant frequencies in Russia, Ukraine and Poland (Rosser 2000).

Table 1. Y-chromosome HG Frequency in Populations (% of individuals with Haplogroups (HG) (Rosser 2000, Semino 2000)

HG ¹	1	2	3	9	12	16	21	22	26	25
Icelandic	46	32	21	0	0	0	0	0	0	
Saami	6	31	21	0	0	42	0	0	0	
N. Sweden	23	48	19	2	0	8	2	0	0	
Gotlander	17	59	16	0	0	6	0	0	2	
Norwegian	29	33	31	2	0	4	2	0	0	
Danish	50	32	7	7	0	2	4	0	0	
Finnish	2	23	10	0	2	61	2	0	0	
Estonian	9	14	27	1	4	37	3	0	5	
Latvian	15	12	43	0	0	32	0	0	0	
Lithuanian	5	13	34	0	0	47	0	0	0	
Russian	7	17	47	4	4	14	7	0	1	
Belarussian ²	10	34	39	2	2	2	10	0	2	
Polish	18	17	54	4	1	4	2	0	0	
Ukrainian	4	48	30	0	0	11	4	0	0	
Czech	19	19	38	11	6	0	8	0	0	
Slovakian	17	17	47	3	1	3	10	0	1	
Hungarian	30	28	22	3	0	0	17	0	0	
Romanian	18	27	20	24	0	0	7	2	2	
Bulgarian	17	42	12	12	0	0	17	0	0	
Bavarian	48	23	13	5	0	0	8	3	0	
Yugoslavian	11	49	16	8	2	0	13	0	1	
Croatian	10	47	29	5	0	0	0	na	2	7
Slovenian	21	27	37	6	0	0	7	1	0	
Macedonian	10	20	35	15	0	0	0	na	0	15
Italian	44	14	2	20	0	0	13	0	6	
N.Portuguese	62	16	0	6	0	0	11	2	3	
Basque	73	8	0	0	0	0	0	19	0	
Cornish	82	18	0	0	0	0	0	0	0	
N. Africa	4	3	0	12	0	0	77	0	0	

¹ The correspondence between the above used Rosser nomenclature and that of Y Chromosome Consortium (2002) is as follows: HG1=P*(xR1a), HG2=BR*(xDE, JR), HG3=R1a1, HG9=J, HG12=N(xN3), HG16=N3, HG21=E*(xE3a), HG22=R1b8, HG25=E3b1, HG26=K*(xL, N3, O2b, P)

² In a much larger sample of 306 vs 41, Behar et al. (2003) report that HG16 frequency in Belarus is 10.5%, rather than 2%, as reported by Rosser et al. (2000)

Table 2. HG16 Frequency in some European and Eurasian Populations (Rosser 2000, Weale 2002, Behar 2003, Peričić 2005)

Iceland	0	Denmark	2
Ireland	0.5	Norway	4
North Wales	0	Finland	61
Midlands	0	Estonia	37
East Anglia	0	Latvia	32
Friesland	0	Lithuania	47
		Russia	14
		Belarus	10,5
Bavaria	0	Ukraine	11
Slovenia	0	Poland	4
Croatia	0	Germany	3
Serbia	0		
Hungary	0	Chuvash	18
Romania	0	Mari	33
Bulgaria	0	Yakuts	86
Macedonia	0	Buryats	58

Age and Origins of Y-chromosome Haplogroups in Extant European Populations

Y-chromosome haplogroups nomenclature is used according to Rosser et al. (2000) and its YCC (2002) correspondence is added in square brackets.

HG1 [P*(xR1a)]

Rosser et al use HG1 as part of their nomenclature system to define the M173 as an ancient Eurasiatic marker that was brought by or arose in the group of *Homo sapiens* who entered Europe about 35,000 to 40,000 years ago and spread east to west. This marker is now found at its highest frequencies in Western Europe, particularly on the Atlantic coast; amongst Spanish at 68%, Scotts at 79%, in Irish at 81%, in Cornwall at 82% and amongst Basques at 89% (Semino 2000, Rosser 2000).

HG2 [BR*(xDE, JR)]

HG 2 contains a heterogeneous set of chromosomes that are not necessarily related (Zerjal 2002). However, haplogroup I - M170 is a component of Rosser's HG2. According to Semino et al., the polymorphism represents a putative Paleolithic mutation, whose age has been estimated to be ~22,000 years. With the exception of recent gene flows, I - M170 is confined to Europe. They proposed that I - M170 originated in Europe in descendants of men that arrived from the Middle East 20,000 to 25,000 years ago, who have been associated with the Gravettian culture. During the Last Glacial Maximum (LGM), Western Europe was isolated from Central Europe, where an Epi-Gravettian culture persisted in the area of the present-day Austria, the Czech Republic and the northern Balkans. The northern

Balkans could have been another possible LGM refugium and reservoir of M170. After climatic improvement, this culture spread north and east (Semino 2000, Peričić 2005).

Rosser et al. posit that HG2 is the most ancestral lineage within Europe. HG2 is not only distributed throughout Europe, but is found also in North Africa (and also in eastern populations such as Uzbeks in Fergana Valley). It has been found in Pakistan in Pathan and Sindhi populations and also in Barusho who lay claim to be the descendents of the army of the Alexander the Great. Also, I - M170, a component of HG2, has been detected at relatively low frequencies in Tajiks and Uzbeks in Fergana Valley. But in contrast, I-M170 has not been detected in India. The highest frequencies have been reported from the Balkans and Ukraine; in Herzegovinians at 71%, Bosnians at 54%, Ukrainians at 48%, Macedonians in Greece at 35%, Slovenians at 27% (Rosser 2000, Qamar 2002, Nasidze 2005, Peričić 2005).

HG3 [R1a1]

HG3, which is derived from M173 lineage with M17 mutation is the prevalent haplogroup among the Slavic speakers. Genetic evidence suggests central Asia as source region of this marker (Quintana-Murci 2001). It has a low frequency in Western Europe, 0% in Basques and in Cornwall and 1% in Ireland, but the frequency rises abruptly in Central Europe in Sorbs at 63%, in Belarus at 51%. HG3 is also present on the Indian sub-continent; the frequency in Pakistan is at 16%, the frequency in India as a whole is 24%, but substantially higher in the Upper Castes at 45%. Based on reported frequencies, it is estimated that ~60 million Slavic speaking males and ~110 million males on the Indian sub-continent carry this genetic marker, making it one of the most prolific on the planet. In India, the frequency is the highest in the upper castes, particularly amongst the Indo-Aryan speakers (Semino 2000, Bamshad 2001, Behar 2003, Sengupta 2006). In addition to the genetic affinity between Slavs and Indo-Aryans, there is also a remarkable linguistic similarity, particularly in the language of the Vedas and the present day Slovenian (Skulj 2002, 2004).

Rosser et al report that HG3 comprises about half of the chromosomes in the Russian, Polish and Slovakian samples. The distribution resembles the third principal component of variation of classical gene frequencies, which has been interpreted by some geneticists as marking the movement, from north of the Caspian, of the Kurgan people, dated to 7000 years ago (Rosser 2000).

HG9 [J]

HG9 is another haplogroup, which arrived in Europe from the Middle East during and after Neolithic time. Its origin has been estimated to be 15,000 to 20,000 years ago and may represent the male contribution of the demic diffusion of the farmers from the Middle East to Europe (Semino 2000, Marjanović 2005). High frequencies of HG9 have been found throughout the Fertile Crescent region: in Palestinians at 51%, Lebanese 46%, Syrians 57%, but Iranian populations from the southeastern Caspian region and the Zagros Mountains exhibit the highest frequencies so far observed at ~60% (Quintana-Murci 2001).

HG12 [N(xN3)]

HG12 is thought to be ancestral to HG16, and its distribution overlaps that of HG16. It is most frequent in the Mari at 17%, who may be the population of origin of the Tat mutation, which defines HG16. In addition, HG 12 is found in Czechs at 6%, Russians and Estonians at 4%, in Finns, Cypriots, Yugoslavs at 2% and Poles and Slovaks at 1% (Rosser 2000).

HG16 [N3]

Laitinen et al. note that Y-chromosomes carrying C allele of the Tat polymorphism belong to haplogroup 16. It is the C allele, which is usually regarded as an indicator of Finno-Ugric origin. Most C alleles are found among speakers of Altaic or Uralic languages. The highest frequency of the C allele has been detected in the Siberian Yakut (86%), followed by Buryats (58%) who live in Mongolia. The C allele is also predominant in the Finns (61%), the Karelians (40%), Estonians (34%) and the Mari (33%), who are the speakers of the Finno-Ugric languages. It is also frequent in Latvians and Lithuanians who speak Indo-European languages. In contrast, the frequency drops off sharply in the neighboring populations (Laitinen 2002). HG16 probably arose in the region of the present day China (Rootsi 2006).

The high frequency of Tat C allele in Finland and all three Baltic countries, suggests common eastern — possibly Finno-Ugric — roots for these people. The HG16 chromosomes were proposed to represent population movements from Eastern Europe or Northern Asia to the Baltic Sea.

Baltic people cluster very closely with the Mari, but remain clearly separated from the rest of the populations. This favors the hypothesis that the Baltic males may descend from the same Finno-Ugric-speaking populations. Therefore, it seems more likely that the Estonians have always spoken a Finno-Ugric language, whereas the Latvians and the Lithuanians may have replaced their original Finno-Ugric language with an Indo-European one (Laitinen 2002).

HG21 [E*(xE3a)]

The presence of HG21 in Europe has been attributed to multiple migrations from the Middle East and North Africa during and after the Neolithic. The divergence time has been estimated at a range of 7–14 thousand years. The clinal distribution of E-M78 in Europe has been attributed to dispersals in all directions from the Balkans in Neolithic and post-Neolithic times, as far as Iberia to the west. It is present in Slovenians at 7%, in Czechs at 8%, Slovaks at 10%, in Serbs at 13% and in North Africa at 77% (Rosser 2000, Semino 2004, Marjanović 2005).

HG26 [K*(xL,N3,O2b,P)]

The Chuvash who are a Turkic speaking Eurasian population, have the highest reported frequency of HG26 at 18% (Rosser 2000). This genetic marker is believed to have originated in Asia 35–45 thousand years ago; at some point later individuals with this marker K-M70,

proceeded south to Africa. The presence of this genetic marker in the Arabs of Oman and Egypt is reported to be at 8% (Luis 2004).

Discussion

Barbujani notes that languages have a great evolutionary significance, because linguistic affinities are also clues to population histories. A common language frequently reflects a common origin, and a related language indicates a common origin too, but farther back in time. He also observes that partial correlations with language are stronger for Y-chromosome, which is paternally inherited, than for mtDNA, which is maternally inherited. He concurs with other researchers who suggest that, when women were incorporated into a group speaking a different language, they passed to the future generations, along with their own genes, their husbands' language (Barbujani 1997).

Laitinen et al. are in agreement with archaeological finds, which suggest that Finno-Ugric speaking tribes have inhabited the shores of the Baltic Sea continuously for millennia. This would be the most logical explanation for the Y-chromosome data for the common Finno-Ugric ancestry for the males of the three Baltic populations. They cite Česnys, who proposed that the early inhabitants of the Baltic region had arrived to the coast of the Baltic Sea from the east, possibly as early as 8000 BC (Laitinen 2002).

This raises some questions. When did the males carrying HG1, HG2, HG3, HG12, HG21, and HG26 migrate to the Baltics, was it pre or post Finno-Ugric migration? If the population with HG16 chromosomes was the first to arrive on the coast of the Baltic Sea, why did they not spread more in relationship to other populations, since they would have had the initial momentum with them, without any opposition from other populations? Why did the ancestors of Latvians and Lithuanians adopt an Indo-European language and from what populations? Is it really possible that Estonians were using their language in trade and commerce and left it in southern Europe, far from the shores of the Baltic Sea when they did not prevail upon the neighbors Latvians and Lithuanians to retain the original Finno-Ugric Estonian language?

HG16, which is an indicator of Finno-Ugric presence in populations and occurs at high frequencies in Finland 61% and in the Baltic countries at 32–47%, is absent from Bavarian, Croatian, Hungarian, Slovenian and Italian populations (Rosser 2000, Semino 2000). This makes it very difficult to accept a significant presence of Estonians, of the magnitude to leave the language, in southern Europe and on the Adriatic coast, since they did not leave a genetic footprint there. If the Estonians possessed in the past the cultural forces of 'elite dominance,' this would also be reflected by the languages of the surrounding countries, and they would all be speaking Estonian. Thus the absence of HG16 in southern Europe is a serious challenge to the hypothesis that Veneti were forefathers of Estonians.

In addition, the absence of HG16 south of the Carpathian Mountains raises serious doubts about the presence of Hungarians on the Pannonian plain prior to the 9th century.

Furthermore, the presence of HG16 amongst Slavic populations north and northeast of the Carpathian Mountains and its absence south of them and in the Balkans, indicates

that there were no large scale, long distance Slavic migrations to the Balkans, from the areas beyond the Carpathian Mountains in the middle of 6th century. This is in agreement with Curta's observations: »... (T)here is already enough evidence to move away from the migrationist model which has dominated the discipline of Slavic archaeology ever since its inception. A retreat from migrationism is necessary simply because the available data do not fit any of the current models for the study of (pre)historic migration. Cultural correspondences were too often explained in terms of long distance migration ...«(Curta p. 307). However, during the 6th century many local raids by Antes, Sclavenes, Avars and Huns took place (Curta pp. 116-117).

Why were there so many raids and battles between people who knew and understood each other and who probably had a common genetic origin, for example Antes and Sclaveni who were also both known as Venethi or Venedi (Curta 2001 p.7) (Modern equivalent would be a recent war between Slovenia and what is now called Serbia.) Was this just plain human greed, or were there other forces at play?

The answer probably lies in the aftermath of the cataclysmic event, which occurred in the middle of the 6th century, which had a pronounced effect not only on the population of Europe, but on the whole world. This event was the eruption of the volcano Krakatoa, in what is now Indonesia, dated at 535 AD, which some people associate with the beginning of the Dark Ages. This global disaster directly or indirectly caused the deaths of a large percentage of the world's population (Relfe 2007). The event was recorded both in Europe and Asia. A Chinese court journal in February 535 mentions a huge thunderous sound coming from southwest. Pustaka Raja Purwa, an Indonesian chronicle, recorded that there came forth a furious gale together with torrential rain and a deadly storm darkened the whole world. Procopius wrote in 536: »... during this year a most dread portent took place, sun gave forth its light without brightness, like the moon ...«. In China famine was recorded (Sutherland 2007); Japanese king Senka in 536 also mentions cold and hunger. Tree ring evidence from Scandinavia and western Europe reveals a huge reduction in tree growth during 536-542, not recovering fully until the 550's (Relfe 2007). Procopius also writes that, in December 539, a numerous "Hunnic army" crossed the **frozen Danube** and fell as a scourge upon eastern Balkan provinces (Curta 2001 p.78).

This would indicate that during the middle of the 6th century, when crops failed, people and their armies resorted to plundering and these appear to be significant events for that period. The direction of the raids was primarily from north to south; crop failures in the north would be more pronounced than in the south. In 535, Huns also invaded northern India and the Gupta Empire was defeated. For Europe, Curta cites ancient historians who recorded 40 raids in the Balkans in the 6th century by Huns, Antes, Avars, Bulgars, Sclavenes and others. From 493 to 626 a total of 52 raids are reported; 37 of them or 71% were initiated by Antes, Avars and Sclavenes (Curta 2001 p.116-117). From Procopius we also learn that these raiders also fought each other: »... sometime between 533 and 545 the Antes and Sclavenes became hostile to one another and engaged in the battle, which ended in victory of the Sclavenes over the Antes ... the Huns, the Sclavenes, and the Antes, in their daily inroads wrought frightful havoc among the inhabitants of the

Roman provinces ... as Antes and Sclavenes fought against each other, Romans recruited soldiers from both ethnic groups. In 537, 1600 horsemen, most of whom were Sclavenes and Antes, were shipped to Italy to rescue Belisarius, who was blocked in Rome by the Ostrogoths« (Curta 2001 p. 78).

Despite very detailed description of events and raids in the 6th century, ancient historians did not record any migration of people to the Balkans (Curta 2001 p.74). Reading the various hypotheses to explain Slavs in the Balkans, it appears that they have been construed within the last ~150 years, without considering the possibility that the population is autochthonous. However, the maternally inherited mtDNA markers show that there is a genetic continuity between the skeletal remains of the ~2500 year old Etruscan and Venetic elites and the present day Slovenians (Skulj 2005).

Conclusions

1. Since no evidence of male inherited HG16 genetic marker, which is a signature of Finno-Ugric populations, has been found in western Europe amongst Dutch, French, Spanish, Basque and Portuguese nor in central Europe amongst Bavarians, Italians, Slovenians nor anywhere in the Balkans, it is safe to say that Finno-Ugric genetic influence is non-existent in southern Europe, on the Adriatic and in the Balkans. Consequently, it is very unlikely, that male adventurers or traders from the Baltic Sea would leave a language, without leaving a Y-chromosome Finno-Ugric genetic marker HG16 in the northern Adriatic. This would be entirely out of context, since they did not bequest their language to other countries in the Baltic area, where HG16 frequency is quite high at 32 and 47%, yet both Latvians and Lithuanians speak Indo-European languages.

2. Genetic evidence, i.e., absence of HG16, does not support Alinei's hypothesis that proto-Hungarians or Finno-Ugrians were present as autochthonous population in the present day Hungary prior to the arrival of Hungarians in the late 9th century.

3. Absence of HG 16 in the male populations of the Pannonian plain and in Slovenia, Croatia, Serbia, Romania and the Balkan populations also disproves the theory that the 'southern' Slavs migrated to the present locations 1500 years ago, from the areas beyond the Carpathian Mountains. Had they done so, they would have brought with them HG16, which is frequent and widely distributed genetic marker north and northeast of the Carpathian Mountains - in Poland, Russia and Ukraine.

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Povzetek

Pomen pogostosti kromosoma Y za teorije o izvoru in poselitvi ugrofinskih, pramadžarskih in slovanskih ljudstev

Genetiki razlagajo genetsko raznovrstnost, razširjenost, pogostost in starost genetskih zaznamovalcev ali haploskupin (HG) v Evropi kot znake človeških preseljevanj pred zadnjo Ledeno dobo in po njej. Pri haploskupinah na Y-kromosomu, podedovanih po očetovi strani, se pri Slovanih opaža visoka pogostost predvsem HG2 in HG3, ki je višja od 50%. V Indiji je HG3 zelo pogosta pri višjih kastah, kjer je ta pogostost okrog 45%, skoraj enaka Slovanom v Evropi, toda v Indiji niso zasledili HG2. Genetiki menijo, da je HG2 najstarejša v Evropi. Ta genetski zaznamovalec naj bi se s selitvijo ljudstev, po ledeni dobi, razširil iz severnega Balkana po celi Evropi in prišel celo v severno Afriko in vzhodno tudi do Uzbekov v Fergano in v Pakistan. V severni Evropi, pri Fincih, je najbolj pogosta HG16 potem pa HG2; pri Baltih HG3 in HG16 zatem pa HG2. Pri slovanskih narodih severno in severovzhodno od Karpatov je tudi navzoča HG16, ki pa je ni pri Slovanih južno od Karpatov. Te in druge manj pogoste

genetske zaznamovalce lahko uporabimo kot kazalce človeške stanovitnosti ali preseljevanja v predzgodovinski in zgodovinski dobi po svetu. Za Slovence in južne Slovane je važna odsotnost HG16, ki potrjuje hipotezo, da predniki Slovencev in večine slovanskih prebivalcev na Balkanu niso prišli v Slovenijo oziramo na Balkan v zgodovinski dobi pred 1500 leti izza Karpatov, ampak so večinoma živeli na sedanjem ozemlju že tisočletja prej.