

Archaeological and genetic data suggest Ciscaucasian origin for the Proto-Bulgarians

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Abstract. The present study aims to properly introduce the newly acquired genetic data from various surveys into the debate for the origin of the Proto-Bulgarians. A part of the research focuses on the archaeological definition of Proto-Bulgarians with all their key features, identifying the most likely key area of Proto-Bulgarian ethnogenesis - the Kuban River area. The archaeological features that prove solid contacts with early Alans are discussed, as the emerging of biritualism or even multiritualism in the same zone. Available genetic data are processed with the Past software to produce principle component analysis (PCA) for the modern Bulgarians, comparing them with various ancient populations. The results prove close ties with Saltovo-Mayaki peoples and particularly with Caucasian Alans. Based on this observation and particularly the placing of various Alan samples firmly within the phylogenetic tree of modern Bulgarians, the ethnogenesis zone of the Proto-Bulgarians is reviewed again and its early start - 1st - 2nd c. - is confirmed. The general conclusion is that Proto-Bulgarians were a mixture of Late Sarmatians and older Caucasus populations, closely related to the Alans and preserving their genetic inheritance, even after arriving on the Balkans and mixing with Slav peoples and the remnants of the local Late Antiquity peoples.

Keywords: Proto-Bulgarians, Alans, ancient DNA, Kuban

The present-day country of Bulgaria, often designated as “Danube Bulgaria” in various archaeological and historical works, was established during the centuries following the Hun period in Europe and undoubtedly represents one of the most enduring results of the Migration period in Europe (Völkerwanderung in German). The identity and origin of the people who stood behind this enduring act of state-creation still remain unclear and often hotly debated.

The historical, archaeological, onomastic and linguistic research that started in the 18th c. allowed scientists both domestic and foreign to reach certain conclusions grouped in around several major theories. The most comprehensive summary on the matter in the late 20th c. was provided by Veselin Beshevliev. He summarized that there were in the past four major theories about the

origin of the Proto-Bulgarians labelled by him as “Thracian”, “Slavic”, “Finnish” and “Ural-Altai” (Beshevliev 1981, 15). He concluded that “the Danube Bulgarians are descendants of the Bulgarian tribe Unogundurs, whose ethnic identification was not entirely clarified, but they were undoubtedly of Turkic origin” (Beshevliev 1981, 20). However, he came to the conclusion based mostly on available linguistic evidence and especially on tribal and personal aristocratic names that the Proto-Bulgarians were not a homogenous group and different identities were present in the process of mixing at least on aristocratic level. Beshevliev’s views demonstrate the level at which the debate about the origin of Proto-Bulgarians reached in the late 20th c., but the situation was about to change.

The main agent of this change of views in Bulgarian archaeology was the prominent Bulgarian scientist Rasho Rashev (1943-2008). Rashev supported Beshevliev’s view that the Proto-Bulgarians were not a homogenous group and different suffixes attached to tribal and clan names actually represent different ethnicities - *-ar*, *-gir* and *-dur* for different Turkic, Ugrian and Iranian elements, that probably merged together during the Hun era of Europe (Rashev 1991, 29). Furthermore, he concluded that the 12-year calendar used by the Proto-Bulgarian elite presumably was Turkic, similar to the ones used in Middle Asia. This was the result of events in the 6th c., when the different Proto-Bulgarian tribes in the Caucasus area fell under the control of the Western Turk Khaganate. Rashev examined the remains of ordinary people. He came to the conclusion that the inhumations, which represented about one third of the total number of graves, showed direct parallels with “Sarmatian burial practices from the 1st - 2nd century” in the region between the Danube and Don Rivers. As for the cremations, Rashev assumed that the ones in biritual necropolises could be Proto-Bulgarian but not Slavic (Rashev 1991, 31). He also underlined that very few Turkic loans exist into the well-studied Bulgarian language from the 10th c., which means that the Turkic speakers amongst the elite were very few in number. Regarding the Iranian language of the regular population, he presumed that in areas, as the forest steppe of the middle Dnieper River, the Sarmatian Proto-Bulgarians entered into prolonged contacts with the Slavs, leading to their early ethnolinguistic Slavicization. The overall solution of the problem for the ethnicity of the Proto-Bulgarians offered by Rashev is the same as the one proposed by Stancho Vaklinov after the excavation of the Novi Pazar necropolis and by Smirnov, Artamonov and others in relation to Volga Bulgarians and the genesis of the Saltovo culture - that a tiny Turkic elite ruled over a host of Sarmatians and Ugric peoples (Rashev 1992, 26).

In recent years Sergej Botalov suggested that the “*Huno-Bulgarian*” area was established as early as mid-3rd c. AD in the steppe zones next to the Northwest Caucasus. As earliest sites, he pointed at Yúzhnaya Ozeréyevka and Tzemdolinsk necropolises, as well as other sites near Novorosiysk and Anapa. The key features are the earliest known cases with west orientation of the heads of the deceased buried with horses or cases of separate horse burials. Those features are considered the earliest of this type in Eastern Europe. The “*Huno-Bulgarian*” area stretched south to the coastal area of Tuapse, with the Bzid I necropolis. The grave inventories are typical of Late Sarmatians, especially finds from the same

period from the Volga and Don Rivers (Botalov 2010, 4; Gavrituhin, P'jankov 2003). Botalov considered that the core of the area was in its northern part where present-day Tamanski and Novorosiyski districts are and where the key necropolises Durso and Borisovski are situated. Notable Russian researchers Gavrituhin and P'jankov relate this group with Kuvrat's Great Bulgaria (Gavrituhin, P'jankov 2003, 192). To the south, the Proto-Bulgarian area stretched to Tuapse and Sochi; to the east the *Giliach* necropolis with rectangular pits with stone plating and east or north head orientation and typical "Hun and post-Hun" inventories suggest their presence in the upper Kuban River area. *Giliach* necropolis includes pottery with strong Central and East Caucasus influence, but east from it begins another area, which is dominated by mound or catacomb burials (Botalov 2010, 4-5). Defined as described above, the "*Huno-Bulgarian*" area served according to Botalov as "cradle" for the much greater "*North Black Sea area*", which shaped in two major stages - 6th -7th c. - the political period of Western Turkic Khaganate domination and Great Bulgaria supremacy. This greater area later ended its existence by gradual inclusion into Danube Bulgaria and the Khazar Khaganate (late 7th - 8th c.). This "*North Black Sea area*" includes notable necropolises as Netailovsk, Krimski, Krasnaja Gorka in its eastern section; Novi Pazar, Kulevcha, Galiche, Dolni Lukovit I, Topola, Istritza and others - in its western section (Botalov 2010, 10-11). The above-mentioned area demonstrates one very important archaeological feature. Apparently biritualism on the Lower Danube has its closest parallel in various *Saltovo* necropolises.

The statistical analysis of the five variants of grave directions demonstrates that the dominant one for the Lower Danube sites was the north, with deviations to east and west. The situation in *Saltovo* necropolises proper is somewhat different - the north-northeast orientation is dominant only in the biritual placed in the Crimea and Taman Peninsula area (Komatarova 2012, 153). The south-southwest orientation that is predominant for the *Zlivkinski* type cemeteries is completely missing in the Lower Danube area. The general conclusion may be that the Proto-Bulgarians who, after separating from the proto-Saltovo massive (Great Bulgaria period), arrived with Asparukh and settled on the Lower Danube (late 7th c.), moved out from the above-mentioned areas of the Crimea and Taman Peninsula and not from the Harkov area to the north. The "classic" *Saltovo* period started 70 years later - around mid-8th c. (Komatarova 2012, 160). The early separation (after 650-660) and settling down shortly thereafter (after 680) could be the explanation for the stronger preservation of some Late Sarmatian features on the Lower Danube, but it also could derive from a specific regional tradition. This north orientation of the graves in the Northwest Caucasus area could be explained by traditions deriving from "post-Maeotian population". This observation is confirmed by the latest discoveries of sites in the same area - such as the Varnavinskoe-3 site (Krasnodar area) from the 5th - 7th c. where the north orientation of the inhumations is compared by the researchers with the Borisovski and Durso necropolises (Sukhanov, Sviridov 2018, 125).

One very interesting feature of the cremation burials on the Lower Danube is the use of stone or brick cassettes. This grave setting is most common in the necropolises close to the Black Sea - Devnya 1 and Devnya 3, Varna, Balchik, Topola, Bdintsi and Kapul Viilor. In the *Saltovo* culture areas, stone cassettes

are most common in the Kuban-Black Sea area - especially in the graveyard Borisovski, Krasnodar area (77.5% of the cremation graves), where the cassettes do not have bottoms and are made with stone slabs only (Komatarova 2011, 34). This technology for construction of stone cassettes finds its closest parallel in the cassettes of early Alans in the Central Caucasus and the Kuban River area.

The use of urns for cremations in biritual necropolises attested on the Lower Danube is also a common feature in Saltovo sites - more dominant in the Donetsk area (Suhaja Gomolsha site) and far less common in the Kuban area sites - Borisovski, Durso and Kazanovo 2. While on the Lower Danube cremations are attributed to both the Slavic populations and the Bulgarians proper in the Northwest Caucasus area they should be attributed to non-Slavic groups, possibly indigenous people of the Caucasus or other cremation practitioners, living alongside the Proto-Bulgarians (Komatarova 2011, 35-36). The emerging biritualism during the 4th - 7th c. in the Northwest Caucasus area is the most plausible source for the biritualism on the Lower Danube. It is notable that biritualism in the Northwest Caucasus area continues to exist in the "classic" *Saltovo* area, as attested by the latest find from a 9th - 10th c. site in the Krasnodar area in which cremations are dominant - 15 out of 19 graves, and which includes both cremations in urns and pits (Rukavishnikova, Men'shikov, Vorob'ev 2018, 364).

The developments in the field of archaeology, related to Proto-Bulgarians, could be successfully supplemented with data from other sources. In the last years, genetic studies have firmly entered the arsenal of archaeology with lasting consequences. One of the first projects, involving data from present-day Bulgaria, was published in 2013. It was a major representative survey of present-day male lineages in Bulgaria (over 800 individuals) and it revealed that "Haplogroups C, N and Q, distinctive for Altaic and Central Asian Turkic-speaking populations, occur at the negligible frequency of only 1.5%" (Karachanak et al. 2013). This major observation was somewhat a surprise considering the supposed Turkic-Altaic origins of Proto-Bulgarians, the serious impact of 11th - 12th c. late nomads as Pechenegs, Cumans and Uzi peoples and the five centuries of Ottoman rule. The authors of the survey conclude that "...our data suggest that a common paternal ancestry between the proto-Bulgarians and the Altaic and Central Asian Turkic-speaking populations either did not exist or was negligible" (Karachanak et al. 2013, abstract). The latter conclusion could mean that the Proto-Bulgarians were really too few, or as shown by the present one and other DNA surveys - originally did not have Central (Inner) Asian ancestry at all.

The next major project that is relevant to the topic of this article was published in 2015. It was the first ever mtDNA sampling of materials from three 8th - 9th c. necropolises on the Lower Danube (Ancient DNA). Again, the main haplogroup H (H, H1, H5, and H13) prevalent in European populations has a 41.9% frequency in modern Bulgarians, and it was observed in 7 of 13 Proto-Bulgarian samples. The researching team found no evidence of East Asian (F, B, P, A, S, O, Y, or M derivative) haplogroups. Their overall conclusion was that "*Our results suggest a Western Eurasian matrilineal origin for proto-Bulgarians, as well as a genetic similarity between proto- and modern Bulgarians*" (Nesheva et al. 2015, 1).

However, a big picture demonstrating the complex realities in the steppes is necessary in order to properly analyse the results from the two mentioned pro-

jects and attach them to more specific source area - a possible homeland for the formation of the Danube Proto-Bulgarians. Such a picture came from a capital article which was recently published in the *Nature* journal - "137 ancient human genomes from across the Eurasian steppes" (Damgaard et al. 2018).

The conclusions from the "137 genomes" survey successfully highlight the population dynamics in the Eurasian steppes. The general outline of haplogroups for the Western Huns is European with one exception, in which the O haplogroup is attested (Chinese contacts?), but still the clear division between Western and Eastern Huns has been confirmed. The relation between the Western Huns and the preceding Saka (Scthytian)-Sarmathian groups in the steppes has been fully confirmed and no room remains for any alternative development. The survey also brings interesting results about the early medieval Alans (6th - 9th c.) who are generally accepted to be descendants of the late Sarmatian culture. The strong connection is confirmed, but it also becomes clear that when settling in the Caucasus area they started mixing with the local population. Evidently, in the 4th - 5th c. the local Caucasian population had already massively transformed them to the point that "their genetic ancestry was already indistinguishable from the neighboring Caucasian populations by the 5th - 6th c. CE" (137 genomes supp, 194-195).

In his work, population geneticist David Reich comes to a somewhat puzzling conclusion, that all contemporary European ethnicities can be best represented as an admixture of three ancestral founding Neolithic populations - Early European Neolithic Farmers (ENF), Western Hunter-Gatherers (WHG), and Ancient North Eurasians (ANE) - except the Bulgarians and other ethnicities from Balkan Peninsula, who can equally well be represented as an admixture of two groups only - Early European Neolithic Farmers and contemporary Caucasian people (Lazaridis et al. 2014, 409-413).

The positioning of present-day Bulgarian samples on the principal component analysis (PCA) (Fig. 1) plot suggests substantial Caucasian admixture that is not to be found in most of the other European samples; the degree of Caucasian admixture in Bulgarians and other southeast Europeans makes the authors of the paper note that like the rest of Europeans, southeast Europeans can be modelled as 3-way admixture (ANE-EEF-WHG), but unlike the rest of Europeans on the plot, they can also be modelled as 2-way only admixture (EEF-Caucasians, where ANE component would have come from hypothetical Caucasian migration to the Balkans).

Further research established a vector of massive migration from the Black Sea - Caspian steppe region to Europe. This mass migration occurred during the Early Bronze Age, brought Indo-European languages into Europe and was major contributing factor to the population genomics of all contemporary Europeans, Bulgarians included (Haak et al. 2015, 207-211). Eneolithic Yamna culture has been identified as a source population for Indo-European migration to Europe. Having sequenced more than 100 ancient genomes from Neolithic and Bronze Age Western Eurasia, researchers established that people from Yamna themselves represented an admixture of two distinct groups of people - Caucasian Hunter-Gatherers, genetically deeply rooted in North Iran and Caucasus and East European Hunter-Gatherers from what is now Russian Plain. Both

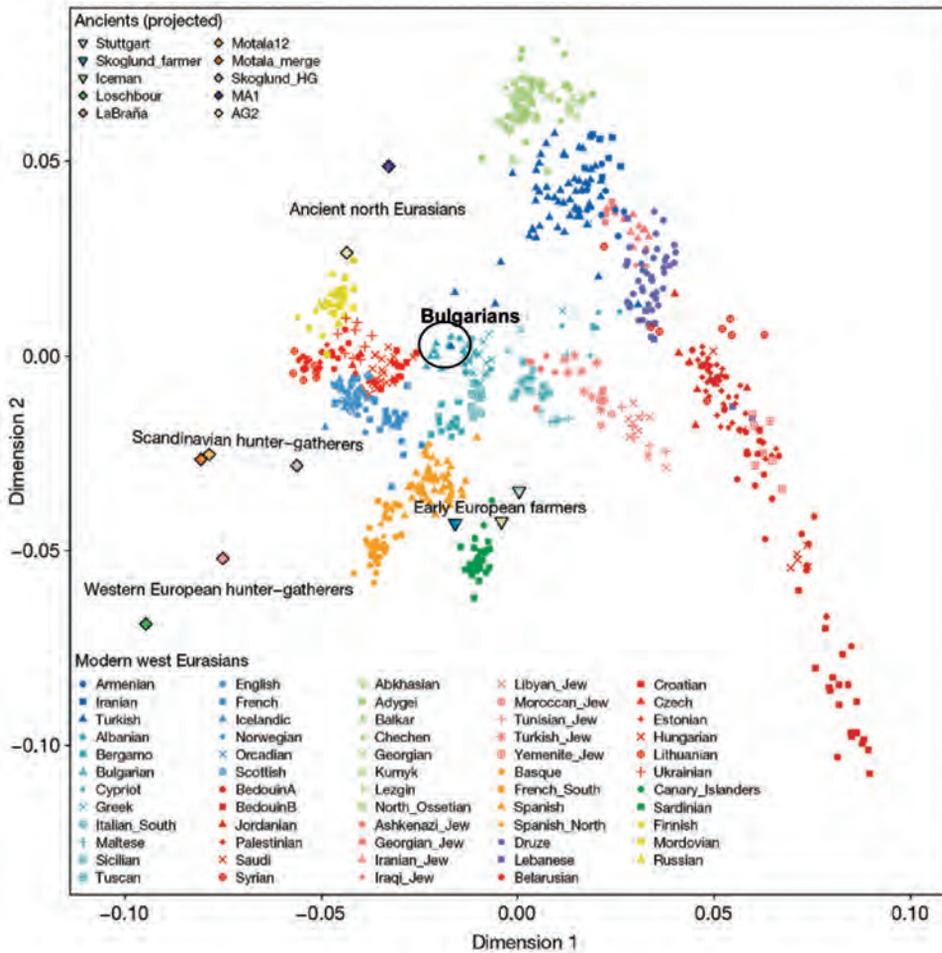


Fig. 1. Map of West Eurasian populations and principal component analysis. After Lazaridis et al. 2014

groups were rich in ANE component and the bearers of Yamna culture arose from the admixture of these two distinct groups in approximately equal proportions. Later in the Bronze Age, for reasons out of the scope of population genetics, people from Yamna migrated massively in multiple directions, including the Balkan area (firstly) and the rest of Europe (app. 1000 years after they reached the Balkans), where they intermixed with the existing WHG and EEF, adding their own unique admixture of ANE and CHG to the mix of the future Europeans. According to the research, up to 97% of the genetic mix of contemporary Europeans was created during Bronze Age Indo-European migrations, as following epochs added little to none to this. This conclusion is generally valid throughout today's Europe, but not for the Balkans and particularly not for the present-day Bulgarians (Fig. 2).

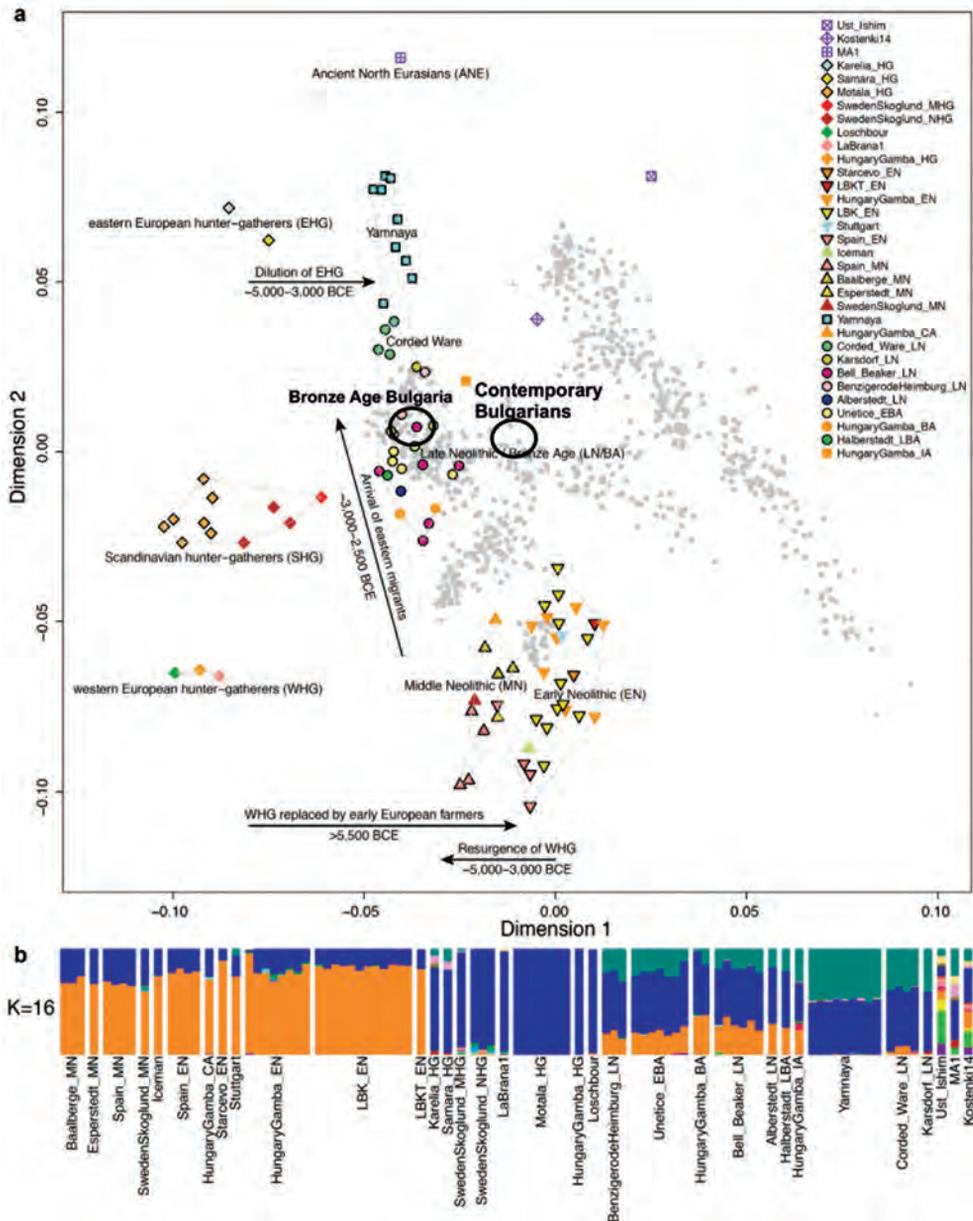


Fig. 2. Contemporary Bulgarians on the global genetic map of West Eurasia. They show an extra layer of Caucasian admixture that is missing from the Bronze Age population of the same lands. After Haak et al. 2015, 207-211

Bulgarian population genomics suggests an additional admixture event that happened much later than Indo-European migrations during the Bronze Age - there is an extra layer of Caucasian admixture, that adds up to the original Caucasian layer, brought on the Balkans and the rest of Europe by the Indo-Europeans (see Fig. 2; Haak et al. 2015, 207-211; Mathieson et al. 2018, 197-

203). It seems that the ANE component presented in contemporary Bulgarians would come entirely from a hypothetical Caucasian nation, rich in ANE component by itself. In the present DNA research, we test the hypothesis that the massive Caucasian component in contemporary Southeast European nations, first noticed by David Reich, arrived on the Balkans with the Proto-Bulgarians, based on the analysis of the available DNA data from both ancient and contemporary samples. Our analysis suggests that this extra Caucasian component in contemporary Bulgarians did indeed arrive on the Balkans with the migration of the Proto-Bulgarians during the 6th - 7th c. AD and we hypothesize that contemporary Bulgarians are admixture of ancestral Slav groups, rich in locally absorbed Neolithic farmers DNA and Proto-Bulgarians, rich in Caucasian DNA and genetically very close if not identical to the bearers of the Saltovo-Mayaki (SM) culture from the 7th - 9th c. AD.

By analysing ancient DNA samples from the Bronze Age, Iron Age and medieval Western and Central Eurasia, we try to establish the source population(s) and the timing of the additional Caucasian admixture in contemporary Bulgarians. We also review already published genetic research on the topic in the scientific literature and attempt to identify what is already known about the timing and the hypothesized source population. We test several well-known historical hypotheses about the origins of contemporary Bulgarians and early medieval Proto-Bulgarians.

We use PAST software for ancient DNA analysis and to plot over a hundred ancient DNA samples against the DNA samples of contemporary Bulgarians. We conduct PCA, measure genetic distance between the selected samples and build a genetic tree based on the genetic clustering of the samples with several contemporary individuals from Southeastern Europe from selected contemporary ethnicities, with focus on contemporary Bulgarians. All genetic trees and plots have been made with PAST software for palaeogenetic DNA analysis.

The testing produced important results enabling us to clarify the relationship between contemporary Bulgarians and ancient individuals from Western, Eastern and Central Eurasia. Our results do not support Central Asian or East Asian origin of contemporary Bulgarians (Fig. 3-5). Our results also do not support Central Asian or Far Eastern origins of the early medieval Proto-Bulgarians (Fig. 3, 5). Instead, the results reveal massive Caucasian component in both contemporary Bulgarians and medieval Proto-Bulgarians, implying major contribution of the Proto-Bulgarians to the contemporary Bulgarian genetic make-up and also implying at least partly Caucasian origins of the Proto-Bulgarians. Using statistical genome-wide analysis, we detected a nontrivial genetic connection between the medieval Proto-Bulgarians and the inhabitants of the Bronze Age Armenian Plateau as well as the Iron Age Sarmatians from the North Caucasus (Fig. 3). Our analysis also indicates a surprising connection between contemporary Bulgarians and Iron Age Scythians from the Hungarian Plain (Fig. 6).

We retrieved sequenced genome-wide data files for 137 ancient individuals who lived between 8,000-1,200 years ago in Western, Eastern and Central Eurasia (137 genomes) and analysed their relationship to the genome-wide data of 40 contemporary Bulgarian samples. All contemporary individual DNA genome-wide data files were retrieved from Yunusbayev et al. 2012. To analyse the ge-

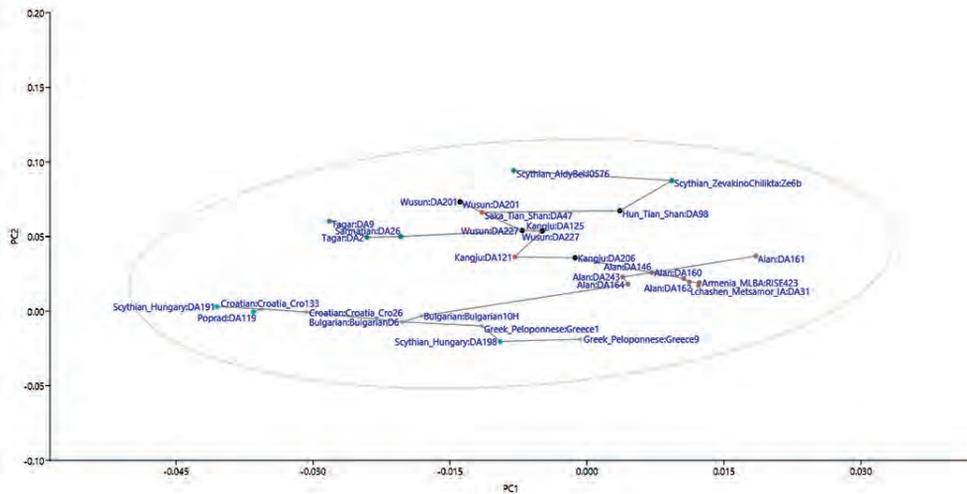


Fig. 3. PCA1, genome-wide analysis on the relationship between contemporary Bulgarians and ancient samples from the Bronze and Iron Age Eurasian Steppe. Plot: Sv. Stamov

netic distances and genetic relationship of the retrieved samples to the contemporary Bulgarian samples, we conducted several PCA plots, which visualized the genetic relationship between the individuals as well as their genetic contribution to the contemporary Bulgarians. We also created several genetic trees based on their degree of relatedness. For our PCA and genome-wide statistical analysis we used PAST3.22, version December 2018 - Paleontological statistics software package for education and data analysis (Hammer, Harper, Ryan 2001).

In our first PCA plot (Fig. 3) we combined the genome-wide sequenced data from 137 ancient samples from the Eurasian Steppe - from what is now Mongolia to what is now the Hungarian Plain (137 genomes) and generated unsupervised genome-wide PCA plot mapping against selected contemporary individuals from Europe (data files from Yunusbayev et al. 2012). In order to examine population transformation in what is now contemporary Bulgaria from the Early Bronze Age through the Iron Age and the Medieval Era till now, we also added eight ancient Southeastern European samples from the Bronze Age and the Early Iron Age, which we retrieved from Haak et al. 2015 and Mathieson et al. 2018.

None of the contemporary Bulgarians yielded any direct or mediated relation to the ancient Far Eastern and Central Asian nomadic steppe populations - Eastern Xiongnu, 'Western' Xiongnu, Tian Shan Huns, Usuns and Tian Shan Sakas (Fig. 3). However, PCA results suggest a genetic connection between contemporary Bulgarians and the ancient individuals AlanDA243, AlanDA164 and Alan DA146 belonging to the present-day Ossetia area (Fig. 3, 5, 6). PCA revealed that whoever they were, people from the Saltovo culture/region of Ossetia area did indeed contribute their genes to the formation of contemporary Bulgarian population. The results of PCA (Fig. 3) render the direct connection between contemporary Bulgarians and Inner Asian steppe nomads from migration period highly unlikely.

However, PCA reveals a connection between Scythian samples from the Hungarian Plain from the 4th c. BC (Classical Antiquity), the European Alans from the migration period and the nomads from the Saltovo-Mayaki culture as all three groups showed a clear genetic connection to contemporary Bulgarians (Fig. 6). These results imply nomadic influence from migration period being carried over to the population genomics of contemporary Bulgarians.

Our PCA also revealed a discrete mediated connection between contemporary Bulgarians and Central Asian Bronze Age nomads of East Iranian origin known as Kangju group. This relation however is dependent on the presence of the sample Alan DAI46 from the SM culture on the PCA Plot and disappears if we remove this sample from the plot. We suggest that this discrete connection represents earlier stages of the migration of certain proto SM groups (Sarmatians-Alans?). Yet the rest of the SM samples did not yield the same connection to Kangju but showed a strong detectable connection to the samples from the Bronze Age Armenian Plateau, suggestive of multiple admixture events during different earlier stages of migrations and contacts of future SM peoples, as one of these stages must have included strong contacts with the Armenian Plateau in the Central Caucasus.

Since there were multiple waves of migration from the Caucasus to the Balkans which included Indo-European migration during the Bronze Age and the emergence of Minoans during the Early Bronze Age and all of them carried a substantial Caucasian component (Haak et al. 2015, 207-211; Mathieson et al. 2018, 197-203), in our next plot we tried to distinguish the signal coming from SM people against the signals coming from the earlier migrations of Indo-Europeans, early Thracians and Minoans. In order to test the Huns as potential

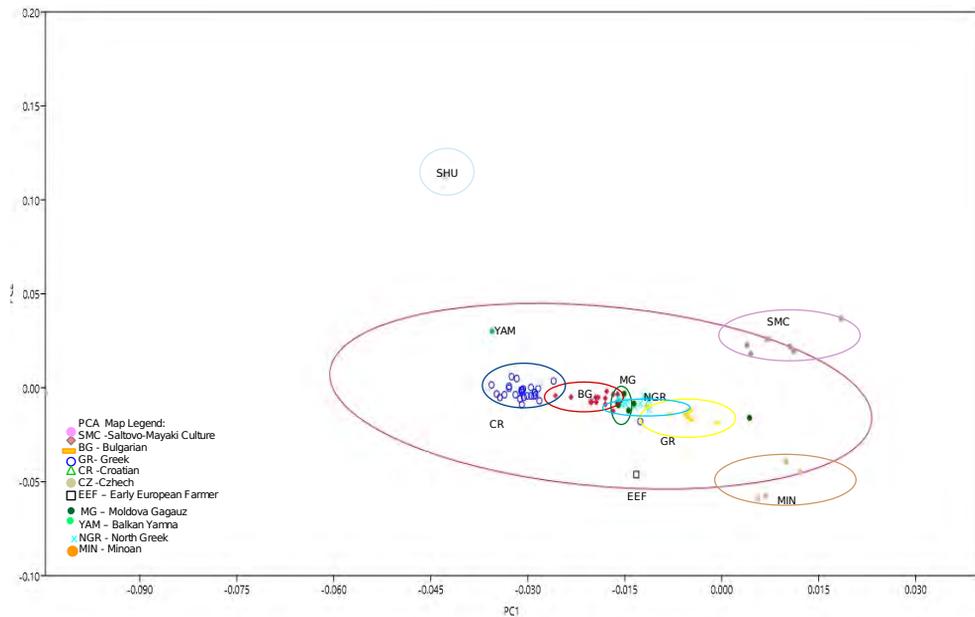


Fig. 4. PCA2, genome-wide analysis on the relationship between contemporary Bulgarians and ancient samples from the Bronze and Iron Age Eurasian Steppe. Plot: Sv. Stamov

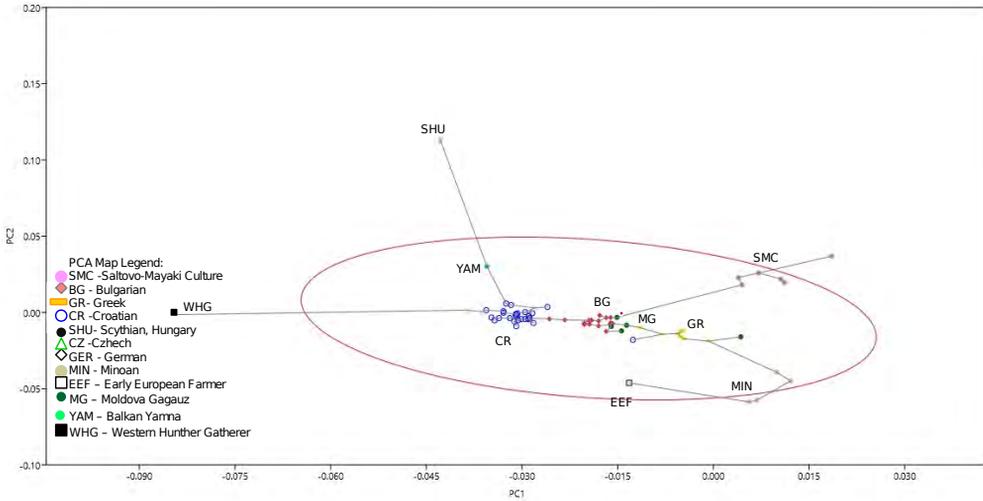


Fig. 5. Saltovo Mayaki-Alan populations and Bulgarians. Plot: Sv. Stamov

carriers of the same signal, we also included a sample of Iron Age Siberian hunter-gatherer as a proxy for the Huns and in order to test the early Slavs for yet another potential carrier, we included contemporary Croatian samples as a proxy for the medieval Bulgarian Slavs. We included Moldova Gagauz samples to test if they carry stronger Proto-Bulgarian signal as it has been hypothesized by some of Bulgarian historians. We present the results in Fig. 4 and 5.

In the PCA2 plot the current Balkan nations form a cline. None of the tested samples showed any relationship to SHG sample. The signals coming from SM Proto-Bulgarians, Bronze Age Minoans and Bronze Age Proto-Thracians are clearly distinguishable from each other. Moldova Gagauz samples take intermediary position between contemporary Bulgarians and contemporary Greeks and do not show stronger relation to SM Proto-Bulgarians than contemporary Bulgarians; hence, the signal from Proto-Bulgarians in contemporary Bulgarians comes directly from SM and is not mediated by Gagauz people (who also carry this signal). Bronze Age Proto-Thracians are genetically closer to early medieval Slavs (represented here by Croatian samples) than to contemporary Bulgarians and their influence on Bulgarian population genomics is not direct, but is probably mediated by early Slavs; Peloponnese Greeks show closest affinity with Neolithic Peloponnesus and Bronze Age Minoans. We conclude that the influence of Minoans on contemporary Bulgarian population is not direct and is due to population transfers and exchanges that led to admixture between medieval Bulgarians, medieval Greeks and medieval ERE populations. Both contemporary Greeks and contemporary Bulgarians show considerable distance from the Bronze Age Thracians and the Thracian contribution is mediated by the Croats as a proxy of the early Slavs, unless it is a masked Illyrian contribution in contemporary Croats. We cannot determine whether Croatian

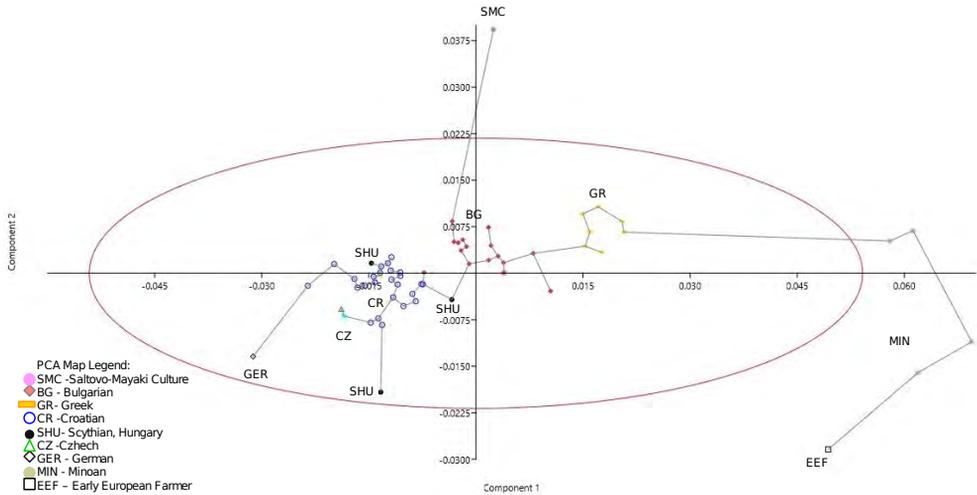


Fig. 6. PCA reveals a connection between contemporary Bulgarians, Scythian samples from the Hungarian Plain from the 4th c. BC (Classical Antiquity), European Alans from the migration period and the nomads from the Saltovo-Mayaki culture. Plot: Sv. Stamov

samples reflect Illyrian or Thracian influence on the genomes of early Slavs based on the available data only. Further research is needed to clarify this topic.

We noted that SM (Proto-Bulgarian-Alan) influence among contemporary Balkan nations has its strongest representation in contemporary Bulgarians (Fig. 5, 6) where it arrives directly and this Proto-Bulgarian influence on the other Balkan nations is mediated by the contemporary Bulgarians who channel it.

The results suggest that SM related populations are the precursor of contemporary Bulgarians. This makes the SM culture at its precursor stage (600-700) a leading candidate for the source population of Asparukh's Bulgarians. These results also suggest that Asparukh's tribe(s) is (are) indistinguishable from the Sarmato-Alanic groups from the Early Middle Ages and Late Antiquity and, surprisingly, do not carry Siberian and Central Asian admixture on the Balkans with them, as even the Proto-Thracians of the Early Bronze Age Balkans show bigger Siberian admixture (probably reflective of their Indo-European ANE component). Unlike Proto-Thracians and the early Slavs, Proto-Bulgarians carry substantial Caucasus Mountain admixture, related to the tribes from the Bronze Age Armenian Plateau and seems to have transmitted this admixture to the contemporary Bulgarians (see Fig. 3). The relationship between Proto-Bulgarians and Sarmato-Alanic tribes from the Late Antiquity and Early Medieval Era remains to be clarified further, however genome wide-data suggest that Proto-Bulgarians were themselves an admixture in equal proportions between two close, but distinct populations - 1) an Alano-Sarmatian tribe from the region north of the Caucasus with some Kangju link to it and 2) an unknown tribe(s) of native Caucasian origin originating in the present Armenian Plateau. Both the Scythian samples from the Hungarian Steppe (Fig. 6) and the Alans from

the Saltovo-Mayaki culture bear strong genetic resemblance to the Bronze Age Caucasian samples, which is missing in the Central Asian nomads but is present in the contemporary Bulgarians (see also Fig. 1-4).

Our results cast serious doubt on the connection between the Inner Asian nomadic tribes from Antiquity and the Proto-Bulgarians-Alans from SM culture and the North Caucasus. It is notable that recent sampling of Avar graves has proven beyond any doubt that significant part of the Avars was of Inner Asian origin and they kept marrying in certain closed circles for a long period. The surveys of the Avars continued by an extended team bringing even more conclusive results - the principal component analysis of the Avar dataset was compared with haplogroup frequencies of another 47 ancient groups, proving that the Avar elite show affinities with Asian populations: close to the 15th - 19th c. Yakuts from East Siberia and two ancient populations from China. The Avars are firmly related to South Siberian Bronze Age populations and fall with Iron Age and medieval Central and East-Central Asian sample sets of the Ward-type clustering tree.

We also clarified the origin of this Caucasian component further and managed to split the Caucasian component coming from SM from the Caucasian components already presented on the Balkans prior to Proto-Bulgarian migration. We established that while all three carry a similar Caucasian component, the signal, coming from SM is the strongest in contemporary Bulgarians, the signal coming from Bronze Age Thracians is the strongest in contemporary Croatians and the signal, coming from Bronze Age Minoans is the strongest in contemporary Greeks. These three signals distinctly differ from each other and their source populations are clearly distinguishable. Yet all three carry an excessive Caucasian component, suggesting non-local origins for all three of them and suggestive of at least three different migrations from the Caucasus Mountains to the Balkans. However, contemporary Bulgarians have received their Minoan component mostly through population exchange with Byzantium and their Bronze Age Thracian component through admixture/population exchange with early medieval Slavs and Croats. The signal that distinguished contemporary Bulgarians from the other Balkan nations is the unique signature of SM-Alan peoples, who appear amongst the direct precursors of contemporary Bulgarians.

One major conclusion from the genetic data is that the Proto-Bulgarians were more numerous than the Slav tribes they intermixed with when founding medieval Bulgaria. Another key observation is the absence of Inner Asian ancestry. Both early medieval and contemporary DNA samples failed to yield any connection between early medieval Proto-Bulgarians and contemporary Bulgarians, on the one hand, and ancient and contemporary Central Asian groups, on the other. However, they revealed a strong genetic connection to both Sarmato-Alanic DNA samples from the Late Antiquity and the Early Medieval Era, as well as a Sarmato-Alanic mediated connection to the contemporary Caucasian groups. For this reason, our research suggests the Caucasus Mountains and especially their adjacent regions to the north as a homeland of Proto-Bulgarians and as a place where their ethnogenesis developed, which effectively renders Proto-Bulgarians as an ancient group within the range of Sarmato-Alanic tribes from

All these observations and especially the archaeological ones lead to the conclusion that the dominant tribe of the Great Bulgaria period - the Unogondurs, known as *Nandor* to ancient Hungarians and *V-n-n-t-r* in Josephus the Khagan's letter and Perso-Arabic sources, had somewhat different ethnogenesis within a larger group of similar tribes and were particularly under strong Alan-Caucasian influence, inhabiting the southernmost parts of a larger ethnogenesis area - closer to the mountain chain itself. Archaeological features of this Alan influence include black-grey polished pottery, stone cassettes, hokers and others. It is noteworthy that the Unogondurs left strong traces in Armenian sources - we should recognize them in Movses Khorenatsi's *Vanandur* and Anania Shirakatsi's *Olhontor-Blkar*. This line of analysis - that there were different Proto-Bulgarian tribes, which were developing somewhat separately from each other but in neighbouring areas, is also confirmed by the famous list of Pseudo-Zahariah Rhetor. In it Proto-Bulgarians are mentioned twice - once as settled peoples with cities and neighbouring the Alans - those being the Unogondurs in the Ciscaucasus area and second time as nomads, living in tents - those probably being the one living in the steppes of the Don area - notably the Kutrigurs.

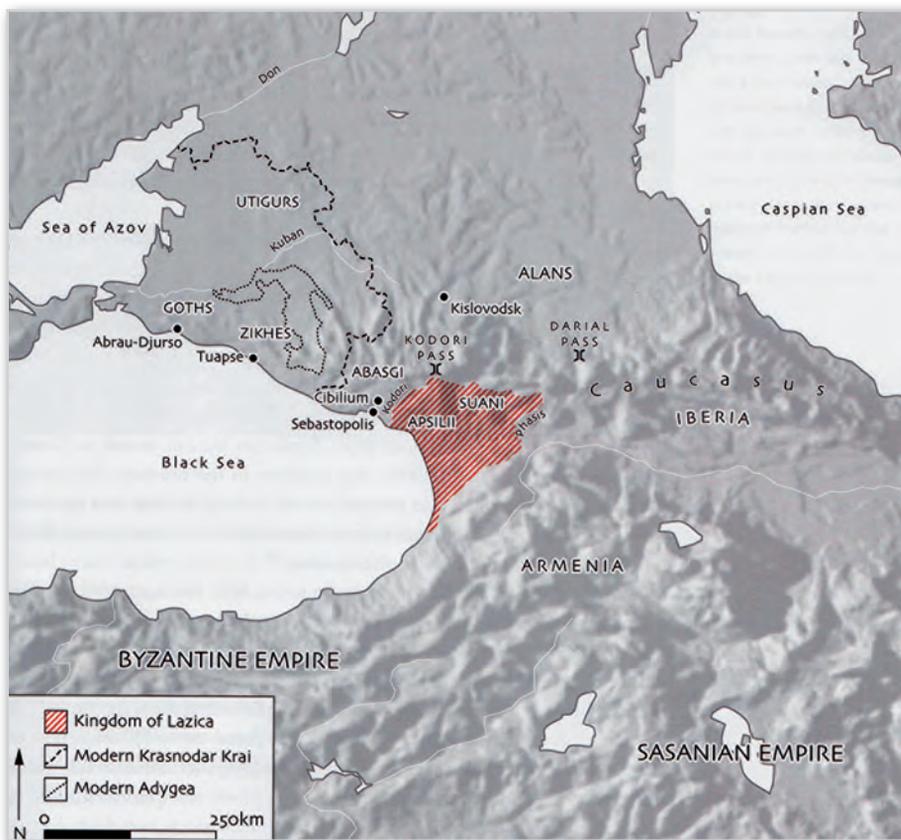


Fig. 9. Map of the zone of Proto-Bulgarian ethnogenesis in the Ciscaucasia. After Adams 2014, 253.

Living in the southernmost reaches of the described ethnogenesis area in the Northwest Ciscaucasus - around the middle Kuban River area and south of it (Fig. 9), the Unogondur-Bulgars emerged on the historical scene after the Turks weakened their grip on the region in the early 7th c. The decline and dispersing or change of identity of Utrigurs and Kutrigurs, highlighted by Agathias of Mirinea, enabled the Unogondurs to unite both related Proto-Bulgarian and other, not-related groups into the Old Great Bulgaria of Theophanes and Nicephorus and emerge as the Οὐννογουνδοῦρων βουλγάρων from the 8th - 9th c. in Byzantine sources.

The research carried out in this study, combining archaeological data and DNA research, brings the debate about the origin of the Danube Proto-Bulgarians to a new level by identifying their Ciscaucasian “cradle” and thus their likely Sarmatian-Caucasian origin, similar to those of the early Caucasian Alans. It, however, could not answer many questions, which remain to be solved. The ethnolinguistic identity of the ancient Bulgars and particularly the channels of ancient Turkic influence need to be further clarified - was it only a political phenomenon of the 6th - 7th c. or they were seriously mixing up earlier with indisputably early Turkic tribes like the Sabirs? How the ethnonym “Bulgar” appeared and when exactly, was it a political designation that spread over various tribes of different ethnocultural and ethnolinguistic identities? Were the Proto-Bulgarian elite belonging to different ethnicities and what were they?

The future research - archaeological and genetic - will probably allow us to reexamine many of those issues, answer those questions and make further progress. But it is beyond any doubt that ancient DNA data will be invaluable for the proper understanding and interpretation of archaeological facts and - eventually - understanding History.

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