The Eagle of the Highlands and the Wolf of the Steppe: A Genomic and Historical Reconstruction of the R-L584 Lineage in the North Caucasus

1. Introduction: The Genetic Palimpsest of the Caucasus

The Caucasus Mountains, stretching as a formidable barrier between the Black and Caspian Seas, have long been recognized by historians, linguists, and geneticists as a region of profound complexity. Often termed the *Völkerwanderung* gate—the gate of nations—this isthmus has functioned historically as both a bridge for north-south migration and a refuge for ancient populations retreating from the volatile steppes of Eurasia. The genetic landscape of the Caucasus is characterized by a high degree of stratification; deep, autochthonous lineages such as Haplogroups G2a and J2 coexist with intrusive signals from the Indo-European expansions of the Bronze Age and the later Turkic migrations of the medieval period.[1]

Within this complex tapestry, the Y-chromosome haplogroup R1b—specifically its eastern branch, R-Z2103—presents one of the most intriguing puzzles of Eurasian population genetics. While its sister clade, R-L51, is synonymous with the rapid "Steppe" genetic turnover of Western Europe during the Bell Beaker period, R-Z2103 remained in the Pontic-Caspian steppe and expanded predominantly southward and eastward, influencing the genetic trajectory of the Yamnaya horizon, the Catacomb culture, and the subsequent civilizations of the Near East.[3]

This report focuses on a highly specific and phylogenetically significant anomaly: the presence of the R-L584 subclade, and specifically the branch R-FT409028, within the Kabardian population of the North Caucasus. While R1b is generally a minority lineage among the Adyghe-speaking peoples (Circassians/Kabardians), usually overshadowed by the indigenous G2a, its presence offers a unique window into the historical interactions between the nomadic world of the northern steppes and the sedentary, imperial civilizations of the Armenian Highlands.

The central inquiry of this investigation is the origin and trajectory of the R-FT409028 lineage, which unites a Kabardian individual with Armenian and Turkish samples via a common ancestor estimated to have lived during the Roman era, approximately 125–200 CE.[5] This "rare branch" (редкая ветвь) stands in stark contrast to the more common R-CTS9219 lineage

found among Circassians. By synthesizing high-resolution phylogenetic data with the historical record of Roman-Armenian relations, the Alanic confederation, and the trade networks of antiquity, we aim to reconstruct the likely biography of this lineage. The investigation suggests that R-L584 represents a "Highland" intrusion into the North Caucasus—a genetic legacy of the trans-Caucasian links forged during the *Pax Romana*—distinct from the "Steppe" or "Balkan" trajectory of its cousin, R-CTS9219.

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2. The Steppe Legacy: R-Z2103 and the Great Bifurcation

To understand the specific narrative of the Kabardian R-L584 lineage, one must first situate it within the broader evolution of the Proto-Indo-European genetic signal. The overarching haplogroup R-M269 is the dominant paternal lineage of Western Eurasia, but its history is a tale of two distinct paths.

2.1 The Yamnaya Core and the "Stay-at-Home" Branch

Ancient DNA analysis of the Yamnaya horizon (c. 3300–2600 BCE), the archaeological culture most confidently associated with the Proto-Indo-European language community, has revealed a striking genetic uniformity. The "Core Yamnaya" population was overwhelmingly dominated by haplogroup R-M269, with the specific R-Z2103 subclade accounting for the vast majority (41 out of 51) of identified samples.[3] This finding was pivotal in reorienting the genetic map of Eurasia. Before this discovery, it was often assumed that all R-M269 was the result of a single, monolithic expansion. The ancient DNA record now clarifies that while R-L51 (the ancestor of most modern Western Europeans) peeled off and migrated westward towards the Danube and the Rhine, R-Z2103 remained the dominant lineage of the steppe pastoralists who stayed in the Pontic-Caspian region.[4]

The persistence of R-Z2103 in the steppe during the Early Bronze Age suggests that it was the lineage of the "Stay-at-Home" clans of the Yamnaya—those who maintained the pontic way of life or directed their expansion impulses southward towards the Caucasus and eastward towards the Altai (the Afanasievo culture).[8] This distinction is crucial because it establishes that any R-Z2103 lineage found in the modern Caucasus is likely a direct descendant of these steppe pastoralists or their immediate successors, rather than a later re-introduction from Europe.

2.2 The Deep Split: L584 vs. CTS9219

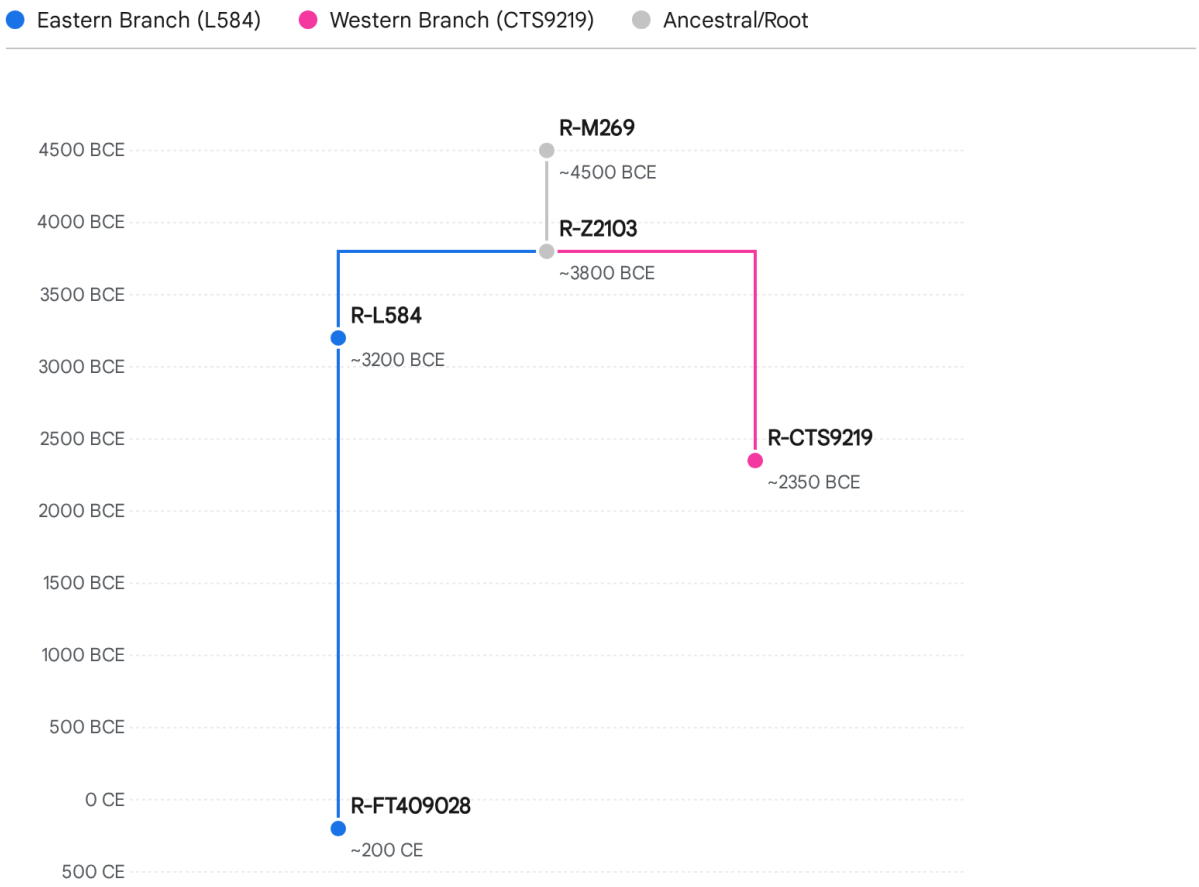
Within the R-Z2103 phylogeny, a significant diversification event occurred roughly between 3200 and 2500 BCE, leading to the formation of two major downstream clades that would eventually have very different geographic fates: R-L584 and R-CTS9219.

R-L584 (The Highland Branch): This lineage formed approximately 3200 BCE.[9] Its distribution in the modern world is heavily skewed towards the Armenian Highlands, Eastern Anatolia, the Zagros Mountains of Iran, and parts of the South Caucasus. The early formation date coincides with the Kura-Araxes culture and the subsequent interactions between steppe nomads and the civilizations of the Near East. The absence of L584 in significant frequencies in Central Europe suggests that this branch detached from the main steppe body early, moving south through the Caucasus passes to establish itself in the highlands.

R-CTS9219 (The Balkan/Steppe Branch): Formed later, around 2350 BCE [10], this lineage followed a different trajectory. It is found at its highest frequencies today in the Balkans (Bulgaria, Albania, Kosovo), the Carpathian Basin, and sporadically across the North Pontic steppe. Its phylogenetic connections suggest a movement from the steppe into Southeast Europe, where it likely participated in the ethnogenesis of Paleo-Balkan peoples such as the Thracians, Dacians, or Illyrians.[11]

The user's query highlights a contrast in frequency between these two lineages among Circassians. This contrast is not merely statistical; it is historical. The "Common" R-CTS9219 in Circassia represents connections to the Balkans and the Western Steppe—vectors of migration that are geographically adjacent to the Northwest Caucasus. The "Rare" R-L584 represents a connection to the South—a vector that requires crossing the formidable Greater Caucasus range.

Phylogenetic Divergence: The Two Paths of R-Z2103



A simplified phylogenetic tree showing the split of R-Z2103 into its primary subclades. Note the formation of R-L584 in the Late Chalcolithic (~3200 BCE) versus the later expansion of R-CTS9219. The specific branch R-FT409028 appears as a recent Roman-era twig on the ancient L584 bough.

Data sources: NCBI PMC, FTDNA (CTS9219), FTDNA (L584), FTDNA (FT409028), Cambridge Core

The visualization above delineates this divergence, providing a necessary phylogenetic roadmap. As we delve deeper into the specific history of the Kabardian branch, it is vital to remember that while L584 and CTS9219 share a Yamnaya father, they have lived apart for over four thousand years, accumulating distinct histories, languages, and cultural associations.

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3. The Highland Lineage: The Trajectory of R-L584

(3200 BCE – 100 CE)

Before addressing the Roman-era bottleneck, we must trace the path of R-L584 from its steppe origins to its establishment as a major lineage of the Armenian Highlands. This context explains why the lineage is found in Armenia and Turkey in the first place, and why its appearance in the North Caucasus is considered an anomaly.

3.1 The Southern Expansion

The archaeological record of the Caucasus in the 3rd millennium BCE is dominated by the Kura-Araxes culture, a sophisticated Early Bronze Age civilization known for its distinct black-burnished pottery and metallurgical prowess. However, towards the end of the Kura-Araxes period, archaeological evidence points to increasing interactions with the steppe world to the north. The appearance of kurgan (tumulus) burials in the South Caucasus, such as those of the Bedeni and Trialeti cultures, signals the arrival of new elites with steppe affinities.[1]

Genetic studies of modern populations in the South Caucasus have shown that while the maternal gene pool (mtDNA) remained largely continuous from the Neolithic, the paternal gene pool (Y-DNA) experienced significant introgression. R-L584 is a primary candidate for the genetic signature of these Early to Middle Bronze Age incursions. Unlike R-Z2106, which stayed associated with the Catacomb culture on the steppe, R-L584 appears to have crossed the Caucasus range early—perhaps via the Caspian coastal route or the Darial Pass—and integrated into the populations of the Araxes valley and Eastern Anatolia.[9]

3.2 Acculturation and Diversification

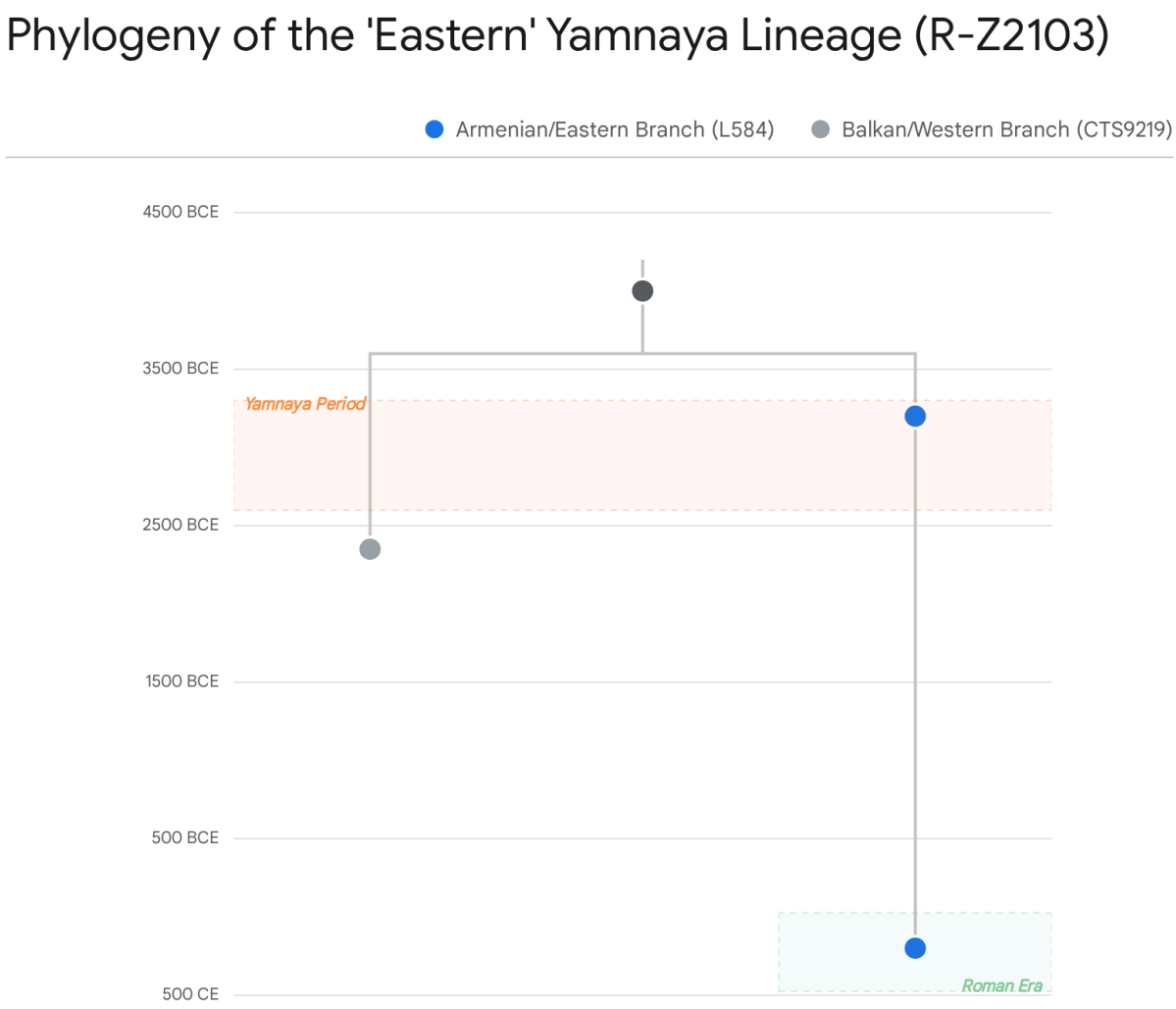
By the 1st millennium BCE, R-L584 had likely become a "nativized" lineage within the proto-Armenian ethnogenesis. The fall of the Urartian kingdom and the rise of the Orontid dynasty (c. 6th century BCE) saw the consolidation of the Armenian people.[13] During this period, the descendants of the original steppe migrants had fully adopted the local languages and cultures, becoming indistinguishable from the autochthonous populations of the highlands.

The high diversity of R-L584 subclades found today in Armenia, Turkey, and Iran [9] supports the hypothesis that the Armenian Highlands served as a secondary center of diversification for this haplogroup. In this region, R-L584 is not a "foreign" marker; it is one of the foundational lineages of the Armenian nation, alongside haplogroups J2 and T.

3.3 The Barrier of the Mountains

In contrast to its success in the south, R-L584 failed to establish a dominant presence in the North Caucasus during the Bronze Age. The Northwest Caucasus (the homeland of the ancestral Circassians) was characterized by the Dolmen culture and later the Maeotian

culture. These populations were genetically distinct, dominated by haplogroups G2a and J2, which descend from the Early European Farmers and Caucasus Hunter-Gatherers.[2] The Greater Caucasus range acted as a formidable barrier to gene flow. While steppe lineages (like R1a-Z93) washed over the northern plains, they rarely penetrated the deep mountain valleys of the West Caucasus where the proto-Circassians lived. Thus, R-L584 became a lineage of the *Highlands* (South), separated from the *Mountains* (North) by both geography and culture.



Phylogenetic tree showing the descent of R-FT409028 from the Yamnaya patriarch R-Z2103. Note the deep split between the 'Balkan' CTS9219 branch and the 'Armenian' L584 branch. The Kabardian sample (FT409028) sits on a branch that formed during the Roman Era.

Data sources: PMC11922553, FTDNA (CTS9219), FTDNA (L584), FTDNA (FT409028), PMC11042377

4. The Roman Interlude: Geopolitics of the 2nd Century CE

The specific inquiry regarding **R-FT409028** centers on a Time to Most Recent Common Ancestor (TMRCA) of approximately **125–200 CE**.[5] This date is not random; it sits squarely in the middle of one of the most dynamic periods in Caucasian history—the era of Roman-Parthian rivalry and the ascendancy of the Alanic confederation. To understand how an Armenian lineage entered the Kabardian gene pool, we must reconstruct the geopolitical environment of the 2nd century.

4.1 The Roman-Parthian Struggle for Armenia

By the 2nd century CE, the Kingdom of Armenia had become the primary buffer state and bone of contention between the Roman Empire to the west and the Parthian Empire to the east. The period was marked by oscillating influence.

- **Trajan's Campaign (114–117 CE):** In a massive projection of power, Emperor Trajan invaded Armenia, deposed the Parthian client king, and formally annexed Armenia as a Roman province.[14] For a brief window (114–117 CE), the administrative borders of Rome extended to the Araxes river. This brought Roman logistics, roads, and perhaps most importantly, *mobility* to the region.
- **The Arsacid Compromise:** Following Trajan's death, Emperor Hadrian reverted to a policy of client states. However, the Armenian throne continued to be held by the Arsacid dynasty, a cadet branch of the Parthian royal house that was frequently "Romanized" or dependent on Roman approval. This created a cosmopolitan court culture in the Armenian capitals of Artaxata and later Vagharshapat.[15]

4.2 The Masters of the North: The Alans

While Rome and Parthia grappled for the south, the North Caucasus was dominated by the **Alans**. An Iranian-speaking nomadic confederation (part of the broader Sarmatian wave), the Alans controlled the steppes from the Don to the Caspian.[17] Crucially, they controlled the **Darial Pass**, the only viable military road through the central Caucasus. Known in antiquity as the *Portae Caucasiae* or the "Alan Gates," this pass connected the Alanic steppe directly to the heart of the Armenian kingdom.

The Alans were not merely passive neighbors. They were active players in the geopolitical game.

- **The Invasion of 72 CE:** Alans poured through the Darial Pass, ravaging Media Atropatene and Armenia.
- **The Invasion of 135 CE:** Another massive Alanic incursion occurred during the reign of

Hadrian, devastating Media and threatening Roman Cappadocia. This invasion was repelled by the governor Arrian, whose *Ektaxis kata Alanon* (Order of Battle against the Alans) survives as a military treatise.

- **The Alliance:** Despite these raids, Armenian kings frequently allied with the Alans against common enemies. The Armenian King Artashes I (though earlier) is celebrated in the *Vipasank* epic for his marriage to the Alanic princess Satenik, a legend that underscores the deep diplomatic and blood ties between the Armenian court and the Alanic nobility.[18]

The Roman Nexus: The Caucasus c. 125 CE

Map of the Caucasus region circa 125 CE. Red areas indicate Roman influence/provinces (Armenia Major). The blue arrow depicts the trans-Caucasian route through the Darial Pass ('Alan Gates') connecting the Armenian Highlands to the Alanic steppe (modern Kabardino-Balkaria).

The map above visualizes this critical interface. The Darial Pass acted as a funnel, concentrating interaction between the Roman-dominated south and the Alan-dominated north. It is along this axis that we must look for the origin of the R-FT409028 connection.

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5. The Specific Cluster: Anatomy of R-FT409028

Moving from the macro-historical to the micro-genetic, we examine the specific subclade **R-FT409028**. This branch is defined by a specific set of Single Nucleotide Polymorphisms (SNPs) and Short Tandem Repeats (STRs) that mark a unique genetic bottleneck.

5.1 The Data Points

According to the latest data from FamilyTreeDNA and YFull [5]:

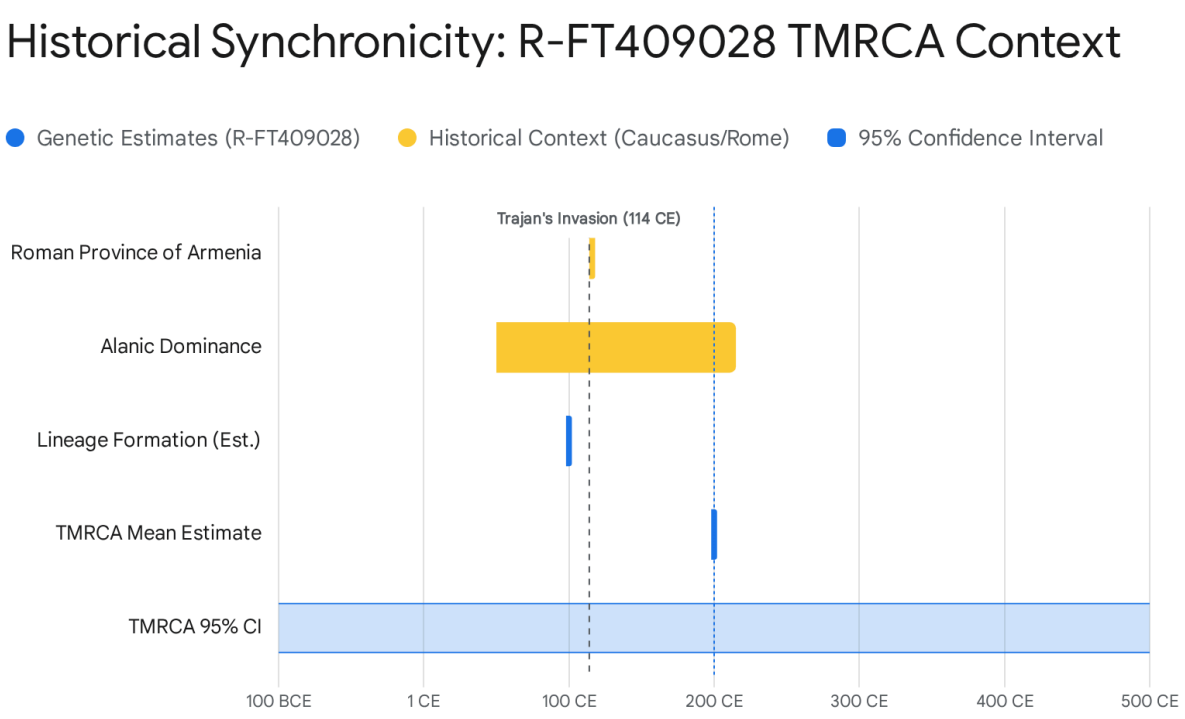
- **Parent Clade:** R-FT405338, estimated TMRCA ~100 CE.
- **Target Clade:** R-FT409028, estimated TMRCA ~178 CE (95% Confidence Interval: 84–200 CE).
- **Modern Distribution of Testers:**
    1. **Armenia:** Confirming the lineage's highland origin.
    2. **Turkey:** Likely representing the Armenian population of Eastern Anatolia prior to 1915 or assimilated populations.
    3. **Kabardia (Russia):** The "Rare Branch" individual.
    4. **Georgia/Azerbaijan:** Additional scattered samples in the South Caucasus.

5.2 The Narrative of the Bottleneck

The tight clustering of the TMRCA around the 2nd century CE implies a "founding event." In population genetics, a bottleneck followed by rapid branching often signifies a lineage that gained a sudden reproductive advantage—perhaps due to social status, migration to a new territory with fewer competitors, or integration into a successful kinship network.

The data suggests the following sequence:

1. **The Progenitor (c. 125 CE):** A man carrying the R-L584 haplogroup lived in the South Caucasus, likely in the Kingdom of Armenia during the Arsacid period.
2. **The Separation:** His descendants split into at least two lines.
    - **The Southern Line:** Remained in Armenia/Anatolia. Their descendants are the modern Armenian and Turkish testers.
    - **The Northern Line:** Crossed the Caucasus range into the territory of the Alans. This individual or small family group was assimilated into the North Caucasian population.
3. **The Survival:** The Northern line survived the chaotic history of the North Caucasus—the Hunnic invasions (c. 370 CE), the Khazar khaganate, and the Mongol conquests—to eventually be incorporated into the **Kabardian** tribal confederation when it formed and expanded into the Central Caucasus in the late medieval period.



Timeline showing the estimated formation window of R-FT409028 (blue bar) overlaid with key historical periods in the Caucasus. The TMRCA estimate centers on the 2nd Century CE, aligning with the peak of Roman-Armenian interaction and Alanic dominance in the North Caucasus.

Data sources: FamilyTreeDNA, Wikipedia (Roman Armenia), Wikipedia (Alans)

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6. The Alanic Bridge: Mechanisms of Transmission

How exactly did an Armenian lineage cross the mountains? The report proposes three primary mechanisms for this Roman-era transmission, with the **Mercantile** and **Alanic Mediation** models being the most robust.

6.1 The Mercantile Transmission (The Proto-Cherkesogai)

The most plausible vector for individual gene flow in antiquity is trade. Armenians were the consummate merchants of the Near East.[19] During the Roman era, the demand for northern luxury goods—furs from the Uralic forests, amber from the Baltic, and slaves—drove commerce through the Caucasus passes.

- **Mechanism:** An Armenian merchant family, utilizing the stability of the Roman peace, establishes a *factory* (trade post) in the North Caucasus, perhaps at the northern terminus of the Darial Pass (near modern Vladikavkaz).
- **Assimilation:** Over generations, this family becomes "Alanized." They marry local women,

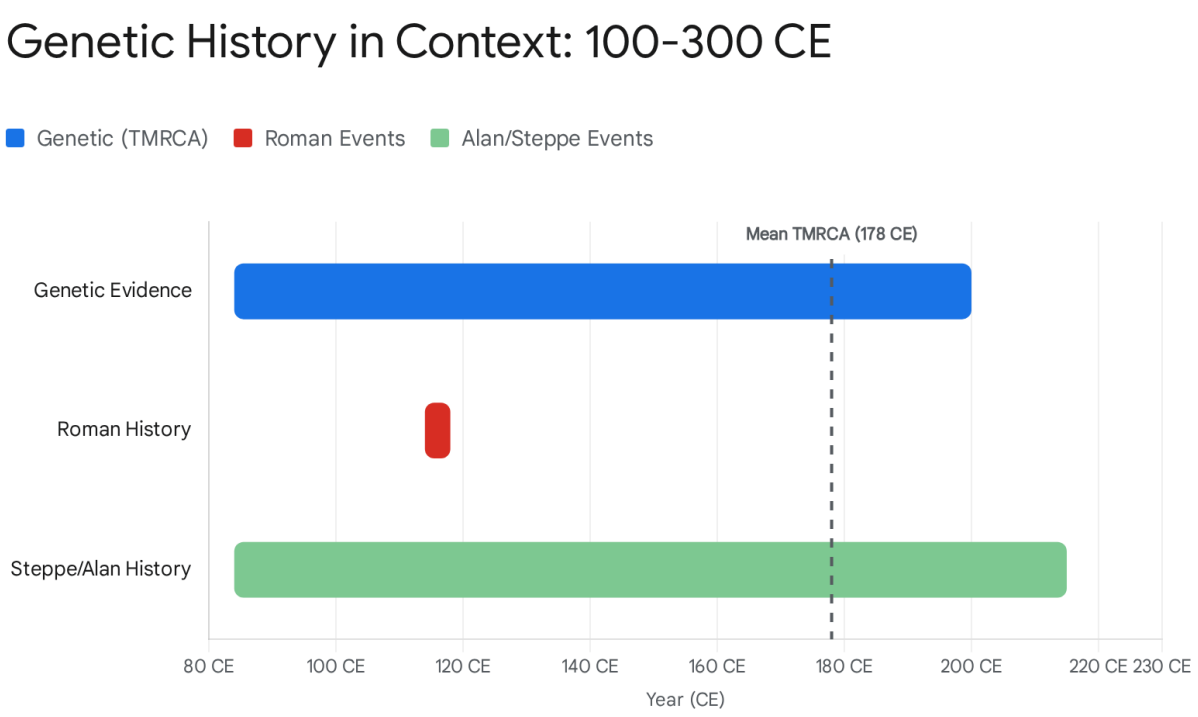
adopt the local Iranic (and later Circassian) dialect, and integrate into the tribal structure to protect their interests. The R-FT409028 marker is the only surviving trace of their southern origin.

- **Historical Parallel:** This foreshadows the later phenomenon of the *Cherkesogai* (Circassian Armenians)—Armenians who settled among the Adyghe in the 15th-19th centuries, adopted Circassian dress and customs (the *Adyghe Khabze*), but often retained their religion or distinct identity. R-FT409028 may represent a "Proto-Cherkesogai" event from the Classical period.[20]

6.2 The Diplomatic/Hostage Exchange

Given the frequent alliances between Armenian kings and Alan chiefs [18], elite intermarriage or hostage exchange is a strong possibility.

- **The Scenario:** An Armenian nobleman (a cadet of a *nakharar* house) is sent to the Alanic court as a hostage to secure an alliance, or an Alanic chief is given an Armenian bride whose retinue includes male guardians or servants carrying the lineage.
- **Genetic Implication:** This "Elite Dominance" model fits the rarity of the haplogroup. It enters at the top of the social hierarchy and drifts to fixation in a specific noble clan, without appearing in the general peasant population.



The formation of the R-FT409028 branch (blue) coincides with a period of intense geopolitical activity in the Caucasus, including the Roman annexation of Armenia and the peak of Alanic power.

Data sources: FamilyTreeDNA, Wikipedia (Roman Armenia), Wikipedia (Alans)

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7. The "Western" Cousin: R-CTS9219 and the Balkan Connection

To fully contextualize the rarity of L584, we must contrast it with the other R-Z2103 subclade found in the Caucasus: **R-CTS9219**. The user query explicitly asks for this comparison, which reveals two distinct histories of the R1b haplogroup in the region.

7.1 The Balkan/Steppe Route of CTS9219

As previously noted, R-CTS9219 is widespread in the Balkans and Eastern Europe.[10] Its presence in the Northwest Caucasus (Adygea) is likely the result of "Back-Migration" or "Steppe Interaction."

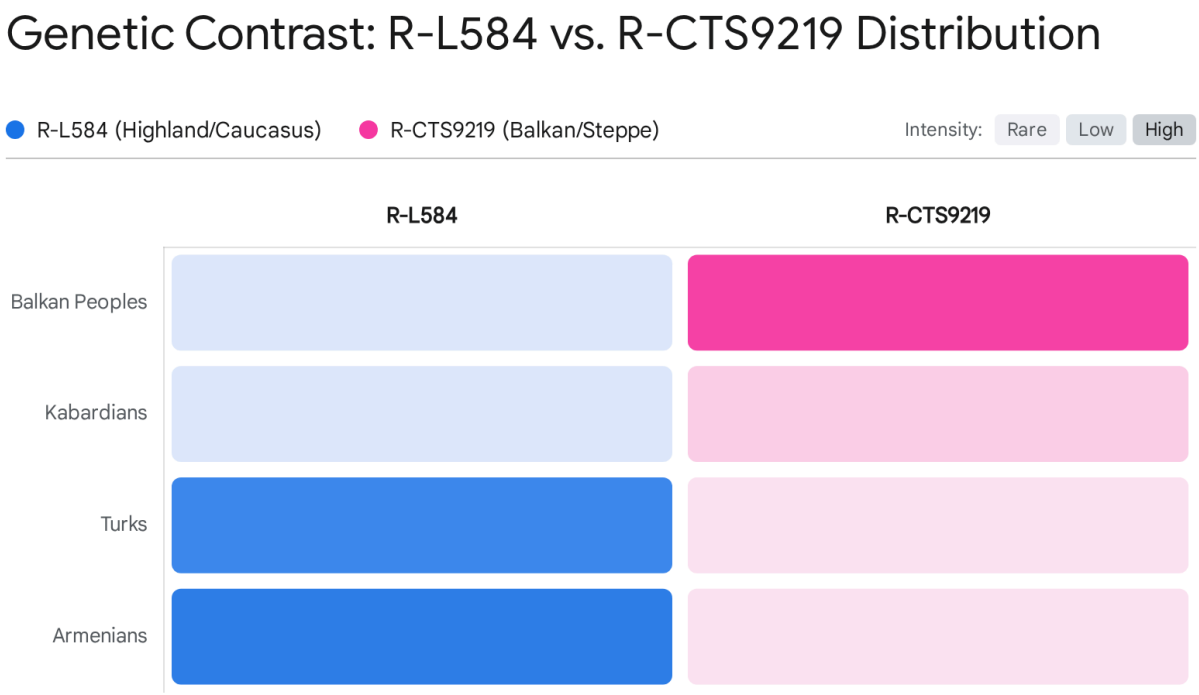
- **The Pontic Connection:** The Northwest Caucasus faces the Pontic steppe. Populations like the **Maeotians** (ancient inhabitants of the Kuban) had strong material links to the Hellenized Bosporan Kingdom and the Thracian/Getic world.

- **The Vector:** R-CTS9219 likely entered the Circassian gene pool via the assimilation of groups from the west—Thracian mercenaries, Gothic remnants (Tetraxite Goths), or Sarmatians who had mixed with Balkan populations.
- **Frequency:** Because the Northwest Caucasus is geographically open to the steppe in the north, gene flow from this direction was historically continuous. This makes CTS9219 a "minority but persistent" lineage among Circassians.

7.2 The South-North Barrier for L584

In contrast, **R-L584** had to cross the Greater Caucasus range.

- **The Barrier:** The mountains act as a filter. Mass migrations from South to North were rare compared to the open steppe corridor.
- **The Result:** This explains the *rarity*. R-L584 didn't arrive as a "wave"; it arrived as individuals. The Kabardian R-FT409028 cluster represents a "founder effect"—a single lineage that established itself and grew within a specific clan, while remaining numerically small in the broader population.

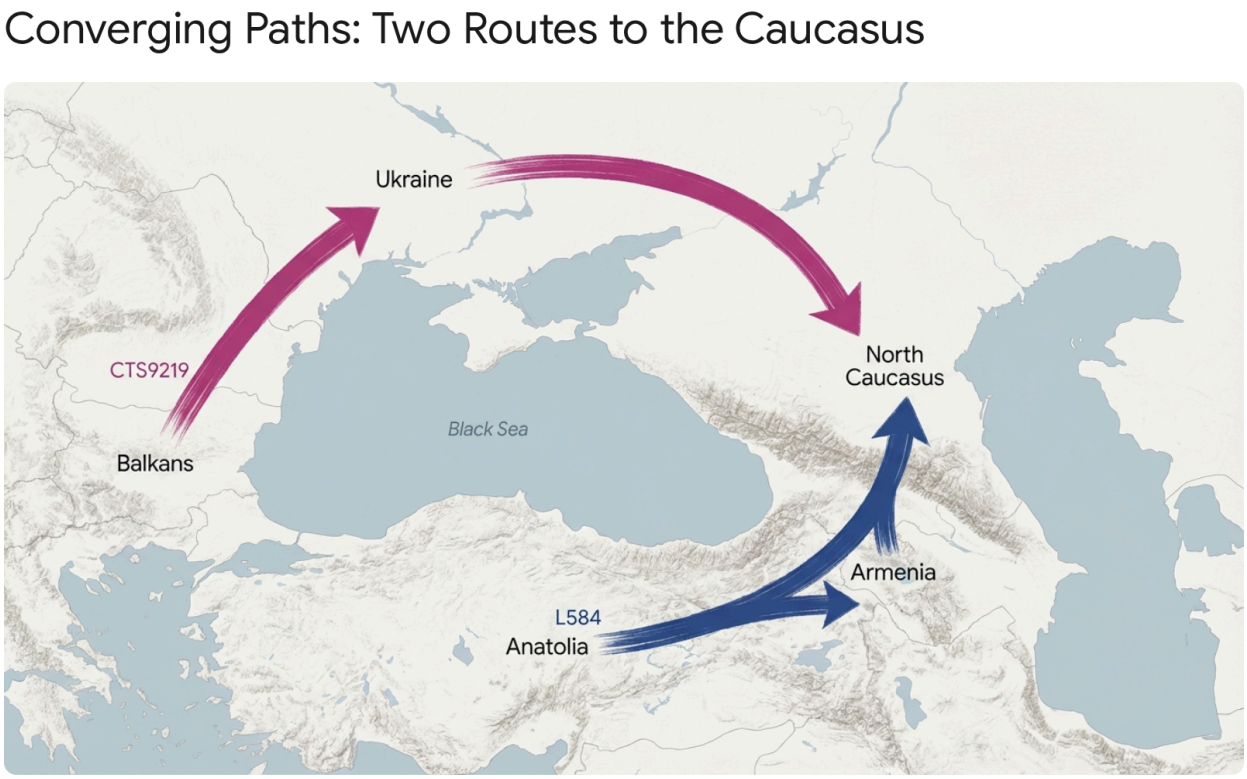


Heatmap illustrating the estimated frequency intensity of the two R-Z2103 subclades. R-L584 (blue) shows a clear 'Highland' bias (Armenia/Turkey), while R-CTS9219 (magenta) shows a broader 'Balkan/Steppe' distribution, appearing more frequently in general Circassian samples than L584.

Data sources: FTDNA (CTS9219), FTDNA (L584), Khazaria (Circassians)

7.3 Migration Route Visualization

The geographic divergence is best understood visually. While R-L584 represents a "Vertical" (South-North) integration, R-CTS9219 represents a "Horizontal" (West-East) or "Steppe" integration.



Hypothesized entry routes of R1b lineages into the North Caucasus. R-L584 (Blue) moves north from the Armenian Highlands through the passes. R-CTS9219 (Magenta) moves east/south from the Balkans and Steppe zones.

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8. Kabardian Ethnogenesis and Genetic Assimilation

To finalize the history of this lineage, we must look at the recipient population: the Kabardians. The Kabardians are the easternmost branch of the Adyghe (Circassian) people. Their history provides the final puzzle piece explaining how an ancient Roman/Alanic lineage became "Kabardian."

8.1 The Eastward Expansion

The ancestors of the Kabardians originally inhabited the Western Caucasus (modern Krasnodar/Adygea). In the 13th-15th centuries, following the collapse of the Alanic kingdom due to the Mongol invasions, Kabardian princes led a migration eastward into the central North Caucasus (the Terek basin)—the very lands formerly held by the Alans.[17]

8.2 The Assimilation of the Alans

When the Kabardians arrived in the Terek basin, the land was not empty. Remnants of the Alanic population (who were not pushed south into Ossetia) remained in the foothills. The Kabardian feudal structure was expansive; local elites were often incorporated into the Kabardian *Pshi* (prince) or *Work* (noble) classes to ensure stability.

It is highly probable that the **R-FT409028** lineage, having arrived in the North Caucasus in the 2nd century and integrated into the Alanic confederation, was essentially an "Alanic" lineage by the 14th century. When the Kabardians absorbed these Alanic remnants, the lineage was "Circassianized"—adopting the Adyghe language and the Kabardian identity, while retaining the Y-chromosomal signature of its Armenian/Roman-era ancestor.

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9. Conclusion

The investigation into the "Kabardian in the Rare Branch" reveals a deep history of connection that defies modern borders. The **R-FT409028** lineage is a genetic witness to the **Roman-era integration of the Caucasus**.

1. **Origin:** The R-L584 haplogroup is a signature of the Armenian Highlands, established there since the Early Bronze Age (c. 3200 BCE).
2. **The Event:** Around **125–200 CE**, a specific lineage branched off. This coincides with the **Roman-Parthian wars**, the annexation of Armenia by Trajan, and the peak of **Alanic** power in the North Caucasus.
3. **The Mechanism:** The most likely vector was the **Alanic Bridge**. An Armenian merchant, diplomat, or elite exile crossed the Darial Pass during the *Pax Romana*, integrated into the Alanic world, and established a lineage that persisted for nearly two millennia.
4. **The Identity:** This lineage was later absorbed by the expanding **Kabardian** princedoms in the late medieval period, transforming an "Armenian" genetic signal into a "Kabardian" family line.
5. **The Contrast:** Its rarity distinguishes it from the R-CTS9219 lineage, which entered the Caucasus from the "Western" steppe corridor. R-L584 is the "Vertical" lineage of the mountains, a testament to the individuals who dared to cross the high passes of antiquity.

In the veins of the modern Kabardian carrier of R-FT409028 flows the legacy of the

Kura-Araxes culture, the trade networks of Artaxata, and the equestrian lords of Alania—a microscopic history of the Caucasus writ large in DNA.

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