

## At last, science can help you answer the compelling questions: Who am I? Where does my genetic path begin?

GPS Origins™ will uncover your ancestry, specifically the journey of your DNA which shaped who you are today.

Learn about the distinct genetic communities that share your origins, the routes your DNA traveled, and why it settled in particular places. Your DNA reflects exciting events throughout evolutionary history!

GPS Origins™ unique algorithm, developed by Dr Eran Elhaik and his team at the University of Sheffield, identifies with unprecedented accuracy where and when the key parts of your genetic makeup were formed.

Let's begin your journey...

## HUMAN ORIGINS : OUR SHARED HISTORY TO YOUR STORY

The questions of who we are and where we come from have been asked for throughout our history. Once we explained our origins with mythology and folklore but now we utilize modern science to answer them.

Genetics help us tell the story of our origins from the beginning, through the formation of the human gene pools and to the last 2000 years of history.

The test results you have just received, along with the following information, will help you understand your personal story, from the shared history of all humans to your unique family story.

### From Sea to Land: Our Shared History

Our origins lie far beyond the first appearance of humans, with an evolutionary story common to many forms of life on earth. About 360 million years ago fish-like creatures ventured out of the Devonian Sea and became the first reptiles. After hundreds of millions years of evolution the mammals emerged after the extinction of the dinosaurs 65 million years ago thrust them into the evolutionary spotlight, and allowed them to expand into the world the dinosaurs left vacant.

Our human story really begins with the origin of primates, which split away from the other mammalian groups between 65 and 80 million years ago. It would be at least another 60 million years before the appearance of the species *Ardipithecus*, an ape that evolved from the Old World Monkeys and is regarded as the first fossil human ancestor.

Fossil finds from *Ardipithecus* in Ethiopia date it to between 4 and 6 million years ago.<sup>12</sup> This species could walk on two legs like humans but shared other characteristics with chimpanzees. *Ardipithecus* further developed into a number of lineages found throughout East Africa and South Africa that are known as the Australopithecines.<sup>13</sup>

Over the next 3 million years, many Australopithecine species appeared in Africa but they evolved little; their brains remained roughly the same size as those of chimpanzees and they did not use tools. Around 3 million years ago, the subspecies *Homo habilis*<sup>14</sup> began using stone tools, and by 1.5 million years ago the fire-mastering *Homo erectus* appeared. Fossils reveal that *Homo erectus* had a much bigger brain than its Australopithecine ancestors. This subspecies began spreading across much of Africa, Asia, and the Middle East, while the Australopithecines began to disappear.<sup>15</sup>

Next, a new human subspecies, the Neanderthals, appeared. They evolved from a *Homo erectus* relative outside of Africa and had spread widely throughout Europe and the Middle East 500,000 years ago.<sup>16</sup> Neanderthals had stocky builds and thick limbs and were specially adapted to the Ice Age conditions. There is evidence that Neanderthals buried their dead, a practice once thought exclusive to modern humans,<sup>17,18</sup> which raises questions about the nature of the Neanderthal's genetic contribution to modern humans.<sup>19</sup>

### Africa: The First Modern Humans

It is thought that the ancestor of modern humans is one of the *Homo erectus* relatives, which appeared in East Africa sometime between 100,000 to 200,000 years ago.

Many different ancient human species also evolved outside Africa, and persisted for more than a million years of geologic time. Their fossils have been unearthed in Europe, Southeast Asia, and China. Yet this diversity had all but disappeared by 100,000 years ago, and human fossils became remarkably uniform across the globe.<sup>23</sup>

The theory that has become known as the Out of Africa model began with a study in the late 1980s, investigating small changes in the DNA carried by the mitochondria - the DNA passed down by the mother.<sup>24</sup> The study analyzed DNA changes in the mitochondrial genome, and surmised that all humans diverged from a single ancestor living 200,000 years ago in Africa. While this does not indicate that there was just one mother, or 'African Eve', for all humanity, the results suggested that all humans alive today descended from a single population residing in Africa more recently than any of the previously mentioned early human species.

The Out of Africa model has also been applied to research on the Y chromosome.<sup>25,26</sup> This chromosome is found only in male lineages and passed down through the generations, unchanged for the most part. A recent study estimates that the 'African Adam' lived 208,000 years ago<sup>27</sup>.

## Beyond Africa: Colonizing the Continents

Mitochondrial and Y chromosomal DNA have been our primary tools for deciphering the human story because each person receives only one copy from each parent. Mitochondrial DNA is passed down from the mother and Y chromosomal DNA from the father, allowing scientists to track the ancestry of both the maternal and paternal lines. Perhaps one of the most interesting stories told by the mitochondrial and Y chromosomal DNA is how humans colonized the world.

The earliest human migrants appear to have reached Southern China some 80,000 years ago<sup>28</sup>, and DNA studies suggest they may have interbred with Neanderthals on their way through the Middle East.<sup>29</sup> They then spread to the rest of Asia along a route that probably tracks south of the Himalayas and into East Asia between 50,000 and 60,000 years ago,<sup>30</sup> possibly interbreeding with another subspecies known as the Denisovians.<sup>31</sup>

Archaeological and genetic evidence indicate that modern humans crossed the ocean from Southeast Asia and reached the islands near the tropical Pacific area of Oceania as far back as 50,000 years ago, probably in small water craft.<sup>32</sup> At the same time, populations spread to Europe through Turkey and into Central Asia. Some of these Central Asian migrants subsequently moved westward from the Ural Mountains and may be represented today by the peoples of Northern Europe and of the Baltic region, such as the Sami people.

Climate and geography delayed further migrations of modern humans into other areas of the world. Much of northern Eurasia was extremely cold during the last Ice Age (11,000 to 12,000 years ago) and human populations remained small and isolated. A small group of people from Siberia, however, managed to reach North America around 18,000 years ago<sup>33</sup> by way of a land bridge that existed when sea levels were lower. They moved south, and by 15,000 years ago, began to populate South America.

There were several more migratory waves to the Americas with the most recent being the Inuit, who colonized the Arctic of North America between 4,000 and 6,000 years ago.

Asian migration also continued eastwards to Oceania. The large islands of Oceania that are closest to Asia have been inhabited for at least 30,000 years, while the most isolated islands of Northeastern Oceania remained uninhabited until just 3,500 years ago.<sup>34,35</sup> The people who made the first voyages into this region were Austronesians, a group that emigrated from an area around present day Taiwan and are today known as Polynesians.

But as the last Ice Age came to an end and the climate warmed, a human cultural revolution was about to start, and it began in the Middle East.

## Agriculture and the Growth of Civilization

The transition from hunter-gathering to farming occurred in the Middle East between 10,000 and 12,000 years ago,<sup>36</sup> and between 9,000 and 10,000 years ago in China<sup>37</sup> and parts of the Americas.<sup>38,39</sup> By 5,000 years ago agriculture had facilitated the rise of some of the first large civilizations such as Mesopotamia in West Asia,<sup>40</sup> the Maya in Central America,<sup>41</sup> and the earliest Chinese civilizations along the Yangtze.<sup>42</sup>

Early farming cultures then expanded into new areas. Farmers from the Middle East brought agriculture to Europe and rice farming travelled with groups across East Asia. This expansion was accompanied by a genetic reshuffling as different groups came into contact and reproduced. Such reshuffling has been a continuous process over the last 10,000 years.

Genetic research has played a key role in understanding the migrations that took place during this period. Mitochondrial DNA lineages have been used to confirm and enhance archaeological interpretations such as tracing the ancestry of Norse and Gaelic populations, and Y chromosomal studies have been used to track male lineages in studies of Oceania.

## Genetic Origins (Gene Pools): The Key to Identifying Your Ancestral Communities

As humans traversed the globe and colonized different continents, each group accumulated small differences in their DNA. Most of these differences or mutations occurred in the X-chromosome and autosomal chromosomes that are inherited from both parents and allows us to follow the particular journeys made by each human group.

Some genetic roads diverged, not meeting again until modern times, while others led back to one another as genetically distinct groups. The accumulations of mutations in people from different areas of the world are what allow us today to distinguish various groups from one another.

DNA mutations may have occurred by the custom of marrying within a tribe, class, or social group, creating a group of people who were more similar to one another genetically than they were to their ancestors and neighboring groups - in other words, creating a new gene pool or genetic origin..

It's hard to know exactly how many gene pools there are because every genetic background includes "gene puddles" where small, isolated groups of people married only within their local group, acquiring and maintaining unique mutations over time. At this time, scientists have identified about forty gene pools from all over the world. Over time, some of these gene pools spilled toward each other, particularly those in Eurasia, whereas other pools remained more constant.

## Recent History and the Genetic Melting Pot

As ancient peoples traded, conquered, enslaved and fell in love, they spread their genes, along with their unique mutations, across larger areas at an increasingly rapid pace, interweaving previously distinct parts of the original gene pools. If in the past, human groups diverged from one another and became genetically distinct, populations coming together creating new genetic tapestries out of the original genetic origin. Today, every one of us is the product of these historical genetic exchanges: it is extremely rare to find individuals whose DNA belongs to a single gene pool.

Because the X and autosomal chromosomes contain the accumulated mutations that correspond with different gene pools, they provides a more nuanced picture of historical interactions in the past. Your genetic origin results will show you how your genome is linked to the human story of the populations who lived 60,000-15,000 years ago.

## Empires, Pandemic and More Migration: Your Story in the Modern World

The past 2,000 years of human history have seen the rise and fall of empires that spanned entire continents, such as the Persian, Roman, Mongol, Arab Caliphate and most recently, the British Empire.

The expansion of European empires brought European DNA to many different parts of the world such as Australia, Asia and particularly the Americas, where the intermingling of Europeans and native tribes has led to many central and south Americans having mixed ancestry.

Pandemics, such as the Black Death in Europe and smallpox in the Americas caused widespread devastation. Conquests by Viking raiders reshaped entire cultures and identities. All of these events have left their mark in the DNA of present-day populations.

Countries such as the United States, which have experienced large waves of migration from different areas in the last two hundred years have facilitated the further mixing of many different gene pools.

Between the 17th and 19th centuries, slave trade brought as many as 650,000 Africans to the United States along with nearly 4.5 million Irish people who escaped famine and poverty between 1820 and 1930. Other groups to entered the United States between the mid-19th and early 20th centuries which included about 5 million Germans, over 2 million European jews, 4 million Italians, and up to 300,000 Chinese.

Consequently, these migrations merged gene pools that had, thus far, remained largely separate due to geographical barriers. Many Americans and British now share genetic origins with up to a dozen different gene pools, some of which have diverged more than 60,000 years ago, such as the European and Native American gene pools.

Your GPS Origins™ results reveal your genetic origins and the journey your DNA has made with end-points recorded each time the DNA has markedly changed through intermarriages.

For example, if you have Scottish ancestry your results could show that you are a descendant of the Viking ancestors who arrived in the Medieval era, but did not mix with Scots and retained their Danish origin. If you are African American, you may learn about connections to the Bantu peoples and the pre-colonial trading kingdoms in West Africa. If you are an Ashkenazic Jew, you might find your path leads to the ancient Ashkenaz in northeastern Turkey.

Ongoing genetic research of archaeological remains could mean that, in the future, you may be able to match your background with a range of individuals - whether that is an ancient Mayan King found in a temple complex in Guatemala, a warrior from a Viking boat burial or a flint-knapping craftsman from Mesolithic Germany. The human story, as told through our genes, is only the beginning.

You are now ready to discover your genetic path.

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# Dennis Ling's Gene Pool Percentages

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## # 1 Fennoscandia 19.3%

Origin: Peaks in the Iceland and Norway and declines in Finland, England, and France

## # 2 Southern France 18.9%

Origin: Peaks in south France and declines in north France, England, Orkney islands, and Scandinavia

## # 3 Western Siberia 13.9%

Origin: Peaks in Krasnoyarsk Krai and declines towards east Russia

## # 4 Orkney Islands 13.1%

Origin: Peaks in the Orkney islands and declines in England, France, Germany, Belarus, and Poland

## # 5 Sardinia 8.5%

Origin: Peaks in Sardinia and declines in weaker in Italy, Greece, Albania, and The Balkans

## # 6 Basque Country 8.2%

Origin: Peaks in France and Spain Basque regions and declines in Spain, France, and Germany

## # 7 Southeastern India 8%

Origin: Endemic to south eastern india with residues in Pakistan

## # 8 Tuva 6.8%

Origin: Peaks in south Siberia (Russians: Tuvinian) and declines in North Mongolia

## # 9 Northern India 1.9%

Origin: Peaks in North India (Dharkars, Kanjars) and declines in Pakistan

## # 10 Pima County: The Sonora 1.1%

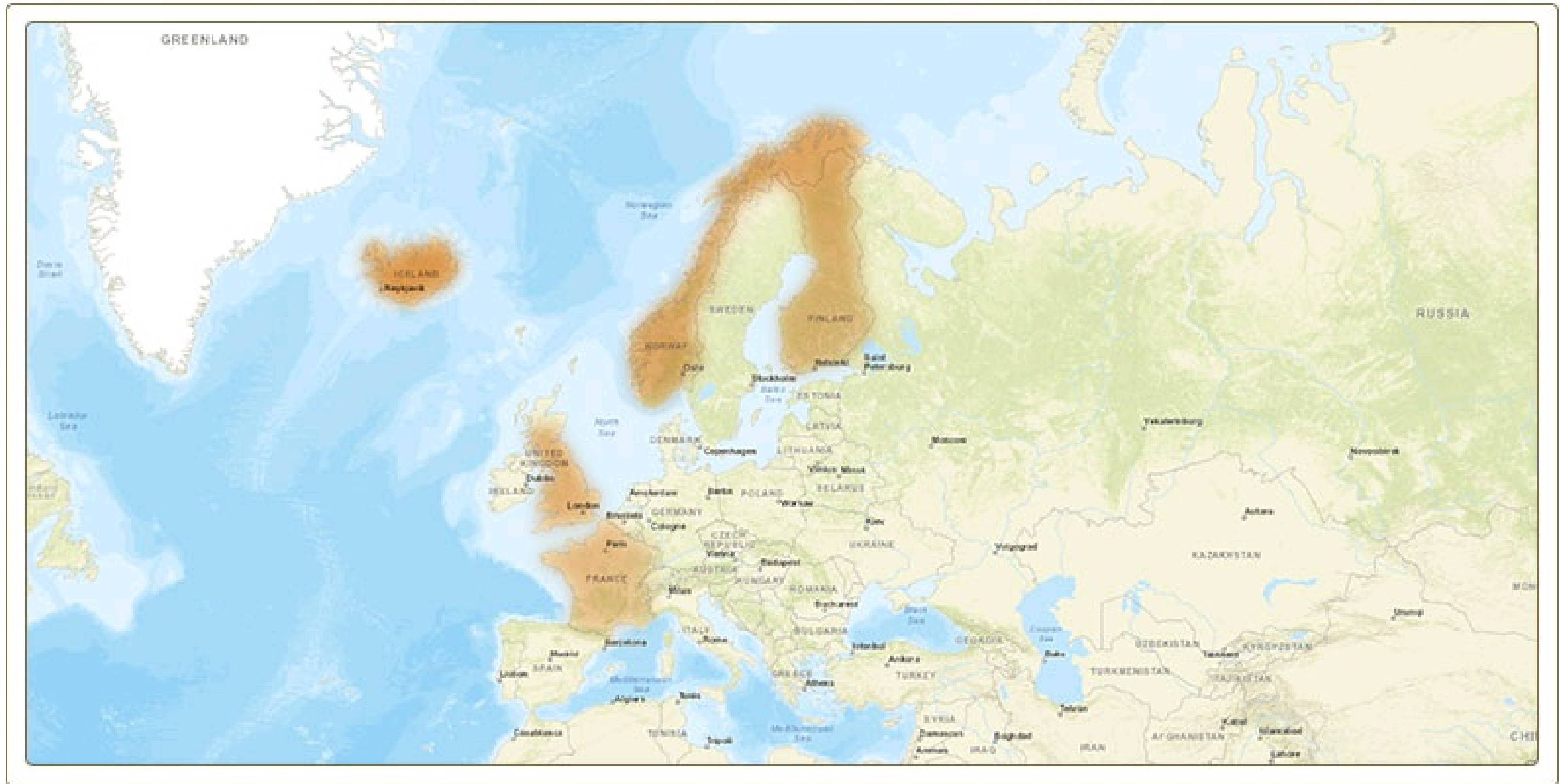
Origin: Peaks in Central-North America and declines towards Greenland and Eskimos

## # 11 Bougainville 0.2%

Origin: Peaks in Bougainville and declines in Australia

# Dennis Ling's Gene Pool Stories

## 1. Fennoscandia Story



The area known as Fennoscandia encompasses the countries of Norway, Sweden, Finland, a part of Russia known as the Kola Peninsula. It also included Denmark during the Viking Age, which forms part of greater Scandinavia. The often blonde haired and blue eyed people of this region are known for their intrepid spirit, braving the bitter winters of northern Europe and conquering lands further afield within the continent, even briefly reaching North America.

The retreat of glaciation at the end of the last Ice Age saw the arrival of hunter-gatherers in the north of Europe between 11,000 and 12,000 years ago.<sup>1</sup> The presence of these people is known from archaeological evidence, but where they came from is still unclear and subject to some debate.<sup>2</sup> It is likely they were from similar populations that represent much of the early migration of small hunter-gatherer bands that moved into Europe during the Paleolithic.

Agriculture appeared in Scandinavia between 4,000 and 6,000 years ago.<sup>3-6</sup> Archaeological evidence has shown that this farming culture originated in Central Europe and spread north into Fennoscandia.<sup>7</sup> Similar to other regions in Europe, there has been a considerable debate as to whether this evidence for farming meant that immigrants arrived and pushed out the local ancient hunter-gatherers, or whether farming culture was adopted by the people already living in the area.

Recent genetic studies looking at samples of ancient DNA from preserved bones have found inconsistencies between prehistoric people and later farming populations,<sup>2</sup> suggesting that there may have been replacement of people to some degree. There are two major language groups in Scandinavia, these being the Germanic language of Norway, Sweden, and Denmark, and the Finno-Ugric languages of Finland. The division between the Germanic and Finno-Ugric speaking areas has been used as evidence to support the theory that the Baltic may have been a refugia for earlier hunter-gatherers.<sup>2,8</sup> Analysis of Y-chromosome ancestry from Finno-ugric speakers in Scandinavia and other areas points to a high level of heterogeneity. The potential ancient origins of these people date to 12,000 - 14,000 years ago, when they would have travelled on an ancient Paleolithic migration route that may have gone through Central Asia before turning west to Europe.<sup>9</sup>



The consensus among researchers today is that the genomes of the people of Fennoscandia are of a mixed ancestry, combining ancient hunter-gatherers and more recent Germanic farmers. In areas with more extreme cold climates, there remains more original hunter-gatherer influence, likely due to the marginal nature of farming under such conditions. In Finland, some genetic studies have noted potential historic population crashes as evidence for regional genetic distinctiveness, possibly occurring around 3,900 years ago.<sup>10</sup> Surviving on farming alone was perilous in such an extreme climate and there is evidence for a long coexistence of farming and foraging cultures in Finland.<sup>1</sup>

Between 600 and 700 A.D., social changes in Scandinavia marked the start of a migration event of a different kind, one that saw the cultures of Scandinavia make their mark on the rest of Europe. It is believed that economic and political stress, as well as a rapid period of agricultural expansion led to a desire to seek resources and land further afield, giving birth to the start of the Viking Age.<sup>11</sup> Various small kingdoms and chiefdoms invaded and colonized many countries within Europe. Vikings raided and invaded much of Northern and Western Europe, taking over lands in England, Scotland, and France. They moved east into Russia and moved further west into Iceland, Greenland, and ultimately North America. They briefly settled in what is now Canada's province of Newfoundland.<sup>12,13</sup> They often mixed with the local populations, as shown by the mixed British Celtic and Norse origins of Iceland that have been identified both through historical and genetic research.<sup>14,15</sup>

The age of the Vikings may have ended in medieval times but the movement of people from Scandinavia has continued to the present day. In recent centuries, many have ended up in parts of United States and Canada, often moving into the Midwest, such as Northern Michigan where a distinct Finnish immigrant community has been well established.<sup>16</sup>

In the future, we can envision genetic tests that will be able to distinguish between the ancient hunter-gatherer and more recent Germanic farming components. There may also be tests that can link individuals back to ancient DNA extracted from archaeological skeletal material. What may also prove fascinating for historical enthusiasts is the possibility of future tests that are able to distinguish specific migrations of Viking settlers to different areas of Europe.

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## 2.Southern France Story



Europe has seen multiple waves of migration of humans and ancient human ancestors, with Southern France being a major crossroads in such journeys. The people of Southern France today appear to share many commonalities in appearance with their Mediterranean neighbors. At the same time, the region's position within Europe to the west of the Alps has facilitated a higher rate of movement of people between north and south.

Southern France and much of the surrounding area was inhabited by Neanderthals during the Paleolithic: an early human species that went extinct upon the arrival of modern humans between 35,000 to 50,000 years ago.<sup>1</sup> The area was at the edge of the Paleolithic ice sheets and was a place of refuge for people pushed back by worsening climate conditions further north. This meant constant movement in and out of the region. The earliest modern humans that arrived in Southern France were Ice Age hunter-gatherers. These people are famous for producing some of the earliest cave paintings known to exist in the limestone caves of the Pyrenees.<sup>2</sup>

Hunter-gatherer subsistence patterns persisted for many millennia and population density remained low. The development of agriculture in the Middle East and its spread into Europe starting 12,000 years ago<sup>3</sup> brought major changes to the region, and involved potentially large-scale migration of people along the southern corridor of the Alps. These people brought their languages, which are believed to be part of the Indo-European language family which exists all over Europe today.<sup>4,5</sup> Virtually all of the currently spoken languages in Europe are thought to relate to this expansion of early farmers. In Southern Europe, this track south of the Alps links the Latin languages of Italy, Spain, and France, while Germanic languages are found north of the Alps.<sup>6</sup> This suggests that the early farming cultures that arrived in France came through the south and proceeded north.

A Bronze Age culture had developed by 1000 B.C.,<sup>7,8</sup> with settlements throughout Southern France. Over the next millennia, Iron Age societies began to appear throughout all of France, and became unified as a culture known as the Celts.<sup>9</sup> These Celtic societies formed strong links throughout France and into other parts of Northern Europe. These societies were eventually subdued by the Romans who conquered all of present day France, turning it into the Roman province of Gaul.<sup>10</sup> After the breakup of the Roman Empire, the southern area of France has generally remained within the borders of the Kingdom of France, with some fluctuation in Borders on the Catalonian and Italian sides. Similar regional economic practices have seen it stay firmly rooted in the cultures of the Mediterranean.

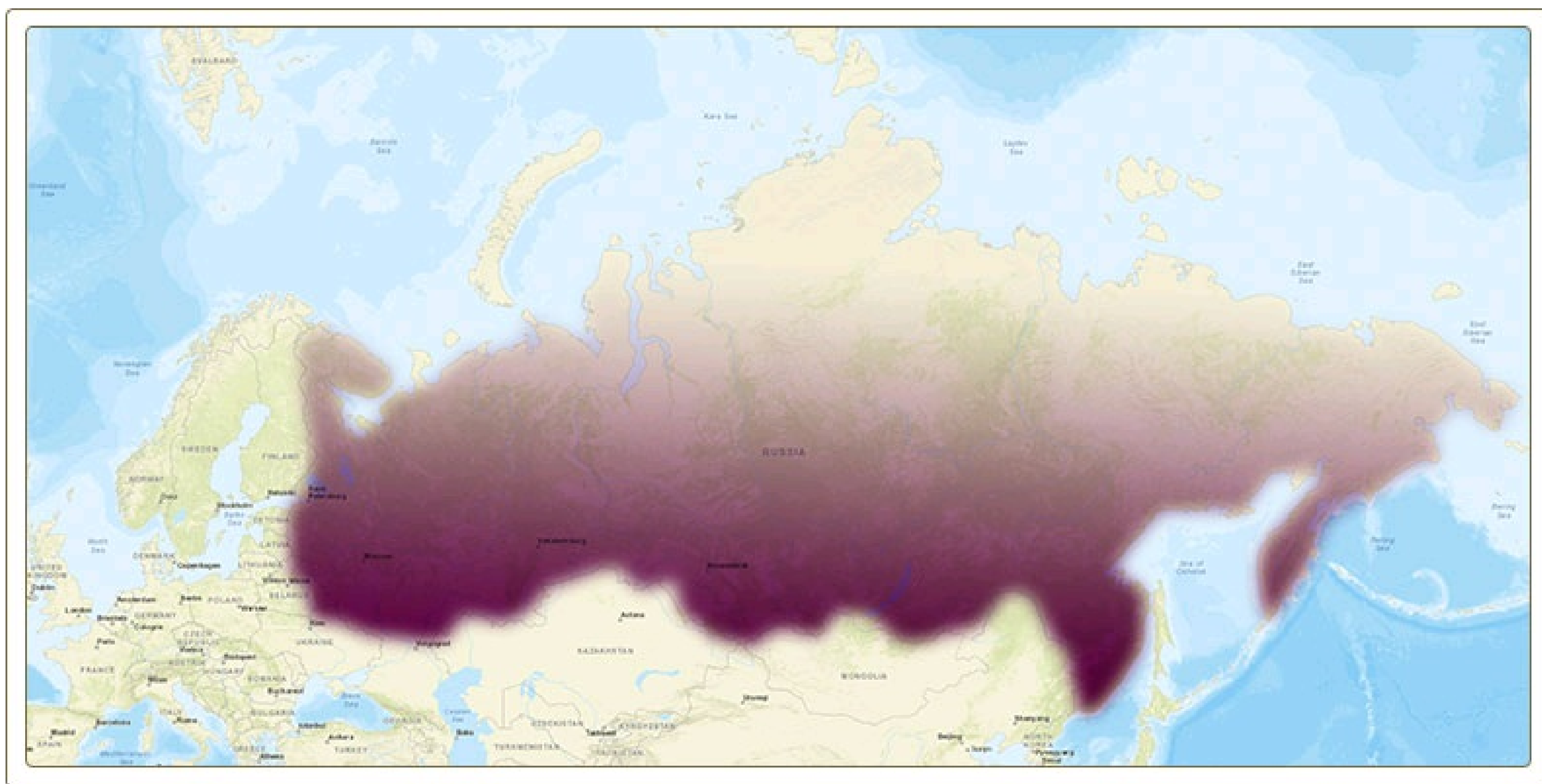
The level of linguistic diversity in the region may hint at historical populations that were divided based on ethnic divisions. Catalan, Aragonese, and Gascon are Indo-European languages related to French that are still spoken in other areas of the Pyrenees today.<sup>11</sup> Aragonese and Gascon have been in decline in recent centuries. While it may not be possible to link these populations back to the earliest societies in the area, they do provide some grounds for investigating local genetic ancestry.

Future genetic testing may be able to distinguish between early hunter-gatherer influences and later agriculturalists. Some studies have found links between Southern France and its Mediterranean neighbors.<sup>12</sup> Research has also found genetic contributions from other migration events such as Semitic and North African components. In the future, we may be able to distinguish these components as well. It may also be possible to determine which specific groups within Southern France (Catalan, Aragonese, or Gascon) an individual may be more likely related to and what languages their ancestors used to speak.

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### 3. Western Siberia Story



Siberia's vast, open landscape set the stage for the movement of people and cultures to multiple regions of the Eurasian continent: both to the south and into what is now China, east into North America, and west into Europe. The people of Siberia today are divided between different regional ethnic and linguistic groups. The people of Eastern Siberia are more closely related to Mongolians and the Tungusic tribes of Northeast China, such as the Manchu, while Western Siberians are made up of small, former nomadic tribes such as the Ket and the Selkup.<sup>1</sup> The people of Western Siberia could be described as having mixed Eurasian characteristics. However, it is likely these people have their own, unique ancestry that goes back just as far as the earliest migrations of humans into other areas of Eurasia.

The harsh and arid conditions of Siberia have meant that population densities have always remained low with nomadic foraging being the predominant subsistence-pattern for most of the region's history.<sup>2</sup> The region is particularly known for reindeer breeding. Whereas agricultural innovations have led to substantive displacement, colonization, and mixing of Paleolithic groups in other areas of the world, far less intermixing has occurred in the steppes of Western Siberia. This has attracted the attention of geneticists attempting to determine who were the original Paleolithic peoples that migrated through Siberia.<sup>3,4</sup>

Precisely how the earliest inhabitants of Siberia arrived in the region remains unclear and is still subject to debate, with routes up through China and Mongolia commonly proposed, but also some from further west toward Europe.<sup>5,6</sup> The earliest dated archaeological evidence for human habitation has been found in the Altai Mountains dating to 45,000 years ago.<sup>7,8</sup> Many of the early groups maintained nomadic subsistence patterns well into the 20<sup>th</sup> century. Much research has gone into identifying them through their linguistic heritage. The two major linguistic groups are the Samoyedic and Ugrian languages. Speakers of Samoyedic language include the Nenets, Enets, Nganasan, and the Selkup, while Ugrian includes Khanty and Mansi.<sup>1,9</sup> These two linguistic groups are thought to be related. Studies of Y-chromosome and mitochondrial DNA lineages have related the Khanty and Mansi to both west and east Eurasian gene pools.<sup>10</sup>

There is another small group that lives in the region known as the Kets, who number fewer than 1,000 people today. They speak an Eastern Siberian language known as Yeniseian, which is related to Yukaghir, Nivkh, and Chukotko-Kamchatkan.<sup>1</sup> It is believed that at one time these people were more

widespread within Western Siberia and may have arrived in the area prior to Samoyedic and Uralic peoples. Their language may be related to those found among some Native American groups such as the Athabascan, which provides a link to the people of the Americas.<sup>11</sup> Native Americans are thought to be directly related to eastern Siberians and some Y-chromosome studies have found that the Kets share more in common with nearby Samoyedic and Ugric groups.<sup>5</sup> However, recent mitochondrial and Y-chromosome DNA studies of related Altai mountain peoples, focusing on both Tungusic and Yeniseian speakers, have also reestablished a possible link with Native Americans.<sup>12</sup> This leaves open the possibility of an ancient connection, although more recent mixing between Yeniseians and Samoyedic and/or Ugric peoples has made this picture unclear.

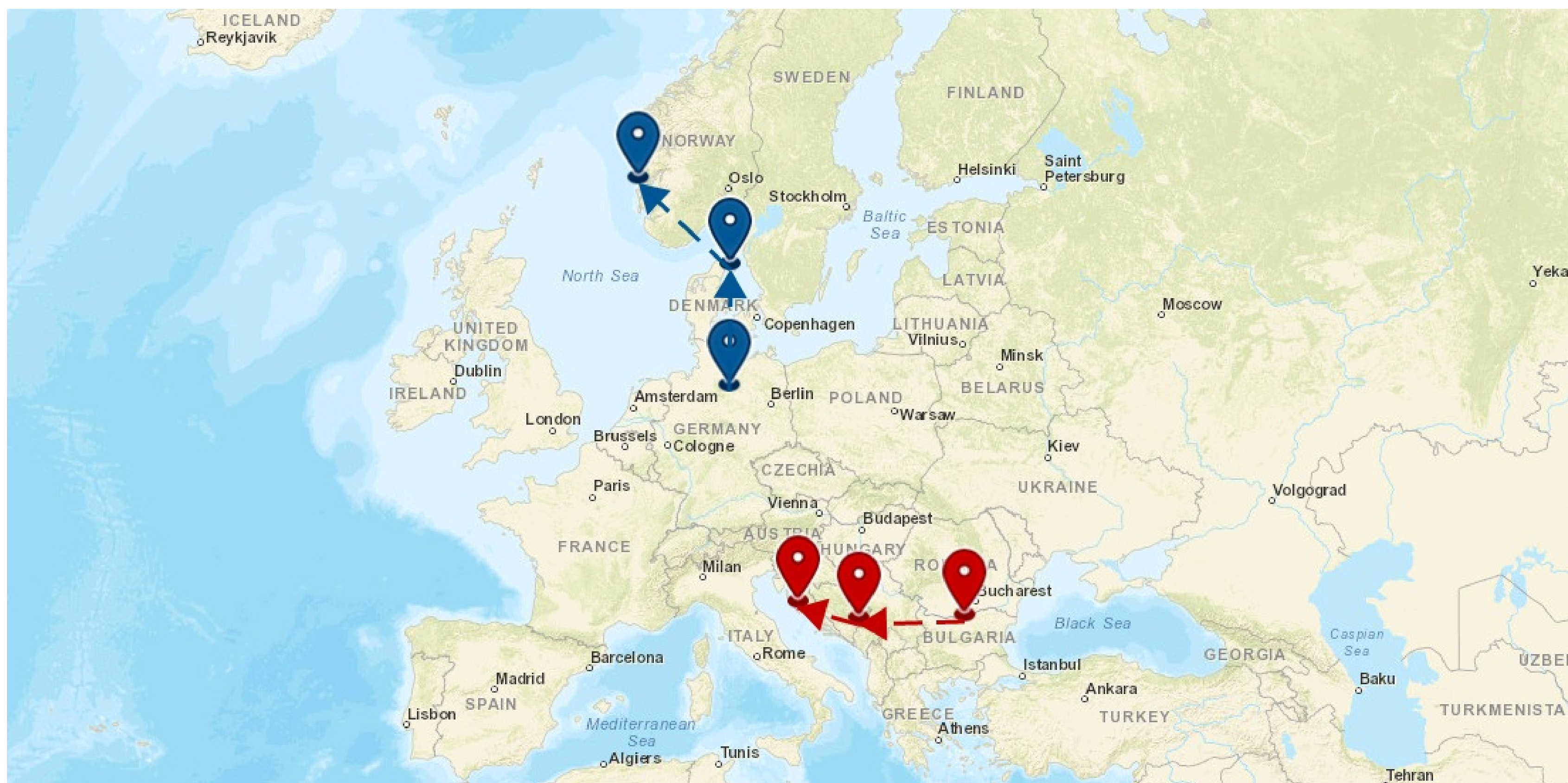
The Russians arrived and colonized Siberia between the 17<sup>th</sup> and 19<sup>th</sup> centuries. This involved significant Russian migration into Siberia. Farming and resource extraction became a major economic focus of the Russian state in the 20<sup>th</sup> century.<sup>13</sup> While most of the people who live in Siberia arrived through recent colonial migration, there has been very little intermixing between indigenous groups and Russian settlers. This period also involved the relocation of native groups and disturbance of traditional ethnic boundaries.

Future testing may be able to determine ancestry attributed to a specific Western Siberian peoples. There are also many further possibilities of tracing very ancient migration routes such as those that went west into Eastern Europe and those that went into North America. There may also be an ancestry test for the proportion of ancient Siberian DNA a person has and their relationship with Native Americans. Tests that assess one's connection with specific linguistic groups may also be possible.

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# Dennis Ling's DNA Migration Routes



## Migration Story A

Date: 513 AD - 1419 AD

Radius: 158miles

Latitude: 43.539

Longitude: 25.38

### Ancient ancestry in Bulgaria

Your ancestors came from Bulgaria prior to 527 AD, so let's take a look at what was going on in Bulgaria up to this point:

#### The Odrysonian Kingdom

Between 450 BC and 299 BC, Bulgaria was ruled by local leaders in a period known as the Thracian period. After the downfall of the Persian Empire, Thracian tribes, who united to form the Odrysonian Kingdom, inhabited Bulgaria. The Thracians were skilled gold workers who lived in small villages and lacked a clear centralized authority. In 359 BC they were defeated by the Macedonian Empire and came under Macedonian rule. People migrated from France and Germany and Central Europe to Bulgaria when the Celts began to overrun the Balkans. At the same time, populations moved from Bulgaria to places like Greece and Macedonia as people fled Thracian invasions.

#### The Celtic Kingdom of Tylis

Between 298 BC and 46 AD, Bulgaria was ruled by local leaders in a period known as the Celtic period. Several Celtic tribes reached Bulgaria and attacked the Macedonians and Thracians. Although the Celts suffered several defeats they eventually overwhelmed much of Bulgaria and established the Celtic Kingdom of Tylis in the east of the country. Internal warfare made the country vulnerable and in 46 AD it was conquered by the Roman army. People migrated from France and Germany and Central Europe to Bulgaria.

#### Roman Invasion

Between 47 AD and 680 AD, Bulgaria was ruled by local leaders in a period known as the Roman era. Having invaded, the Romans set about rapidly constructing the advanced infrastructure, administration and legislation, characteristic

of their empire, in Bulgaria. The Thraco-Roman people experienced centuries of relative peace and prosperity until, from the 3rd century AD, Roman Bulgaria was devastated by near constant invasions by over fifty peoples including the Huns, Goths and Avars which largely put an end to Roman rule. People migrated from Central Europe and Asia and across the Roman Empire to Bulgaria as resettlement was a standard part of Byzantine culture people were moved to Bulgaria to ensure all land was cultivated, armies were populated and rule was enforced. During the Great Migration dozens of Asian and European tribes settled in Bulgaria, including the Bulgars from Kazakhstan. At the same time, populations moved from Bulgaria to places like across the Roman Empire as Bulgarians sought work, property and trade opportunities across the Roman Empire.

## **Movement from Bulgaria to Bosnia and Herzegovina**

At some point before 527 AD your ancestors moved to Bosnia and Herzegovina. These are the events your ancestors would have lived through in Bosnia and Herzegovina.

### **The Roman Era**

Between 9 BC and 400 AD, Bosnia and Herzegovina was ruled by local leaders in a period known as the Roman era. In 9 BC the Romans annexed the area that is now Bosnia and Herzegovina and settled it with Roman citizens from across the empire, introducing Christianity. In 395 AD, when the Roman Empire split, Bosnia and Herzegovina fell within the Byzantine Empire. People migrated from Italy and Greece and elsewhere in the Roman Empire to Bosnia and Herzegovina with the arrival and occupation of the Roman army and assimilation of Bosnia and Herzegovina within the Roman Empire.

### **The Ostrogothic Kingdom and Tribal Warfare**

Between 401 AD and 499 AD, Bosnia and Herzegovina was ruled by local leaders in a period known as the Migration period. When the Byzantine Empire lost control of Bosnia and Herzegovina the invading Ostrogoths incorporated it into the Ostrogothic Kingdom. Over the subsequent decades the Ostrogoths were replaced first by the Alans, an Iranian nomadic people, and then the Huns from Central Asia, whose mighty army caused many Germanic tribes in Eastern Europe to flee to the west. People migrated from Iran, Mongolia, Poland, and Ukraine and Eastern Europe to Bosnia and Herzegovina due to constant raids and invasions by the Ostrogoths, the Persian Alans and Huns, some of whom settled in the region and assimilated with local populations.

### **The Arrival of the Eastern European Slavs**

Between 500 AD and 928 AD, Bosnia and Herzegovina was ruled by local leaders in a period known as the Byzantine era. The Byzantine Emperor Justinian brought Bosnia and Herzegovina under Roman control once again. However, he was powerless to stop the waves of Eastern European Slavs and Eurasian Avars migrating into the region, pillaging, looting and settling. Over the next three centuries Bosnia was fully Christianized, adopted a Slavic language and established a primitive feudal system. People migrated from Romania and Ukraine and the Slavic states and Central Asia to Bosnia and Herzegovina as waves of Slavs and Avars raided, looted and settled the country.

## **Movement from Bosnia and Herzegovina to Croatia**

At some point after 527 AD your ancestors moved to Croatia and once they reached there this is what they would have experienced:

### **Roman Croatia**

Between 32 BC and 475 AD, Croatia was ruled by local leaders in a period known as the Roman era. In 32 BC Croatia was conquered by the Romans and divided into the province of Pannonia in the north and Dalmatia in the south. The final uprising against Roman rule was suppressed in 9 AD and Croatian administration and politics underwent Romanizing reforms. As Croatia was a Roman frontier, frequently threatened by raiding barbarian tribes, it had a strong military presence and many fortresses were erected. People migrated from Italy, Greece, Macedonia, Montenegro, Albania, Kosovo and, in smaller numbers, and the rest of the Roman Empire to Croatia as new Roman citizens migrated around the Roman world in search of new opportunities. At the same time, populations moved from Croatia to places like countries within the Roman Empire as Roman the Croats newly acquired Roman citizenship allowed them to seek trade and employment across the Roman Empire.

### **The Ostrogothic Kingdom**

Between 476 AD and 613 AD, Croatia was ruled by local leaders in a period known as the Ostrogothic period and the Byzantine era. During the Great Migration of tribes across Europe, Emperor Marcian allowed Ostrogoths to settle Croatia under Byzantine authority. In 535 AD the Byzantine Emperor Justinian fully reclaimed the country and established the Theme of Dalmatia. However, in the 560s, waves of Avars from Central Asia, Croats from southern Poland and Slavs decimated many Roman towns and forced Roman Croats to flee to the coast and mountains. People migrated from Scandinavia and Central and Eastern Europe and Asia to Croatia as the nomadic Ostrogoths,

Croats, Avars and Slavs began to settle and colonize Croatia.

## Migration Story B

Date: 454 AD - 1398 AD

Radius: 158miles

Latitude: 52.981

Longitude: 10.8

### Ancient ancestry in Germany

Your ancestors came from Germany prior to 382 AD, so let's take a look at what was going on in Germany up to this point:

#### Early Germanic Tribes

Between 100 BC and 394 AD, Germany was ruled by local leaders in a period known as the Archaic period and Late Antiquity. Germany was home to multiple Germanic tribes who frequently emerged victorious against Roman military campaigns, preventing Roman advance into Germany. At the end of the 4th century AD the Huns invaded Germany and many of the native Germanic tribes began to migrate westwards to escape the rule of the Hunnish Empire. People migrated from Scandinavia and Poland and Eastern Europe to Germany as part of the mass migration of tribes into Germany. Many Danes moved south seeking new lands after crop failures in Denmark. At the same time, populations moved from Germany to places like neighboring European countries as Germanic tribes continued to migrate across the continent.

### Movement from Germany to Denmark

At some point before 382 AD your ancestors moved to Denmark. These are the events your ancestors would have lived through in Denmark.

#### The Danish Tribes

Between 400 BC and 101 BC, Denmark was ruled by local leaders in a period known as the Iron Age. The early Danes relied on agriculture and animal husbandry, traded with Romans and had some communication with the Celtic tribes of Central Europe. However, a change in the climate challenged this agricultural system and prompted many local groups to migrate south into Germany. At the same time, populations moved from Denmark to places like Germany and the Netherlands and Central Europe in response to a worsening climate in Scandinavia.

#### The Danes Adopt Runes

Between 100 BC and 400 AD, Denmark was ruled by local leaders in a period known as the Roman Iron Age. By the 1st century BC, the Roman Empire bordered Denmark to the south and the Roman influence over the Danes increased, with some Danish warriors fighting in the Roman army. Around 200 AD the Danes adopted a written form called runes.

### Movement from Denmark to Norway

At some point after 382 AD your ancestors moved to Norway and once they reached there this is what they would have experienced:

#### The Nordic Iron Age

Between 500 BC and 800 AD, Norway was ruled by local leaders in a period known as the Nordic Iron Age. During this period Norway was relatively stable; it operated under an extended family-based clan system with chieftains ruling over groups of tribes. Agricultural productivity increased and the Norwegian tribes would trade furs and skins with Romans. A writing system was developed, known as runes. People migrated from Germany, Sweden, and Denmark and Central Europe to Norway due to Germanic tribes migrating through Scandinavia and looking for new lands to colonize during the Migration period. At the same time, populations moved from Norway to places like Central Europe with the migration of Gothic Tribes, Lombards, Heruli and Varangians to Russia and the rest of Europe, especially during the Great Migration.