

# New study sheds light on the origin of the European Jewish population

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Despite being one of the most genetically analysed groups, the origin of European Jews has remained obscure. However, a new study published online today in the journal *Genome Biology and Evolution* by Dr Eran Elhaik, a geneticist at the Johns Hopkins School of Public Health, argues that the European Jewish genome is a mosaic of Caucasus, European, and Semitic ancestries, setting to rest previous contradictory reports of Jewish ancestry. Elhaik's findings strongly support the Khazarian Hypothesis, as opposed to the Rhineland Hypothesis, of European Jewish origins. This could have a major impact on the ways in which scientists study genetic disorders within the population.

The Rhineland Hypothesis has been the favoured explanation for the origins of present-day European Jews, until now. In this scenario Jews descended from Israelite-Canaanite tribes left the Holy Land for Europe in the 7th century, following the Muslim conquest of Palestine. Then, in the beginning of the 15th century, a group of approximately 50,000 left Germany, the Rhineland, for the east. There they maintained high endogamy, and despite wars, persecution, disease, plagues, and economic hardships, their population expanded rapidly to around 8 million in the 20th century. Due to the implausibility of such an event, this rapid expansion was explained by Prof Harry Ostrer, Dr Gil Atzmon, and colleagues as a miracle. Under the Rhineland Hypothesis, European Jews would be very similar to each other and would have a predominant Middle Eastern ancestry.

The rival explanation, the Khazarian Hypothesis, states that the Jewish-

convert Khazars – a confederation of Turkic, Iranian, and Mongol tribes who lived in what is now Southern Russia, north of Georgia and east of Ukraine, and who converted to Judaism between the 7th and 9th centuries – along with groups of Mesopotamian and Greco-Roman Jews, formed the basis of eastern Europe's [Jewish population](#) when they fled eastward, following the collapse of their empire in the 13th century. European Jews are thus expected to exhibit heterogeneity between different communities. While there is no doubt that the Judeo-Khazars fled into Eastern Europe and contributed to the establishment of Eastern European Jewry, argument has revolved around the magnitude of that contribution.

Dr Elhaik's paper, 'The missing link of Jewish European ancestry: contrasting the Rhineland and the Khazarian Hypotheses', examined a comprehensive dataset of 1,287 unrelated individuals of 8 Jewish and 74 non-Jewish populations genotyped over 531,315 autosomal single nucleotide polymorphisms (SNPs). This was data published by Doron Behar and colleagues in 2010, which Elhaik used to calculate seven measures of ancestry, relatedness, admixture, allele sharing distances, geographical origins, and migration patterns. These identified the Caucasus-Near Eastern and European ancestral signatures in the European Jews' genome along with a smaller, but substantial Middle Eastern genome.

The results were consistent in depicting a Caucasus ancestry for all European Jews. The analysis showed a tight genetic relationship between European Jews and Caucasus populations and pinpointed the biogeographic origin of the European Jews to the south of Khazaria, 560 kilometers from Samandar –Khazaria's capital city. Further analyses yielded a complex multi-ethnic ancestry with a slightly dominant Caucasus -Near Eastern, large South European and Middle Eastern ancestries, and a minor Eastern European contribution.

Dr Elhaik writes, "The most parsimonious explanation for our findings is that Eastern European Jews are of Judeo-Khazarian ancestry forged over many centuries in the Caucasus. Jewish presence in the Caucasus and later Khazaria was recorded as early as the late centuries BCE and reinforced due to the increase in trade along the Silk Road, the decline of Judah (1st-7th centuries), and the rise of Christianity and Islam. Greco-Roman and Mesopotamian Jews gravitating toward Khazaria were also common in the early centuries and their migrations were intensified following the Khazars' conversion to Judaism... The religious conversion of the Khazars encompassed most of the Empire's citizens and subordinate tribes and lasted for the next 400 years until the invasion of the Mongols. At the final collapse of their empire in the 13th century, many of the Judeo-Khazars fled to Eastern Europe and later migrated to Central Europe and admixed with the neighbouring populations."

Dr Elhaik's findings consolidate, otherwise conflicting results describing high heterogeneity among Jewish communities and relatedness to Middle Eastern, Southern European, and Caucasus populations that are not explained under the Rhineland Hypothesis. Although Dr Elhaik's study linked European Jews to the Khazars, there are still questions to be answered. How substantial is the Iranian ancestry in modern day Jews? Since Eastern European Jews arrived from the Caucasus, where did Central and Western European Jews come from? If there was no mass migration out of Palestine at the 7th century, what happened to the ancient Judeans?

And crucially for Dr Elhaik, how would these new findings affect disease studies on Jews and Eurasian populations?

"Epidemiologists studying genetic disorders are constantly struggling with questions regarding ancestry, heterogeneity, and how to account for them," he says. "I hope this work will open up a new era in genetic studies where population stratification will be used more correctly."

**More information:** 'The Missing Link of Jewish European Ancestry: Contrasting the Rhineland and the Khazarian Hypotheses' by Eran Elhaik, *Genome Biology and Evolution*, [DOI: 10.1093/gbe/evs119](https://doi.org/10.1093/gbe/evs119)

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