Penn anthropologists delve into genetic history of Kazakhstan and the Mongolian expansion

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Researchers at the University of Pennsylvania have painted the clearest picture yet of the history of the Kazakhs of the Altai Mountain Range, providing insights into the heritage of a wide swath of people in Central and East Asia.

Using genetic techniques, Theodore Schurr and doctoral student Matthew Dulik, both of the Penn Department of Anthropology, worked with Ludmila Osipova from the Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences, Novosibirsk.

Schurr's team's research was published in the open access journal *PLoS One*. These findings are a continuation of work that Schurr and colleagues have been conducting in the Altai region for a decade.

"It's a key area because it's been a crossroads and conduit for people for thousands and thousands of years," Schurr said. "People not only moved out of it to settle much of Siberia and probably did so more than one time, but it is also possibly the ancestral homeland of Native Americans."

Future research by Schurr and his team will attempt to trace the movement of these lineages as they crossed the Bering Strait into North America.

While this study examines the paternally inherited Y-chromosomes of self-identified Kazakhs in Russia's Altai Republic, the researchers previously published a similar study looking at ancestral lineages in the region using mitochondrial DNA, which is maternally inherited. Adding the male dimension to the historical picture of Altai Kazakhs was especially important, however, given the role that the 13th-century expansion of the Mongol Empire played in the formation of ethnic Kazakhs.

"The sweep of people coming in from Mongolia was largely male," Schurr said. "They left their imprint on much of Central Asia, including Kazakh populations, and we're able to see that more clearly with paternal lineages than maternal ones."

Because women do not have Y-chromosomes, sons receive all of the genetic information contained within them directly from their fathers. These paternal lineages can be used to extrapolate male connections through many generations of fathers and sons.

Testing modern populations for certain Y-chromosome markers can determine the paternal lineages to which present-day men belong. Combining that genetic data with archeological, linguistic and climatological findings allowed the researchers to map Kazakh population groups within time and geographic space.

While some of these lineages can be traced thousands of years into the past, the most significant influence on both Altai Kazakhs and their countrymen to the west occurred within the last eight centuries, during the Mongol expansion.

"There are a couple of lineages associated with the Mongol expansion, including one called C3*, which is specifically associated with Genghis Khan and his male relatives," Schurr said. "Where we see that lineage,

we see the influence of Mongol men and can reconstruct the westward Mongol expansion. We'd expect to see that the newest mutations are the farthest west and the oldest ones are in the Mongol homeland, which they in fact are."

This archeogenetic analysis also allowed the researchers to examine the genetic influence that indigenous Altai populations had on other groups and, as result, inform the kind of nomadic lifestyle they practiced.

"We use the same techniques to analyze the Altai lineages themselves and determine whether they were brought in from elsewhere or expanded from their source area into places north, west and east," Schurr said. "We can see these connections throughout much of Siberia because it's a very dynamic area, and, even though they live in small groups, they are moving around a great deal."

The Altai region lies near the ancient Asian network of trade routes known as the Silk Road. It served as an important connection for trade routes to the north, into Siberia. In addition commercial goods, the Silk Road moved people across the whole of the continent and beyond.

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