Ancient DNA analysis of Early Medieval Alan populations of the North Caucasus

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The Alans were an ancient and medieval Iranian nomadic pastoral people of the North Caucasus. Genetic data of the early Middle Ages Alans and their affinities to the Scythian-Sarmatian tribes, traditionally considered as their ancestors, as well as to the modern population of Europe and the Caucasus have not yet studied thoroughly.

In this study we have analyzed ancient DNA of 70 individuals from 12 burial complexes belonging to the Alan culture from the III-XIII century AD, from the territory of the North Caucasus (Russian Federation).

DNA was extracted from the archaeological material (teeth, temporal bone). We produced low-coverage illumina whole-genome shotgun sequencing data for 63 individuals and analyzed these in the context of ancient and modern genetic variation of the region. The coverage of the genomes was 0.0004-0.3X (median coverage 0.045X and content of endogenous DNA 21,45%).

We used READ method to determine genetic kinship in our sample. We found different degrees of relatedness between 3 males (genetic sex was confirmed), buried in the same burial place, two of them had the same mtDNA hg (K1a4c), and all three belonged to the Y-chromosome R hg.

To analyze changes in the gene pool we divided our sample into early (III-VIII AD) and late Alans (VIII-XIII AD). The Y-chromosomal palette of Alans consisting of 6 different haplogroups (R, Q, J, I, G, E) started to be similar to that of present day autochthonous North Caucasus populations only in the later phase of Alan culture. The distribution of mitochondrial haplogroups in early and late Alans has insignificant differences, while in both groups the East Eurasian component is approximately the same.

PCA analysis is consistent with the results of the obtained haplogroups of both mtDNA and Y-chromosomes. Studied Alan groups can be characterized as genetically heterogeneous, most of the samples are close to the modern populations of the North Caucasus, and some of the samples show an admixture of the East Asian component or a connection with the populations of the Volga-Ural region.

It can be assumed that the late Alans were partially assimilated by the populations of the North Caucasus, while both the early and late Alans had long and close contacts with the East Eurasian populations, which may also be associated with the route of the Great Silk Road through the Caucasus.

Fig. 1. Map of the archaeological sites, where the studied samples were collected (blue color) as well as data from the literature (black color) (Dagvaard et al. 2018)

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Fig. 2. Photographs of the material used for DNA extraction (A - tooth, B - temporal bone)

Fig. 3. Results of READ analysis

Fig. 4. Comparison of Y-chromosomal and mitochondrial haplogroup distribution in early and late Alan populations

Fig. 5. Principal component analysis of 601 present-day (grey color) with 191 projected ancient samples

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