

Archaeology, anthropology and paleogenetics of the Fatyanovo culture – new results

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Goals: The Corded Ware culture, one of the main archaeological traditions of Europe of the Late Neolithic, was widely distributed in the third millennium *BC*. The Fatyanovo archaeological culture, spread from Ilmen and Pskov lakes to Kama and Vyatka rivers and from the Vologda region to the Desna basin, can also be considered its derivative.

A long-standing comparative study of the craniological materials of the Upper Volga Fatyanovo culture included data of cultures of the battle axes and the Corded ceramics from the territories of Estonia, East Prussia, Saxony-Thuringia, the southwestern part of Germany, Bohemia, Moravia, Slovakia, and southeastern Poland. It was revealed the heterogeneity of the anthropological composition of representatives of this cultural and historical community [1]. According to the conclusions of this research, the Fatyanovo people of the Volga-Oka interfluvium formed a single group with the tribes of the Estonian battle axes culture and the Vistula-Neman culture in Poland.

A recent paleogenetic study included examination of samples from the Volga region and from Estonia. It was shown that the Fatyanovo people, being descendants of people of mixed origin (steppe dwellers and early European farmers [2]), were close to other carriers of the Corded Ware cultures, and were participants in a wide migration to the northeast from the Central Europe through the Baltics [3].

Within the framework of this work, the skeletal remains of 63 buried from the excavations of the Fatyanovo burial grounds (Volosovo-Danilovsky, Sushchevsky (Nikolo-Perevoz), Miloslavsky, Mytishchensky, Goretsky, Galuzinsky, Nikultsino, Voronkovo and Lovtsy) from the storage of the Institute of Archeology of the Russian Academy of Sciences were subjected to a comprehensive anthropological and genetic examination.

Methods and Results: Our anthropological examination of the materials of the Volosovo-Danilovsky burial ground, the largest monument of the Fatyanovo culture, investigated by D.A. Krainov in the Yaroslavl region, revealed rare and specific injuries of the left arm in the area of the elbow joint and hand in men. The closest analogies were previously described among representatives of the Corded Ware cultures in Germany (Eulau archaeological site) and in Poland (Kruszyn), where they were interpreted as military (defensive) wounds.

At the first stage of complex genetic studies of skeletal remains from the Fatyanovo burial grounds, samples (numbering more than 20) were selected, according to anthropological data, related to men. Ancient *DNA* was extracted from the samples, quantitative analysis of the quality of which in most cases showed high characteristics.

Microsatellite studies of *Y*-chromosomal *DNA* were carried out for all male samples – a fragment analysis was performed using a 27-locus *STR* panel. As a result, haplotypes were obtained, according to which haplogroups of the studied individuals were predicted. Then targeted *NGS* of *DNA* samples was carried out. A specially designed panel of probes targeting 700 *SNP* *Y*-chromosomes made it possible to check and refine the haplogroups of the studied individuals. A number of *SNPs* of nuclear *DNA*, on which a panel of probes was also designed, made it possible to identify phenotypic signs such as hair, eye, and skin color. Part of the probes of the developed panel completely covers mitochondrial *DNA*, therefore, as a result of *NGS*, mitochondrial haplogroups and haplotypes of the studied individuals were identified, and data were obtained that confirmed its antiquity by bioinformatic analysis of mitochondrial *DNA*.

Based on the results of genetic studies of the uniparental markers of a representative sample of individuals, new data on the possible origin of the population of the Fatyan culture were obtained.

Conclusions: The joint consideration of anthropological and genetic data gives evidence for hypothesis of migrations of the Central European inhabitants to the Russian Plain. Thus, injuries of the left arm in the area of the elbow joint and hand in the Volosovo-Danilovsky burial ground testify to similar battle tactics among the Fatyanovo people of the Upper Volga and the Corded Ware men of Germany and Poland. The features serve as an independent indicator of their belonging to a single cultural community. The paleopathological study finds confirmation in the results of paleogenetic analysis showing a connection with the Central European population of the Corded Ware culture.

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References

1. Denisova R.Ya. Anthropology of the ancient Balts. Riga: Znaniye, 1975. (in Russian)
2. Trifonov V.A., Prokhorchuk E.B., Zhur K.V. Genetic diversity of ancient populations in the Caucasus and the adjacent steppes during the eneolithic–bronze age (V–II mill. BC): main results and issues of cultural and historical interpretation. *Brif Commun Inst Archaeology*. 2021;262:95-114.
3. Saag L., Vasilyev S.V., Varul L., Kosorukova N.V., Gerasimov D.V. et al. Genetic ancestry changes in Stone to Bronze Age transition in the East European plain. *Sci Adv*. 2021;7:eabd6535.