

## Article

# The Finnic Peoples of Russia: Genetic Structure Inferred from Genome-Wide and Y-Chromosome Data

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**Abstract: Background:** Eastern Finnic populations, including Karelians, Veps, Votes, Ingrians, and Ingrian Finns, are a significant component of the history of Finnic populations, which have developed over ~3 kya. Yet, these groups remain understudied from a genetic point of view. **Methods:** In this work, we explore the gene pools of Karelians (Northern, Tver, Ludic, and Livvi), Veps, Ingrians, Votes, and Ingrian Finns using Y-chromosome markers (N = 357) and genome-wide autosomes (N = 67) and in comparison with selected Russians populations of the area (N = 763). The data are analyzed using statistical, bioinformatic, and cartographic methods. **Results:** The autosomal gene pool of Eastern Finnic populations can be divided into two large categories based on the results of the PCA and ADMIXTURE modeling: (a) “Karelia”: Veps, Northern, Ludic, Livvi, and Tver Karelians; (b) “Ingria”: Ingrians, Votes, Ingrian Finns. The Y-chromosomal gene pool of Baltic Finns is more diverse and is composed of four genetic components. The “Northern” component prevails in Northern Karelians and Ingrian Finns, the “Karelian” in Livvi, Ludic, and Tver Karelians, the “Ingrian-Veps” in Ingrians and Veps (a heterogeneous cluster occupying an intermediate position between the “Northern” and the “Karelian” ones), and the “Southern” in Votes. Moreover, our phylogeographic analysis has found that the Y-haplogroup N3a4-Z1927 carriers are frequent among most Eastern Finnic populations, as well as among some Northern Russian and Central Russian populations. **Conclusions:** The autosomal clustering reflects the major areal groupings of the populations in question, while the Y-chromosomal gene pool correlates with the known history of these groups. The overlap of the four Y-chromosomal patterns may reflect the eastern part of the homeland of the Proto-Finnic gene pool. The carriers of the Y-haplogroup N3a4-Z1927, frequent in the sample, had a common ancestor at ~2.4 kya, but the active spread of N3a4-Z1927 happened only at ~1.7–2 kya, during the “golden” age of the Proto-Finnic culture (the archaeological period of the “typical” Tarand graves). A heterogeneous Y-chromosomal cluster containing Ingrians, Veps, and Northern Russian populations, should be further studied.

**Keywords:** Finnic people; gene pool; Y-chromosome; genome-wide SNPs; ancestral components; Karelians; Veps; Ingrian Finns; Votes; Ingrians