Archaeogenetic study of historic Livs

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The Late Iron Age and early medieval period were a dynamic time in the Eastern Baltic region for the formation of various ethnic groups. One such group was the Livs, who inhabited the eastern coast of the Baltic Sea, with their core settlements concentrated around the lower reaches of the Daugava and Gauja rivers. There are notable records that describe the history and culture of medieval Livs. They were mentioned in the 13th-century *Livonian Chronicle of Henry*, lending their name to the historical region of Livonia, which includes present-day southern Estonia and Latvia. The Livic language, belonging to the Finno-Ugric branch of the Uralic language family, was replaced by Latvian over the centuries but is undergoing a revival process since the restoration of Latvian independence.

The Livs played an important role in the history of the Finnic-speaking groups in the Eastern Baltic, so understanding their origins and mutual influences with other groups is important for better comprehending the processes that shaped the genetic and cultural landscape of the region. Given the inherent difficulties in using individuals from the present-day Latvian territory with alleged Livic ancestry to study the historic Livs, the analysis of DNA from human remains in archaeological sites of Livic/Finnic context can offer crucial insights for understanding the origins of the Livs and, more widely, Finnic speaking groups in Eastern Europe.

In this study, we aim to investigate the population structure of the Livs and their genetic connections to medieval/early modern and contemporary populations from the eastern Baltic region using ancient DNA (aDNA). We generated whole-genome sequences from individuals dating to the Late Iron Age and early medieval period (10th to early 13th century AD) from what is now Latvia. Our final dataset includes 56 ancient genomes that passed authenticity and

contamination checks, with a minimum coverage of 0.03x, enabling downstream population genetic analyses. This includes 40 individuals from two Livic burial sites, Ogresgala Čabas and Salaspils Laukskola. In addition, there are 16 individuals from other Late Iron Age and medieval sites across eastern Latvia, including the southeastern (Kivti, Kristapiņi, Augustinišķi), northeastern (Asaru/Buliņu, Daņilovka), and northern (Jaunpiebalga) regions, which are mainly associated with Latgalians (Baltic cultural context) and are used as a comparative background from neighbouring territories. Genetic analysis showed that the investigated individuals exhibit close affinity to modern populations from Eastern Europe, with Livic individuals displaying significant genetic diversity. We examined identical-by-descent genomic segments shared between ancient as well as between ancient and modern individuals. Our findings indicate that the Livs were genetically closer to other ancient individuals from Latvia than to those from Estonia, with the exception of individuals from the Siksälä site from the south-easternmost corner of Estonia who showed the opposite pattern.