Who are you, who am I?

The potentials of aDNA research in inhumation burials
of Pre-Roman Iron Age Finland

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Abstract

A literature review on the Baltic-Finnic ethnogenesis, the Pre-Roman Iron Age in Finland as well as aDNA research shows potential for not only future aDNA research on the Pre-Roman Iron Age, but other research methods as well. Other fields such as linguistics should also not be ignored, especially when it comes to researching ethnogenesis. The literature review focused on literature, both archaeological and biological, that centered on cemeteries. Due to the acidity of Finnish soil research on organic samples has been deemed difficult – but as the study shows, not impossible. Newer and more efficient methods are constantly discovered, and the future of aDNA research on the Pre-Roman Iron Age in Finland has potential. This thesis concludes that as of right now, aDNA results from the Pre-Roman Iron Age have been slim but using other methods alongside extracting aDNA raises the potential and can provide more thorough results on the inhabitants of Pre-Roman Iron Age Finland. Future methods and research can tell us more about migration events and when the genetic admixture of Finns was formed.

Key words: aDNA, ethnogenesis, Finland, haplogroups, literature review, methods of natural sciences, Pre-Roman Iron Age, tarand cemeteries

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1 Introduction

Tell me who are you, who am I?

Dazzling light, Ateez (2019)

Research on the Pre-Roman Iron Age of Finland is quite scarce compared to later Iron Age. The same goes for ancient DNA, or aDNA, research in Finland compared to neighbouring regions, especially Sweden and Estonia. A review of the plentiful existing research literature tells of the issues these types of research have in Finland, but it also serves as proof that there is potential for more research in the future, in aDNA and in archaeology. Especially aDNA methods develop so fast that literature gets old quite quickly. By combining archaeological, biological and archaeobiological research literature a clearer picture of future potential and research gaps can be formed. The chosen literature consists mostly of very recently published articles and books on aDNA as well as a look at some current projects relating to the subject at hand. aDNA research has been plentiful since the 1990s, but any common conclusions have been cited with mostly recent studies.

Hannah Snyder (2019) describes literature reviews as a foundation for all types of research and continues to state that they serve as the grounds for future research and theory. She observes that literature reviews are especially helpful when providing overviews in areas where research is interdisciplinary. In addition, according to Snyder (2019), literature reviews can be an excellent way to evaluate the state of knowledge on a particular topic, identify research gaps or discuss a particular topic. Literature review as a methodology works well for the purposes of this thesis, as the core purpose is to provide an overview of interdisciplinary research, discuss the topic in question and identify possible direction for future research. The thesis intends to show current paradigms and theories of archaeological research on the Pre-Roman Iron Age in Finland and how interdisciplinary research with natural sciences has been used in the past. Furthermore, the literature review is used as a tool to discover how interdisciplinary research methods could help provide answers to questions of Pre-Roman Iron Age settlement, ethnicities and the arrival of tarand cemeteries in future research.

For the archaeological background on the Pre-Roman Iron Age a general overview from *Muinaisuutemme jäljet* (2015) is used as it is sufficient for the purposes of the thesis. The Korvala site in Sauvo, which has been referred to as the most important site of the Pre-Roman

Iron Age period research in Finland with its unique qualities, has very little published research on it besides excavation reports. Although the research on the Pre-Roman Iron Age in Finland is not as plentiful as for example in Estonia, where more sites and samples have been discovered, it, with its tarand cemeteries (fi: tarhakalmistot) have been hailed as important for the research of the ethnogenesis of the Baltic-Finnics, and I tend to agree after carrying out the literature review. A closer look at tarand cemeteries is provided later in the thesis.

Homo Fennicus – itämerensuomalaisten etnohistoria (Lang 2020) functions as a base from which, with additional literature, the thesis and its concluding hypothesis have been built upon. Lang also brought up the question of ethnogenesis, or the formation and development of a specific ethnic group. I believe ethnogenesis as a term should be approached carefully, as ethnogenesis can happen by self-identification or by outside definition, of which outside definition can be problematic. When it comes to archaeological research it´s practically impossible to define ethnicities, or specifically when ethnicities have formed, as bones and grave goods don´t directly speak of ethnic identity with any certainty – and neither does DNA.

Existing literature gives a good base on which new hypotheses and thinking can be built. Tarand cemeteries are a signature of the Pre-Roman Iron Age in the Baltics, and they can speak of prehistoric connections between Finland and Estonia – but how exactly could they be utilised to answer questions of prehistoric genetic admixture? Could tarand cemeteries be the answer to the arrival of the Siberian component in the genetic admixture of Finns?

2 The Pre-Roman Iron Age in Finland

The Bronze Age, which preceded the Pre-Roman Iron Age, has been characterised by connections. Professor of archaeology Mika Lavento (2015a: 210) tells that these connections were between the inland and coastal populations as well as between the coastal population and the network connected by the Baltic Sea. Inland populations in turn had influences from Central Volga and even Ural regions. The effects of these connections can be seen in the archaeology of the Pre-Roman Iron Age through changes in archaeological culture.

The Pre-Roman Iron Age spans from 500 BCE to 0/50 CE. However, when referring to inland and northern Finland, the term "younger Early Metal Period" which refers to the time period spanning from approximately 700 BCE to 300 BCE is commonly used (Raninen & Wessman 2015: 216).

2.1 Settlement theories

In *Muinaisuutemme jäljet* (2015) archaeologists Sami Raninen and Anna Wessman (2015: 220, 234) say that the existing research for the Pre-Roman Iron Age differs from the later Iron Ages; unlike other Iron Age research, which has been based largely on burial sites, Pre-Roman Iron Age research has leaned on mostly ceramics and dwelling site finds. This has led to certain assumptions about connectivity between Pre-Roman Iron Age communities and their ethnicities, which should be discussed in more detail. The lack of grave finds despite the introduction of iron and the beginning of placing iron artefacts in graves, which became more common later, led to the Hackman paradigm, according to Raninen and Wessman.

The Hackman paradigm assumed that based on a lack of clear evidence it could be interpreted that the west coast in Finland was deserted during the Pre-Roman Iron Age and the prevailing explanation was that the Finns would have migrated from modern day Estonia during the Roman Iron Age (Edgren 1999: 311). This paradigm was abandoned after C. F. Meinander (1969) proved that the makers of the Morby type ceramics had roots to the Bronze Age and that there was continuity between the periods. This changed Pre-Roman Iron Age research, although Meinander has later been critiqued, especially on the inflexible classificatons of Morby and Morby-like ceramics (Edgren 1999: 311, 316; Mäkivuoti 1999: 334; Moisio 2015: 5). According to archaeologist Torsten Edgren (1999) the seeming desertion of the west coast has then been explained by the changed climate and the beginning of the subatlantic climate era, which was unfavourable for agriculture. However, the current belief is that the climate conditions fluctuated between favourable and unfavourable (Raninen & Wessman 2015: 221). Hackman paradigms migration explanation for the arrival of ethnic Finns from Estonia might have been abandoned, but it shows that researchers have put some emphasis on connections between Finland and Estonia, both archaeologically and sometimes ethnically.

2.2 Ceramics

Raninen and Wessman as well as archaeologist Henrik Asplund (2008: 210) tell that the Morby-type ceramics prevalent in the coastal region developed from Paimio ceramics, perhaps by the end of the Bronze Age. The latter half of the Early Metal Period also signified more local groups in ceramics in inland Finland, distinguished as subtypes of Säräisniemi 2 -ceramics, which will be referred to as Sär2 from this point on (Raninen & Wessman 2015: 220, 222; Lavento 2015a: 211). Morby and Morby-like ceramics have been occasionally found inland too, which supports the idea that the Bronze Age connections between the coast and inland areas continued into the Pre-Roman Iron Age and beyond (Raninen & Wessman 2015: 225). Ceramics with decorations resembling Morby Ware have been found in Estonia as well as Sweden (Asplund 2008: 225, 229).

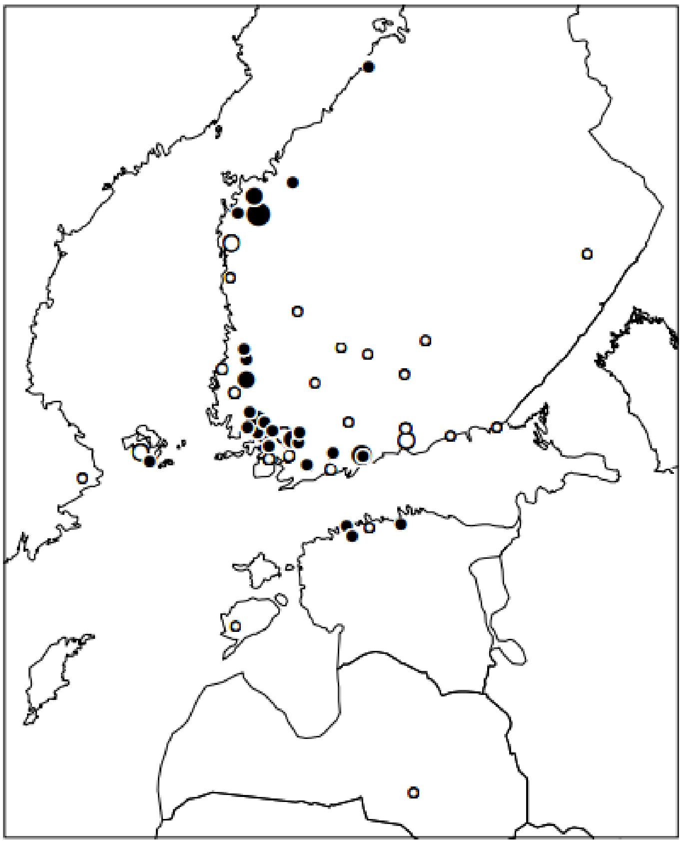

Fig. 1. Morby Ware distribution. Circles represent uncertain identification or pottery resembling Morby Ware (Asplund 2008).

Morby-type ceramics distribution was mostly the coastal regions of Uusimaa, Finland Proper, Satakunta and Southern Ostrobothnia. It has however not been found east of Porvoo. Raninen and Wessman (2015: 223, 225) say that the coastal area can be seen as a quite uniform culture which formed on continuous traditions from the Bronze Age, similar livelihoods, the contacts between the local communities as well as the contacts outwards to the Baltic Sea. They also describe that in the culture associated with Morby-type ceramics, the dwelling sites were focused on what was then the outer coast. In addition to the coast there are signs of dwelling in the Southwestern archipelago all the way to the outer archipelago and Åland.

Raninen and Wessman (2015: 226) continue to explain that the northern coast differed from the Morby-type ceramics culture, as it´s not found there despite there being a lot of similar cairns. However, Sär2 type ceramics have been found. Seal hunting played a more important part in the north than it did in the south, and thus the culture of the northern coast seemed to have been closer to that of inland Finland.

2.3 Graves and dwelling sites

Continuing with Raninen and Wessman´s general overview of the Pre-Roman Iron Age, during the Bronze Age cairns were placed on hills overlooking the ocean, but Pre-Roman Iron Age cairns have been found to be on gently sloping moraine slopes near dwelling sites, arable land and meadows. They were also lower in height and instead of individual graves burial sites often consisted of tens of stone structures in groups. Said stone structures were quadrangular, and some cairns had rectangular lines of stones called "tarands". Tarand cemeteries are explored more closely later. The inland cairns (sometimes referred to as "lapp cairns") also partially represent the same traditions as the cairns on the coast (Raninen & Wessman 2015: 222, 225). This, along with the previously mentioned difference in the dispersal of different types of ceramics, shows at least a slight difference in archaeological culture between coastal and inland Finland. What this difference meant linguistically and ethnically is not quite as simple, as they cannot be equated to particular archaeological cultures, but tarand cemeteries could help provide some answers to this with further research.

Edgren (1999: 317-318) explains that although the relationship between dwelling sites and graves were close during the Pre-Roman Iron Age, especially in Ostrobothnia, Finland Proper had graves further away from dwelling sites. These graves were simple cairns with mixed earth, from post Bronze Age round cairns to rectangularly piled cairns. The cairns had both cremations and inhumations in them. These burial methods were parallel to each other in cairns from the Pre-Roman Iron Age up to the Roman Iron Age in Finland, Estonia and central Sweden. Edgren´s explanation supports the fact that research on inhumation burials from cairns parallel to Sweden and Estonia could tell us about possible migration events and connections more closely. Edgren continues to say that Pre-Roman Iron Age dwelling sites were located mostly on sandy grounds, inclined to either south or west on the slope. These have been interpreted as the dwelling sites of farmers. Some dwelling sites were on rock lands, in particular in Ostrobothnia. Besides dwelling sites there were also seasonal hunting camps in the outer archipelago of Southwestern Finland. Dwelling sites were closer to the shoreline in Ostrobothnia in comparison to southern Finland.

The basic living unit for the Pre-Roman Iron Age, particularly in the coastal region, has been defined as a small, singular farm according to Raninen and Wessman (2015: 223, 225). They continue to say that communities were also far apart and the fall of chief lead communities moving from the Bronze Age into the Iron Age seemed to have been a common phenomenon in Europe. The use of these Pre-Roman Iron Age dwelling sites continued well into the Roman Iron Age.

2.4 Livelihood and ethnicities of settlement

The Pre-Roman Iron Age is the period that solidified the role of agriculture and the rise of the importance of metallurgy. There is however not enough research to properly form a detailed picture of how farming and animal husbandry became more common. Both Raninen and Wessman (2015: 221, 227) as well as Edgren (1999: 326) speak of land cultivation during the Pre-Roman Iron Age; land cultivation was seemingly mostly slash-and-burn farming, but there are also references to arable farming. Although great emphasis is put on the importance of agriculture, the above-mentioned authors state that it´s certain that the hunter-gatherer-fisher lifestyle retained its importance in the Pre-Roman Iron Age.

In their general overview Raninen and Wessman also speak of animal husbandry, which has been considered a central source of livelihood based on the locations of known dwelling sites, but cattle bone finds dating to the Pre-Roman Iron Age have been rather scarce. The people inhabiting inland Finland have thus been mostly interpreted as hunter-gatherer-fishers. The land cultivation of inland areas has been interpreted as small scale slash-and-burn farming (Raninen & Wessman 2015: 223, 227).

The changing of the climate to the subatlantic climate of the Pre-Roman Iron Age made land cultivation more difficult periodically, according to Raninen and Wessman (2015: 221). However, particularly the coastal region preserved it´s fairly uniform culture from the Bronze Age. Archaeologist Markku Mäkivuoti (1999: 335-336) has stated that the burial sites and dwelling sites of the coast indicate a region of settlement that could be considered as ethnically Finnish. This would make the makers of Morby and Morby-like ceramics with their Pre-Roman Iron Age burials the foundation for the so called ethnically Finnish population. It has then been suggested, as maintained by Mäkivuoti, that the Sär2 groups of ceramics, and the inland and northern populations with their eastern influences would represent the ancestors of the Sami, or several ethnic groups.

Although some differences between coastal and inland populations, such as ceramics, can be observed during the Pre-Roman Iron Age, Lavento (2015b: 228) has said that the biggest difference was the utilising of the ocean, and that no clear cultural differences can be observed during the Pre-Roman Iron Age. Even though the differences may not be clear, they certainly are there, as can be seen from the observed differences in ceramics, livelihood and the slight differences in cairn types.

Emphasis should perhaps be put on the fact that research shows the coastal communities and the inland communities shared similarities and communicated with each other. It should also be noted that equating groups of ceramics to an ethnicity is not unproblematic, and by itself does not serve as proof that the Pre-Roman Iron Age saw Finns on the coastal regions and other ethnicities in inland regions of the country. It has however been discussed that the Pre-Roman Iron Age habitants of Finland would have been “pre-Finns” (Grünthal 2002: 12), and as such the question of ethnicity or the Finnish ethnogenesis is quite relevant to the Pre-Roman Iron Age from my point of view. Discussing ethnogenesis was not in the original research plan, but it came up several times in the literature review, and thus the decision was made that it should be included and discussed within the thesis.

3 aDNA research and other methods

3.1 Introduction to aDNA research

DNA stores genetic information as genes and transmits it to other molecules and the next generations (Morris 2019: 51). It is the building block of who we are, and it has been and is currently extensively researched, as it provides the key to understanding not only the causes of certain diseases or physical attributes but our ancestry as well. DNA extracted from samples from ancient people is referred to as ancient DNA or aDNA. DNA from living humans is usually extracted from blood samples, aDNA is extracted from several organic materials of which the best sources are teeth, dental enamel and bones. The cranial bone *Pars petrosa* is especially good for preservation of DNA in ancient samples (Moilanen & Paasikivi 2023: 7; Salmela & Översti 2024: 87). However, aDNA can be easily contaminated by either the bacteria in the soil of the burial site, the people who handle the samples or the chemicals which the samples are handled with (Salmela & Översti 2024: 88). DNA also begins degrading postmortem, and degraded DNA has short fragment lengths on top of there being a limited quantity of it, there are also damage patterns, which make doing analysis more difficult (Childebayeva & Zavala 2023: 1). This makes it practically impossible to extract aDNA from finds of previous archaeological excavations, as the risk for contamination is high.

Genomes can be categorised by haplogroups, which are determined by the haplotypes inherited through mtDNA and Y-chromosomal lineages. mtDNA or mitochondrial DNA is inherited through the maternal line, from mother to children. Mutations in mtDNA are rare and thus it is inherited as almost identical or atleast very similar to that of the maternal line. This similar mtDNA sequence is referred to as a haplotype – which is defined by a specific set of mutations expressed in that particular lineage. The Y-chromosome is a sex chromosome present usually only in males, and it´s inherited through paternal lineages. As with mtDNA, Y-chromosomal DNA can be used to define haplotypes or the haplogroup of an individual. Differences in the frequencies of haplogroups between different populations makes it possible to do comparisons between different populations in different areas and for example detect migrations (Salmela & Översti 2024: 88-90; Översti & Salmela 2024: 99, 101).

On top of mtDNA and Y-chromosomal DNA, which are inherited through only one of the parents, humans have autosomal DNA inherited through chromosomes that are inherited from both parents. Autosomal DNA makes up most of DNA at 98%, and it specifically can be used to detect kinship (Salmela & Översti 2024: 90).

If aDNA can be linked to an archaeological culture, it enables making interpretations between populations in different time periods. aDNA without archaeological context does not provide as much information as it does with context – even better if the site of the sample can be dated with for example radiocarbon dating.

3.2 aDNA research in Finland

For research gaps to be seen, it must first be understood what it is that we already know. What is known of the genetic makeup of Finland is that there have been at least two major migration events; the arrival of the comb ceramic culture and the later arrival of the corded ware culture (Lappalainen et al. 2006: 208; Lang 2020: 15). In addition to the major migration events, the inhabitants of Finland have faced at least one bottleneck event, which is one of the reasons behind the reduction in haplotype diversity in both Finns and Sami (Lahermo 1998: 44). Theories place this event between 2000-4000yBP (Lahermo 1998: 16; Lang 2020: 104).

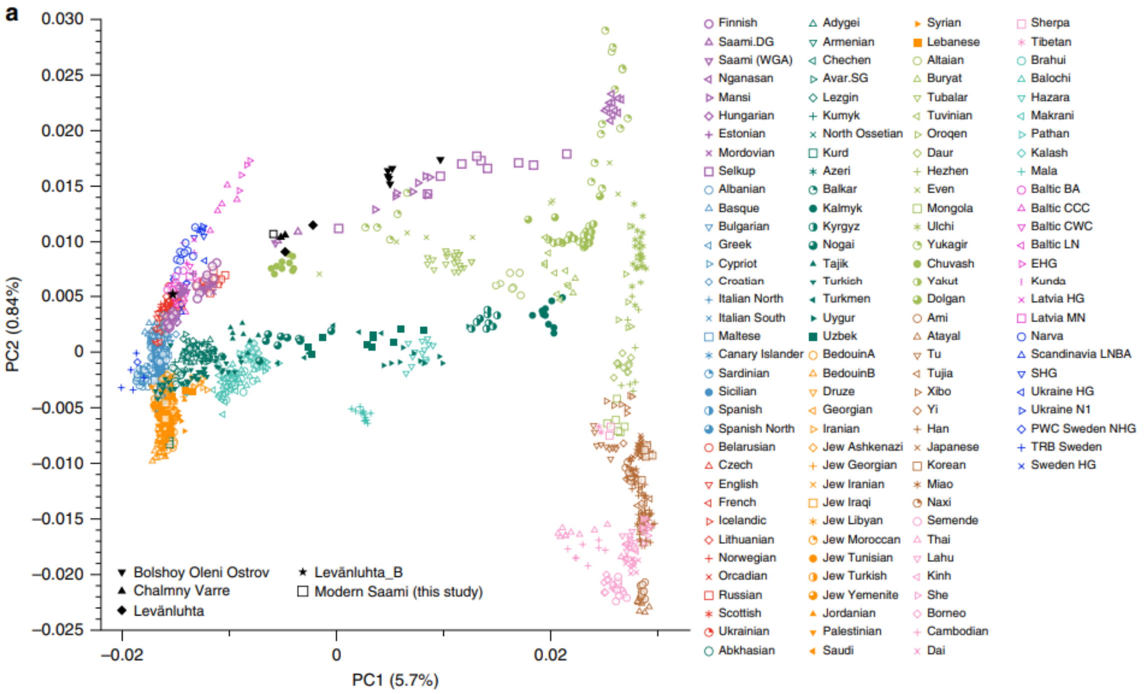

Fig. 2. a PCA plot of 113 Modern Eurasian populations (Lamnidis et al. 2018).

Finns genetically resemble the other Baltic Sea habitants who also speak Finnic languages as can be seen in Fig. 2. – except the Sami, who have a much larger eastern element in their genome compared to most of western Eurasia (Salmela 2023: 1251). Although Finns greatly resemble other Baltic Sea peoples and are virtually indistinguishable from other Europeans through mtDNA (Lahermo 1998: 1319), The difference between maternal lineages of eastern and western Finland can be detected from samples as early as the Iron Age and early Middle Ages. According to Elina Salmela this genetic difference was affected by the spread of permanent farming settlement, but that random genetic drift does not explain the contribution of the Siberian type genetic component (Salmela 2023: 1251-1252). This implies that the Siberian type genetic component was added to the gene pool before permanent farming settlement, and that the spread of it was not directly related to the spread of permanent farming settlement.

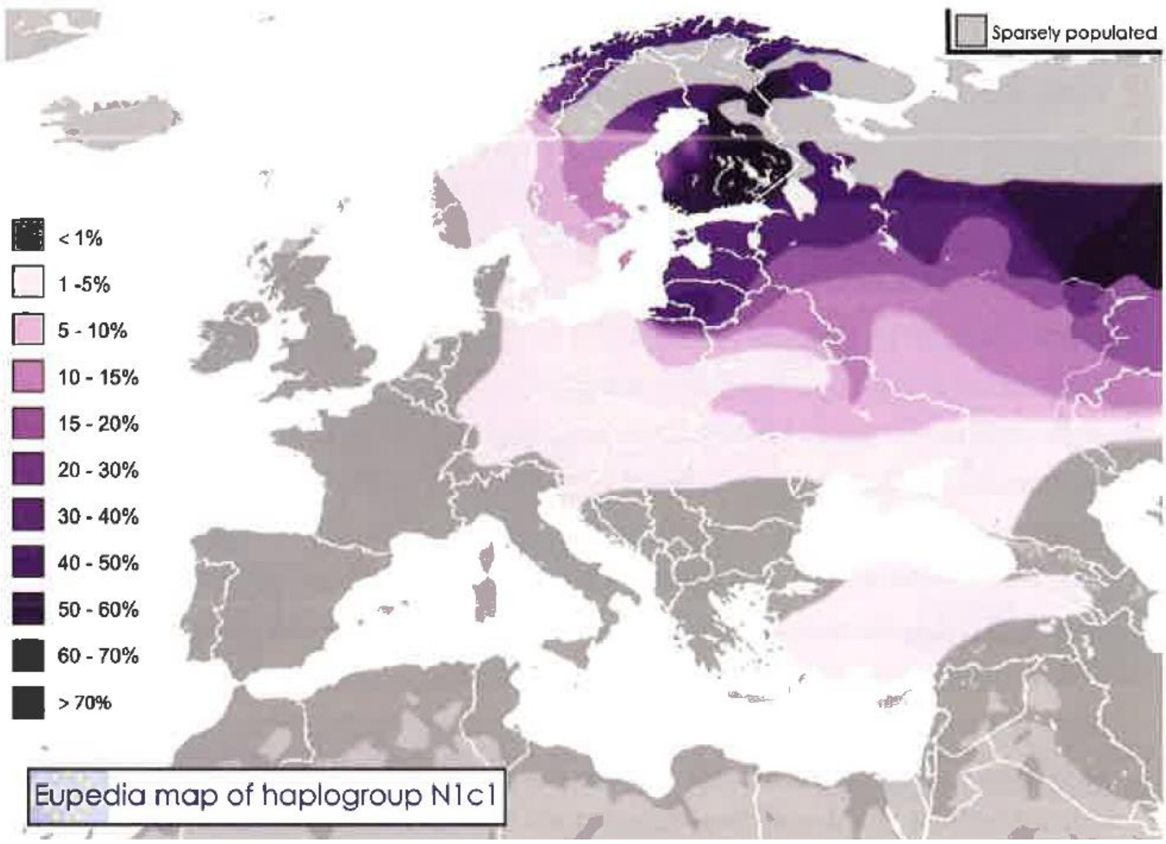

Fig. 3. The modern dispersal of Y-chromosomal haplogroup N1c1 (Lang 2020).

Finns, along with other modern Uralic speakers, exhibit a larger eastern component particularly in Y-chromosomal haplogroups compared to the rest of western Eurasia, but for example the haplogroup N1c, which is especially prevalent in Uralic speakers, is absent in all published Mesolithic genomes from Karelia and the Baltics (Lamnidis et al. 2018: 8). This suggests that the so-called Siberian component was acquired later. The earliest known occurrence of haplogroup N1c in Fennoscandia is from Bolshoy in the Kola Peninsula, from an Early Metal Period grave dated 1610-1436 calBCE (Lamnidis et al. 2018: 4). The study, which includes the data from Bolshoy, suggests that the eastern genetic component arrived in north-eastern Europe before 3500yBP. Y-chromosomal haplogroups and their dispersal have been used to detect a difference between east and west in Finland, present in the modern day (Lang 2020: 94; Sundell 2014; Lappalainen et al. 2006).

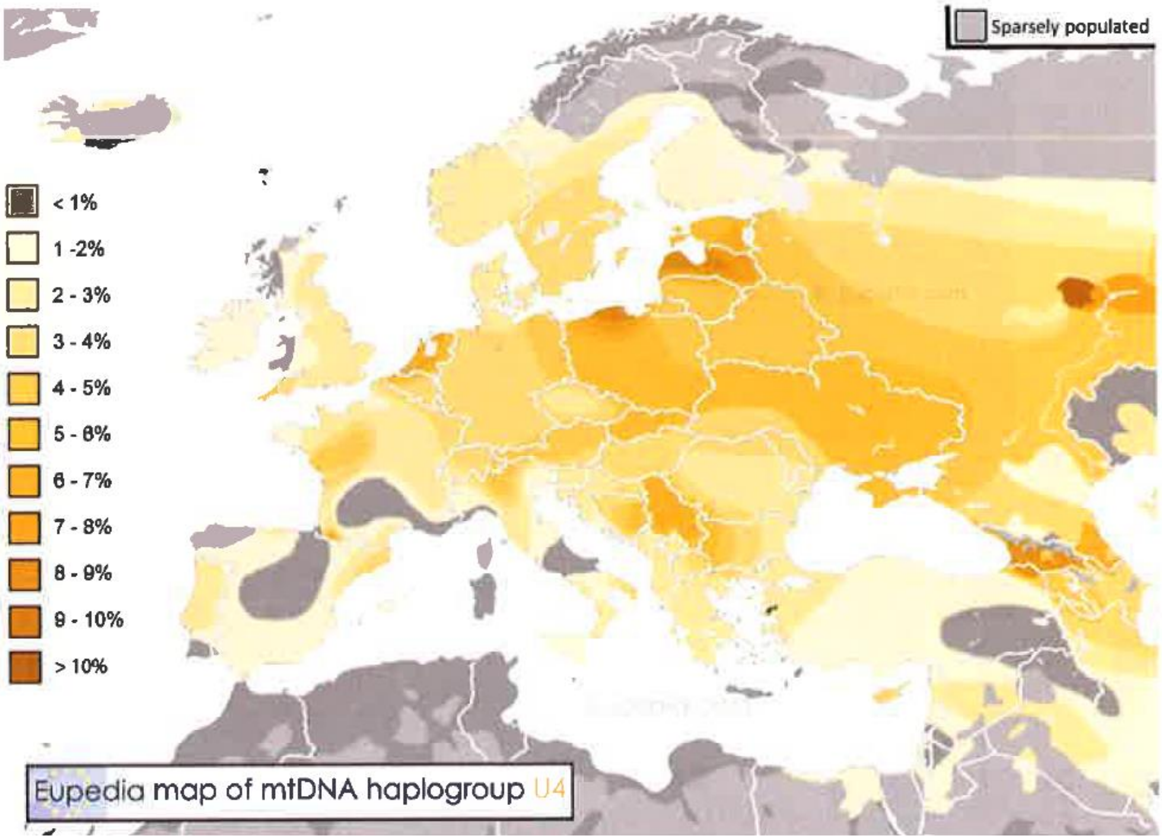

Fig. 4. The modern dispersal of mtDNA-haplogroup U4 (Lang 2020).

The mitochondrial haplogroup U is considered to signify eastern heritage, and in Europe its most common in the Sami, and Finns exhibit it with a larger percentage than most of western Eurasia (Överst & Salmela 2024: 101). This suggests male-mediated geneflow from the east, and female-mediated geneflow from the west.

Moilanen and Paasikivi (2023: 7) state that there are only fragmentary teeth and dental enamel left from Stone Age Finland, and thus extracting aDNA from Stone Age Finland is not possible as of today. Computational methods can however be applied. Computational methods take DNA data and run it through different types of simulations to for example see what types of migration events could have affected the gene pool in Finland (see Lahermo 1998). Although aDNA samples are currently practically impossible to extract from Stone Age samples, I think it should be noted that organic samples such as feather fragments have been found in, for example, the Mesolithic ochre grave of Majoonsuo in Eastern Finland (Kirkinen et al. 2022). As previously stated, a lack of aDNA does not mean a lack of potential, and other scientific methods may be applicable when genetic analysis is not possible.

The prevalent burial method of Bronze and Iron Age Finland was cremation and once bone burns, all organic material is lost. Moilanen and Paasikivi (2023) also mention that a potential research ground for ancient pathogen research could be the inhumation burials of 1000-1200 CE Iron Age Finland. However, the authors do not mention the tarand cemeteries of the Pre-Roman Iron Age and Roman Iron Age that have been deduced to include inhumation burials.

Inhumation burials from Bronze Age cairns have not been preserved but the size of the stone coffins and the lack of burnt bone signal to the fact that these would have been inhumation burials (Lang 2020: 200), which is a reasonable deduction. Burials that come after the Pre-Roman Iron Age include grave goods which are necessary for dating without natural sciences – but burials lacking grave goods that are located below the Bronze Age shoreline have been hypothesized to belong to the Pre-Roman Iron Age (Lang 2020: 201).

Major projects on the matter of not necessarily ethnogenesis, but the genetic history of habitants of North-Eastern Europe are SUGRIGE (2016-2022), a Finno-Ugric ancient genome project, and SUMRAGEN (2023-), a Finnish ancient genome project, of which SUMRAGEN focuses on the genomics and metagenomics of Finnish aDNA samples. The project defines metagenomics as the microbiome, including exposure to pathogens, the evolution of pathogens and disease – that people carry. So far, the project has sequenced 629 individuals, including the Hattula Suontaka burial which garnered a lot of media attention (Moilanen et al. 2022; *SUGRIGE-projekti* n.d.; *SUMRAGEN-projekti* n.d.).

Several aDNA samples have been extracted and studied in Finland as well. One recent example is the Late Iron Age Luistari site in Eura, from which 31 individuals were sampled as part of the SUGRIGE-project. The individuals showed no clear distinction between eastern or western influence, both eastern and western features can be distinguished from the results (Översti & Salmela 2024: 99, 106). The implication from this is that the eastern component arrived before Late Iron Age and the Pre-Roman Iron Age is not excluded as an option.

aDNA samples have been successfully taken from Pre-Roman Iron Age sites in Finland as well. Most have not been successful, but from Vöyri Latjineliden, dated partially into the Pre-Roman Iron Age, researchers have been able to get decent amounts of DNA (*pers. comm.* Peltola 2024). Thus, aDNA research is possible despite the difficulties it faces in the Finnish soil. It should be noted however, that extracting aDNA is not the only way to study the people of Pre-Roman Iron Age Finland and possible migration events etc. In addition to the methods that are applicable for research, a perhaps more important question to ask is what exactly are the questions that research could answer.

3.3 Isotopes and more

Extracting aDNA is not the only method that can tell us about the people of the past, and it should be noted that when aDNA sampling is not possible, other biological methods could still be utilised, and a lack of aDNA does not mean the lack of potential. Stable isotopes of strontium (Sr) and oxygen (O) can be used to identify the place of origin of an individual, as isotope composition is stored in the bones and in isotope research dental enamel is particularly important, because it contains isotope ratios that reflect the individual's childhood place of residence. For example, an individual from Maaria, Kärsämäki was identified to not be native to the southwestern coast of Finland (Moisio 2015: 63, 65). The organic part of bones, collagen, store isotopes of coal (C) that have been measured along with carbon dating for a longtime. Collagen also stores information on what ancient people ate. Nitrogen (N) isotopes along with isotopes of coal also provide a clearer picture of diets of ancient populations (Etu-Sihvola 2024: 117). Although the Hackman paradigm has largely been abandoned, it does not mean that there could not have been migrations during the Pre-Roman Iron Age, and isotopes could provide answers to this. It should be noted that the arrival of tarand cemeteries in Finland is not quite clear. Most tarand cemeteries in modern day Finland have been dated to the Roman Iron Age, but the possibility of them having arrived during the Pre-Roman Iron Age, as in Estonia, has been discussed (AKP Tarhakalmisto). The change in settlement after the Bronze Age could also be an indicator of this demographic change. Isotopic research applied to tarand cemeteries could help determine, whether tarands came to Finland as cultural exchange or by new settlers from the east. aDNA research may tell point blank whether the inhumation burials in tarand cemeteries were done by people carrying N-haplogroups, but isotopes can actually tell whether the individual, carrying an N-haplogroup or not, originated in the region or came from for example Estonia.

In addition to isotopes proteomics, a method based on the analysis of proteins, could be utilised. Proteins have a larger and more stable structure than DNA and RNA and thus they are better preserved (Moilanen & Paasikivi 2023: 8). The potential is especially great in places such as Finland where preservation of DNA is poor.

4 Of ethnogenesis and Tarand cemeteries

4.1 Ethnogenesis and the questions it presents

In his book *Homo Fennicus – Itämerensuomalaisten etnohistoria (2020)* Dr. Valter Lang has compiled research from the fields of aDNA, historical and comparative linguistics and archaeology to put together a look at the history and current paradigms of research on the ethnogenesis of Baltic-Finnics. However, the larger conclusion is that there is no unified consensus on the Baltic-Finnic ethnogenesis (Lang 2020: 14). Several theories have been presented, and according to Lang, more views get published, and they not only contradict each other but also exclude each other - both between different fields and within singular fields. The compilation of research on several fields is quite interesting and provides a good overview on research on the Baltic-Finnic ethnogenesis. As more research is continuously conducted, *Homo Fennicus* serves a purpose as a baseline for anyone interested in getting into the field, but more so it serves a purpose in showcasing the research history and current paradigms, or lack thereof, of the field.

As Lang discusses, connecting research and results of archaeological, linguistic and aDNA research has proven to be difficult, and for example it is a loosely based assumption that the continuation of an archaeological culture would also mean the continued use of a particular language. I would also problematise "ethnogenesis" as a word again. It refers to the emergence of an ethnic group – but how can this be determined exactly? Linguistics, archaeology and aDNA can tell us a multitude of things, but who is allowed to put a pin on where and when an ethnic group has emerged? Archaeological cultures cannot be pinpointed to singular ethnic groups unambiguously, and the admixture of genes is never-ending. When it comes to Finns, the arrival of the 4th or the Siberian type genetic component could be considered the ethnogenesis – but perhaps it should simply be considered an event that affected the admixture of genes.

After outlining the field of ethnohistorical research on the Baltic-Finnics Lang emphasises the importance of the tarand cemeteries of the modern Baltics and Finland. Lang (2020: 217) mentions a 2018 aDNA study done by Lehti Saag et al. that according to Lang confirmed that the early tarand cemeteries of coastal Baltic Sea regions could have been built by people coming in from the East. This is an interesting hypothesis that would also suggest that perhaps the tarand cemeteries found in modern Finland were also an impact of an eastern migration. The study shows that a Siberian component was added to the Eastern Baltic gene pool during the Bronze Age to Iron Age transition at the very latest. The transition period matches the hypothesized arrival of western Uralic languages (in the Eastern Baltic) which supports the idea that Iron Age migration from the East spread these languages. The study also included a few individuals from tarand cemeteries of the Pre-Roman Iron Age (Saag et al. 2019). We could possibly see similar results if we could obtain aDNA samples from around the same time in Finland, as the connections between Estonia and Finland at that time are strongly supported by scholars. It should be noted that the study included only a few Pre-Roman Iron Age individuals from tarand cemeteries, but the results are exciting nonetheless and could be promising for future research.

According to modern research in historically comparative linguistics, the Uralic language family is about 4500 years old (Grünthal et al. 2022: 491) and Proto-Finnic diverged from western Uralic languages in the Bronze Age or latest at the beginning of the Iron Ages, and the separation between Proto-Finnic and Proto-Sami has been dated to around 1000-600 BCE (Lang 2020: 146, 287) Historical and comparative linguistic research thus could pinpoint the ethnogenesis of Finns to right before the Pre-Roman Iron Age as stated in the 2019 Saag et al. study as well – if Proto-Finnic can be considered a significant indicator of ethnogenesis.

4.2 Tarand cemeteries and kinship

Tarand cemeteries are rectangular grave formations composed of rocks on the surface of the ground. The amount of “tarands” in a burial site can range from one to several dozens. The tarand cemetery types can be categorised into three categories; early tarand cemeteries, typical tarand cemeteries and later singular tarand cemeteries (Lang 2020: 210). Burials in tarand cemeteries were mostly inhumations, the tarand were small and coffin-like, meant for 1-2 bodies. Grave goods are either missing or there is very little of them (Lang 2020: 211-212). The lack of grave goods makes it difficult to date these tarands without samples. It is especially difficult, if the usage of the burial site continued into later ages. Lang also states that during the middle and later phase of the Pre-Roman Iron Age cremations appear along with inhumations and the amount of grave goods increases.

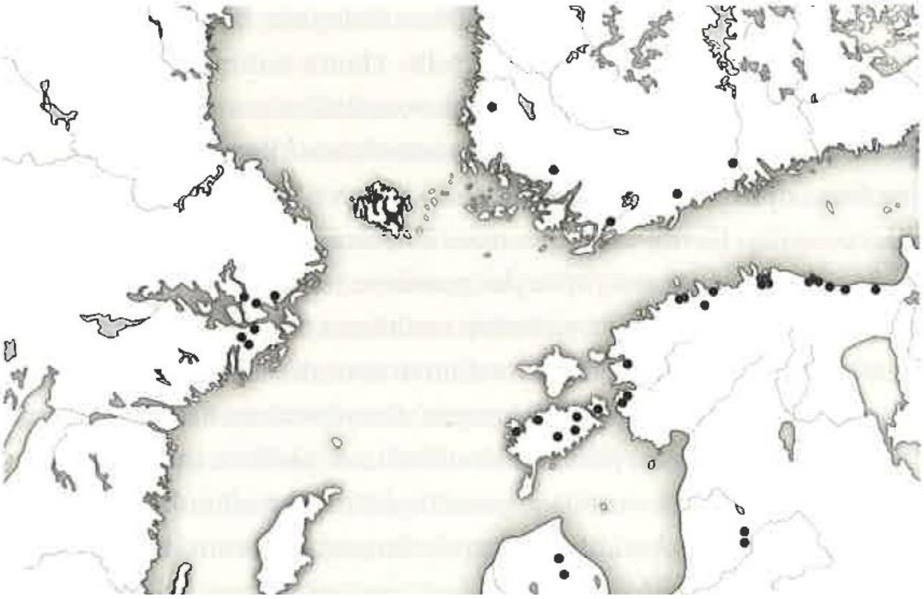

Fig. 5. The dispersal of early tarand cemeteries (Lang 2020).

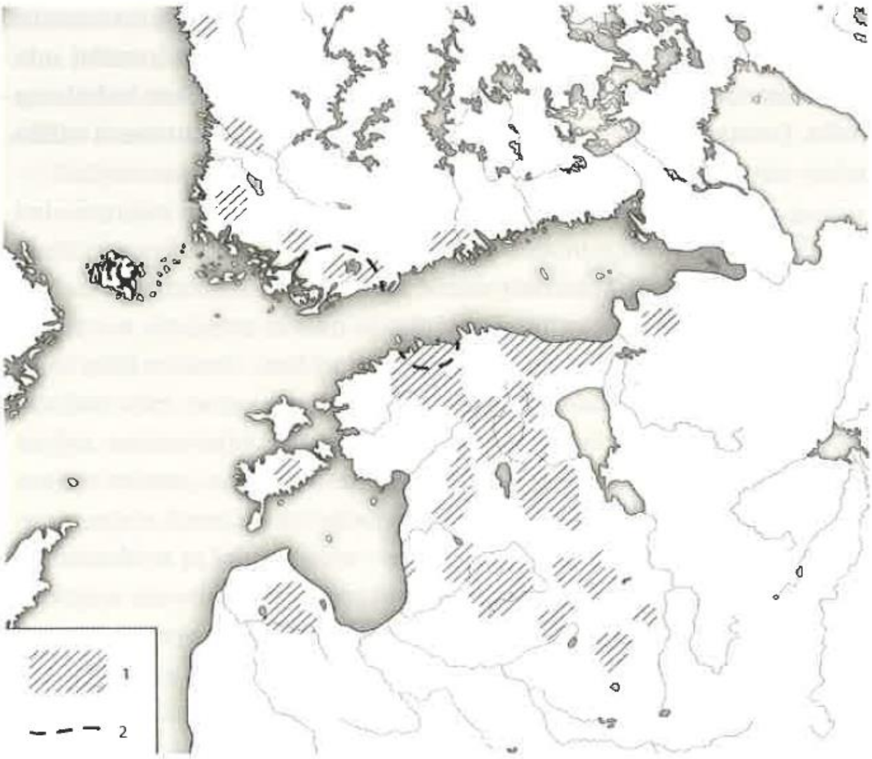

Fig. 6. The dispersal of typical tarand cemeteries (1) and singular tarand cemeteries (2) (Lang 2020).

The similarity of burials and partially of grave goods between geographically modern day Estonia, Finland and Sweden, shows a connection between the peoples using them in late Bronze Age and early Pre-Roman Iron Age, before the connections weakened greatly which can be seen from the fact that typical grave goods of Estonian younger Pre-Roman Iron Age no longer spread to Finland and Sweden (Lang 2020: 215).

Not much of preserved unburnt bone has been found from the tarand cemeteries of Finland. Due to the acidity of the Finnish soil, we do not have osteological collections from Stone Age and Bronze Age, unlike Estonia (Lang 2020: 90). However, bone matter, dental enamel and even fragments of jaw and skull bones have been found from the inhumation burials of Aisti, Mynämäki and Kolmhaara, Honklahti. A calibrated AMS dating was done on the Kolmhaara site, and the sample sets the site at 379-59 BCE (Edgren 1999: 319-321). Torsten Edgren (1999: 324) states that the best equivalent to the coffin graves of these sites is at Korvala, Sauvo. In *Muinaisuutemme jäljet* Raninen and Wessman describe Korvala as the most significant Pre-Roman Iron Age site, with 24 tarand and stone coffin burials, of which most were inhumations, with the exeption of one cremation. The authors continue to state that the site was used up to the older Roman Iron Age (Raninen & Wessman 2015: 224).

Archaeologist Marianne Schauman-Lönnqvist (2006) explains that the Korvala site had very acidic soil, and thus not much bone was unburnt bone was found during the excavations that took place between 1996-2001. However, a forearm bone was preserved as well as some fur and textile garment fragments thanks to close contact with bronze artefacts. The grave finds were also similar to those of Estonia and Latvia during the same time period. The burials were dated to the later Pre-Roman Iron Age based on weaponry. The weapons seemed to be similar to those found in Scandinavia, and the site has been said to represent both eastern and western influences on the coast (Schauman-Lönnqvist 2006). Edgren (1999: 328) also mentions a verbal statement that he received from Marianne Schauman-Lönnqvist in which it is mentioned that all the burials at Korvala were interpreted as male burials, and that the burial site would have been located on an island. In addition to the Korvala site, burials similar to tarand cemeteries dated to the Pre-Roman Iron Age have been found at for example the influential Dåvits site – however the author does not refer to them as such. Most tarand cemeteries in Finland have been dated to the Roman Iron Age (AKP Tarhakalmisto).

Researching Pre-Roman Iron Age burials that lack grave goods can be challenging without carbon dating specifically because the same burial sites have sometimes been in use in the later Roman Iron Age as well. This does raise a question; if the same burial site has been in continued use through several periods, could it be said that it most likely has seen said continued use from the same population or at least representatives of the same ethnic group as it did in previous periods? If this assumption would hold true, younger results from the same site that has seen continued use could be applied to the older periods. However, this assumption should not be applied lightly.

5 Results and conclusions

5.1 Methodological possibilites

As the literature review shows, there are several methodological possibilities, and the potential only grows as research methods develop. aDNA samples from the Pre-Roman Iron Age have already been sampled, and although the preliminary success rate is quite poor, it can be said that sampling aDNA from the Pre-Roman Iron Age is possible, although it may not be the most fruitful on its own. Although the Pre-Roman Iron Age is not well represented in the aDNA research that has been published in Finland thus far, with the continued development of methods future possibilities of extracting aDNA should not be underestimated. However, other methods, such as isotopes, proteomics and metagenomics should not be ignored. As stated in 3.3, stable isotopes from tarand cemeteries could provide direct information on where those buried there originated from, which could give answers on the origins of tarand cemeteries themselves. Tarand cemeteries include cremations along with inhumations, from which aDNA cannot be extracted from. However, stable isotopes of strontium remain a possibility in cremations, and samples can determine the origins and migration patterns of those buried within the cemeteries. They can provide ample results especially if the graves have been dated precisely.

Each year there’s more progress that pushes the limits of what was previously thought possible for genetic research from degraded DNA (Childebayeva & Zavala 2023: 11) so even if the results are slim, more analysis could be done on them in the future computationally. More computational methods are continuously developed, making analysis on existing samples more efficient. Although it may sound optimistic, this could raise the potential of slim aDNA results as well.

There has been little aDNA research in Finland from periods before Later Iron Age, but the research situation might change for the better in the future if we can extract DNA from something other than bone – for example chewing resin that has already been used in Scandinavia to extract DNA from the chewers spit (Salmela 2023: 1247-1248). As methods develop, the ethical side of aDNA research must also be taken into consideration. Once a sample has been taken, it cannot be undone – sampling is destructive. This raises the question of waiting –

what if in a decade the methods are more developed, and we can get more results from difficult or particularly degraded samples with smaller sample sizes?

5.2 Questions and answers

The research within the literature review implies that if the Siberian component was added to the Baltic gene pool with the arrival of tarands, and tarands appeared in Finland with Estonian influence, that the arrival of tarands in Finland could also signify the arrival of the Siberian type component into the gene pool. This hypothesis cannot be proven without further interdisciplinary research into the tarand cemeteries and their inhumation burials in Finland, and the hypothesis should be discussed carefully. It should also be noted that the Siberian component didn´t necessarily arrive at once, but rather through several smaller events.

Questions of ethnogenesis or more accurately when certain influences on our admixture happened could be answered by aDNA research on the tarand cemeteries of the Pre-Roman Iron Age. In particular, if we look at the tarand cemeteries of Estonia and compare them to the tarand cemeteries of Finland, we could possibly see the arrival of certain eastern haplogroups to Finland around the same time or sometime later. We could also see that that is not the case – which would raise more questions on the arrival of N-haplogroups and the Siberian type genetic component. Stable isotopes in turn could provide answers on how tarands arrived to Finland – through cultural exchange or through immigration.

It must also be remembered that aDNA by itself does not tell speak of ethnic identities – it can be compared to modern ethnic populations, but there are no certainties (Salmela & Översti 2024: 88). Ethnicity is a sum of cultural identity and a sense of belonging in a community, it cannot be determined by biological factors alone. Thus, any interpretations on the ethnic identities of people from our prehistory must be done carefully.

A clearer picture on not only the Pre-Roman Iron Age migration patterns but perhaps the genetic admixture of inhabitants of prehistorical Finland could be formed with interdisciplinary research. aDNA research could show the arrival of N-haplogroups and thus the eastern or Siberian type component, stable isotopes could explain migration patterns and linguistics and archaeology could speak of cultures. The literature review shows that in the case of Pre-

Roman Iron Age Finland and the ethnogenesis of Finns, the importance of interdisciplinary research should not be underestimated.

References

Internet references

Arkeologisen kulttuuriperinnön opas, Tarhahauta n.d. Available at: https://akp.nba.fi/wiki;tarhahauta (accessed 11 March 2024)

SUGRIGE-projekti n.d. Available at: https://sites.utu.fi/paleogenetics/projektista/sugrige-projekti/ (accessed: 15 February 2024)

SUMRAGEN-projekti n.d. Available at: https://sites.utu.fi/paleogenetics/projektista/sumrage/ (accessed: 15 February 2024)

Personal communications

Peltola, S.M. (2024) Email to Aster Niemelä. 27. February 2024

Research literature

Asplund, H. (2008) Kymittæ : sites, centrality and long-term settlement change in the Kemiönsaari region in SW Finland. Turku: Turun yliopisto, SER. B OSA – TOM. 312 HU-MANIORA.

Childebayeva, A. and Zavala, E.I. (2023). Review: Computational analysis of human skeletal remains in ancient DNA and forensic genetics. *iScience*, 26(11). p.108066. doi: https://doi.org/10.1016/j.isci.2023.108066

Edgren, T. (1999) "Alkavan rautakauden kulttuurikuva Länsi-Suomessa" in *Pohjan poluilla: suomalaisten juuret nykytutkimuksen mukaan.* Helsinki: Suomen tiedeseura. pp. 311-333

Etu-Sihvola, H. (2024) "Alkuaineiden isotoopit kertovat muinaisesta ravinnosta ", *Luihin ja ytimiin: tutkimuksia ja tulkintoja Euran Luistarin kalmistosta.* Turku: Oy Sigillum Ab. pp. 117-121

Grünthal, R. (2002) "Johdanto" in *Ennen, muinoin: miten menneisyyttämme tutkitaan.* Helsinki: Suomalaisen Kirjallisuuden Seura. pp. 9-17

Grünthal, R., Heyd, V., Holopainen, S., Janhunen, J.A., Khanina, O., Miestamo, M., Nichols, J., Saarikivi, J. and Sinnemäki, K. (2022). Drastic demographic events triggered the Uralic spread. *Diachronica,* 39(4). pp.490–524. doi: https://doi.org/10.1075/dia.20038.gru

Kirkinen, T., López-Costas, O., Martínez Cortizas, A., Sihvo, S.P., Ruhanen, H., Käkelä, R., Nyman, J.-E., Mikkola, E., Rantanen, J., Hertell, E. J., Ahola, M., Roiha, J. and Mannermaa, K. (2022) Preservation of microscopic fur, feather, and bast fibers in the Mesolithic ochre grave of Majoonsuo, Eastern Finland. *PLOS ONE*, 17(9), pp.e0274849–e0274849. doi: https://doi.org/10.1371/journal.pone.0274849

Lamnidis, T.C., Majander, K., Jeong, C., Salmela, E., Wessman, A., Moiseyev, V., Khartanovich, V., Balanovsky, O., Ongyerth, M., Weihmann, A., Sajantila, A., Kelso, J., Pääbo, S., Onkamo, P., Haak, W., Krause, J. and Schiffels, S. (2018). Ancient Fennoscandian genomes reveal origin and spread of Siberian ancestry in Europe. *Nature Communications*, 9(1). doi: https://doi.org/10.1038/s41467-018-07483-5

Lang, V. (2020) *Homo Fennicus : itämerensuomalaisten etnohistoria*. Translated from Estonian by H. Oittinen. Helsinki: Suomalaisen Kirjallisuuden Seura.

Lahermo, P. (1998) *Mitochondrial and Y chromosomal variation in the Finno-Ugric-speaking peoples.* Turku: Turun yliopisto SER. D OSA – TOM. 315 MEDICA – ODONTOLOGICA.

Lappalainen, T., Koivumäki, S., Salmela, E., Huoponen, K., Sistonen, P., Savontaus, M.-L. and Lahermo, P. (2006). Regional differences among the Finns: A Y-chromosomal perspective. *Gene*, 376(2). pp.207–215. doi: https://doi.org/10.1016/j.gene.2006.03.004

Lavento, M. (2015a) “Pronssi- ja varhaismetallikausi” in *Muinaisuutemme jäljet: Suomen esi- ja varhaishistoria kivikaudelta keskiajalle*. Helsinki: Gaudeamus. pp. 125–211

Lavento, M. (2015b) ”Sisämaan asutus ja kulttuuri varhaismetallikauden lopulla (500 eaa. - 300 jaa.) in *Muinaisuutemme jäljet: Suomen esi- ja varhaishistoria kivikaudelta keskiajalle*. Helsinki: Gaudeamus. pp. 228-230

Meinander, C.F. (1969) “Dåvits – En essä om förromersk järnålder in *Finskt museum 2/1969.* Helsingfors: Finska Fornminnesföreningen.

Moisio, J. (2015) *Beyond the sea: migrations and the middle ground in the coastal region of Finland Proper during the Roman Iron Age*. Turku: .

Moilanen, U., Kirkinen, T., Saari, NJ., Rohrlach, A.B., Krause, J., Onkamo, P. & Salmela, E. (2022) “A Woman with a Sword? Weapon Grave at Suontaka Vesitorninmäki, Finland”, *European Journal of Archaeology*, vol. 25, no. 1, 1461957121000309. pp. 42-60. doi: https://doi.org/10.1017/eaa.2021.30

Moilanen, U., Paasikivi, S. 2023, ”Esihistoriallisten tartuntatautien ja epidemioiden tutkimusmahdollisuudet Suomessa”, *Ennen ja nyt: historian tietosanomat*, vol. 2023, no. 23. pp. 5-18. doi: https://doi.org/10.37449/ennenjanyt.125929

Morris, J., Hartl, D.L., Knoll, A.H., Lue, R. and Michael, M. (2019). *Biology: how life works*. 3rd ed. New York, NY: W.H. Freeman & Company.

Mäkivuoti, M. (1999) ”Arkeologinen tilanne ajanlaskumme alkuvuosisatoina” in *Pohjan poluilla: suomalaisten juuret nykytutkimuksen mukaan*. Helsinki: Suomen tiedeseura. pp. 334-336

Raninen, S., Wessman, A. (2015) ”Rautakausi”,*Muinaisuutemme jäljet: Suomen esi- ja varhaishistoria kivikaudelta keskiajalle.* Helsinki: Gaudeamus. pp. 215–364

Saag, L., Laneman, M.,Varul, L., Malve, M., Valk, H., Razzak, M.A., Shirobokov, I.G., Khartanovich, V., Mikhaylova, E.R., Kushniarevich, A., Scheib, C.L., Solnik, A., Reisberg, T., Parik, J., Saag, L., Ene Metspalu, Rootsi, S., Montinaro, F., Remm, M. and Mägi , R. (2019). The Arrival of Siberian Ancestry Connecting the Eastern Baltic to Uralic Speakers further East. *Current Biology*, 29(10). pp. 1701-1711.e16. doi: https://doi.org/10.1016/j.cub.2019.04.026

Salmela, E. (2023) ”Mistä suomalaisten perimä on peräisin?”, *Duodecim,* Vuosikerta 139, Nro 16. pp. 1247-1255.

Salmela, E., Översti, S. (2024) ”Muinais-DNA:n käyttö menneisyyden tutkimuksessa”, *Luihin ja ytimiin: tutkimuksia ja tulkintoja Euran Luistarin kalmistosta.* Turku: Oy Sigillum Ab. pp. 87-93

Schauman-Lönnqvist, M. (2006) “The Early Iron Age cemetery at Korvala in Sauvo”, *Finland And Tallinn. Report and Proceedings of the 151st Summer Meeting of the Royal Archaeological Institute in 2005: Supplement to the Archaeological Journal volume 162 for 2005*. London: Royal Archaeological Institute. pp. 49–53.

Snyder, H. (2019). Literature Review as a Research methodology: an Overview and Guidelines. Journal of Business Research, [online] 104(1). pp.333–339. doi: https://doi.org/10.1016/j.jbusres.2019.07.039

Sundell, T. (2014) *The past hidden in our genes: combining archaeological and genetic methodology: prehistoric population bottlenecks in Finland*. Helsinki: University of Helsinki.

Översti, S., Salmela, E. (2024) ”Muinais-DNA-analyysin tuloksia Luistarista”, *Luihin ja ytimiin: tutkimuksia ja tulkintoja Euran Luistarin kalmistosta.* Turku: Oy Sigillum Ab. pp. 99-106