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Chapter 22

Uralic archaeolinguistics

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Abstract

This chapter considers the Uralic language family in connection with the genetic and cultural history of Northwest Eurasia. In the north and east, foraging economies have persisted among Uralic-speaking groups into modern times, partly combined with reindeer husbandry. Meanwhile, farming was only gradually introduced into the area from the west and south from the 4th/3rd mill. BC onwards, likely connected to Indo-European expansions. Today, the Uralic speaker populations and their neighbours form a genetic cline across the North Eurasian taiga and tundra. The time depth of this genetic landscape is unknown, whereas the Uralic language family likely emerged during the last five millennia. The current distribution of Uralic languages in the north is, instead, a consequence of secondary dispersals in the Iron Age and Medieval Era. We review the hypotheses of temporal and structural disintegration of the Uralic family as well as the hypotheses of its homeland and provide independent introductions to the formation of cultural and genetic landscapes of the area contemporaneous to Uralic family emergence and evolution. Our interdisciplinary qualitative inference supports the hypothesis that the family could have spread westwards as *lingua franca* within the Seima-Turbino Bronze Age network at the turn of 3rd and 2nd mill BC. We further develop this scenario by identifying a distinct transregional communication space ("flowerpot complex") in Southern Siberia and promote the Uralic languages' origin in the region of the

Sayan mountains, wherefrom the languages would have spread west to its secondary and tertiary homelands in Western Siberia and Volga-Kama region.

Keywords

Uralic languages; Northwest Eurasia; Genetic history; Cultural history; Language spread; Indo-European contacts; Hunter-fisher-gatherers; Reindeer husbandry; Seima-Turbino phenomenon

Academic biography

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22.1 Introduction

The Uralic languages form a coherent family stemming from Proto-Uralic. The name Uralic language family is used almost synonymously with the term Finno-Ugric language family, even though "Finno-Ugric languages" also refers to all other Uralic languages but Samoyedic. Uralic languages are spoken in Northwestern Eurasia (Fig. 22.1) adjacent to or amidst Indo-European languages, e.g., North-Germanic and Slavic languages, as well as Turkic, Tungusic, and Ket (the only existing language Yeniseian language).

The Uralic homeland is suggested to have been located somewhere along the southern edge of the current distribution range (see Fig. 22.1 for homeland hypothesis). Depending on the author, the Proto-Uralic is assumed to have been spoken 4000-2500 BC (6000-4500 years ago), placing its emergence within the Neolithic to Early Metal Age periods. Uralic languages later dispersed on an east-west axis along the southern fringe of the forest zone and formed intermediate proto-language speaker areas (Fig. 22.2) wherefrom the secondary expansions took place. It was mostly in the Iron Age and Medieval times that the current

distribution range of Uralic languages was reached. Uralic studies have a long history, but open questions remain about e.g. the homeland, sociolinguistic and demographic reconstructions of the early Uralic speaking populations and connection with the neighbours – all these information are needed for forming testable hypothesis of the Uralic evolution (Nichols 2021).

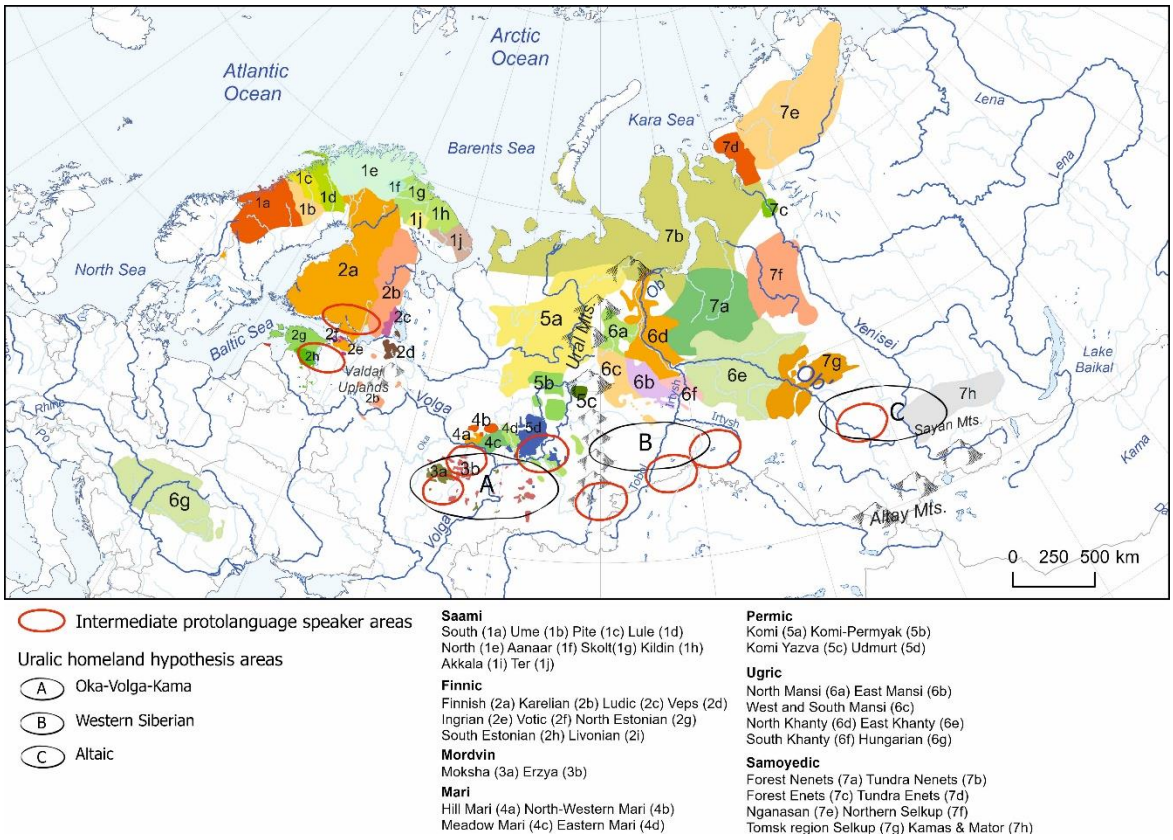

Fig. 22.1. The map of Uralic languages' speaker areas indicates the traditional speaker areas in the late 20th century. The speaker areas are derived from Rantanen *et al.* (2022) and the cartography presented in Roose *et al.* (2023). For the location of the Uralic language speaker areas, see Uralic Historical Atlas web app (URHIA 2023) and for the Arctic indigenous languages, see the web app Arctic Indigenous Languages (2022). The red circles indicate the hypothetical location of the intermediate protolanguages (Saarikivi 2022). Uralic homeland is located within the east-west axis of intermediate protolanguages: The three main hypotheses of the homeland are indicated with black circles (see the text for references). Timing of the intermediate protolanguages according to Saarikivi (2022) is as follows: Proto-Samoyedic late Bronze-Age or early Iron Age; Proto-Finnic, -Permic, -

Khanty, -Mansi and -Hungarian during Iron Age, Proto-Saamic either during Iron Age or late Bronze Age (Aikio 2012). Proto-Mari and -Mordvinic are probably medieval (Saarikivi 2022).

Biogeographically, the current area of Uralic languages ranges from the tundra in the north through the vast taiga zone of boreal forest to the forest steppes and steppes in the south (Fig. 22.2). The continental climate with short summers make the northern parts of the area unsuitable for agriculture, while rich marine resources in the north and high seasonal peaks in bioproductivity in the taiga make it favourable from a hunter-fisher point of view and also suitable for reindeer husbandry (Pelletier *et al.* 2022). The forest steppe and steppe zones to the south provide good environmental conditions for pastoral lifestyles and agriculture.

Anatomically modern humans have been present in Northern Eurasia already 40,000 years ago (Fu *et al.* 2014). After the end of the Ice Age c. 9600 BC, forager communities gradually resettled the region from the south. Over the following millennia and partly into recent times, hunter-gatherer-fisher lifeways, in places combined with reindeer husbandry, dominated in the northern taiga and tundra regions of the Uralic language area. Further south in the steppe, forest steppe and mixed forest zone, animal husbandry, agriculture and/or pastoral lifeways gradually took hold between the end of the Stone Age around 3000 BC and Medieval times. Due to the overall low primary production of the northern areas, human population densities remained modest in much of the region.

Genetically, Uralic-speakers – and some of their non-Uralic speaking neighbours – share a small genome-wide component (see 22.4.1; Tambets *et al.* 2018), which appears to have formed in Late Neolithic or Bronze Age in Yakutia in North-Eastern Siberia by 2500 BC (Zeng *et al.* 2023). Before its geographic origin was known, the component has been called variably "Siberian" or "Uralic", occasionally also less specifically "eastern"; in this chapter, we employ the term "Siberian-like". In addition to this genome-wide component, most Uralic-speaking populations share a relatively high frequency of certain subtypes of the

paternally inherited Y-chromosomal haplogroup N (see 22.4.2). In a contrasting pattern, the maternally inherited mitochondrial haplogroups of the Uralic populations resemble those of their non-Uralic neighbours more closely than those of other Uralic populations across their North Eurasian distribution (Tambets *et al.* 2018). This pattern, as well as that seen genome-wide, underlines the important role of contacts across language-family borders.

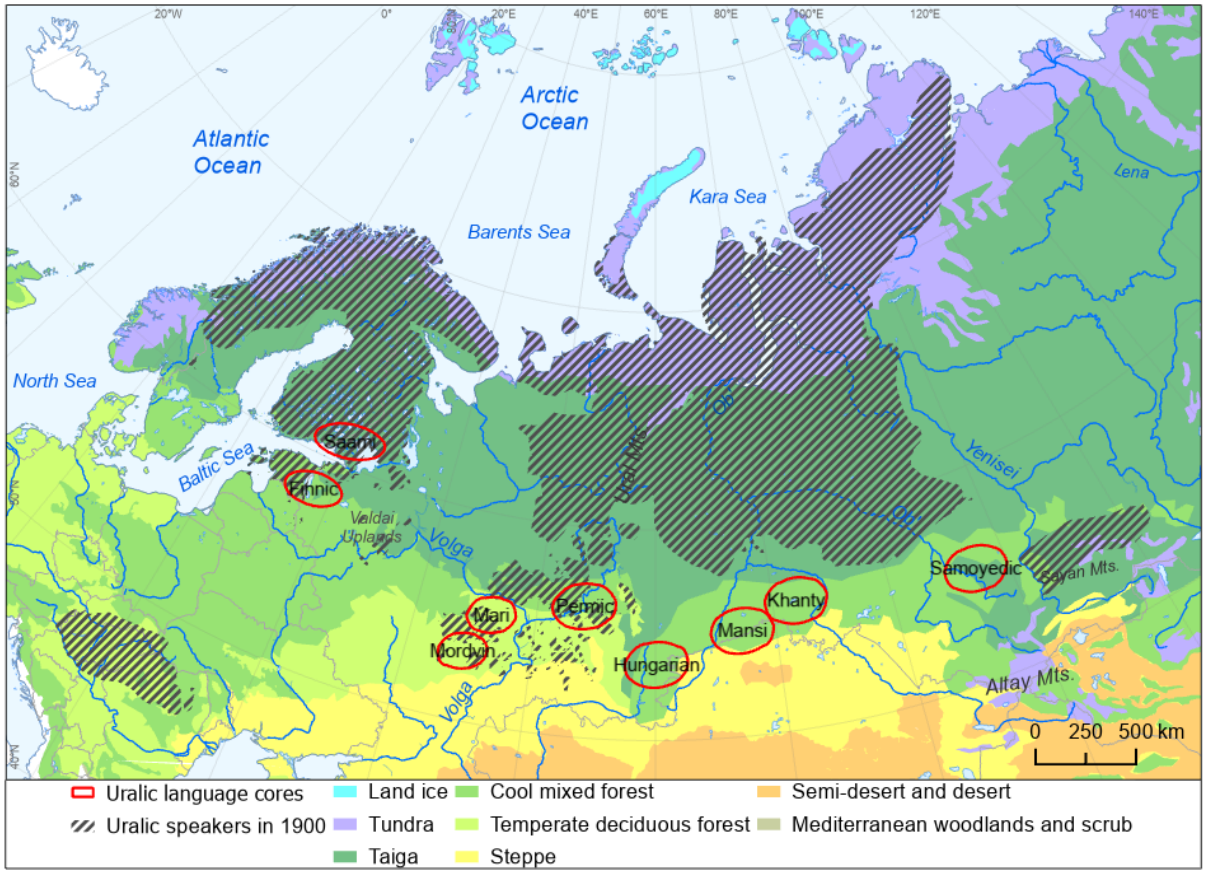

Fig. 22.2. Location of the Uralic languages in the 20th century and the location of the intermediate protolanguages (see text in Fig. 22.1) in relation to the current vegetation zonation. The climate and vegetation had changed over millennia, but less so in the southern edge of the Uralic language speaker area than in the north, where the tundra almost disappeared during the Holocene Thermal Optimum 6000-2000 BC (cartography published in Roose *et al.* 2023).

In this chapter we present a sketch of the Uralic history by integrating linguistic, archaeological and genetic evidence. We evaluate the potential of interdisciplinary

approaches to reach a better understanding of the dynamics and entangled developments across the three fields. Previous research has often followed the approach of resolving which "archaeological culture" would have carried Uralic languages to the west from a Proto-Uralic homeland. Such equations of spatio-temporal patterns set the stage for studying joint evolution of genetic, cultural and linguistic landscapes. However, pre-assumptions that areas of similar material traits ("archaeological cultures") equal linguistic areas equal genetic descent units ("populations") are heavily criticized by scholars from different disciplines, emphasizing instead the complex, fluid, polythetic constitution of human social relations (Heyd 2017; Furholt 2018; Frieman and Hofmann 2019; Saarikivi and Lavento 2012; Saarikivi 2022). Throughout the text we consider the gene-language co-evolution (as well as gene-culture and language-culture co-evolution) as one hypothesis to be evaluated against alternative hypotheses assuming asynchronous spread of genes, languages, and cultures.

We start our account with a summary of Uralic language family developments. We then outline the major strands of cultural development since the start of the Neolithic, based on archaeological findings. Only from the Early Medieval period (in the west of the study region) and the Early Modern period (for much of Western Siberia) onwards do written sources provide additional information. The genetics section describes the modern genetic landscape and indicates how ancient DNA is currently changing our understanding of the Uralic past. Finally, we present an overview of the theories regarding the spread of Uralic languages and their speakers and add our insights to the discussion. This chapter is a short review of the state of art in the three disciplines and in interdisciplinary Uralistics, and does not aim to promote one single truth of the historical events.

22.2 Linguistics

22.2.1. Uralic languages and family structure

The Uralic language family today comprises of about 40 languages. The majority of its approximately 25 million speakers reside in Northwestern Eurasia (Fig. 22.1). Only in Estonia, Finland and Hungary are Uralic languages the national languages: elsewhere they are endangered minority languages or have already gone extinct. In most of the area where minority Uralic languages are spoken, the matrix language is Russian.

The Uralic language family is a well-supported genealogical group (most recent studies on Proto-Uralic in Aikio 2022; Zhivlov 2023). The subfamilies are altogether well established, even though discussion on intermediate stages is ongoing. The commonly accepted subfamilies include Samoyedic, Permic, Mordvinic, Saami and Finnic, which are comprehensively presented in two recent handbooks of Uralic linguistics: The Oxford Guide to the Uralic Languages (Bakró-Nagy *et al.* 2022) and The Uralic Languages 2nd edition (Abondolo and Valijärvi 2023). Saami and Finnic have been traditionally considered descendants of a common Finno-Saami ancestor, but a recent understanding rather binds them together with Mordvinic as a "Western Uralic" intermediate level (Kenesei and Szécsényi 2022). The traditional way to account for the similarities between Mansi and Khanty is to consider them as members of an Ob-Ugric subfamily and Mansi and Khanty together with Hungarian as members of Ugric subfamily. Today however, both the Ugric and Ob-Ugric lexical and phonological similarities are assumed to stem from a prehistoric *Sprachbund* rather than joint ancestry (Skribnik and Laakso 2022). Phylolinguistic studies (Syrjänen *et al.* 2013; Lehtinen *et al.* 2014) with basic vocabulary cognate data (Syrjänen *et al*. 2018, de Heer *et al.* 2021) suggest that Finno-Saami and Mordvinic would have a joint ancestral stage and provide only limited evidence for grouping Hungarian with Khanty and Mansi.

There is much debate over the internal structure of the family. This discussion is crucial for interdisciplinary studies as the structure of the family also impacts the reconstruction of

the Proto-Uralic, and locating and timing of the homeland. A comprehensive review of the various hypotheses regarding the structure of the Uralic language family is currently still lacking, although short introductions to the proposals made over the past 150 years are available (Syrjänen *et al.* 2013). Grünthal *et al.* (2022) condense the suggested family models into three hypotheses:

(i) The traditional binary model, which assumed that Samoyedic languages split first from the Finno-Ugric languages (Korhonen 1981). This inference is based especially on low numbers of early Indo-European loans in Samoyedic languages and on the scarcity of joint etyma between the Samoyedic and Finno-Ugric languages, which is seen as indicative of long independent histories.

(ii) An alternative binary model divides the family into Western and Eastern branches based on phonological differences (Häkkinen 2007; Häkkinen 2009). The eastern branch would include Samoyedic and Ugric languages, and the western branch would include Permic, Mari and the "Western Uralic languages". In this scenario, the low number of joint etyma is explained with rapid turn-over of the Samoyedic lexicon in intense contacts with other Siberian languages.

(iii) A third hypothesis proposes a rake model, according to which Proto-Uralic would have split rapidly into 5-9 branches (e.g., Salminen 2001, Aikio 2022).

In their qualitative analyses, Grünthal *et al.* (2022) considered the rake model of rapid disintergration most likely. To add complexity to the model, both Grünthal *et al.* and Holopainen (2019) assume nevertheless that Samoyedic languages were the first to separate from Proto-Uralic. The seminal paper by Grünthal *et al.* builds a scenario rapid spread of Proto-Uralic into dialect continuum called "Common Uralic" with isolated speaker populations, Finno-Ugric intermediate subbranches (Fig 22.2). Thus, the understanding today

is that likely there was a series of rapid disintegrations, among which the Proto-Samoyedic was the first to form a new language variant.

The tree models as well as rake model reflect the genealogical - or vertical - evolution of the family. However, part of the evolution of language families is also horizontal transfer of material between contemporary language variants (Wang and Minett 2005). Norvik *et al.* (2022) studied areal contacts within the Uralic family by using an admixture model with newly collected typological data (Norvik *et al.* 2021). The admixture analysis identified four linguistic areas: Saami, Finnic, Volga area including Mordvinic, Mari and Permic languages, and finally an eastern or Siberian area with Samoyedic and Ob-Ugric languages. Hungarian did not readily group with any of these four clusters. While vertical evolution is indicated by distinct genealogical branches, the horizontal transfer of linguistic material within linguistic areas, or *Sprachbünde*, may level out evolving or already-evolved differences. The new picture taking together both vertical and horizontal evolution hints at more complex linguistic evolutionary dynamics than assumed in earlier studies that have been focusing on vertical developments in lexicon and phonetics only (Norvik *et al.* 2022).

22.2.2. The Age of the Uralic Language Family

For interdisciplinary purposes it is important to know when Proto-Uralic as a coherent entity started to disintegrate into subbranches. The suggested hypotheses vary between more than 5000 BC (7000 years ago) (Hajdú 1975) and only 2000 BC (4000 years ago) (Häkkinen 2009; Grünthal *et al.* 2022) for the start of this process. Sinor (1988) has suggested a date of 5000-4000 BC and Janhunen (2000) has argued for 7000-5000 BC. The older timings were based on the smaller amount of shared Uralic vocabulary compared to Indo-European – stronger lexical erosion was considered to indicate longer evolutionary time scale and thus Uralic family had to be older than Indo-European. Kallio (2006) discusses, however, other

reasons why the amount of reconstructed joint lexemes in Indo-European would be larger than in Uralic languages, and the criteria for determining what is a word-stem of Uralic origin, have been refined over time (Rédei 1986; Sammallahti 1988; Häkkinen 2009; Aikio 2022). In all, the size of the joint vocabulary is no longer considered a useful tool for relative timing the family.

Another way to time the family had been to deduce the Uralic chronology from the timing the first loanword layer acquired from Indo-European languages. Earlier, the first loanword layer was assumed to have been acquired to Proto-Uralic from Proto-Indo-European (Koivulehto 1999; Sammallahti 2001). The Proto-Uralic stage was thus thought to be approximately contemporaneous with the Proto-Indo-European. Gimbutas (1970) assumed that Indo-European was spoken c. 4000 BC and Mallory (1996) suggested 4500-2000 BC ago and thus, until the last decades the most popular hypothesis on dating Proto-Uralic with c. 4000 BC (reviewed in Kallio 2006) was based on assumed Proto-Indo-European timing. This is however a problematic starting point for the timing is still under discussion (see e.g. Heggarty *et al.* 2023 and Lubotsky and Pronk, this volume).

The Uralic dating changed drastically when Kallio (2006) suggested and Holopainen (2019) proved that the first loanword layer was more likely acquired from Proto-Indo-Iranian than Proto-Indo-European. Holopainen (2019) states that even though small numbers of early Indo-European borrowings were already acquired in Proto-Uralic (as they are found in small amounts in Samoyedic languages), the bulk of the loanword layer was acquired only at the stage of "Common Uralic". The contact probably started from Pre-Proto-Indo-Iranian (Kroonen *et al.* 2018) or Proto-Indo-Iranian (Holopainen 2019) and lasted until the divergence of Proto-Indo-Aryan and Proto-Iranian (Kroonen *et al.* 2018). In Finno-Ugric literature, it is asserted with confidence that Proto-Indo-Iranian was spoken approximately 4000 years ago, which thus would also be the time of a Proto-Indo-Iranian borrowing

episode. The reliable timing of Proto-Indo-Iranian thus is crucial for traditional timing of the Uralic family. Grünthal *et al.* (2022) used the belief of the Proto-Into-Iranian contact episode c. 4000 years ago as the starting point for calculating the age of Proto-Uralic. They assumed a constant rate of c. 500 years for an ancestral language variant to turn into daughter languages and therefore deduced that Proto-Uralic was still a coherent language stage c. 4500 years ago (2500 BC).

Honkola *et al.* (2013) instead proposed a phylolinguistic approach (Heggarty and Powell, this volume and Dunn, this volume) that did not depend on the timing of Proto-Indo-Iranian, but rather on historical linguists' beliefs (used as priors in the model) about the divergence of Samoyedic, Finno-Saami and Permic languages. They suggested occurrence of Proto-Uralic disintegration c. 3200 BC. Maurits *et al.* (2020) later re-evaluated these time calibrations and identified three time points in the historical linguistic literature that researchers agreed on: the disintegration of the Permic, Finnic, and Saami languages. These "beliefs" are used as priors in an ongoing phylolinguistic study of Uralic languages. Important for interdisciplinary considerations, Maurits *et al.* (2020) provide a review on how much the Uralic literature agrees on different linguistic splitting events.

22.2.3. The Proto-Uralic homeland

The current location of Uralic languages in the north is a consequence of an initial spread on the east-west axis along the forest-steppe and/or southern taiga zone, followed by various secondary northward diffusions or migrations of languages and/or their speakers – and the Hungarian migration to the south-west. However, discussion is ongoing about the direction of the initial spread - from east to west or from center to west and east. This question is related to the assumption of the homeland of Proto-Uralic.

There is broad agreement that the homeland was located at the southern edge of the current Uralic distribution area, but hypotheses vary in its exact location between the Sayan mountains and the Baltic area. There are three main hypotheses (Fig 22.1.): Already 150 years ago Castrén suggested a "Western Siberian homeland" (Castrén 1849). A more eastern origin – the "Altaic homeland" hypothesis – was proposed by e.g. Napolśkikh (1997) and Janhunen (1999, 2022). Later the prevailing understanding of the homeland turned to the region west of the Ural Mountains, to the Central Volga area (Toivonen 1953; Salminen 1999; Häkkinen 2009), the region between the Baltic Sea and the Urals (Sammallahti 1977), or the Volga-Kama river system (Koivulehto 1999), which we call here "Volga-Kama homeland" hypothesis. In locating the Uralic homeland it is again the early Indo-European contact that matters: The homeland must be somewhere where Indo-European contact would have been possible.

As said before, likely the first tractable linguistic contact was not between Proto-Indo-European and Proto-Uralic, but within the later stages of both families. In the earlier hypothesis Proto-Uralic must have been placed near to northern limits of suggested Proto-Indo-European homeland, but now this is no longer demanded: The Proto-Uralic could have been spoken elsewhere than within the first contact zone. Following this, Grünthal *et al.* (2022) suggest a homeland in "Western Siberia" and a wide contact zone between Proto-Indo-Iranian speaking steppe populations and "Common Uralic" speaking northern populations along the axis of the suggested areas of intermediate proto-languages (Fig. 22.2). The latest contributions to the question of the Uralic homeland mostly promote a "Western Siberian" (Nichols 2021, Häkkinen 2023), with support remaining also for an "Altaic" origin (Bjørn 2022, Janhunen 2022).

For the "Western Siberia" and "Volga-Kama" hypothesis the Samoyedic case poses a challenge, for the Proto-Indo-Iranian loanword layer does exist in Samoyedic languages,

albeit in smaller quantity than in Finno-Ugric languages (Holopainen 2019). Many potential reasons are suggested: rapid replacement of Samoyedic lexicon (Häkkinen 2009), early isolation of Proto-Samoyedic from the Proto-Indo-Iranian contact area (e.g. Grünthal *et al.* 2022) and acquisition of Indo-European loans through contact with another Indo-European intermediary e.g. with Tocharian (Warries 2022). Further, it may be that the similarities could be actually sign of geneaological relatedness (discussed in Lubotsky and Pronk, this volume) or that they may be just change resemblances and not borrowings (nor inherited) at all (Zsolt 2022).

All in all, discarding the hypothesis of pan-Uralic linguistic contact with early stages of Indo-European has had drastic implications for timing and locating Proto-Uralic. A Proto-Uralic homeland can now be proposed which allows for the rapid spread of "Common Uralic", with fission of Samoyedic languages before the Proto-Indo-Iranian contact episode. However, the location and timing of Proto-Indo-Iranian, Proto-Indo-Aryan and Proto-Iranian are still crucial for locating and timing the intermediate areas of Uralic protolanguages and the spread of "Common Uralic". This calls for a continued discussion between Uralists and Indo-Europeanists on the question of Proto-Indo-Iranian timing and placement.

22.2.4. The secondary expansion of Uralic languages

The secondary dispersal of the Uralic languages likely started from the potential speaker areas of the intermediate protolanguages sketched in Fig. 22.1. The Southern Samoyedic languages, descended from Proto-Samoyedic, moved according to Wagner-Nagy and Szeverény (2022) from the pointed area (Fig. 22.1) somewhat east to the Sayan mountains (Fig. 22.1.). Janhunen (2022) however suggest that Proto-Uralic actually originates from Sayan mountains and not from area west or north-west from it. Janhunen (2022) suggests that Proto-Samoyedic would have been in contact with Proto-Yeniseic speakers at the upper

Yenisei, pushing Northern Samoyedic languages ultimately towards their current speaker areas in the north in the late 1st mill. BC- mid 1st mill AD. Khanina's (2022) review paper of Samoyedic languages concludes that the ancestors of the Northern Samoyedic language began their northward spread only about 2000 years ago along the Yenisei river. Finally, from the Lower Yenisei, some 400 years ago, the Northern Samoyedic language variants, including Proto-Nganasan, spread northeast towards the Taymyr peninsula (Aksjanova and Lopulenko 2005).

Proto-Hungarian was spoken at the southern edge of the Ural Mountains, from where it spread towards the Carpathian basin from the 9th century AD onwards (Róna-Tas 1999). However, the speed and timing of the migration is still under investigation. Saami languages likely spread from the Volga area to Karelia and Finland during the Late Bronze Age – Early Iron Age (Aikio 2012, Lang 2020). Kallio (2014) refers to earlier studies and state that Saami languages disintegrated only during the first centuries AD. Saami languages occupied the entirety of Finland and reached the middle parts of Norway and Sweden during the Iron Age (Aikio 2012). The spread further north only took place between 200-800 AD (Aikio 2012). While it was previously thought that the current distribution of Saami languages was formed by an initial spread to the north and a secondary expansion to the south, Piha (2020) provides support to the hypothesis that the southernmost Saami language, South Saami, likely migrated across the Baltic Sea already earlier than Saami varieties spread to the current Sápmi. South Saami has traditionally been considered the most archaic Saami language, which indeed could imply an early split after Proto-Saami – or retaining archaic forms in a peripheral areal position.

Also Finnic languages stem from the "Western Uralic" subgroup, thus having the original homeland in the "Volga-Kama homeland" (Fig. 22.1). The timing of the arrival of Proto-Finnic to the Baltic area is unclear, but Kallio (2014) suggest that this took place in the Late

Bronze Age – Early Iron Age, so that Finnic languages had spread over the Gulf of Finland already by 500-0 BC and diverged after that. Both Heikkilä (2014) and Lang (2020) contextualize these events as a primary spread of Proto-Finnic to the Baltic area and secondary spread to the current speaker areas.

22.2.5. Relations with other families

There is no convincing evidence to support any hypothesis of geneaological connections of the Uralic language family to other language families, although several hypotheses on such connections have been put forward. The Uralic-Yukaghir hypothesis assumes that the lexical similarities between Uralic and Yukaghir would stem from a joint origin. However, Aikio (2014) was not able to reconstruct regular sound correspondences between the families. Instead, Häkkinen (2012) suggested that the similarities arose from early borrowings from Proto-Uralic or from an earlier language state, very hypothetical Pre-Proto-Uralic, to Yukaghir. Even though the current assumption of a "Western Siberian" origin of Proto-Uralic would fit with this scenario better than the "Volga - Kama" scenario, it may be that Aikio (2014) is correct in assuming that the similarities arose from later contacts between Samoyedic and Yukaghir languages. Indeed, the Uralic loans in Yukaghir are specifically from Samoyedic (Rédei 1999; Häkkinen 2012; Aikio 2014).

Another hypothesis also builds on lexical similarities: an Indo-Uralic macro-family combining Uralic and Indo-European families (e.g. Collinder 1934). However, e.g. Koivulehto (2001, 2003) assumed that the similarities are borrowings from Indo-European to Uralic languages, and later, Zsolt (2020) suggests that the similarities can be as well borrowings from Proto-Indo-European, pre-Tocharian or just chance resemblances.

A third hypothesis is based on typological similarities: Castrén (1894) and Janhunen (1999, 2009) have suggested that Uralic languages would be part of the Altaic languages. The

Altaic macro-family would involve Turkic, Mongolic and Tungusic, and even more speculatively Korean and Japanese (e.g. Georg *et al.* 1998; Vovin 2005; Robbeets *et al.* 2022). Today, however, the Uralo-Altaic typological similarities are assumed to be based on prehistoric linguistic contact (Sinor 1988; Nichols 2021).

The fourth macro-family hypothesis, Eskimo-Uralic, stems from lexical and morphological similarities between Uralic languages and Eskimo-Aleut languages (Bergland 1959; Fortescue 1998; Seefloth 2000). Bergland (1959) dates the Proto-Eskimo-Aleut to 2000 BC, and assumed that Proto-Uralic still existed 4000 BC. This created a temporal problem for joint origin of the families. He solved this by assuming a Pre-Proto-Eskimo-Aleut language variant that could have been spoken contemporary to Proto-Uralic. Also locating the joint ancestor created a problem as he assumed that Proto-Uralic was spoken "in the region of Ural" whereas Proto-Eskimo-Aleut was spoken much more to east. However, the spatio-temporal match improves under the scenario of "Altaic homeland" as the Uralic home-of-origin (Fig. 22.1) and with the current timing of the Proto-Uralic stage at c. 4500 BC. Aikio (2022) has indeed promoted renewed attention to a potential Eskimo-Uralic genealogical relationship.

22.3 Archaeology: Cultural history between the Baltic Sea and the River Yenisei

22.3.1. Neolithic and Eneolithic Period

In this chapter, we present the cultural history of the Uralic region across space and time. The two different dates given in the subchapter captions for the beginning and the end of the phases, respectively, show the chronological range in which these developments occur across the vast study area.

Neolithic: c. 6300/5500-4300/3800 BC

The Mesolithic era is temporally detached from the developments relevant to the Uralic language family and will not be reviewed here. In most of the study region, the Neolithic is associated with ceramic-producing hunter-gatherers, based on the Russian terminology system that takes the emergence of pottery as the main criterion for the onset of the period (Chairkina *et al*. 2017; Zhilin *et al*. 2018). It is unconnected to agriculture and animal husbandry, which reached these regions either millennia later from the south-western periphery, or not at all in their more northerly parts (Piezonka 2017; Nordqvist 2018).

In the Trans-Urals and Western Siberia, the Neolithic period started with the onset of pottery production c. 6300-6000 cal BC and saw a steep rise in the number of sites (Kosinskaya 2013). Defensive hunter-gatherer settlements, currently among the oldest forts known worldwide, occur around 6000 BC (Dubovtseva *et al.* 2019; Schreiber *et al.* 2022; Piezonka *et al.* in press). They have emerged autochthonously in this region and coincide with a range of other novelties such as new lithic technologies and ritual mounds (*kholmy*) (Chairkina & Piezonka 2021). It is currently unclear whether the exceptionally early manifestations of defensive behavior in Stone Age Western Siberia are reflecting internal development towards more territoriality, e.g. connected to economic shortages or to spatially concentrated resources, or whether they are related to incoming migrants from the south, either themselves erecting the forts as foreposts, or triggering defense building by the local population (Borzunov 2020; Schreiber *et al.* 2022). In any case, these innovations bear witness to substantial social, economic and cultural transformations and indicate a change in quality and quantity of contact networks. These dynamics have yet to be adequatly addressed in studies of the evolution of local genetic or linguistic landscapes.

Based largely on pottery typology, a multitude of groupings regarded as “archaeological cultures" has been distinguished in the Neolithic of the Transurals and West Siberia (Chairkina and Kosinskaya 2009; Vybornov *et al*. 2014; Dubovtseva 2015; Klement´eva and

Pogodin 2017; Piezonka *et al*. 2020). The earliest complexes, flat-based wares are found in the Baraba forest steppe to the south-west of the study area already between ca. 6400-6200 BC (Molodin *et al.* 2019). Further north, two distinct early pottery traditions appear around 6000 BC which regularly occur mixed in the same contexts. This indicates complex interrelations of material culture styles, intersecting communication networks and population groupings. Comb stamped styles emerging at that time in the eastern side of the study region in Western Siberia might be the origin of a comb ware strand of early pottery in the western side of the study area in Northeast Europe (Piezonka *et al.* 2020). In the 5th mill. BC, the traditions develop further, with conical/pointed bases now dominating the shapes (Kosinskaya 2006; Dubovtseva 2015; Parzinger 2020). Wavy ornaments bear witness to contacts across the Urals as they also appear in the Kama region (Lychagina 2015).

Between the Baltic and the Urals, the earliest complexes with pottery emerged in the southern and central parts of this region at the end of the 7th millennium BC (Dolbunova *et al.* 2022). Over the following c. 1000 years, pottery technology dispersed north and west up into the Baltic, northern Fennoscandia and the Far Northeast of Europe (Piezonka 2015; Dolbunova *et al.* 2022). The early wares include sparsely ornamented types, comb-stamp decorated pottery (a style that possibly originated in earlier traditions east of the Urals), and a "southern" tradition characterized by organic tempering. In the later 5th mill. BC, we see the local consolidation and further development of the various traditions. One of these, Lyalovo in central and northern Russia, a part of Pit-Comb ware, which is related typologically also to Typical Comb Ware in the Eastern Baltic, was earlier suggested as representing the speaker community of Proto-Uralic (Carpelan and Parpola 2001).

Eneolithic: c. 4300/3800-2500/1800 BC

The Eneolithic as the final phase of the Stone Age in the Uralic area is associated with substantial changes impacting the region from the south and south-west, including population movements, technological developments (metallurgy, wheeled transport etc.) and economic innovations.

Between Urals and Yenisei, the Eneolithic starts between 4300 and 3800 BC. It is defined by the emergence of copper artefacts and incipient farming in the steppe and forest steppe to the south (Chairkina and Kosinskaya 2009). Long-distance migrations across the steppe brought early, probably Indo-European-speaking herder groups from eastern Europe thousands of kilometres east to Inner Asia and the Altai. These groups were genetically rooted in Yamnaya populations of the northern Pontic and Caspian steppes. In the Altai, Sayan mountains and middle Yenisei region, they form the local Afanasievo tradition between c. 3100 and 2500 BC (Bjørn 2022; Heggarty *et al.* 2023; Poliakov *et al.* 2019). Afanasievo has been related specifically to a proto-Tocharian language variant (Warries 2022).

Further north in taiga and tundra, however, this phase sees the continuation and gradual development of the existing socio-cultural formations and hunter-fisher lifeways. Mobile populations left behind numerous small pit-house settlements, interpreted as winter stations. Fortified settlements in the taiga almost ceased to exist (Borzunov 2020; Schreiber *et al.* 2022). Pottery styles develop continuously in terms of morphology and decoration, with some ornaments as well as emerging flat bases representing novel features. Influence of the southern Chalcolithic is reflected by first copper artefacts (awls, dagger blades etc.) and sporadic evidence of domesticated animal bones (Chairkina and Kosinskaya 2009). Further north and east in taiga and tundra, lifeways and economies remained even more conservative. Typical hunter-gatherer cosmologies are reflected by animal-shaped wooden artefacts found in the Transuralian peat bogs. A large collection of wooden paddles from the Eneolithic and

Early Bronze Age contexts in these wetlands bears witness to the importance of waterborne travel (Kashina and Chairkina 2017).

Between Fennoscandia and the Urals, this phase followed the partial disintegration of the contact networks of the Comb and Pit-Comb ceramic horizons at the beginning of the 4th mill. BC. These changes are reflected in new pottery technotypes, namely asbestos- and organic-tempered wares in Finland and Karelia, late comb ware-Narva hybrids in the Baltic, and various organic-tempered ceramic types further south and east. The latter complex encompasses the Volosovo tradition (c. 4000-2900 BC) in central Russia and related "porous" wares further north (Nordqvist 2018). The Volosovo culture was seen as a candidate vector for Proto-Finno-Ugric languages spreading towards west (Carpelan and Parpola 2001). Changes of the seasonal lifeways and social structure as well as population growth led to the emergence of more permanent settlements. In the forest zone, these consist of multi-roomed pit houses of larger households and in the Baltic coastal region, of settlements that were most likely occupied year-round (Piezonka 2021). The economy continued to be based on hunting, gathering and fishing, now involving large-scale and specialised harvesting of wild resources, combined with effective processing and storage techniques (Tallavaara *et al.* 2018). New ritual and symbolic practices took hold as reflected by a growing number of formal burial sites (Ahola 2019; Macāne 2022). The appearance of richly furnished amber graves indicates long-distance connection between the Baltic and the inland and increased social diversification (Kostyleva and Utkin 2010). From early to late Volosovo, a trend towards more aquatic diets and a shifting orientation of contacts from eastern focus to a western focus are suggested through burial analyses (Meadows *et al.*, submitted). Large-scale networks enabled the exchange of goods such as lithic raw materials, copper and amber and probably also went hand in hand with movements of people (Nordqvist 2018).

From the early 3rd mill. BC onwards, the long-established hunter-gatherer networks and lifeways were disrupted by the spread of the Corded Ware complex from the south and south-west, extending along the coast into the Baltic region and Finland (in Finland: Battle Axe culture) and inland as far as the middle Volga and Kama regions (Middle Dnieper culture, Fatyanovo complex with Balanovo and Abashevo traditions). Substantial new populations arrived at the north that carried steppe ancestry, partly replacing the local hunter-gatherer communities. New weapons and pottery types, new social structures and ideologies are reflected in burial rites, and for the first time also animal husbandry and the use of milk are noted (Ahola *et al.* 2018). In the following centuries, hybridization processes between Corded Ware and local traditions took place in some regions. To the north of the Corded Ware influence, hunter-fisher communities continued their traditional, mobile lifeways relatively unchanged. Corded Ware and its central Russian off-shoot Fatyanovo have been assumed to be associated with Indo-European speakers, based on their roots in the Yamnaya complex of the northern Pontic steppes, which is suggested to have vectored Indo-European languages to Europe (Heggarty *et al.* 2023)

22.3.2. Bronze Age, Iron Age and Medieval Period

Bronze Age: c. 2500/1800-1000/500 BC

Across the Uralic area, the transition to the Bronze Age is marked by increased production and use of metal artefacts (mainly bronze) and their firm establishment in the socio-economic relations in all but the northernmost areas, giving rise to new transregional trade and communication networks and social hierarchies. In the eastern and central parts of the study region, this process started around the middle of the 3rd mill. BC while further west and north in the Baltic and Scandinavian regions, it took hold centuries later between c. 1800-1600 BC.

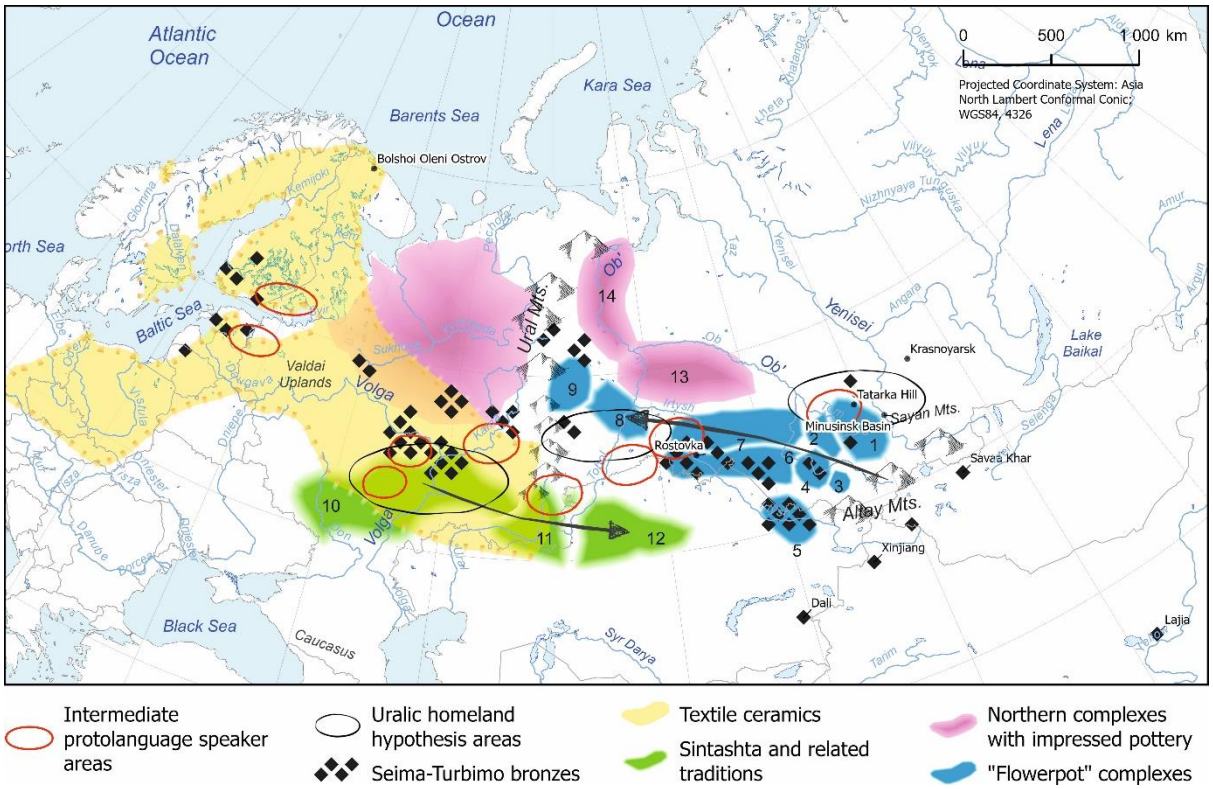

Fig. 22.3 Archaeological formations of the Early Bronze Age (c. 2500-1600 cal BC) relevant to this paper (compiled and modified from Chernykh 2015, Lavento 2001, Marchenko *et al.* 2017, Parzinger 2006, Zeng *et al.* 2023, Wang *et al.* 2021, Narasimhan and Patterson 2019, Zhang *et al.* 2021, Ning 2020; cartography published in Roose *et al.* 2023). The cultures mentioned in the map: 1 Okunev, 2 Krochalevka, 3 Karakol, 4 Elunino, 5 Kanaj, 6 Krotovo, 7 Samus', 8 Tashkovo-Loginovo, 9 Koptjaki, 10 Abashevo, 11 Sintashta, 12 Petrovka, 13 Predsuzgun, 14 Sartyn'ja.

Of particular importance with respect to the dispersal of the Uralic languages is the Seima-Turbino transcultural phenomenon (c. 2200-1600 BC). Named after two burial sites in European Russia, this phenomenon is defined by a range of specific metal objects made of high-quality tin or arsenic bronze, encompassing weapons such as spear heads, celts, daggers and knives with characteristic geometric decoration and/or sculpted handles (Chernykh and Kuz'minykh 1987; Chernykh and Kuz'minykh 1989; Schwarzberg 2009; Marchenko *et al.* 2017). Distributed from Mongolia and the Altai mountains in the east to the Eastern Baltic and Finland in the west, this complex transgresses much of the area today associated with the southern edge of the Uralic language family (Fig. 22.3). Apart from a few agglomerations of

bronze finds and their casting moulds at cemeteries and ritual sites especially in the centre of this wide distribution range, many of the artefacts have been discovered as single or stray finds. Various hypotheses have been put forward to explain the Seima-Turbino phenomenon. One hypothesis holds that Seima-Turbino encompassed two components, namely metallurgists and horse riders from the Altai – just southeast from the area of one of the hypothetical Uralic homelands ("Altaic homeland" hypothesis in Fig. 22.1) - and mobile hunter-gatherers of the southern forest zone of the West Siberian taiga that are thought to have moved simultaneously to the northwest (Chernykh 1992). Another theory stresses the diversity of cultural contexts across the vast distribution area and questions the postulated uniformity of the bronze items associated with the complex, hence favouring a model of gradual spread of a new bronze-working technology and associated sets of prestigious bronze artefact types, instead of substantial population movements and migrations of any particular group (e.g. Koksharov 2006; Schwarzberg 2009). In these discussions, the Abashevo/Sintashta complex (c. 2200-1750 BC) plays a prominent role. With Abashevo rooted in the wider Corded Ware tradition, this complex reflects a potentially Indo-Iranian speaking herder-warrior society with horse-drawn chariots and developed bronze manufacture to both sides of the southern Urals (Fig. 22.3). The Abashevo/Sintashta society is either regarded as the target of campaigns of "Siberian units" of Seima-Turbino tradition (Marchenko *et al.* 2017: 1393; Chernykh 2015), or it is presumed to have interacted with the Seima-Turbino trade network of waterborne travel that existed to the north in the forest region (Grünthal *et al.* 2022). These socio-economic dynamics were possibly related to environmental changes in the wake of the 4.2 ka climatic cooling event (see Grünthal *et al.* 2022).

A detailed consideration of the various cultural contexts in which the majority of Seima-Turbino artefacts have come to light, however, allows a more coherent association of this

metal-working tradition with the cultural dynamics in the study area. The radiocarbon chronology of Seima-Turbino complexes confirms that the older finds, starting in the last quarter of the 3rd mill. BC, are located in the east, in the Baraba steppe and the Altai foothills, while at the westernmost fringes of the distribution area, Seima-Turbino bronzes appear centuries later in the first half of the 2nd mill. BC (Marchenko *et al.* 2017). Thus, the Seima-Turbino bronzes and hence the associated interaction network seems to have its origin near the easternmost fridges of the presumed prehistoric Uralic language speaker areas (around the "Altaic homeland"), and spread westwards only later (towards the "Western Siberian homeland"). East of the Urals, most of the Seima-Turbino objects and contexts are associated with a continuum of interrelated cultural traditions; the objects do not refer to any particular cultural tradition, but were apparently carried or handed down by representatives of various groups. The Seima-Turbino-related objects are found in an extensive belt across North Eurasia, starting from Lake Baikal and northern Mongolia via the Okunev and Elunino traditions in the Altai region and its foothills, extending along the upper Ob' and lower Irtysh rivers in archaeological complexes such as Krotovo, Samus' and Tashkovo-Loginovo, and reaching the eastern Middle Urals in Koptaki contexts (Parzinger 2006, see Fig. 22.3). Archaeologically, these groups are related through pottery typology, namely through the presence of flowerpot-shaped, flat-based ceramics with surface-covering ornamentation and partly also decorated ridges, alongside other diverse pottery types. Here, we refer to this typological continuum by the new working term "flowerpot complex". It is on the sites related to this complex that most of the known casting moulds of Seima-Turbino bronzes have been found. There is a lot of variation across the vast area covered by this complex, concerning material culture, burial rites and settlement structures. Economically, the importance of herding vs. hunting and fishing decreases along a south-north trajectory. Especially in West Siberia and the Transurals, stylistic influences as well as imports from the

steppe of Sintashta and related traditions are present in these complexes, indicating contacts between the Seima-Turbino-associated people and steppe communities (e.g. Korochkova and Spiridonov 2016). A material link to the Baikal region further east (Glazkovo culture) and Yakutia further north-east (Ymyyakhtakh culture) is represented by specific bone armour plates found in burials (Reich *et al.* 2023).

In the West Siberian taiga, the Early Bronze Age sees a rise in conflict from c. 2500 cal BC onwards. This is archaeologically attested by a shift to single-house fortified homesteads measuring up to 200 m^2, each surrounded by a massive system of banks and ditches (Zischow 2012).

To the west of the Urals, Seima-Turbino bronzes appear in the early to mid-2nd mill. BC in a corridor from the middle Urals to the eastern Baltic coast and southern Finland (see Fig. 22.3). Here, they are associated to the broad sphere of the textile-ceramic complexes (Kosmenko 1996; Lavento 2001). In the Uralic area, textile ceramics are found in the Early Bronze Age from the late 3rd and early 2nd mill. BC onwards in a wide belt from West Siberia across the Volga into Fennoscandia and southwest to the Baltic and central Europe (Glushkov and Glushkov 1992; Lavento and Patrushev 2015; Schäfer-di Maida 2017). From the Urals and the Volga region to the eastern Baltic, their distribution is broadly congruent with the distribution of Seima-Turbino bronzes (see Fig. 22.3), and it is possible that they, too, mark the transregional communication space that is related to the dispersal of early Uralic language branches. In such a scenario, the northern fringe of the textile ceramic distribution in NE Europe could indicate a border zone with another communication space that would have been dominated by a different, in this case unknown, language family and that is materially associated with the northern impressed wares of local hunter-gatherer societies (see Fig. 22.3).

Hence, based on the archaeological evidence surrounding the Seima-Turbino transcultural phenomenon, exemplified by the "flowerpot complex" pottery type in the east and the textile ceramics tradition further west, what we see is a continuous corridor of communication and cultural relations from the Altai to the mid-Urals and further west to the eastern Baltic that provided the sphere in which Seima-Turbino bronzes and the associated technological know-how spread gradually from east to west along the major water corridors of the southern taiga. The Seima-Turbino phenomenon – in our interpretation the reflection of such a communication network - might be associated with the dispersal of Uralic languages (Carpelan 1999, Kallio 2006, Häkkinen 2009, Grünthal *et al.* 2022). To the south, this communication space bordered on another major socio-cultural formation that expanded along the northern steppe and forest steppe belt from west to east and encompasses the sub-units of Abashevo in the southeast European steppes, of Sintashta in the Southern Urals, and of Fedorovka in the steppes further east (see Fig. 22.3). This formation has been suggested to be Indo-European, most likely Indo-Iranian, speaking. To the north, the Seima-Turbino communication space borders on another complex with yet a different habitus, which continues Neolithic and Eneolithic hunter-gatherer-fisher lifeways. This complex is represented e.g. by the Predsuzgun and Sartynya groups of the middle and lower Ob' characterised by impressed ware pottery (Parzinger 2020). Related northern impressed wares are also found to the west of the Polar Urals in the far Northeast of Europe (see Fig. 22.3).

In the steppe region to the south-east of the Uralic area, the following Middle Bronze Age was the time of the extensive Andronovo-Fedorovka cultural complex of pastoralists (c. 2000-1350 BC) with its typical fine ceramics that had developed out of Sintashta and related traditions. It is assumed that the Andronovo-Fedorovka communities, like their Abashevo-Sintashta predecessors, spoke variants of Proto-Indo-Iranian languages (Kuxmina 2007, Anthony 2007, Mallory 1989). West of the Urals, this complex continued in the related

Srubnaya culture (c. 1800-1200 BC) (Koryakova and Epimakhov 2007). Its stylistic influences are also discernible in the impressed wares of the taiga such as Suzgun at the middle Ob', with lifeways continuing to be largely based on foraging (Parzinger 2020). Around 1400 BC with the start of the Later Bronze Age, the West Siberian steppes and forest steppes saw the disintegration of the Andronovo horizon into smaller units of herding communities such as Irmen' in the east and Mezhovka in the southern Urals (Schneeweiß 2005).

In Europe, specific long-distance relations at the north-western periphery of the study region are reflected by the burial ground of Bolshoi Oleni Ostrov on the Kola peninsula (Fig. 22.3) which was in use in the 2nd half of 2nd mill calBC (Murashkin *et al.* 2016). The grave goods associated with this population of marine mammal hunters show relations both to Scandinavia (e.g. bronze items), to local hunter-gatherer culture (e.g., elk staff heads) and to north-eastern Siberia (specific textile-impressed "waffle" ceramics). Genetically, this population is the earliest in Europe observed to harbour Siberian-like ancestry components (see 22.4.5).

The forest zone between the middle Volga and the White Sea was dominated by the Ananino cultural complex from c. 900 BC onwards (Koryakova and Epimakhov 2007). Long-distance east-west contacts along the major waterways are reflected in the distribution of Mälar-Akozino axes that concentrate in Southern Scandinavia and in the Volga region (Lavento 2014). Parpola (2012) has suggested that Mälar-Akozino, Ananino and also Textile Ware would have been Uralic speaking societies. The idea was elaborated by Rahkonen (2013) and Heikkilä (2014) suggesting that a now extinct Western Uralic variant spread to Finland within the Textile Ware communication network. Scandinavian influence possibly related to an immigration into coastal Finland and the Eastern Baltic is indicated by the appearance of stone burial cairns in these areas (Bläuer *et al.* 2013). Along the western

coasts, agriculture now firmly took hold while inland, hunting and fishing remained important economic pillars.

Iron Age to Early Modern period: c. 1000/500 BC - 1500 AD

The onset of the Iron Age, in most areas a gradual transition from Late Bronze Age conditions, varies across the study region from c. 1000 BC in West Siberia and c. 500 BC in northern Europe. It is defined by the appearance of local iron production and an increase of iron artefacts. As with previous innovations, these traits are less prominent in the more northerly regions of the study area. Concerning the categorization of the archaeological evidence from the Iron Age to the Early Modern period, cultural units are now no longer predominantly defined through pottery styles but by combinations of traits, including burials traditions, artefact types etc. From the Medieval period onwards, written sources play an increasing role for distinguishing regional groupings and political units.

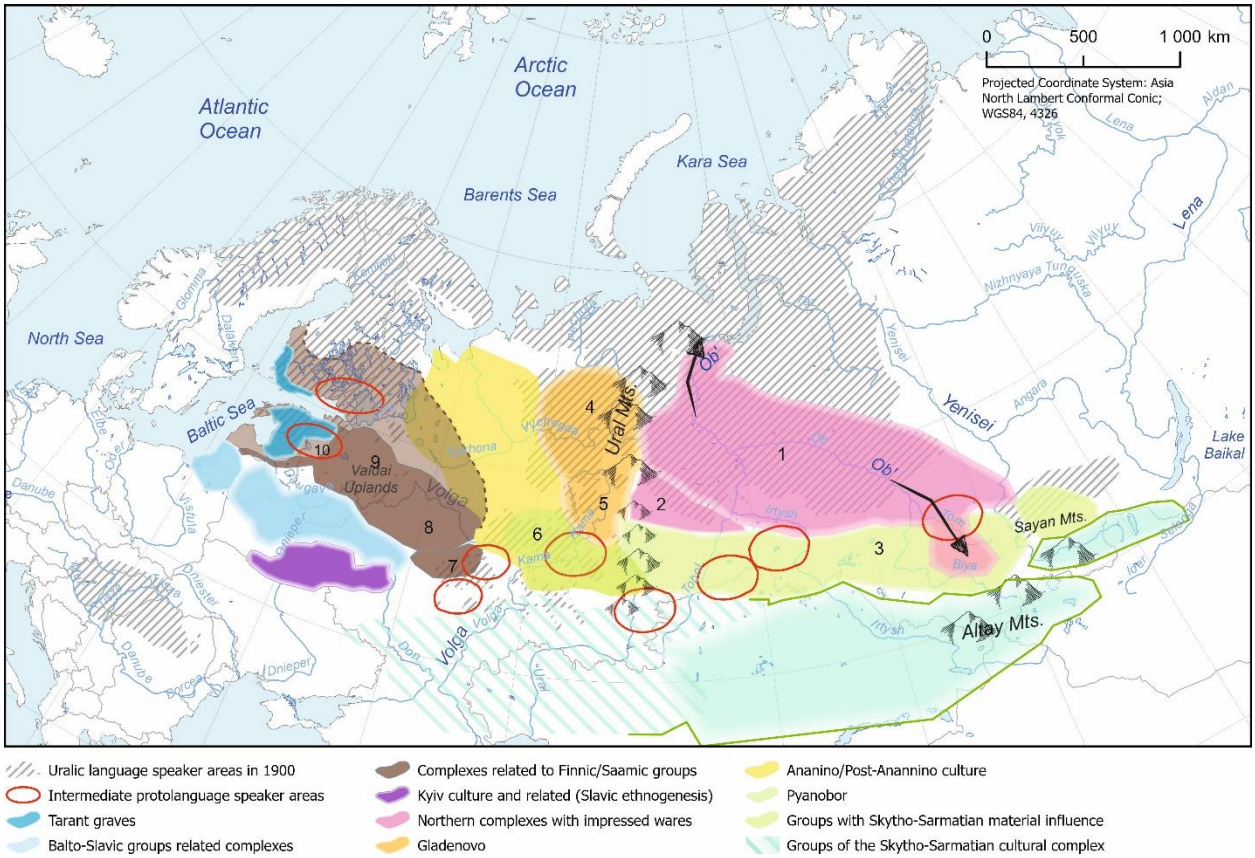

Fig. 22.4. Archaeological formations of the Late Iron Age (c. 200 BC - 400 AD) relevant to this paper (compiled and modified from Parzinger 2006, published in Roose *et al.* 2023). 1 Kulaika, 2 It'kul, 3 Sargat and related, 4 - 5 Gladenovo, 6 Pyanobor, 7 Goredec, 8 Dyakov, 9 Il'men, 10 Esto-Livskaya.

To the east of the Urals, a rise in the number of fortified sites is associated with the transition from the Late Bronze Age to the Early Iron Age around 750 BC (Lips/Kardash 2018; Zischov 2012). Specific to the taiga are the complexes with cross-stamp decorated pottery. Sporadic imports of this ware further south bear witness to long-distance contacts along the major rivers between the taiga hunter-fishers and the steppe herder-fisher communities (Schneeweiß 2007). Around 600 BC, along the middle Ob' and its tributaries the extensive Kulaika cultural complex developed. Connected to the adoption of horses in these more northerly regions, it is characterised by the emergence of rectangular fortified settlements with regular rows of houses inside. The economy in taiga and tundra continued to be based on hunting, fishing and gathering. The pottery continues comb-pit decorations but

includes new forms such as footed cups. Typical are also small bronze figurines, depicting anthropomorphic, zoomorphic and hybrid beings. From the 3rd century BC onwards, Kulaika groups migrated along the rivers to the fringes of the tundra in the north and far south along the upper Ob' to the Altai foothills (Schneeweiß 2007) (see Fig. 22.4). Kulaika persisted into the 4th century AD and was followed by related traditions throughout the early Medieval period up until c. 800 AD (Parzinger 2020). The Kulaika cultural complex has been associated with Ugric-speaking groups (Molodin 2005).

New archaeological evidence from the Lower Ob' indicates the onset of reindeer herding as early as 260 BC, creating novel transport possibilities in taiga and tundra (Gusev 2014; Losey *et al.* 2020). Following these discoveries, the history of reindeer domestication has been connected to the spread of Samoyedic language in recent publications. However, presumptions that the new herding practice emerged in the Sayan-Altai region around c. 2000 years ago and was rapidly taken north thousands of kilometres by speakers of northern Samoyed (Khanina 2022) are not supported by the chronological and material evidence. Instead, a scenario of two independent instances of reindeer domestication in southern and in northern Siberia, respectively, must be further explored. Janhunen (2022) suggests that Proto-Samoyedic would have been spoken within the Tagar culture of the Minusinsk basin at the upper Yenisei in the 1st mill. BC. However, both archaeologically and genetically, the Tagar culture and its individuals seem to be strongly related to the steppe tradition (Abashevo-Sintashta – Andronovo – Scytho-Saka) which has been plausible related to the Proto-Indo-Iranian to Iranian language branches (Jeong *et al.* 2020). Altogether, an expansion of Samoyed languages from the Altai – Sayan region northwards along the river Yenisei seems possible also on geographical grounds, but the detailed dynamics and timing of these processes remains currently open.

South of the taiga in the Eurasian steppe belt, the Iron Age saw the expansion of mounted nomads of the Scytho-Sarmatian complex for whom an Iranian language is firmly attested through names in written sources. For the Post-Medieval period of the Russian imperial conquest of west Siberia (c. 16th–17th centuries AD), information about the indigenous populations, lifeways and ethnolinguistic configurations derives not only from archaeological sources, but also from ethnohistoric accounts attesting the distribution areas of Ob'-Ugric and Samoyed groups and communities within the ethno-linguistic mosaic across the region.
In the European part of the study region, the Iron Age is associated with agricultural consolidation in the more southerly areas, by population growth and by rising social tensions. Numerous fortified sites appear in the Pynabor and Gladenovo transcultural areas in the Kama and Vyatka regions west of the Urals in the centuries around the birth of Christ (Koryakova and Epimakhov 2007). In central Russia, various groups considered to be speakers of Finnic languages, such as Dyakov and Il'men traditions, are distinguished e.g. through their ornamental styles. In Estonia and adjacent parts of southern Finland, the Tarand grave phenomenon marks the area for several centuries from the Early Iron Age to the Migration period (c. 800/500 BC - 400 AD). The southwestern part of the study area is the likely region of the socio-cultural substrate of diverse populations that formed the basis for the Slavic ethnogenesis in the second half of the 1st mill. AD (Schneeweiß 2020). From the 8th century AD onwards, Scandinavian Varangians established a trading network from the Baltic to the Black Sea along the Volga and Dnieper rivers, and a dynasty of Varangian descent became the rulers of the Kyiv Rus', a state of east Slavic tribes that reached its largest extension from the White Sea in the north to the Black Sea in the south in the 11th century AD. From the 13th to the early 16th century, the Mongolian Golden Horde dominated the more southerly parts of the study region while in the Baltic and northern areas, Finno-Ugric ethnic groups constituted dominant populations.

22.4 Genetics

22.4.1 Overall genetic landscape of Uralic speakers

Today's genetic variation in northern and central Eurasia mostly follows geography, with geographically nearby populations showing closer genetic affinity to each other and geographically more distant populations being also more distant genetically (Jeong *et al.* 2019). Overall, the genetic variation across inner Eurasia consists of three genetic clines running from east to west which roughly follow the vegetational zones (Jeong *et al.* 2019; Fig. 22.5 A). The Uralic-speaking populations of the tundra and forest zones lie on the northernmost of these clines, along with some of their neighbours speaking Yeniseian and Slavic languages, which suggests partly shared genetic histories for these populations (Jeong *et al.* 2019). Meanwhile, their histories seem to be largely distinct from the populations residing further south in the forest and steppe zones, speaking mostly Turkic and Mongolic languages, and forming the middle and southernmost of the three clines. These three clines are also distinct from an earlier hunter-gatherer cline that extended across the forest-steppe zone in ca. 8000-3000 BC (Zeng *et al.* 2023).

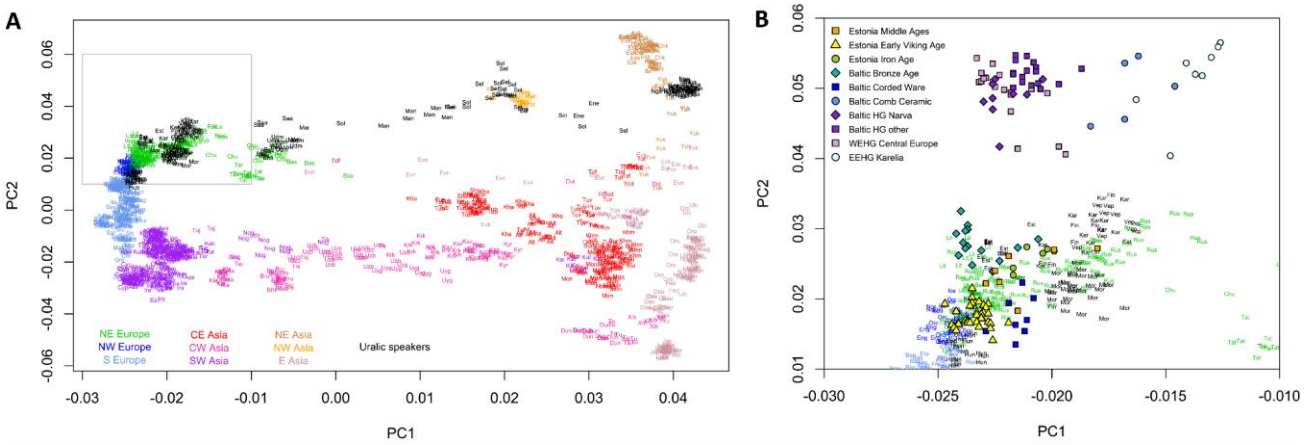

Figure 22.5. A principal component analysis (PCA) plot of the genome-wide genetic variation in Northern and Central Eurasia. Each three-letter symbol is an individual, and the letter codes correspond to the individuals' population of origin; the distances between

symbols reflect the genetic distances between individuals as accurately as is possible in two dimensions. In (A), Uralic-speaking populations are plotted in black (Bes - Besermyan; Ene - Enets; Est - Estonian; Fin - Finnish; Hun - Hungarian; Kar - Karelian; Man - Mansi; Mar - Mari; Mor - Mordovian; Nga - Nganasan; Saa - Saami; Sel - Selkup; Udm - Udmurt; Vep - Veps). Other populations are coloured loosely according to their geographic region of origin (N = Northern, S = Southern, W = Western, E = Eastern, C = Central; SW Asia also includes the Caucasus), and their abbreviations are as follows: Aba - Abazin; Abk - Abkhasian; Ady - Adygei; Alb - Albanian; Alt - Altaian; Arm - Armenian; Ass - Assyrian; Ava - Avar; Aze - Azeri; Bal - Balkar; Bas - Bashkir; Baq - Basque; Bel - Belarusian; Bul - Bulgarian; Bru - Burusho; Bur - Buryat; Che - Chechen; Chk - Chukchi; Chu - Chuvash; Cir - Circassian; Cre - Cretan; Cro - Croatian; Cyp - Cypriot; Cze - Czech; Dar - Darginian; Dau - Daur; Dol - Dolgan; Dun - Dungan; Eng - English; Esk - Eskimo; Evk - Evenk; Evn - Even; Ezi - Ezid; Fre - French; Gag - Gagauz; Geo - Georgian; Gre - Greek; Hez - Hezhen; Ice - Icelandic; Ing - Ingushian; Ira - Iranian; Ita - Italian; Ite - Itelmen; Jap - Japanese; Kab - Kabardinian; Kai - Kaitag; Kal - Kalmyk; Kaz - Kazakh; Ket - Ket; Kha - Khakass; Khm - Khamnegan; Kla - Kalash; Kor - Korean; Koy - Koryak; Krc - Karachai; Krk - Karakalpak; Kub - Kubachinian; Kum - Kumyk; Kur - Kurd; Kyr - Kyrgyz; Lak - Lak; Lez - Lezgin; Lit - Lithuanian; Mal - Maltese; Mol - Moldavian; Mon - Mongol; Nan - Nanai; Neg - Negidal; Niv - Nivh; Nog - Nogai; Nor - Norwegian; Orc - Orcadian; Oro - Oroqen; Oss - Ossetian; Pol - Polish; Rom - Romanian; Rus - Russian; Sar - Sardinian; Sco - Scottish; Sho - Shor; Sic - Sicilian; Spa - Spanish; Tab - Tabasaran; Taj - Tajik; Tat - Tatar; Tel - Teleut; Tod - Todzin; Tof - Tofalar; Trk - Turkmen; Tu - Tu; Tub - Tubalar; Tur - Turkish; Tuv - Tuvinian; Ukr - Ukrainian; Ulc - Ulchi; Uyg - Uyghur; Uzb - Uzbek; Xib - Xibo; Yak - Yakut; Yuk - Yukaghir. The area denoted by the gray square is zoomed-in in (B). Additionally, ancient individuals have been projected onto the plot (HG = hunter-gatherer, WEHG = Western European hunter-gatherer, EEHG = Eastern European hunter-gatherer). Population abbreviations for the modern individuals are as in (A).

Among themselves, the Uralic populations are not particularly similar genetically. Rather, they mostly resemble their geographic neighbours, including those that speak non-Uralic

languages (Tambets *et al.* 2018), demonstrating fairly tight local contacts and shared genetic history across language family borders. These contacts may have taken various forms, from occasional mating related to, for example, trading contacts to systematically exogamous marriage practices. Furthermore, numerous language shift occasions are known (Saarikivi 2006; Janhunen 2022), and at least in the northernmost study area the linguistic identity has been very fluctuating (see 22.5.5). As the Uralic language family is widely distributed geographically, the genetic likeness with geographic neighbours leads to the gene pools of Uralic-speaking populations across the distribution differing from each other quite clearly.

However, most of the Uralic-speaking populations do share a small genome-wide component of genetic ancestry (Tambets *et al.* 2018). Recently, Zeng *et al.* (2023) placed a possible source of this ancestry in Northeastern Siberia at ca. 2500 BC, in a Late Neolithic / Bronze Age population they called Yakutia_LNBA. In earlier analyses, modern Nganasans have often been used as a proxy for this ancestry, because the component is maximized in them, albeit also present in many other Siberian populations.

In the Uralic-speaking populations on the European side of the Urals, this shared component is seen as ca. 10–35% of modern-Nganasan-like ancestry in Volga Uralic speakers, ca. 25 % in Saami, and ca. 5–10% in Finnic speakers (Finns, Estonians, Veps, Karelians) (Lamnidis *et al.* 2018; Tambets *et al.* 2018). However, some non-Uralic-speaking populations carry the component, too: it is seen for example at 27% in Chuvashes in the Volga area (Turkic-speakers; Lamnidis *et al.* 2018) and at 6-11% in Russians (Slavic-speakers) from Central and Northern European Russia (Lamnidis *et al.* 2018; Tambets *et al.* 2018). Intriguingly, Zeng *et al.* (2023) claim that the Yakutia_LNBA component could explain almost all East Asian ancestry in the present-day Uralic-speaking populations that they modeled, whereas in all non-Uralic-speaking populations the component was either

absent or present with other East Asian ancestry components. The connection of this component to the spread of Uralic languages is discussed in 22.5.3.

22.4.2 Y-chromosomal haplogroup N as a hallmark of Uralic-speaking populations

As described above, the overall genomic sharing among Uralic-speaking populations is relatively low. The maternally inherited mitochondrial haplogroups demonstrate no particular affinity between the Uralic populations either; they rather follow the general mitochondrial variation across Eurasia (see Tambets *et al.* 2018 for an overview). In contrast, the paternally inherited Y-chromosomal haplogroups tell a different story, as various subtypes of Y-chromosomal haplogroup N are markedly common in many Uralic-speaking populations (Ilumäe *et al.* 2016, Tambets *et al.* 2018). The duality in the geographic patterns of maternal and paternal haplogroups has often been assumed to signal a difference between male and female migration histories, in particular a male-dominated migration across Eurasia on the one hand and widespread female exogamy on the other.

The history of Y-chromosomal haplogroup N seems closely tied with that of the genome-wide Siberian-like ancestry component: subtypes of the haplogroup were carried by all males of the Yakutia_LNBA population (see 22.4.1), and in populations further west, the earliest observations of these two types of ancestry coincide (Zeng *et al.* 2023). Previous phylogenetic analyses of haplogroup N in present-day populations are largely in line with the ancient-DNA evidence, having suggested a slightly earlier expansion starting at ca. 3000 BC (Ilumäe *et al.* 2016).

22.4.3 Genetic history of Western Siberian Uralic speakers and the Siberian-like ancestry component

Several recent studies of aDNA focusing especially on Southern and Northeastern Siberia (e.g. Sikora *et al.* 2019; Allentoft *et al.* 2022; Childebayeva *et al.* 2023; Gill *et al.* 2023; Zeng *et al.* 2023) have revealed the highly complex population history of Siberia. Meanwhile, much of Northern Central Siberia, i.e., the core area of Uralic languages' eastern distribution, remains unexplored by aDNA - unfortunately the acidic soils in much of the area prevent good preservation of skeletal remains.

From the point of view of Uralic population history, perhaps the most interesting facet of the Siberian aDNA record is the formation of an ancestry component that is widely found in present-day Uralic speaking populations (Gill *et al.* 2023; Zeng *et al.* 2023). It seems to originate in Middle/Late Neolithic Yakutia by 2500 BC - Gill *et al.* (2023) discuss the time depth of its origin in detail - and start spreading westwards by 2200 BC (Zeng *et al.* 2023). Subsequently, the component may have spread further west in connection with the Seima-Turbino phenomenon (Zeng *et al.* 2023; see 22.3.2 and 22.5.3), which in itself appears genetically highly heterogeneous (Childebayeva *et al.* 2023, Zeng *et al.* 2023).

Studies of modern populations across Western Siberia also testify to a very complex genetic history: while the overall genetic affinities reflect the geographic distances between populations, there are clear exceptions to this. In many cases, the genetic affinities extend across the borders of language families, with Khanty and Mansi close to Evenk (Wong *et al.* 2017), Khanty and Selkup to Ket (Flegontov *et al.* 2016; Triska *et al.* 2017; Karafet *et al.* 2018), Nenets to Even (Wong *et al.* 2017), and Nganasans to Even, Evenk and Yukaghir (rather than to Nenets and other Samoyed speakers) (Pugach *et al.* 2016; Karafet *et al.* 2018); they are mirrored in rich linguistic contacts within the area (see 22.2.5) and possibly mediated by the fluency of ethnic, linguistic and cultural identities (see 22.5.4). Furthermore, a clear genetic substructure is seen in the Nenets (Karafet *et al.* 2018) as well as in the Mansis (Tambets *et al.* 2018). In general, the genetic structure of the Uralic-speaking populations of

Siberia also reflects a history rife with founder effects, small population sizes, and recent admixture with European populations.

22.4.4 Genetic history of the Volga Uralic area

The present-day Volga Uralic populations show long-range affinities to Uralic speakers who live both east and west of them: Komis and Udmurts with Khantys, Udmurts also with Saami, Mansis and Nenets, and Maris further with Veps, Nganasans and Selkups (Triska *et al.* 2017; Tambets *et al.* 2018). The Komi population also harbours a clear north-south genetic substructure (Khrunin *et al.* 2013), possibly partly influenced by recent spread northwards and reindeer-herding-related contacts with Nenets (Blokland and Rießler 2011).

The Volga Uralic speakers' gene pools also closely resemble those of their Turkic-speaking neighbours (Jeong *et al.* 2019), mirrored by signs of linguistic contacts between the speaker populations (Golden 1992). The contacts appear very areal, as the Turkic-speakers do not show a similar genetic affinity (Jeong *et al.* 2019) or linguistic contacts (de Heer *et al.* 2023) to the Uralic speakers in Siberia as the Volga Uralic populations do. As an exception, the Bashkirs (who are Turkic-speakers) show genetic affinity to Uralic Khanty (Triska *et al.* 2017), which could indicate that they have shifted from a Uralic to a Turkic language or at least had tight contacts to the Uralic speakers. Similarly, many Northern Russian populations - unlike Russian speakers further south - carry genetic signals typical of Uralic speakers (Khrunin *et al.* 2013; Kushniarevich *et al.* 2015), suggesting that the arrival of the Slavic language to the area involved admixture with and/or language shift of the local populations. This is in line with evidence from aDNA, which shows that admixture of a new type of ancestry with the local gene pool coincided with the Slavic arrival (Peltola *et al.* 2023), and with historical records.

22.4.5 Genetic history of the Eastern Baltic area

The genetic history of the Eastern Baltic area, where Finnic languages are spoken today, is relatively well covered by aDNA data (Fig. 22.6), the oldest of which date to the Mesolithic (Saag *et al.* 2021). They show the Eastern Baltic as a border or admixture zone between two Mesolithic hunter-gatherer ancestries at the western end of a hunter-gatherer cline stretching across Eurasia (see 22.4.1 and 22.5.1): Western European hunter-gatherers (WEHG, often also abbreviated WHG; suggested to be renamed as Oberkassel cluster by Posth *et al.* 2023) and Eastern European hunter-gatherers (EEHG or EHG or Sidelkino cluster, respectively) (Fig. 22.5 B) (Jones *et al.* 2017; Mathieson *et al.* 2018); recent analyses have also shown the presence of a Ukraine-originating ancestry component (Allentoft *et al.* 2022). The arrival of the Typical Comb Ceramic tradition to the Eastern Baltic Narva cultural area led to an upsurge of EEHG ancestry in the 4th millennium BC, whereas the Corded Ware expansion in the 3rd millennium BC brought - along with new, agricultural economic practices and a new material culture - a new type of genomic composition, with a large proportion of steppe-originating ancestry (Saag *et al.* 2017; Mittnik *et al.* 2018).

Later, the Bronze Age in present-day Estonia saw a slight resurgence of WEHG-like ancestry, possibly signalling a migration from Scandinavia (which would also fit the emergence of Scandinavian-type stone cist graves) (Saag *et al.* 2019). Meanwhile, further north in the Kola Peninsula, a very distinct genomic composition prevailed, attested at the Bolshoi Oleni Ostrov cemetery ca. 1500 BC (see 22.3.2). This Early Metal Age population can be modeled with ca. 50-60% of EEHG and 40-50% of Siberian-like ancestry, resulting from an admixture ca. 17-18 generations earlier, around 2200-2000 BC (Lamnidis *et al.* 2018; Childebayeva *et al.* 2023), but more complex admixture scenarios are also compatible with the data (Gill *et al.* 2023). In this population, the Y-chromosomal haplogroup N is observed for the first time in the wider Circum-Baltic area (Lamnidis *et al.* 2018), whereas in

Estonia the haplogroup only arrives later, during the Iron Age (i.e., there it is roughly contemporaneous with the estimated arrival date of the Uralic languages), along with a small but distinct Siberian-like component detectable elsewhere in the genome (Saag *et al.* 2019).

Viking burials in Estonia harbour a Scandinavian-like genetic composition (Margaryan *et al.* 2020), whereas later medieval individuals already closely resemble modern Estonians (Kivisild *et al.* 2021). However, compared to the Iron Age, the modern Estonian population also has some additional ancestry of the component known as Early European farmers (Saag *et al.* 2019). Altogether, the modern populations in the eastern Circum-Baltic area retain a higher proportion of hunter-gatherer ancestry components than most other European populations do: WEHG ancestry is highest in the Eastern Baltic populations and EEHG ancestry in Finland; however, each component still constitutes less than 10% of the populations' gene pool, while the steppe-originating ancestry comprises ca. 40% or more (Allentoft *et al.* 2022, esp. Figure 5 therein).

Whereas the extant Finnic-speaking populations are genetically relatively close to each other, the Saami stand out by genomic signatures of small population size and relative isolation and also by a larger eastern genomic component (Huyghe *et al.* 2010; Tambets *et al.* 2018). Notably, a modern Saami-like genetic composition has also been seen south of the present-day Saami area, in Late Iron Age Ostrobothnia in Western Central Finland (Lamnidis *et al.* 2018). Though not *per se* indicative of linguistic identity, this finding does fit with Saami languages having been spoken also in Southern Finland (Aikio 2012) before the Finnic languages entered the country and spread across it during the last two millennia (Frog and Saarikivi 2015).

The Estonian population has an internal structure that mostly follows geography (Nelis *et al.* 2009, Pankratov *et al.* 2020, Kivisild *et al.* 2021), whereas in Finland the structure is conspicuously dichotomous, with a strong genome-wide difference between Eastern and

Western Finns (Salmela *et al.* 2008; Kerminen *et al.* 2017) coupled with a strong dialectal division to East and West (e.g. Syrjänen *et al.* 2016).

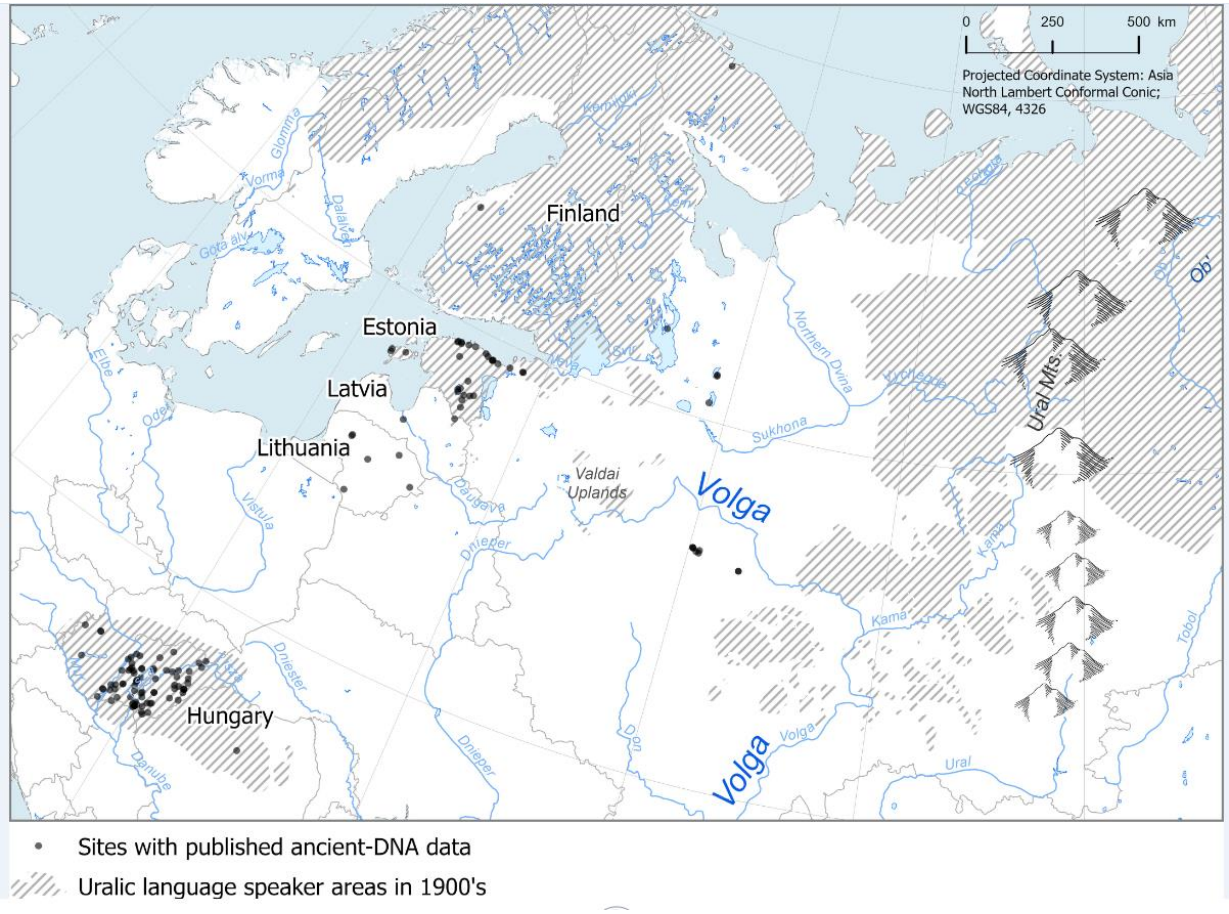

Figure 22.6: Some of the main sampling locations of ancient-DNA data described in the text (from Saag *et al.* 2017, 2019, 2021, Lamnidis *et al.* 2018, Mittnik *et al.* 2018, Gnecchi-Ruscone *et al.* 2022, Maróti *et al.* 2022, Peltola *et al.* 2023) projected on Uralic speaker areas in 1900. (Cartography: Roose *et al.* 2023).

22.4.6 The curious case of Hungary

It has long been evident that modern-day Hungarians very closely resemble their non-Uralic neighbours in their gene pool, and only very slight traces suggest a genetic connection to the east that would be in line with the origin of the Hungarian language. As an example of the latter, 1-4% of male Hungarians share a Y-chromosomal haplogroup (N3a4-B539) with populations from the region of the Urals, including the speakers of Ob-Ugric languages in Western Siberia (Post *et al.* 2019) that the Hungarian language resembles the most (albeit

through contacts (*Sprachbund*) rather than by a closely shared genealogical origin; cf. 22.2.1).

Recent aDNA studies, however, show evidence of substantial genetic contributions from the east in at least three main waves from the Hun period in 5th century AD to the Avar period in late 6th to 9th century AD and to the Hungarian (Magyar) Conquest period at the end of 9th century AD (Gnecchi-Ruscone *et al.* 2022; Maróti *et al.* 2022). The first two waves carried with them ancestry from the region of present-day Mongolia. The Hungarian conquerors, on the other hand, brought a different kind of ancestry more closely related to present-day Siberian Uralic speakers and thus plausibly to the spread of Uralic languages. However, the genetic contributions of all three Asian-originating waves in Hungary have eventually been mixed with a large proportion of local, much more European-looking gene pool to form the genomic composition of today's Hungarian speakers. This kind of pattern, where a population is genetically close to its geographic neighbours but its linguistic relatives are far away, is fairly uncommon; in fact, Hungarian was the only such 'linguistic enclave' in a worldwide dataset of 397 genetic populations speaking 295 languages collected by Barbieri *et al.* (2022).

22.5 Interdisciplinary considerations: Integrating linguistic, archaeological and genetic evidence

22.5.1. Proto-Uralic speakers: western Neolithic hunter-gatherers or eastern bronze traders?

In the times prior to the Proto-Uralic in the Late Neolithic and Eneolithic (c. 4th and early 3rd millennium BC), the study region was characterized by a complex of mobile hunter-gatherers with impressed ware pottery styles (comb-pit wares and related) which prevailed over much of the forest zone. In the European part of the study region, the hunter-gatherer populations in 4th and 3rd millennium BC were associated mainly with Eastern European hunter-gatherer

ancestry, as remnants of a hunter-gatherer cline that further east involved additional Ancient North European ancestry and increasing proportions of East Asian ancestry (Zeng *et al.* 2023). It was earlier suggested that the Proto-Uralic speaker populations would be found amongst the early Neolithic populations (Sammallahti 1988) or more precisely amongst the Comb-Pit Ware horizon, from within the Lyalovo tradition in the Volga-Oka region (Carpelan and Parpola 2001). This suggestion was based on the two common presumptions that the Uralic family was 6000 years old and Proto-Uralic was spoken west of the Ural Mountains, in the "Volga-Kama homeland" (Fig. 22.1.). It was further assumed that the following Volosovo complex, part of a larger Porous Ware horizon, would have been associated to Proto-Finno-Ugric speakers. Phylolinguistic timing suggested a slightly younger age of Proto-Uralic with first branchings 5300 years ago, in which scenario Volosovo-associated people could have been Proto-Uralic speaking (Honkola *et al.* 2013). Genetically, individuals studied from both Volosovo and Lyalovo contexts carry primarily EEHG ancestry (Saag *et al.* 2021; Zeng *et al.* 2023).

However, the "Neolithic paradigm" of the Proto-Uralic speaker population was no longer compatible with the emergence of younger timing estimates: Kallio (2009) and Häkkinen (2009) assumed that the first disintegration only took place 4000 years ago and Proto-Uralic was maximally 5000 years old. Following from these estimates, Proto-Uralic must be considered a Bronze Age event.

In the western part of the study region, a relevant complex is the Corded Ware with roots in the Yamnaya complex of the Late Neolithic and Eneolithic. In the first half of the 3rd mill BC the Corded Ware Complex brought new populations with steppe-related ancestry, pastoralist and farming lifestyles, and most likely also Indo-European languages from the southwest into the Eastern Baltic and central Russian areas. A descendant for Corded Ware was the Abashevo-Sintashta-Petrovka complex of herders inhabiting the steppes and forest

steppes on both sides of the Urals. The Abashevo-Sintashta-Petrovka complex is associated with the emerging Proto-Indo-Iranian languages. These are the groups that likely had the early contacts with "Common Uralic" speaker communities (Grünthal *et al.* 2022).

The east of the Urals in the 3rd mill. BC was the scene for dynamic socio-cultural and economic processes in the steppe, forest steppe and forest zone, built upon an already three thousand year old history of fortified and complex settlement amongst the local hunter-gatherers, as well as an earlier influx of people, technologies and economies (including agriculture) from the south in the 4th mill. BC. In our opinion, these are the dynamics within which Proto-Uralic emerges and a subsequent "Common Uralic" communication space develops. In Sintashta contexts of the Transuralian forest steppe (c. 2200-1750 BC), individuals show close ties to Corded Ware individuals from Eastern and Central Europe (Allentoft *et al.* 2015). Broadly contemporary with the Abashevo-Sintashta-Petrovka complex, further distinct groups of (material) cultural units existed between the Urals and Altai/Sayan mountains (Fig. 22.3). Although differing in various aspects such as details of burial customs, economy and settlement, these groups (including e.g. Okunev, Krotovo and Tashkovo-Logino) are connected by the presence of simple, flowerpot-shaped vessels as described above. Another trait which connects the groups of this "flowerpot complex" is the distinct concentration of Seima-Turbino bronzes in its area as well as several finds of actual casting moulds for Seima-Turbino bronzes, indicating their production in this context (see Fig. 22.3).

Seima-Turbino bronzes reflect a trading network starting in the last quarter of the 3rd mill (c. 2200 BC) in the Altai foothills and Baraba forest steppe and reaching the westernmost fringes of its distribution area in the Baltic and Fennoscandia in the first half of the 2nd mill. BC (c. 1800 BC). According to Grünthal *et al.* (2022) it was the Seima-Turbino contact network that would have carried the Uralic languages east and west from the homeland,

which now would be the “Western Siberian” alternative. Rather than a migration of people, they suggest that the emerging trading network would have consisted of multi-ethnic participants, who would have needed a joint communication language, a *lingua franca*. “Common Uralic” would have been this language. The rake model of Proto-Uralic first disintegration necessitates a fast spread of language variants, and the fast-evolving Seima-Turbino network would have been the vector for rapid Uralic spread. In this scenario, the already isolating “Common Uralic” speaking populations had independent contacts with Proto-Indo-Iranian speakers of the more westerly located Sintashta-Petrovka herder communities.

22.5.2. The “flowerpot complex” - A new vector in the Seima-Turbino hypothesis

With its location to the north and north-east of Sintashta-Petrovka, the “flowerpot complex” extends between the hypothetical “Western Siberian homeland” and the “Altaic homeland” of Proto-Uralic; it covers an area with dense Seima-Turbino related finds including bronzes and casting moulds from regular burial contexts (Fig. 22.3). We suggest that it was this “flowerpot complex” of typologically related pottery styles and associated material culture that bears witness to an extensive communication space that enabled both the promotion and spread of the Seima-Turbino bronze technology and artefacts, and the disintegration Proto-Uralic and spread of “Common Uralic”.

More precisely, we suggest a scenario pooling (a) Grünthal *et al.*’s (2022) hypothesis of “Western Siberian homeland” and “Common Uralic” being the *lingua franca* of Seima-Turbino trading network, and (b) Carpelan’s (1999, 2007) hypothesis of “Altaic homeland” and Proto-Samoyedic being the *lingua franca* in Seima-Turbino: Maybe Proto-Uralic was spoken within the eastern settlements of the “flowerpot complex”, located near the “Altaic homeland” at the time when manufacturing and trading of prestigious bronze items started to

become an important socio-cultural trait, and while "Common Uralic" subsequently developed as the *lingua franca* of developing wider communication network along the southern fringe of the West Siberian taiga.

According to this scenario, the "flowerpot complex" marks a transregional interaction space which enabled the propagation of the new bronze technology and associated prestige items through the Seima-Turbino trading network. Within the "flowerpot complex", the eastern groups are interesting for two reasons. First, protolanguages are assumed to be spoken in a rather condensed area (Saarikivi 2022, Grünthal *et al.* 2022). Second, a Proto-Uralic speaker group by the "Altaic homeland" would ease the problem of Samoyedic languages lacking the bulk of traces of Proto-Indo-Iranian contact. The "Altaic homeland" would provide a scenario where the Samoyedic languages would have remained close to the homeland and thus avoided the Proto-Indo-Iranian contacts that would have instead affected the east-ward dispersing "Common Uralic" dialectal continuum in the secondary homeland in Western Siberia. The few Indo-European loans to Samoyedic could have been acquired in contact with Tocharian (Warries 2022), a now extinct branch of Indo-European, around the Altai and Sayan mountains and by the Upper Yenisei – and also in Minusinsk basin.

Our promotion of an "Altaic homeland" follows the conclusion of Peyrot (1999) and Bjørn (2022). The former studied Uralic substrate in Tocharian and suggests both that the contact was between (Pre-)Proto-Tocharian and Proto-Uralic rather than Proto-Samoyedic, and that the archaeological counterpart of the contact event could have been tentatively appearing Okunev tradition and late phases of Afanasevo tradition. Bjørn instead studied the etymology of six meanings within language families of Altaic area and suggests that Proto-Uralic could have been spoken within the Okunev tradition, that occurred in the Minusinsk basin, a wide plain at the upper Yenisei isolated from the surroundings by mountain ranges (Fig. 22.3). Okunev is indeed part of our newly defined "flowerpot complex", but its archaeological,

genetic and linguistic origins is widely discussed. In Bjørn's scenario, Proto-Samoyedic would have remained in the vicinity of the Proto-Uralic homeland, near to Minusinsk basin. Minusinsk has been mentioned also by Janhunen (2022) but as the original speaker area of Proto-Samoyedic. Minusinsk Basin is indeed extremely rich in archaeology and a contact area of various language families.

Maybe the "Altaic homeland" was the primary speaker area of Proto-Uralic, and Proto-Samoyedic would have remained there and only later would have partly moved north to a "Late Proto-Samoyedic homeland" (Wagner-Nagy and Szeverény 2022). In this scenario, the "Finno-Ugric-languages-to-become", i.e., expanding "Common Uralic" would have been carried along the emerging Seima-Turbino trading network towards the west to the "Western Siberian secondary homeland" where the already isolating populations had the contacts with Proto-Indo-Iranian speakers of the more westerly-located Sintashta-Petrovka herder communities of the steppe and forest steppe belt. Finally, further west, the "Volga-Kama tertiary homeland" would have been the incubator for the Western Uralic languages.

To the north, this "flowerpot complex" corridor of east-west communication and trade relations is bordered by the taiga populations of persisting hunter-fisher communities who spoke languages of unknown affiliation (Fig. 22.3). It is possible that they, too, played central roles in the socio-economic dynamics further south, including the emergence and spread of the Seima-Turbino phenomenon: They could have been involved e.g. through highly valuable trade goods such as furs which do not leave archaeological traces.

22.5.3. Uralic spread as inter-ethnic communication language

Thanks to very recent ancient-DNA work, our scenario can now be considered also from the genetic point of view. High frequency of various subtypes of Y-chromosomal haplogroup N (see 22.4.2) and the presence of a Siberian-like genome-wide ancestry component (see

22.4.1) have been connected to the Uralic language speaker area and even to the Uralic spread (Saag *et al.* 2019; Tambets *et al.* 2018; see also 22.5.5).

Recently, Zeng *et al.* (2023) located the origin of Siberian-like ancestry to Yakutia c. 2500 BC. The same ancestry was seen in unadmixed form in an individual buried c. 2200 BC in Krasnoyarsk north from Minusinsk basin and Sayan mountains, and in four other individuals buried around 2000 BC in a possibly Seima-Turbino related site of Tatarka Hill, by the Sayan mountains and west of Krasnoyarsk (Zeng *et al.* 2023). Further west, contemporary individuals from Seima-Turbino necropolises in Rostovka and Satyga-16 harbour variable amounts of Siberian-like ancestry (Zeng *et al.* 2023, Childebayeva *et al.* 2023). This is to say that around the time of the start of the Seima-Turbino phenomenon, the genetic profile of the studied individuals in the Sayan mountains / Minusinsk basin area was Siberian-like, but this was not the case for all the area of the "flowerpot complex". Future studies hopefully will shed more light on the temporal spread of the Siberian-like ancestry along the Seima-Turbino communication space, and spatio-temporal variation of populations with "flowerpot complex" material culture.

In all, the linguistic and genetic insights give support to the hypothesis that assumes that Seima-Turbino was not a population migration event but rather a gradual spread of a new bronze-working technology through a communication network with complex population and interaction dynamics. Grünthal *et al.* (2022) propose a sociolinguistic scenario where the Seima-Turbino trading network would consist of individuals from different origins that needed a *lingua franca*, a common language - and that "Common Uralic" would have been that language. The new results give genetic settings where this indeed would be a plausible hypothesis: The genetic heterogeneity of the Seima-Turbino-related individuals from Rostovka and Satyga-16 (Childebayeva *et al.* 2023, Zeng *et al.* 2023), with variable proportions of ancestry derived from a range of hunter-gatherer populations as well as from

steppe pastoralists, indeed suggests a communication network of people with very differing and wide-ranging origins upholding the Seima-Turbino trading network. The inter-ethnic communication network indeed could have necessitated a common language.

22.5.4. Palaeolinguistic considerations

Linguistic palaentology is not considered as strong evidence to gain reliable information of the Proto-Uralic homeland or sociolinguistic settings. However, the reconstructed lexicon refers to a homeland in the inland, near to watersheds, and the vocabulary is compatible with the scenario fitting "flowerpot complex", Sayan area and Seima-Turbino bronzes to Proto-Uralic distintegration. Proto-Uralic reconstructed vocabulary includes e.g. words for fishing, hunting and boat travelling (Saarikivi 2022), while vocabulary of e.g. hierarchical society and agriculture are absent (Salminen 2007). Saarikivi (2022) describes the diorama the vocabulary provides as "stereotypical hunter-gatherer society of taiga forest zone" (p. 30, ibid.) and further provides a short story of the lifestyle (p. 57, ibid.) of mobile population with shamans, trading, and contact to metallurgy.

Metallurgy is referred to by **wäśkä* 'copper or bronze' - a potential loan to Proto-Uralic from the neighbours (critically reviewed by Kallio 2006). Furthermore, Häkkinen (2009) proposes a Proto-Uralic word **äsa-wäśk*a meaning something like "partly-copper/bronze". This would indicate knowledge of not only copper as metal, but also metallurgy. Before the reconstructions of the word(s) for metals, the palaeolinguistic evidence spoke for Eneolithic hunter-gatherer societies, but the words for metals have induced scholars to speculate the connection between Uralic expansion and copper trade (e.g. Carpelan 1999, 2007; Kallio 2006; Salminen 2007; Häkkinen 2009). Proto-Uralic also included a potentially Indo-European loanword **pata* for "pot" that has been seen as a reference to ceramic vessels - however the spread of **pata* may be of Finno-Ugric distribution only (Kallio 2006).

22.5.5 Is gene-language-culture synchronous spread something to expect?

We presented earlier in Tambets *et al.* (2018) a positive correlation between linguistic distances of Uralic speaker populations and their autosomal genetic distances (but not Y-chromosomal and mitochondrial distances), with geographic distance taken into account. Following the path of Cavalli-Sforza (2001), this could be promoted as hypothesis that the Siberian-like ancestry and haplogroup N spread alongside with Uralic languages. However, gene-language similarities of current populations could result also from e.g. later spread of languages (and their speakers) on top of a former, (somewhat) homogenous genetic landscape. To separate synchronous and asynchronous spread of genes and languages we need to build spatio-temporal reconstructions of the formation of genetic and linguistic landscapes, and compare them, rather than conduct correlations of modern genetic and linguistic profiles of modern populations.

Work towards reconstructing the history of Uralic languages is on the way, as are reconstructions of the genetic landscape. The latter have, however, suffered from the lack of aDNA samples and of directly comparable analyses until recently - the presence and proportion of the ancestry components per population may depend on the analytical setting. Furthermore, not all populations may derive their Siberian-like component from the same historical event(s); in other words, the component may have spread through multiple, independent population movements. The same applies to haplogroup N: different subtypes of it have been enriched in different modern (and ancient) populations, which may signal the involvement of multiple population movement events. Thus, reanalyses of the published modern and ancient-DNA data would be needed to get a coherent picture of the genetic history of Uralic speakers.

The formation of genetic landscape is revealed by large-scale studies, but also by studies focusing in detail on particular areas. In the Uralic case, Saag *et al.* (2019) and Lamnidis *et al.* (2018) provide complementary work from the western side of the Uralic language speaker area. The timing of the arrival of the Siberian-like ancestry component and haplogroup N to Estonia fits temporally somewhat to the estimated spread of Uralic languages from the Central Volga to the Baltic area (Saag *et al.* 2019). Contrastingly, in the Bolshoi Oleni Ostrov cemetery on Kola Peninsula (Fig. 22.3), the Siberian-like ancestry appears by 1500 BC (Lamnidis *et al.* 2018; Childebayeva *et al.* 2023), which is about 2000 years before any Uralic language is known to reach the area (for timing of Saami languages in Lapland or Sápmi, see Aikio 2012). An explanation for the early presence of the Siberian-like ancestry component on the Kola Peninsula would be that it spread independently of the Uralic languages – perhaps via a direct influx of people along the north Siberian tundra region. Indeed, the closest parallels to Bolshoi Oleni Ostrov's waffle ceramics are found in the contemporary Ymyyakhtakh cultural complex in Yakutia (Murashkin *et al.* 2016), in the context of which also the Siberian-like ancestry component formed (Zeng *et al.* 2023).

A final word of caution for studying spread of genes, languages and cultures has to do with complex dynamics of languages, material culture and kinship ties leading to "fluctuating ethnicity" of some studied northern populations, e.g. those in the Upper Yenisei with Samoyedic and Turkic languages (Khanina 2022) or Taz Selkup, a Samoyed-speaking hunter-fisher-herder group who migrated to the northern forests of Western Siberia in the 17th-18th centuries AD (Piezonka *et al.* 2016). In the north, exogamy with other, Uralic and non-Uralic ethnic groups (e.g. Evenks, Kets, Russians, Khanty) led to "international, almost cosmopolitan conditions", as Finnish scholar Kai Donner observed in 1912. As an example, Donner describes a man, whose mother was an Evenk, his father a Khant, and his wife a Ket, who spoke Selkup at home but was also fluent in all these other languages (Donner 1926,

152). Today, while language continues to play a central role in consciously enacting and upholding Selkup identity (Tučkova *et al*. 2013, 281), material culture lost its function as an identity marker. Language ("speaker community"), material culture ("archaeological culture") and genetic relatedness ("population") are not congruent in the case of the Taz Selkup (Peterson *et al.* 2022).

22.6 Conclusion

In Uralic historical linguistics, a major shift is taking place with regard to timing and locating of the Proto-Uralic, and its disintegration and spread. This is the result of novel, truly interdisciplinary approaches on how to triangulate between linguistic, archaeological and genetic evidence of human past in North-Western Eurasia. The new timing suggests that the disintegration and spread of the family broadly coincides with the Late Eneolithic and the start of the Bronze Age in the eastern part of the study region. According to the new scenario, the homeland of Proto-Uralic was likely located in the Altai-Sayan mountain region, possibly specifically in the Minusinsk basin, at the very south-eastern periphery of the modern extension of the Uralic languages. The dispersal of the early branches of Uralic towards the west around 2000 BC is related to a transregional communication belt along the southern fringe of the taiga which manifests through widespread material culture patterns including "flowerpot-like" ceramics in West Siberia, textile ceramics from the Urals to the Baltic, and the Seima-Turbino transregional phenomenon of bronze prestige items across this entire vast belt between the Altai and the Baltic. The secondary dispersal of the Uralic languages to their current speaker areas in the north (and south in the case of Hungarian) took place much later in Iron Age and Medieval times. Concerning the socio-economic settings, the spread of Uralic languages seems not to have been driven by the spread of farming, unlike many other major spreads of language families. Instead, it was propelled by interaction and trading

among various hunter-gatherer and herder societies through their need to communicate. The present combined assessment of the newest linguistic, genetic and archaeological evidence thus reveals that the Uralic case might provide a counter-argument from the hunter-gatherer world for the "farming/language dispersal" hypothesis that has so far been dominating scenarios in multidisciplinary approaches in Western Eurasia and beyond.

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