LaPio – The Lapland Pioneers Project

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Abstract
The Lapland Pioneers Project focuses on the study of the earliest pioneer settlement of Lapland and its connections with other areas of northern Europe particularly as reflected by lithic technology. The project began in 2002 with a survey in Utsjoki, followed by excavations in 2004–2006, additional surveys in Utsjoki and in the Varangerfjord area in Norway in 2007–2015, collections research in several countries in 2008–2015, the founding of the international Nordic Blade Technology Network (NBTN) in 2009, and several international workshops and teaching workshops in 2009–2014. The project's findings have led to a radical change in views concerning the early settling of Scandinavia.

Keywords: Post-glacial pioneers, *chaîne opératoire*, cultural reproduction, Post-Swiderian, blade technology, Mesolithic, Lapland, Finnmark, lithics

Background

The earliest human settlement of northernmost Scandinavia – the area known as Lapland in Finland and as Finnmark in Norway – dates to the Early Mesolithic, possibly beginning around 9500 cal BC (10 000 BP). This settlement flourished in coastal Finnmark on the shores of the Arctic Ocean and was originally referred to as the Komsa Culture. Named after the Komsafjell in Alta, the Komsa Culture was discovered by Norwegian archaeologist Anders Nummedal in the late 1920s and early '30s and was originally thought to be a homogeneous phase encompassing the whole Finnmark Mesolithic. Possible origins of the Komsa Culture were seen variously in the Early Mesolithic Fosna Culture of western Norway, in a Palaeolithic refugium that had 'overwintered' the Ice Age in situ on the ice-free coast, in a direct immigration from central Russia, or in an immigration from northern Central Europe via the eastern route around the receding Scandinavian glacier. The origin was debated until evidence of a northward expansion from western Norway began to surface in the 1970s, after which the other theories were abandoned and Komsa was added to the chain of western Scandinavian cultures emanating from the Late Paleolithic Ahrensburg Culture of northern Germany.

In the 1990s Irish archaeologist Peter Woodman divided the Finnmark Mesolithic into three phases that he named the Komsa Phase (10 000–8500 BP), the Sæleneshøgda Phase (8500–7500/7000 BP), and the Trapeze Phase (7500/7000 BP–Neolithic) (Woodman 1993; 1999). The criteria for the division related primarily to differences in lithic reduction technology: Woodman described the Komsa Phase as being characterized by large, asymmetric blades and flakes and globular cores, the Sæleneshøgda Phase (named after a site in Karlebotn) by symmetrical blades and microblades and conical cores, and the Trapeze Phase by transverse points ('trapezes') and an increased use of quartz and bipolar flaking. Woodman's scheme was slightly modified by Bjørnar Olsen (1994), who renamed the stages Phase 1 (10 000–9000 BP), Phase 2 (9000–7500/7000 BP), and Phase 3 (7500/7000 BP–Neolithic [c. 5200BP]) but used essentially the same criteria as Woodman. Phases 1 and 2 were believed to be strictly coastal, with the first inland sites on the Finnmarksvidda plateau only appearing during Phase 3. Regardless of the changes in material culture and adaptation, however, the technological evolution of the Finnmark Mesolithic through the different phases was thought to reflect the diffusion of ideas from western Norway, with no local population changes (see Kankaanpää & Rankama 2014 and Rankama &

Kankaanpää 2018 for more thorough discussions of research history).

In Finland, based on what was known by the 1990s, the settling of northern Finnish Lapland was thought to have come about through the slow northward expansion of the southern Finnish quartz-using Mesolithic or 'Suomusjärvi Culture' (Núñez 1997; Carpelan 1999), with the parishes of Inari and Enontekiö being reached around 8320 BP/7330 cal BC. Due to the dearth of evidence of the earliest postglacial incursions into southern Finland, the idea of human settlement inching northward after the slowly retreating glacier was taken for granted. Incursions from the arctic coast into northernmost Finnish Lapland by the Komsa people were considered possible, but the only evidence consisted of a few stray finds; no inland sites were known from either Finland or Norway that could be connected with the two earliest phases of the Finnmark Mesolithic. Phase 3, for its part, was nearly indistinguishable from the Finnish quartz Mesolithic and chronologically later than the earliest finds from both Inari and Enontekiö (cf. Carpelan 1999). Consequently, the origins of Phase 3 have been seen by several researchers as lying in the Finnish quartz Mesolithic rather than in the earlier cultures of the Norwegian coast (e.g., Rankama 2003; Grydeland 2005).

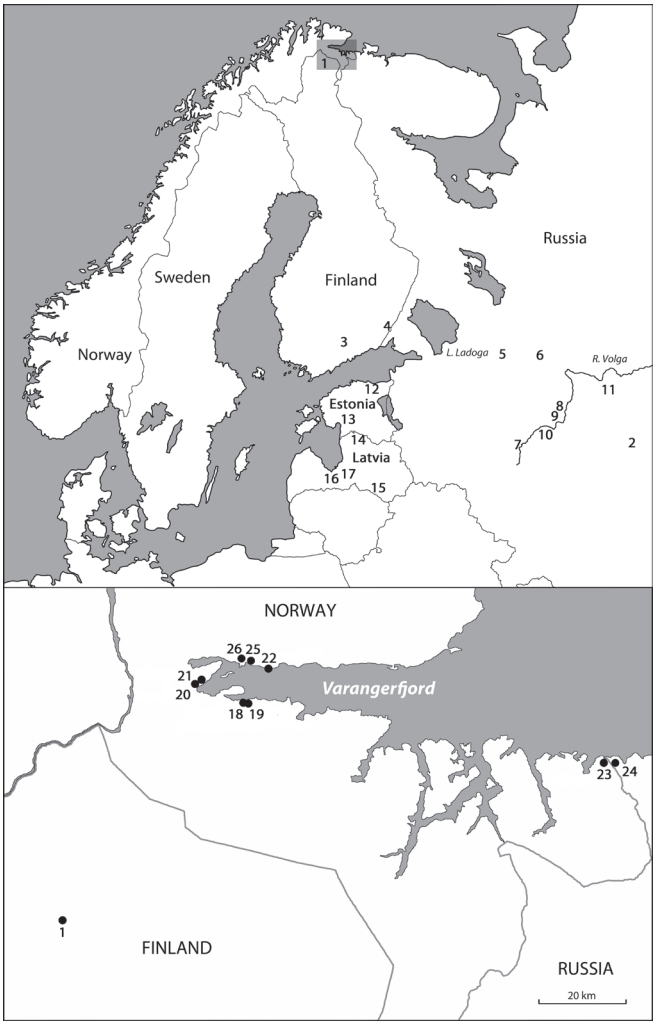


Figure 1. Post-Swiderian sites mentioned in the text:
1. Utsjoki Sujala.
2. Mikulino.
3. Lahti Ristola.
4. Lappeenranta Saarenoja 2.
5. Listvenka 3b.
6. Lotova Gora.
7. Butovo.
8. Tikhonovo 8.
9. Sobolevo 5.
10. Krasnovo 1.
11. Stanovoye 4.
12. Kunda Lammasmägi.
13. Pulli.
14. Zvejnieki.
15. Jersikas pilskalns.
16. Olaines purvs.
17. Salaspils Laukskola.
18. Fállegoahtesajeguolbba.
19. Ovenfor Lossoa's hus.
20. Starehnjunni.
21. Sæleneshøgda.
22. Mortensnes R10.
23. Prestestua 2.
24. Vuoremi sites.
25. Bergeby 2.
26. Nesseby 5.
Map: Jarmo Kankaanpää.

The survey

The *Lapland Pioneers* project (LaPio) had its origin in a survey of Lake Vetsijärvi in Utsjoki, the northernmost parish of Finnish Lapland (Figure 1), which the present authors carried out in 2002 as a self-funded private venture (Rankama 2005). Based on an analysis of prehistoric resources in the Teno River drainage (Rankama 1996), our survey sought to discover inundated Stone Age lakeshore sites with potential organic preservation. We used a kayak to cruise the shallows and search for possible finds on the bottom. It was known that the water level of lakes in supra-aquatic Lapland had generally risen since the Holocene Climatic Optimum that coincided with most of the Mesolithic (e.g., Hyvärinen & Alhonen 1994), and that there would thus be a chance that former shoreline sites had been inundated and preserved.

Lake Vetsijärvi lies on a plateau between low fells some 15 km east of the Inari–Utsjoki highway (Figure 2). It can be reached with an off-road capable vehicle, although covering the 20 km of very poor track takes about two hours and the going is quite bumpy. We hired Mr Eero Sujala, a local resident who owns a cabin on the lake, to transport us to our destination with our gear, but due to our limited budget we could not afford the luxury of renting the cabin. Instead, we set up our tent near a sandy shore at the foot of a peninsula formed by a moraine ridge, assembed our two-seat Klepper, and proceded to paddle slowly along the lakeshore for several days with our eyes fixed on the bottom (Figure 3).

The kayak survey was a disappointment. Very few possible archaeological artefacts were recovered from the water or the shoreline. We were later to discover that Lake Vetsijärvi seems to have been an exception to rule of the water level falling. Delta-like formations in valleys to the south of the lake and a former shoreline that we identified some three metres above the current lake surface suggested that the lake had originally been larger and had had its outlet to the south, but that it had at some stage formed a new outlet to the north – the present Vetsijoki River – and the water level had dropped drastically.

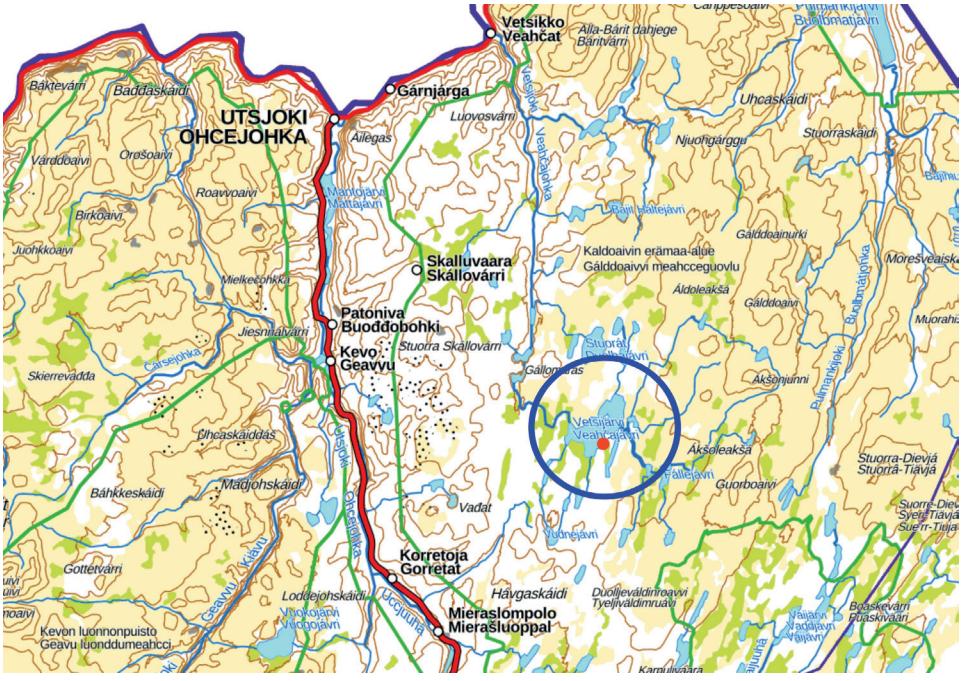


Figure 2. Central Utsjoki Parish, northern Finnish Lapland. Lake Vetsijärvi is encircled in blue, the Sujala site is marked by a red dot. Topographic map: The National Land Survey of Finland.

Figure 3. Tuija Rankama in our kayak looking for underwater finds at Lake Vetsijärvi. Photo: Jarmo Kankaanpää.

Fortunately, our survey was not limited to the shoreline. We were accompanied on our excursion by our ten-month-old Parson Russell terrier Vili and were thus obliged to take several daily walks, many of which followed the track that ran past our campsite and along the ridge to the very end of the peninsula. On our walks we discovered several archaeological features of diverse ages along this track. Aside from a pitfall of uncertain date and two apparently historical Saami hearths, the features included six probable Stone Age dwelling sites or surface scatters. Most of these latter features contained the ubiquitous quartz tools and flakes, but one site produced lithics of several different raw materials including flint and what was identified as chert. We named this site 'Sujala' since it lay close to the Sujala cabin.

The exotic raw materials of the Sujala site first appeared to point towards an Epineolithic date. Upon closer inspection during cataloguing, however, some of the chert 'flakes' began to look suspiciously like sections of large blades. This view was confirmed when photographs of the artefacts were shown to a number of colleagues during a seminar in Vuollerim, Sweden in 2003. Those present included Professor Peter Woodman himself, as well as Professor Kjel Knutsson and Dr Helena Knutsson from Uppsala (the organizers), Professor Ericka Engelstad from Tromsø, Dr Aleksandr Volokitin from Syktyvkar and Dr Mikhail Zhilin from Moscow, who would all figure in future activities concerned with the Sujala finds. The discovery of blade technology switched the date from the very late to the very early Stone Age as the geographically closest parallels were represented by Olsen's phases 1 and 2, the two earliest phases of the Mesolithic on the Norwegian Finnmark coast, which lay some 65 km northeast of Lake Vetsijärvi. As the Sujala site apparently represented the first known inland dwelling site of the early Finnmark Mesolithic, several of the participants of the seminar volunteered to take part in a test excavation. This was duly carried out the following summer with the help of Erica Engelstad, the Knutssons, Mikael Manninen, MA, and Taarna Valtonen, MA, from Helsinki, and archaeology student Lise Sand from Oslo.

The excavations

The test excavation and associated meticulous surface survey of 2004 located a second cluster of similar lithic materials some 200 metres south of the original Sujala site, so we now had Area 1 and Area 2. Test squares were excavated to assess the extent of both areas. These test squares together with surface picking produced a total of 379 finds, most of them of chert, including two sub-conical blade cores and one tanged point. This last artefact was

to produce the next radical shift of focus when Mikael Manninen later in the autumn found an almost exact counterpart in a collection published from the Mikulino site (located some 170 km due east of Moscow) by Dr Aleksey Sorokin of the Russian Academy of Sciences (Sorokin 1984). Mikulino represents the Butovo Culture, which is one of the eastern so-called Post-Swiderian cultures that also include the Estonian Kunda Culture and the northern Russian Veretye Culture and are sometimes referred to as the Kunda-Butovo Interaction Sphere.

The Post-Swiderian cultures were the source of the first incursions into Southern Finland in the immediate postglacial period at sites such as Lahti Ristola (Takala 2004) and Lappeenranta (formerly Joutseno) Saarenoja 2 (Jussila *et al.* 2012). We were not aware of any similar Post-Swiderian points having been found on the Norwegian coast, however, so the find was quite a puzzler. Did we actually have the first inland site of the Finnmark coastal culture or was this the first evidence of a very early incursion of eastern people into northernmost Lapland? And how early was it? We did not yet have any radiocarbon samples from secure contexts. A single dated sample from a burn patch in a test square in Area 2 produced a date of 5390±69 BP (Hela-952), which was clearly too recent, considering that both of our potential parents belonged to the Early Mesolithic.

The rich finds and tantalizing prospects provided by the Sujala test excavation led to more extensive excavations in 2005–2006, financed by grants from the Oscar Öflund Foundation, the Niilo Helander Foundation, and the National Geographic Society. Our volunteer workers on these excavations were Norwegian archaeology students and, in 2005, Professor Charlotte Damm from the University of Tromsø. Excavations focused on Area 2, which had produced the most interesting finds, but we also wanted to leave one area unexcavated for posterity and more advanced excavation and documentation methods.

In 2005 we excavated for two weeks, opening up the part of Area 2 that had produced rich surface finds along the track running along the top of the ridge. The uncovered features included a roundish area of dirty soil centered on a hearth, apparently the floor of a light hut or tent, in the northeastern corner of the excavation area (Figure 4). This feature produced a large number of lithic finds as well as burnt bone (almost exclusively reindeer) and wood charcoal. Several clusters of lithic finds were also discovered outside the presumed dwelling. The finds included a large number of chert blades and blade fragments as well as scrapers, burins, and points or point fragments similar to the one recovered in 2004. A very dense find cluster outside the presumed dwelling produced a particularly large number of flakes, most of them small core edge trimming flakes (Figure 5).

Figure 4. The 2005 excavation area, Spit 1 (–5 cm) seen from the north. Note the area of dark, dirty soil to the left of the North arrow. Photo: Jarmo Kankaanpää.

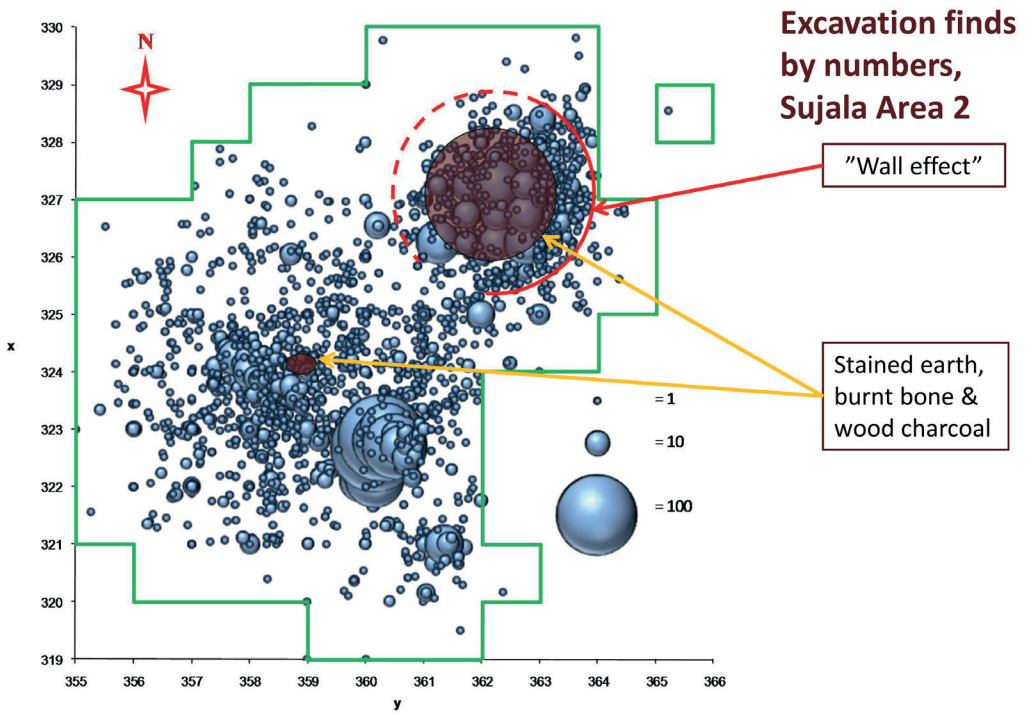


Figure 5. Find map, Area 2. Ball size indicates find quantity.

Three weeks of further excavations in 2006 opened up more area to the west and south. Features included additional clusters of lithic finds as well as a small pit full of wood charcoal and burnt bone. Chert blades, scrapers, burins, and points and their fragments were again the main tool categories. Altogether, the three years of excavation produced 6338 chert finds and 46 finds of other lithic materials from Area 2 while the test excavation of 2004 also produced 177 cherts and 8 quartzes from Area 1. Of these finds, no fewer than 40 were whole or fragmentary tanged points of the same eastern Post-Swiderian type represented by our first point from 2004. This strengthened the case for an eastern origin but simultaneously raised the question of connections with the nearby coast and its presumed 'western' Ahrensburg-derived population.

The site itself was interpreted as a seasonal hunting camp possibly used for only one or a few years. The presence of two bones of divers (*Gavia* sp.) indicated occupation during the summer months (Rankama & Kankaanpää 2007b). The features are thought to consist of the floor of a round, lightly built hut or tent marked by the cluster of stained earth, wood charcoal and burnt reindeer bone and partly delineated by the sharply defined limit of lithic finds probably caused by the 'wall effect', and a 'courtyard/toss zone' in front of the presumed door opening to the southwest, extending some seven meters from the dwelling in a sector of roughly 120° (Figure 6). Statistical analysis of the various find clusters revealed that whereas both blade and tool production and tool use took place both inside the dwelling and outside, the dense cluster of small lithic waste in the courtyard apparently consisted of debris originally produced inside the dwelling but subsequently dumped in a pile outside (Kankaanpää & Rankama 2011).

Dating and publication

A large number of wood charcoal radiocarbon samples were obtained from good contexts, mainly from the hearth and the charcoal pit. Three of

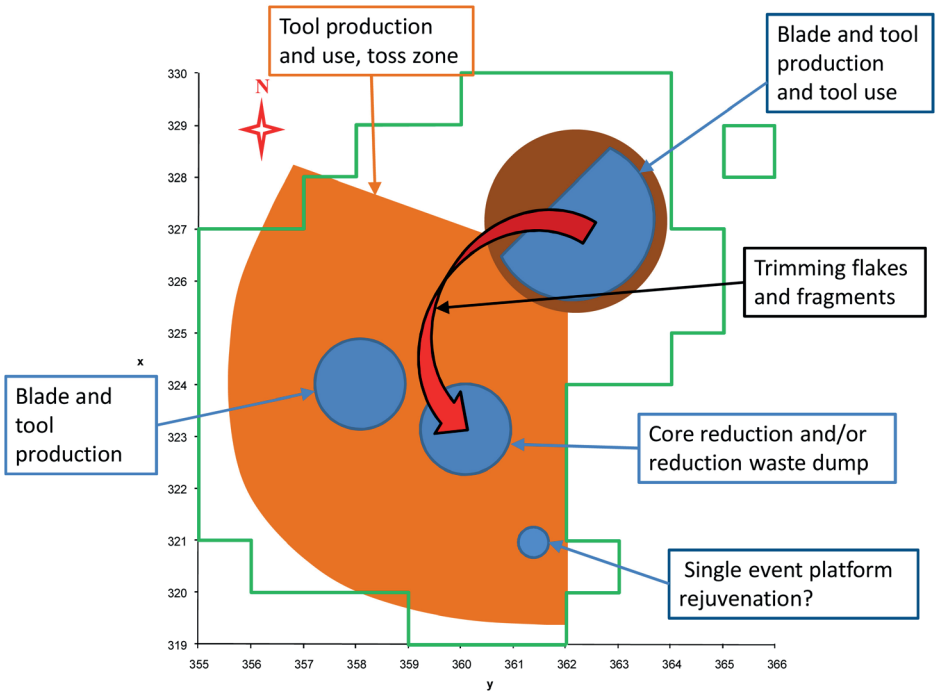
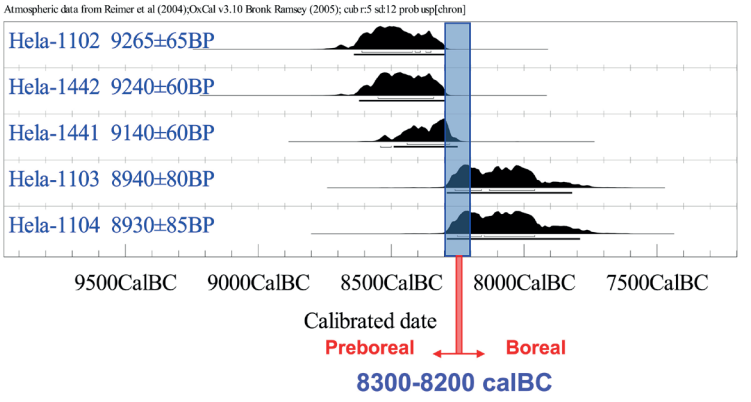


Figure 6. Features and activity locations of Sujala Area 2 with movement of lithic waste suggested by statistical analysis.

these, as well as two samples of burnt bone also from the hearth, were dated. The charcoal samples came out at between 9265–9160 BP while the bone samples gave dates of 8940 BP and 8930 BP (Figure 7). The calibrated ranges of the two sets barely overlap, but assuming an 'old wood' factor for the charcoal of not more than 100 years (as the wood was found to be birch) a siderial date of between 8300–8200 cal BC appears to be the best guess (Rankama & Kankaanpää 2011). These radiocarbon dates are all well in line with the Early Mesolithic date suggested by the lithic material.

The results of the survey of 2002 and the test excavation of 2004 were the subject of a paper given at the 22nd Nordic Archaeological Conference in Oulu in August 2004 (Rankama & Kankaanpää 2006) and a preliminary report (albeit with a somewhat erroneous interpretation) published in the *Antiquity online Project Gallery* in September (Rankama & Kankaanpää 2004). A further paper was published in conjunction with the 2005 workshop of the Finnish National Committee for Quaternary Research (Rankama & Kankaanpää 2005) and the results were also referred to in an article in the 2003 Vuollerim Seminar publication (Kankaanpää & Rankama 2005). The 2005 excavation was included in papers presented at the Seventh International Conference on the Mesolithic in Europe (MESO–2005) in Belfast, Northern Ireland, (Kankaanpää & Rankama 2009), at the 2005 'Arkeologipäivät' annual seminar of the Finnish Archaeological Society (Kankaanpää & Rankama 2006), and at the 'Komsasta kirkkokenttiin' seminar at the Siida Saami Museum in Inari, Finnish Lapland, later the same year (Rankama & Kankaanpää 2007a).

The results of the final 2006 excavation were included in a paper given at the II Northern Archaeological Congress in Khanty-Mansiisk, Russia, in late September 2006 at the invitation of Aleksandr Volokitin of the Komi Science Centre in Syktyvkar, whom we knew from the Vuollerim seminar. During our trip to Khanty-Mansiisk, we stopped at Moscow to visit Aleksey Sorokin, who had been introduced to us by Dr Volokitin and with whom we had previously corresponded over



Sujala radiocarbon dates

9265 65 BP (8640 – 8300 calBC), wood charcoal (*Betula*)
9240 60 BP (8620 – 8300 calBC), wood charcoal (*Betula*)
9140 60 BP (8540 – 8250 calBC), wood charcoal (*Betula*)
8940 80 BP (8290 – 7820 calBC), burnt bone (*Rangifer*)
8930 85 BP (8290 – 7790 calBC), burnt bone (*Rangifer*)

Figure 7. Radiocarbon dates from the Sujala site.

the Sujala finds. Dr Sorokin gaciously allowed us to study some of his finds from Butovo Culture sites, which became the beginning of a long series of studies of comparative collections. The first overviews of the complete fieldwork at Sujala were published in the volume *Kamennyi vek Evropeiskogo Severa* ('The Stone Age of the European North') edited by Volokitin the following year (Rankama & Kankaanpää 2007b) and in an article in *Antiquity* still a year later (Rankama & Kankaanpää 2008). Observations specifically on the Post-Swiderian points were included in an article in *Muinaistutkija*, the quarterly of the Finnish Archaeological Society (Takala *et al.* 2006).

Analysis

After the excavations, the analysis of the material began in earnest. Artefacts included Post-Swiderian type tanged points, sub-conical cores, radially removed platform-shaping flakes, small platform isolation flakes, straight blades with well-prepared small platforms and parallel arrises, perpendicularly sectioned blades and various blade tools including endscrapers, burins, edge-retouched blades and backed insets (Figure 8). Pieces with cortex were very rare but other core-reduction and retouch waste was common, indicating that the lithic raw material had mostly been brought to the site in the form of prepared cores. The blade technology looked very much like the technology typical of Post-Swiderian sites in Russia. Particularly the very straight and symmetric form of the blades and the small platform remnants as well as a practically 90° platform angle indicated blade removal by the pressure method, which was not a feature of the coastal Phase 1 or its western ancestors.

In addition to the identification of artefact categories, this also included an analysis of manufacturing techniques, the identification of macrowear, and refitting. The latter was already begun in the spring of 2006 when Professor Sheila Coulson from the University of Oslo visited us for three days and went through the collection as it was then. The following year her student Lucia Uchermann Koxvold, who had also taken part in the 2005 and 2006 excavations, took over the refitting. The refitting produced a large number

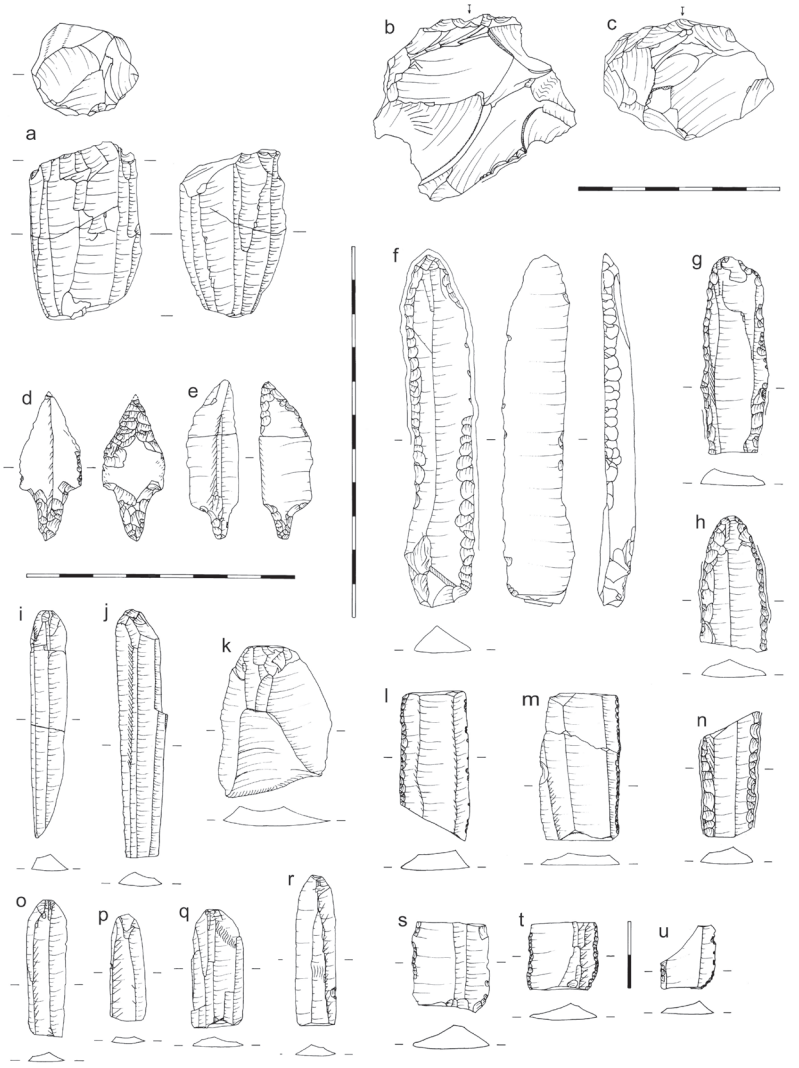


Figure 8. Finds from the Sujala site: a. Sub-conical core. b, c. Platform shaping flakes. d, e. Post-Swiderian tanged points. f- h, l-n. Edge-retouched blades. i-j, o-r. Blades and proximal ends showing preparation of small platform. k. Wide proximal end with languette fracture. l-m, s-u. Blade sections with intentional perpendicular breaks. Drawing: Tuija Rankama.

of reassembled artefacts including blades and burins with their burin spalls that demonstrated direct relationships between all finds clusters and illuminated details about the lithic reduction technology, including core preparation and blade removal. The refitting also proved that the various colours of the chert raw material were the result of post-depositional chemical changes, as fragments with markedly different hues could be fitted together.

The origin of the chert posed a problem as it apparently did not derive from the immediate environs of the Sujala site. Being aware that similar material – referred to as 'dolomite' – was known from sites on the Norwegian arctic coast (e.g., Simonsen 1961), we began in 2007 to look for raw material sources on the Norwegian side. While there, we visited the Varanger Sámi Museum in Varangerbotn and – much to our surprise – came across an exhibition case containing lithic blades

identical to our Sujala finds in both shape and material. It turned out that these artefacts came from a collection of finds gathered by a local amateur archaeologist from a site near the mouth of the Nyelv River, a location known for its Middle and Late Stone Age finds. Further delving into these finds was not possible at the time, but we resolved to return the following summer for more detailed study.

The field widens

In 2008 we visited the Pauler excavations in southern Norway near Larsvik. The Pauler sites represented some of the earliest Mesolithic sites in Norway, with an Ahrensburgian technology that was interesting to compare with our finds from Sujala. Later in the summer we travelled back to Lake Vetsijärvi in order to survey the upper reaches of the Puoltsajoki River by canoe (Figure 9). The river runs into the lake from the north, following a long esker, and we hoped to discover new sites in sandy areas on its banks. This survey, however, was fruitless; apparently the Puoltsajohka had not been an artery to the coast.

Returning from Vetsijärvi, we drove up to Norway again and were this time able to photograph some of the finds from the collection at the Varanger Sámi Museum that had caught our eye the previous summer. The museum director, Dr Kjersti Schanche, was familiar with the find location and attempted to pinpoint it for us on a rather small-scale map. According to Dr Schanche, the site lay on a small plateau above the coastal village of Grasbakken. With map in hand, we set out to find the site to see if anything was left and to gain an idea of the elevation and topography. After climbing quite some time and finding that the terrain was becoming less and less hospitable and the elevation way higher than any post-glacial coastline, we concluded that the mark on the map had to be in the wrong place. Returning and viewing a number of well-known later sites, we decided that it was too late in the day to start searching for the real location. Since this was the last day of our sojourn in Lapland, we had to put off discussing the matter with Dr Schanche until the following summer.

A long-term grant and the international research network

2009 was an important year for the project in many ways. It marked the beginning of our association with the University of Helsinki Department of Archaeology through securing a five-year

Figure 9. Tuija Rankama and terriers Vili (foreground) and Sepe prepare to portage our canoe up a series of rapids on the Puoltsajoki River. Photo: Jarmo Kankaanpää.

research grant from the Finnish Academy of Sciences, but it also marked the forming of the Nordic Blade Technology Network (NBTN) and the beginning of the network's international workshops. The first Nordic Blade Technology Workshop was organized in Helsinki in June by Tuija Rankama and Kjel Knutsson from the University of Uppsala. Participants came from all continental Scandinavian countries and Germany, and we were also able to lure Professor Jacques Pelegrin of CNRS Paris, one of the world's leading experts on lithic technology, to come to look at our material. Finnish finds exhibited at the workshop included the Lahti Ristola site presented by Hannu Takala, the Lappeenranta (Joutseno) Saarenoja 2 site presented by Tapani Rostedt, and the Utsjoki Sujala site presented by ourselves – practically all of the dwelling sites with blade technology known from Finland at that stage. The three-day seminar ended in a knapping demonstration by Professor Pelegrin in our garage, and everyone present was served salmon soup.

The next NBTN workshop was in Falun, Sweden, in August, arranged by Kjel and Helena Knutsson. The focus of this workshop was on the Lannerbro Collection, which consisted of mysterious large blades and blade cores picked up in different parts of Dalarna Province by a local amateur archaeologist over the course of many years. The finds were mainly undated stray finds and the raw material was primarily a local volcanic tuff, but the technology was very similar to that of the Sujala finds, namely prismatic blades detached from a conical core by the pressure technique. As before, the seminar ended with a demonstration of different types of blade detachment, this time by Mikkel Sørensen from the University of Copenhagen, a leading Danish knapping specialist.

September saw us in Lapland again. This time we had Kjersti Schanche herself take us to the site of the museum finds, which turned out to be a sandy saddle at slightly over 70 m above sea level and fairly close to the coastal road. We noted a few finds on the surface but beat a hasty retreat when it began to rain rather heavily. We returned just the two of us on the following day (which was fortunately sunny) and managed to find and photograph a fair number of finds in situ, in addition to photographing a few more at the museum. The finds at the site, like the finds at the museum, clearly represented the same technological tradition that was present at Sujala and that we could now identify as representing the same tradition as the Butovo and Veretye cultures in Russia and the Kunda culture in Estonia as well as the finds from Saarenoja 2 and the oldest phase at Ristola.

The third NBTN workshop took place in Oslo, Norway, in October, arranged by Dr Håkon Glørstad. The 'goodies' this time included finds from the Pauler sites that we had visited the previous year as well as finds from the famous Høgnipen site. The Norwegian finds differed clearly from the Finnish finds in that the blade detachment technique was based on direct percussion and the points represented the 'western' Ahrensburgian tradition. This time there was no demonstration at the end; instead, we were taken to see what was left of the Pauler sites, which were to be destroyed by a new highway.

The fourth NBTN workshop took place in Copenhagen in November and was arranged by Mikkel Sørensen. This time, there was an *embarras de richesse* as Denmark, with its early postglacial occupation and rich sources of flint, has more than its rightful share of Early Mesolithic blade sites as far as Scandinavia is concerned. We were treated to collections with names like Sværdborg and Klosterlund, Barmose and Eskjeberg, and cultures like Maglemose, Kongemose and Ertebølle. From a technological point of view, the most interesting collections were examples of the microburin technique, the typical 'western' method of sectioning blades into tool blanks with diagonal breaks – something that differed sharply from the perpendicular breaks that characterise the Sujala material.

Our final trip in 2009 was to the N.N. Gurina Centennial Conference in St. Petersburg in late November. The subject of our paper was the Varanger 'Saddle site', the first Post-Swiderian site identified on the Arctic coast (Kankaanpää & Rankama 2012a). After our paper, Russian colleague Anton Murashkin suggested that we should study the collections of Dr Natalia Kosorukova at the Cherepovets Museum – advice that we were to follow a few years later.

Fieldwork and collections research

In 2010 we returned to Varanger and to the 'Saddle site', which Dr Schanche informed us was locally known by the Sámi name 'Fállegoahtesajeguolbba', roughly translated as 'sandy location of the tent/hut site of the gyrfalcon'. We set up a baseline with a long tape and proceeded to map, photograph, and catalogue every single surface find that we could discover in situ, as we did not have an excavation permit (Figure 10). This enterprise was to take us all of four days. Thereafter we moved to the museum and – being graciously allotted a table in the cafeteria as a workspace – carried out the same operation (minus the mapping) with the museum's collection from the site, which took another four days. In total, we photographed and catalogued 238 surface finds at the site and 245 finds at the museum. All but two of these represented the same chertlike material as the Sujala finds; the two others were quartzite and slate.

We were to learn, however, that these were not the only or even the first finds from Fállegoahtesajeguolbba. The site had originally been discovered by Norwegian archaeology student Torsten Simonsen, son of the famous archaeologist Povl Simonsen who had worked in the Varangerfjord area for years and had published a major monograph on the region in 1961. Torsten Simonsen had discovered the site in 1978 while working at Canadian archaeologist Priscilla Renouf's excavation of Neolithic hut bottoms near the mouth of the Nyelv River. Simonsen's finds, we learned, were now housed at the Tromsø Museum, so the next step would be to go to Tromsø.

Tromsø, however, had to wait until the following summer, for we were due to attend the MESO-2010 conference in Santander, Spain, in September. There, we presented papers on the Fállegoahtesajeguolbba site (Rankama & Kankaanpää *in press*) and on the spatial analysis of the finds from the Sujala site (Kankaanpää *in press*). The NMTN group organized a session entitled 'Blades and blade makers. Cutting edge research on cutting edge technology in the Nordic Stone Age.' where Tuija, Kjel Knutsson, Håkon Glørstad, Berit Valentin Eriksen and Mikkel Sørensen presented an overview paper on postglacial pioneers and blade technology in Fennoscandia–Southern Scandinavia and Northern Germany.

The travel season of 2011 commenced in March with the fifth NBTN workshop, this time in Schleswig, northern Germany, with Dr Berit Valentin Eriksen serving as our host at

Figure 10. Jarmo Kankaanpää photographing surface finds at Fállegoahtesajeguolbba. Photo: Tuija Rankama.

the Zentrum für Baltische und Skandinavische Archäologie, Schloß Gottorf. The Centre houses perhaps the best collections of Ahrensburg Culture finds, which were important for us as comparative material if we wanted to work out the essential technological differences between the 'western' and 'eastern', i.e., Ahrensburgian and Post-Swiderian lithic traditions as manifested in the Lapland/Finnmark material. We had already surmised in our article in *Antiquity* some years previously (Rankama and Kankaanpää 2008) that the occupants of the Sujala site may have played some role in the shift from Phase 1 to Phase 2 of the Finnmark Mesolithic in neighbouring Norway. What we now were after was a method of differentiating between the two phases more rigorously than on the basis of somewhat vague classifications based on blade and core forms and point typology. We were also looking for a basis for assessing the relationship of the Sujala material and the Post-Swiderian tradition in general with Phase 2. As mentioned previously, no Phase 2 site had to our knowledge produced examples of our original 'guide fossil', the Post-Swiderian point. What we needed was a method of comparing the lithic technologies of the various cultures, phases, and collections in order to establish relationships based on standardized production methods rather than form or function.

Among the many collections we were able to study in Schleswig were above all the Ahrensburg Culture type site Stellmoor, the Ahrensburgian finds from Alt Duvenstedt and Kleine Nordende, and the Poggenwisch and Teltwisch 1 sites that represented the preceding Hamburgian Culture. We were also treated to several lectures on local Mesolithic cultures, sites, and technology by Mara Julia Weber, Daniel Groß, Sönke Hartz and Ingo Clausen, as well as a talk on the Kviteberg assemblage from northern Norway by Anja Roth Niemi from Tromsø and a talk on Russian antler tools for blade production by Mikhail Zhilin. The workshop climaxed once again with a knapping demonstration by Mikkel Sørensen and local primitive technology expert Harm Paulsen.

The spring also saw the publishing of *Mesolithic Interfaces*, a volume of articles edited by Tuija and written mainly by Tuija's lithic technology workgroup (Mikael Manninen, Miikka Tallavaara and Esa Hertell) in various combinations together with Kjel Knutsson and Aivar Kriiska. It also contained a pair of contibutions by ourselves, one of which (Kankaanpää & Rankama 2011) discussed the spatial analysis of the Sujala finds as presented the previous year at the Santander conference, which is just as well since the Santander conference volume has not been published to this date (November 2023).

In August, it was time for Tromsø. Professor Knut Helskog of the Tromsø Museum kindly provided us with a workspace and Monica Kristen Hansen supplied us with finds to study. Torsten Simonsen's collection from Fállegoahtesajeguolbba (under the name 'Ovenfor Gressbakken') turned out to contain 165 finds, including a large number of blade fragments that were very much in line with the finds we had documented in Varanger. We also looked at a pair of other collections, namely Mortensnes R10 and Starehnjunni, two of the collections on which Woodman had based his definition of the Sæleneshøgda Phase (Olsen's Phase 2) of the Finnmark Mesolithic. These finds were essentially similar to Sujala and Fállegoahtesajeguolbba: the same fine blades with small platform remnant indicating the pressure technique, the same perpendicular snapping into sections, the same platform shaping flakes, largely even the same raw material. It was beginning to look like our hunch was correct: Phase 2 was not a local development out of Phase 1, as had been previously supposed; instead, it represented the influx of new people from the southeast who brought with them a new and different lithic technology. That this was not a question of a mere diffusion of knowledge, but an actual immigration of people was indicated by the fact that none of the collections included any traces of 'western' technology, in other words there was no sign of the cultural hybridization or changes in technological processes that would be expected when people gradually adopted features of a 'foreign' material culture while still retaining part of their traditional repertoire.

After a week in Tromsø, we returned to Varanger for more site and raw material survey. Checking out sandy terraces on the eastern side of the Nyelv River opposite Fállegoahtesajeguolbba in an effort to locate a potentially interesting site

called Ovenfor Lossoa's hus proved fruitless. We next trekked from Suottarjohka, on the northern side of the fjord, to a location with the promising name 'Flintelvdalen' but found no flint. A visit to Karlebotn turned up a recent hunter's blind and provided a chance to revisit the Sæleneshøgda site but produced no outcrops of chert. We walked for a stretch up the Nyelv River looking for chert boulders but found only a few drowned lemmings. Stopping at Sven Erik Grydeland's Niibereahpen site, we noted a few coarse chert blades on the surface. We continued up the side road to Pykeija (Bugøynes) and discovered a scatter of cherts on the sandy edges of a road cut. At Pykeija Jarmo tried to photograph the village on its sandy spit between the mainland and a rocky island – precisely the kind of topographic feature that Fállegoahtesajeguolbba would have been located on when it was occupied – and managed to sprain a calf muscle when jumping from boulder to boulder. There followed several days of fruitless searching for chert sources mainly on the northern shores of the Varangerfjord, after which the field season was over.

September saw us attending the 2011 conference of the European Association of Archaeologists in Oslo. The subject of our paper titled 'Fast or slow pioneers?' (Kankaanpää & Rankama 2014) was the speed of the initial colonization of the north and specifically the time frame of the Post-Swiderian expansion into northern Lapland. Our argument was that since the complex Post-Swiderian blade technology was retained by the immigrants, their trek from their original 'homeland' in northwestern Russia or Karelia must have taken place within the adult lifetime of at least one person capable of reproducing the technology. This is because there was no lithic raw material available in the intervening 1000 km wide Precambrian Fennoscandian Shield that could have been used to demonstrate the technology and thus transfer the necessary knowledge and knowhow to the next generation. The idea of a rapid advance was also based on the observation that the route from the southeast to northern Lapland would have run parallel to the retreating edge of the continental glacier (which was retreating west, not north!) rather than toward it, so the idea of a slow creep of colonization restricted by the glacial retreat did not apply. Instead, the habitable corridor leading to the north between the continental glacier with its periglacial desert to the west and the White Sea to the east would have opened up quite rapidly and synchronously and would certainly have been reconnoitred as soon as it could support a flora and fauna capable of sustaining human habitation.

Finally, 2011 saw the publication of our article in the German yearbook *Quartär*, which presented an overview of our research to date (Rankama & Kankaanpää 2011). However, the year also brought sorrow: our older terrier Vili, who should be credited as the actual discoverer of the Sujala site and who had accompanied us on all our excavations and excursions since then, passed away in his tenth year in November. *Requiescat in pace.*

In the brisk -31° C (-24° F) of early morning February 5th, the coldest day of 2012, we set out for Cherepovets, Russia, to study the collections of Dr Natalia Kosorukova at the Cherepovets Museum. We were particularly interested in two sites, Listvenka 3b and Lotova Gora, which were the Russian Post-Swiderian sites nearest to the Finnish border. Taking the fast train to St. Petersburg, we were met by Dr Dmitry Gerasimov who chaperoned us for the day and drove us to the Ladoga Station and our sleeper to Cherepovets. Early the next morning we pulled up at Cherepovets Station, where we were met by Dr Kosorukova and driven by one of her former students to our apartment hotel. There we prepared breakfast and then set out for the museum, a short walk away. The temperature at this point was a balmy -18° C (0° F).

After meeting with the museum's director and presenting him with our *Interfaces* book, we were settled at a nice table with the finds close at hand and set to work. The finds were flint, of course, rather than chert, but their similarity to the Sujala and Fállegoahtesajeguolbba finds and those from the Norwegian Phase 2 sites was convincing: the same fine pressure blades with small platform remnant, the same conical cores, the same platform shaping flakes, and of course the same arrowpoints, along with a number of other shared technology-related features. After five days of analysing, we returned by sleeper to St. Petersburg, where we had an early breakfast with Mitya Gerasimov before returning home.

Teaching workshops begin

Beginning in the spring, the Nordic Graduate School in Archaeology at Oslo University and the Nordic Blade Technology Network arranged a series of international graduate seminars with the title 'Archaeological perspectives on cultural analysis – material culture and the transmission of knowledge' with funding from STINT (The Swedish Foundation for International Cooperation in Research and Higher Education). Student participants came from all continental Scandinavian countries, Germany, and Poland. NBTN members served as teachers, but lectures and demonstrations were also given by local experts at the locations where the seminars were arranged.

The first STINT seminar took place in Paris in May 2012. In addition to introductory talks by NBTN researchers, lectures were also given by French experts Boris Valentin, Éva David, and Valentine Roux. Jacques Pelegrin also gave a demonstration on the differences of various techniques of lithic reduction. One important lesson of this demonstration was that the oldest and simplest technique, the direct percussion method, was also the most difficult to master – a fact that has a direct bearing on discussions of the mental capabilities and physical skill and coordination of the pre-sapiens hominids who developed and used this technique!

The French method of studying techniques of manufacture, known as *chaîne opératoire*, was very much a part of several of the presentations, particularly those of Håkon Glørstad and Valentine Roux. This method played an important role in our research as a tool for differentiating between the 'eastern' and the 'western' lithic traditions in Finnmark, where typological index fossils such as points are rare or missing entirely.

Chaîne opératoire is essentially the mapping of the various stages of manufacture, including the techniques used for each operation. In pre-industrial societies, the art of making implements is passed on from generation to generation in a little-changing traditional form that is usually standardized within a social group – Native Americans had tribe-specific ways of making moccasins and pottery, Eskimos had regionally different ways of making kayaks etc. It could be said that the implements were not made to look like 'our' kind of moccasin or pot: they looked like they did because they were made in 'our' traditional way of making.

This 'social reproduction' is the reflection in material culture of group identity, group cohesion and the persistence of tradition in the form of transmitted knowledge. With many materials, reconstructing the *chaîne opératoire* from the archaeological record is difficult because many stages of manufacture do not necessarily leave any traces either on the finished object or as residue or tools and appliances used for manufacture. Lithic production specifically by knapping has the advantage that the residue is as permanent as the manufactured implements themselves and the waste can be refitted and analyzed to reconstruct the *chaîne opératoire* at least partially. A bonus advantage is that lithic waste tends to remain at the site of production, thus indicating the presence at a certain spot of an individual who possessed the socially specific knowledge and know-how necessary to make the implement in a certain way, in other words a member of a specific archaeological 'culture'. While individual tools can be transported long distances from their location of manufacture and might change ownership many times, the waste or residue of their manufacture thus gives a more reliable indication of where a human representative of a certain tradition has actually been.

Experimental archaeology and more fieldwork

In the end of May 2012, Mikkel Sørensen came to stay with us for a couple of days, for we wanted to carry out an experiment on blade snapping. Mikkel brought with him a sackful of flint cores and made a large number of blades primarily by the punch (indirect percussion) method, though he also fashioned a crutch fabricator from a hazel sapling growing by our local jogging track and made a number of pressure blades as well. The blades were then broken into sections by various methods including striking and bending, and the results were analysed microscopically in order to identify whether the different methods left diag-

nostic traces on the broken ends or specific residues. The results were described in a paper given at the EAA congress in Helsinki the following autumn.

The summer brought a second trip to Tromsø, this time to study finds from the Phase 2 type site Sæleneshøgda and the Ovenfor Lossoa's hus site that we had searched for the previous summer. The Sæleneshøgda collection proved to be a mixed bag in terms of both technology and raw material. There were blades, blade sections, platform shaping flakes and conical cores of the eastern type in both the typical chert and in a variety of other raw materials including flint – some of it representing the oolithic variety – quartz, and quartzite, but there were also quartz flakes more typically connected with Phase 3 and a series of small, tanged points that looked more like Ahrensburg points than Post-Swiderian points. In addition, there was a finely polished gouge that would have raised few eyebrows in a Finnish Mesolithic context but was unique in Norwegian finds. All in all, the Sæleneshøgda collection gave the impression of a mixed site – a conclusion also reached by NBTN graduate seminar member Niko Anttiroiko in his subsequent analysis of the collection (2015).

The Ovenfor Lossoa's hus collection, on the other hand, was much more homogeneous: aside from a few quartzes and other materials, the large majority of the artefacts were chert, and the diagnostic pieces represented the Post-Swiderian technology with its fine prismatic blades and platform shaping flakes. This of course provided us with an incentive to renew our search for the site.

Finishing at Tromsø, we drove to Varanger to renew our efforts and were rewarded with finding Ovenfor Lossoa's hus. It consisted of a series of blowouts on a multi-terraced sandy slope some 1.5 km east of the Fállegoahtesajeguolbba site but somewhat lower than we had expected. The blowouts contained finds similar to the finds in the Tromsø Museum: blades, platform shaping flakes and blade tools of the familiar chert. The find area at the Ovenfor Lossoa's hus site was relatively large. The finds were spread over at least 6000 square metres while the observed spread of finds at Fállegoahtesajeguolbba was only some 400 square metres. The elevation range was also larger, with the Fállegoahtesajeguolbba finds all lying on a flat terrace c. 71 m above sea level while the Ovenfor Lossoa's hus finds lay on a slope between 41 and 34 m above sea level. Although this coincides with the elevation of Mortensnes R10 (39–41 m) and Starehnjunni (42.5 m), there is reason to suspect that at least some of the finds may have been carried down the slope from an originally higher position by erosion.

More teaching workshops and EAA 2012

July brought with it the second STINT seminar/workshop, which was divided between Oslo and Falun. At Oslo, the program began with a brief overview of the Eastern Norwegian Stone Age by Håkon Glørstad, followed by a presentation on attribute analysis by Mikkel Sørensen. After lunch Jarmo gave a short course on artefact photography, after which the students were divided into four groups and proceeded to analyze and document materials from Norwegian sites Pauler 2 and 6 (Early Mesolithic) and Torpum 1 and Rødbøl (Middle Mesolithic) under the direction of NBTN members. Looking at the Middle Mesolithic collections, it became clear to us that they represented the same conical core pressure blade complex as Sujala. After three days of practical training, the whole ensemble travelled to Falun. Here, the operation was repeated with the local blade materials of the Lannerbro collection which, as noted previously, is also technologically very similar to Sujala.

Late August saw the Annual Congress of the European Archaeological Association for 2012 take place in Helsinki. Tuija gave one of the two keynote speeches, 'Northern pioneers: Technological clues to mobility and contacts' at the opening of the congress while Jarmo served as one of the organizers of the session 'Moving on: Colonisation as a social process' along with Håkan Glørstad and Ole Grøn and chaired the session. Tuija, Jarmo, and Mikkel Sørensen also presented their paper 'Breaking Blades. Experiments in Intentional and Accidental Blade Breakage' based on the experiments carried out in the spring.

In October, the third STINT seminar took place in Tver, Russia, at the Tver Museum, where we were hosted by Dr Igor Chernykh of the museum and Mikhail Zhilin of the Russian Academy of Sciences, Moscow. In Tver, we were able to study several extremely important Post-Swiderian collections including the Butovo Culture type site as well as Tikhonovo 8, Krasnovo 1, Sobolevo 5, and Stanovoye 4. The finds were again all flint. By now, the diagnostic features that distinguished Post-Swiderian lithic technology from Ahrensburg technology were becoming eminently clear.

The end of the year saw the publication of our article on the Mortensnes and Starehnjunni finds in the Festschrift commemorating the 60th birthday of Aleksey Sorokin of Moscow, who had been helpful to our early attempts at analysing the Sujala material (Kankaanpää & Rankama 2012b) and whose finds we had been able to view on our way to Khanty-Mansiisk in 2006.

The year 2013 began with a STINT workshop in Tallinn and Riga in March. In Tallinn, we were hosted by Professor Aivar Kriiska and Dr Lembi Lõugas and treated to the finds from the two most famous sites of the Kunda Culture: Pulli and Kunda Lammasmägi itself. After three days, we flew to Riga, where we were met by Dr Ilga Zagorska, who had arranged for us a space atop the tower of Riga Castle, the residence of the President of Latvia, which also housed the National Museum. Here, we were able to study other important Kunda Culture collections including Jersikas pilskalns, Olaines purvs, and Zvejnieki, as well as Salaspils Laukskola, which belongs to the Swiderian technological tradition and is dated to the Late Paleolithic (Berg-Hansen *et al.* 2019). As it happened, we were in luck with our timing – three months later a major fire at the castle destroyed large parts of the upper floors while the museum, though not harmed by the fire, suffered water damage and was closed for an extended period.

More collections and fieldwork

Having gone through the more recent collections of Finnmark Phase 2 material at Varanger and Tromsø, we wished to study the older collections, specifically the ones collected by Anders Nummedal himself in the 1920s and '30s. These were housed in the Norwegian Culture Historical Museum, which meant another trip to Oslo. Thus, in mid-April of 2013 we were installed in a basement room of the Culture Historical Museum (Figure 11). The ceiling-height window provided rather poor light for photography, but we had excellent access to the collections. The sites we looked at included Prestestua 1 & 2, Seilmerket, Tollevik, and Smelroren. Of these, Prestestua 2 was clearly related to Sujala by both technology and raw material while Smelroren was a quintessential Phase 1 site with thick and asymmetric direct percussion blades and globular cores in red sandstone. The other two were less obvious, Seilmerket consisting of coarse flakes and blades of chert while Tollevik was mainly black quartzite with several crudish tanged points clearly differing from the Post-Swiderian pattern.

In July, we were up in Lapland again, this time staying at the Sanila reindeer farm at Kirakkajärvi near Sevettijärvi. From there, we first drove to Grense Jakobselv on the Norwegian-Russian border in order to locate the Prestestua 2 site and establish its elevation, as the available location data in Nummedal's publications and the museum catalogue were sketchy. We managed to find a location that answered to Nummedal's description and produced a number of surface finds, although the elevation of c. 42 m a.s.l. (according to the current map) was somewhat higher than the 38.5 m specified by Nummedal in the catalogue.

The following day we revisited the Ovenfor Lossoa's hus site and systematically documented and photographed the surface finds, recording their location by GPS. On the third day, we moved our headquarters to the Vetsikko cabins in Utsjoki. From Vetsikko, we made one excursion to the northern coast of the Varangerfjord to check out three Phase 2 sites: Mortensnes R10, Bergeby 2, and Nesseby 5. Mortensnes R10 is a series of round hut bottoms, some of which were excavated by Kjersti Schanche in 1984 and 1985. Mortensnes is now a protected site with a tourist centre and the 'tufter' of the R10 group are only one of the several archaeological sites of various ages in the area. No finds were visible on the surface. Bergeby 2 and Nesseby 5 are sites dis-

Figure 11. Our room at the Norwegian Culture Historical Museum in 2013. Photo: Jarmo Kankaanpää.

covered by Knut Odner in the early 1960s (Odner 1966) but not excavated, though both sites produced surface finds now in the Tromsø Museum's collections. The Bergeby 2 site is an apparent small gravel pit on a terrace above the village of Bergeby. Finds that we noted along the edge of the pit included several chert blade sections identical to the finds from Sujala. Nesseby 5 is located on the top of a hill named Cimmanoaivi near the village of Nesseby. Odner only mentions finding artefacts in areas devoid of sod cover. We found a concentration of surface finds next to an old German dugout – possibly a machine gun nest or observation post – at the top of the hill on the shoreward side. Again, the finds included blade sections and flakes of chert.

After our Lapland trip, next on the program was a STINT seminar in Höör, southernmost Sweden, where we were hosted by Arne Sjöström at Holma Manor. After lectures by Aarne, Mikhail Zhilin, Miikka Tallavaara, and Mikkel Sørensen, the workgroups began analysis of experimental blade collections produced by Mikkel. Arne arranged an excursion to the nearby Rönneholm bog, where he had been collecting both lithic and bone finds for several years while the bog was being mechanically stripped for sod. We observed both flint blades and fragments of bone harpoons on the stripped surface. Another excursion took us to the coast near the Barsebäck nuclear power station to collect flint nodules for the knapping sessions that took place on the back terrace each evening.

The year also saw the publication of two of our articles, a Finnish language compendium of our project (Rankama & Kankaanpää 2013) and a larger article by the NBTN group on the western expansion of the Post-Swiderian technology or 'Conical core pressure blade concept' (Sørensen *et al.* 2013).

January 2014 saw the arrival of bones from Listvenka 3b and Lotova Gora sent by Natalia Kosorukova for dating at the University of Helsinki Radiocarbon Laboratory. The results were Early Mesolithic, as was to be expected, with Listvenka dating to roughly the same age as Sujala and Lotova Gora turning out to be somewhat earlier. The Nordic TAG conference took place in April in Stockholm, and Jarmo presented a paper on behalf of the NBTN on 'The dissemination of technological knowledge in Early Postglacial Fennoscandia'. The paper was primarily written by Mikkel Sørensen, who had been taken ill and could not participate. Our association with the University of Helsinki Department of Archaeology ended in August when our five-year grant from the Finnish Academy of Sciences ran out.

November saw the last of the STINT workshops in Warsaw, at the State Archaeological Museum, the Polish Academy of Sciences, and the Warsaw University Department of Archaeology, where we met several leading Polish archaeologists including Stefan Karol Kosłowski, Zofia Sulgostowska and Romuald Schildt, who all gave talks on their work. We were also introduced to the Mesolithic of Belarus by Vitali Asheichyk and Aliaksandr Vashanau. At the museum, we were treated to a knapping demonstration by Witold Migal who showed us the Swiderian bidirectional method of core reduction. This demonstration made it eminently clear that 'Post-Swiderian' lithic technology was definitely not derived from Swiderian and the term was thus a misnomer. We were also able to study several different collections from various stages of the Polish Mesolithic, as well as the Ayakagytma 'The Site' collection from the Kelteminar culture of Central Asia presented by Karol Szymczak. An excursion took us to view the flint mines at Krzemionki and the Sandomierz Museum. Finally, Tuija presented an evaluation of how all of the blade assemblages we had studied during the various workshops related to the Sujala assemblage.

Our work continued after the end of the grant. At the MESO–2015 conference in Belgrade we hosted a session, 'The Study of Technology as a Key to Understanding Pioneer Movements – A North-West European Perspective', together with Kjel Knutsson and Mikkel Sørensen (*in absentia*) and presented a paper on the *chaîne opératoire* of Post-Swiderian blade industries (Rankama & Kankaanpää 2021). The same year saw the study at the National Board of Antiquities of artefacts from sites in Vuoremi, opposite Grense Jakobselv on the erstwhile (1920-1944) Finnish arctic coast, collected by geologist Väinö Tanner in the 1930s. Tanner visited the area with Anders Nummedal, the discoverer of the Komsa culture, and the Vuoremi sites bear an affinity to Nummedal's Prestestua 2, located nearby on the Norwegian side of the border. The results of the study of the Tanner collection are discussed in an article in a *Festschrift* honouring Kjel Knutsson (Rankama and Kankaanpää 2023). An article describing the technological concept of the Post-Swiderian and the collections that we had analysed appeared in a Norwegian publication edited by Hans Peter Blankholm in 2018 (Rankama & Kankaanpää 2018). The end of the decade also saw an analysis of use wear on a selection of Sujala finds by Stoneslab in Uppsala, the publication of which is still pending. A geological thin section analysis of the Sujala chert carried out in connection with the use wear analysis by PhD Erik Ogenhall at the Geoarchaeological Laboratory of the Swedish National Heritage Board revealed it to be a fine grained felsic volcanic rock (quartz porphyritic rhyolite) (Ogenhall 2014).

Results of the project

The primary result of the project has been the discovery of evidence of a very early (before c. 8300 calBC, possibly even 8750 calBC) immigration of eastern Early Mesolithic people into northernmost Scandinavia. The lithic technology of the Sujala site was found to be closely related to that of the so-called Post-Swiderian cultures of Central and Northwestern Russia and the eastern Baltic, or what is termed the 'Kunda-Butovo Interaction Sphere'. This in turn led to a reappraisal of the presumed second phase (the Sæleneshøgda Phase or Phase 2) of the North Norwegian Finnmark Mesolithic, which is characterised by a similar lithic blade technology previously thought to derive from central Norway. The presumed first phase of the Finnmark Mesolithic, known as the Komsa Phase or Phase 1, has been identified as deriving from the Western Norwegian Fosna Culture, itself a derivative of the North German Late Paleolithic Ahrensburg culture. Without previous evidence of an eastern influx, the later inhabitants of Finnmark had been thought to represent a biological continuum, with only the material culture changing due to influences from the southwest. The evidence of the Sujala site has forced a radical change in this view.

Confirming the eastern origin of the Sujala technology necessitated studies of collections both of known 'eastern' Post-Swiderian collections in Russia, Estonia, and Latvia and of collections representing the 'western' Ahrensburg culture in Norway, Denmark, and Germany, as well as representatives of the actual Swiderian culture

in Poland. These studies not only confirmed the position of the Sujala finds in the continuum of the Post-Swiderian cultures and coincidentally the non-continuity between Swiderian and Post-Swiderian, but they also demonstrated that the spread of the Post-Swiderian technology and the people who carried it also reached northern Norway and produced the Sæleneshøgda phase/Phase 2 of the Finnmark Mesolithic. Already in 2011, we ventured to suggest that also the Phase 2-like lithic developments in central Norway may actually have resulted from an expansion of the Post-Swiderian 'Sujala people' southwards from Finnmark rather than from a spread of central Norwegian technology northward, as previously thought. Research by Norwegian archaeologists has since traced the spread from the north to central and southern Norway and provided an explanation for the Lannerbro finds from central Sweden, which probably resulted from a wave of incomers from Norway (e.g., Sørensen *et al*. 2013, Damlien & Solheim 2018). The idea of an actual immigration of people into western Scandinavia from the north and ultimately from the east has also received confirmation from genetical studies, which indicate the influx of an early 'eastern hunter-gatherer' (EHG) population into central Scandinavia from the northeast (Günther *et al*. 2018; see also Manninen *et al*. 2021). The genetical results appear to confirm our original suggestion that continuity in the *chaîne opératoire* also indicates physical continuity.

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