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Chapter 6

BIRCH-BARK FORMATION AT THE FOOT OF KEAVA HILL FORT – NUMEROUS HYPOTHESES, A SINGLE SOLUTION

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Abstract

The article concentrates on a birch-bark formation at the foot of Keava hill fort, introducing the course of its archaeological excavations and various ways of explaining its presence. In addition, the complicated way of archaeological interpretation, especially in case of rather limited background information, and the search for the "right" solution, is tackled. The author reaches the conclusion that the birch-bark deposition is most likely not a human creation after all, but a natural formation where birches growing in a kettle-basin (Verevainu Mire) that became inundated for a longer time, died and decayed on the spot.[1]

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Introduction

The birch-bark formation excavated at the foot of Keava hill fort in the now drained Verevainu Mire (fen) during three years (2003–2005) raised numerous questions and several different and sometimes quite imaginative interpretation possibilities ever since its discovery, but only recently led to a surprising solution for many interested people. After finding the birch-bark strata in 2003 it was naturally associated with the hill fort and a theory was put forth according to which a secret path leading from the foot of the hill fort to the gateway and from there further towards the fen had been founded in the wetland on the foot of the fort during the period of its usage. According to the initial version the path was meant for escaping from the hill fort across the bog when hostile troops approached (Maksimov 2003). The radiocarbon dates obtained from the samples taken from the bark and under it turned this assumption upside down – namely it was ascertained that the birch-bark dates from 4690–4460 years cal BC (1 sigma) and the peat under the bark from 4910–4690 years cal BC (Lang et al. 2004, 69). The initial disappointment somewhat inspired by this result was soon replaced by contentment – the birch-bark formation in Verevainu bog dated to the Stone Age, more exactly to the Early Neolithic, was a truly sensational find that deserved further attention and research. The birch-bark formation suddenly turned into one of the most exciting archaeological sites, it was even called a highly unique site for Estonia (Heinsalu et al. 2003, 38) and no doubts were raised either in popular scientific or scientific articles that the earliest traces of human activity around Keava had been found (see Lang & Konsa 2004, 120). The cooperation of archaeology and palaeo-ecology had to shed light on the problem; however, the irony of the situation increased even more when it became clear that even in case of interdisciplinary approach solutions are not simple and easily formed. In 2003 the geologists Siim Veski and Atko Heinsalu concluded that natural development of the birch-bark strata is very unlikely. The solution explaining the possible natural way of the formation of the structure was found by Tõnu Oja, a specialist in geo-informatics and ecology, who, after a cursory observation of the surroundings, became very sceptical about excluding natural processes.

The course of excavations

Excavations on the birch-bark formation (Fig. 6.1) in Keava took place in the course of three years. Since no reliable methods for excavating this kind of sites were found, two smaller test excavation plots next to each other were established in the first year (see Konsa 2004) that were integrated into a larger plot opened in the next year, thus the area with birch-bark strata was opened on a total of 84 m^2 (see in detail Johanson 2006). This area consisted of an extensively opened so-called main excavation and two trenches, directed to north and west, which were founded in order to ascertain the distribution of the birch-bark formation (Fig. 6.2).

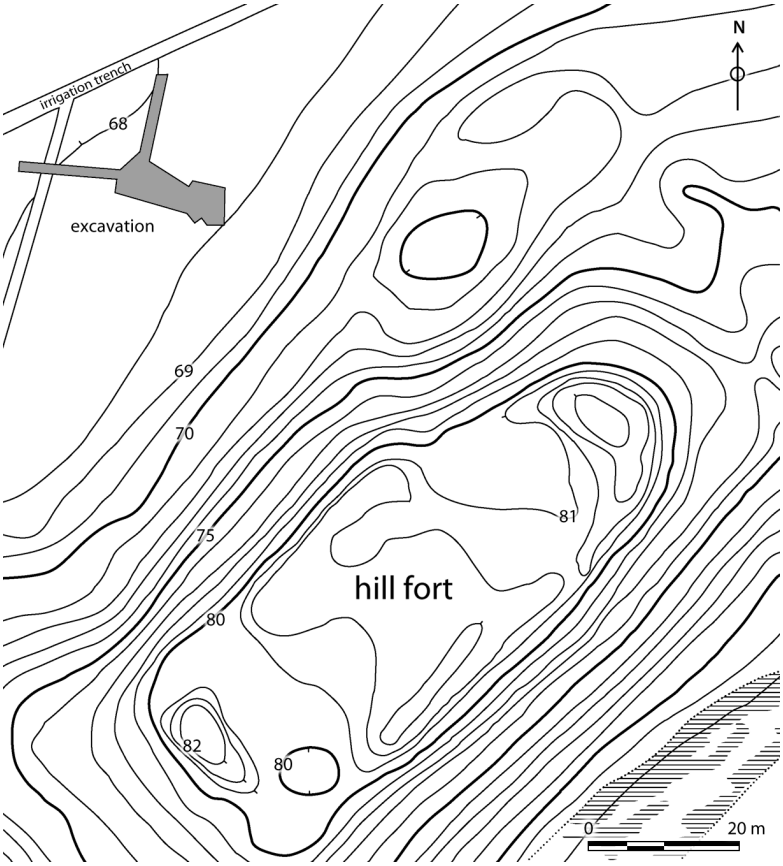

Fig. 6.1. Location of the excavation plot on birch-bark formation.

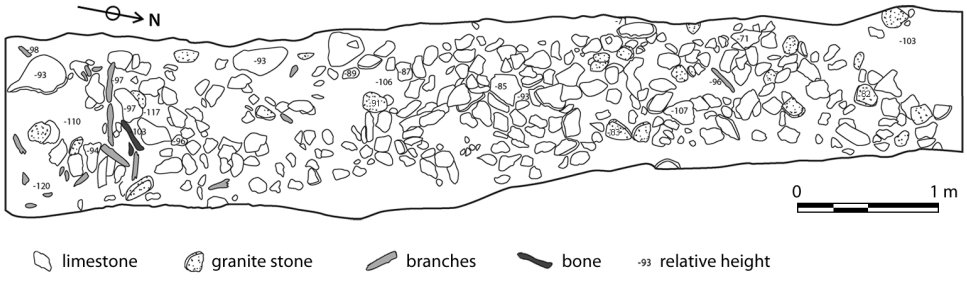

Fig. 6.2. The first layer of the stone setting in the northern trench. Drawing by Kadri Kivari.

Several birch-bark layers were discerned in the main excavation area which showed that the bark had not been deposited evenly within the whole layer, but we were rather dealing with patches of bark at considerably different heights. Thus different birch-bark lumps were probably deposited between and on top of each other but not as an even layer. Mostly two, sometimes three strata of birch-bark pieces were distinguished, which were separated from each other by a 10–15-cm thick layer of peat or peaty soil. It seemed as if the birch-bark pieces had been deposited in the same direction which even more forced the belief of birch-bark laid down for some unknown reason. In some places traces of burning were detected on bark patches. The peaty soil or well-degraded peat on clearly distinguishable birch-bark layers, but also between and under these, contained small 'flakes' – the topmost paper-like chips of birch-bark which occurred everywhere in the peat without discerned layers.

In order to get a better picture of the character of the birch-bark formation, a small 2 × 1 m test excavation was established in the middle of the opened bark structure. Three bark layers, separated by 9 and 14 cm thick peat strata, were distinguished in the 23 cm thick profile of the test excavation. It is noteworthy that on the basis of the smaller test-pits dug in the area of the main excavation as well as the trenches, it was ascertained that in the northern part of the main excavation and in northern trench the mineral land – sand layer – was exposed already approximately in the depth of one metre from the ground level. On the contrary, in western trench and the southern part of the main excavation sand layer could not be reached, despite the depth of the test-pits dug.[2] This suggests that somewhere in the middle of the main excavation and between the two trenches the border ran separating a water body and solid ground. The dry land north of the mentioned border has gradually given way to the wet ground and paludified, while south of the imagined border there had been an adequate water body, which in some point also paludified, though it happened much earlier than in the northern part since the thickness of the well-decomposed peat layer under the humus layer varies a lot.

Both trenches contained birch-bark as well, although to a smaller extent than the main excavation plot. In the western trench bark was found only in its very end and the altitude a.s.l. was principally correspondent with the elevation in the main excavation. This seemed to confirm the uniform origin of birch-bark in a wide area, although with certain 'holes'. The excavation of the northern trench turned out to be more exciting, though not due to the birch-bark but rather because of a stone setting found there (Figs 6.3 and 6.4). Altogether three stone layers could be unearthed within the approximately 7 m in the northern part of the northern trench. The stone layers mostly consisted of lime and single granite stones with the

[2] The result in the test-pit (2.5 m deep plus 75 cm with soil drill) was the following: 1.6 m of well or medium-decomposed peat, under that 1.1 m of poorly decomposed organic-rich peat, 25 cm of sapropel, 30 cm of lake mud (the three latter layers refer to a water body and its overgrowing) (the layers determined by Sirje Hiie, Institute of History at Tallinn University).

Fig. 6.3. The first layer of the stone setting in the northern trench, pictured from the south. Photo by Valter Lang.

Fig. 6.4. Excavations on birch-bark formation. Photo by Valter Lang.

average diameter of 20 cm. We were hardly dealing with a compact deposition; the structure rather left the impression of an uneven and 'unintentionally' piled setting. The deeper, the sparser the setting, the stones were more grouped and were not at all evenly located. There were many decaying poles and twigs between the stones, in addition two animal bones were found inside the setting – metatarsal bone of a horse and a digit bone of a bovid. Unfortunately the stone structure could not be dated since no datable finds were collected; also coal particles were not gathered enough for dating. The function of the stone structure remained unclear as well. Although the two lower layers of the structure had been deposited inside the peat, the space between the stones of the uppermost layer was filled with sand piled on top of the peat and humus layer. It seemed as if the stones of the upper layer had been thrown out of the irrigation trench dug in the 1980s that ran directly next to the excavation plot. Accordingly the stone pavement initially covered a fairly large area. As the two lowermost stone layers were located inside the peat layer, although they were definitely not naturally there, and the formation of peat had normally continued on top of these, then it could be suggested that we might have been dealing with a relatively old formation. Traces of active human activity connected with the stone structure could not be detected. However, the possible functions of the stone pavement could include a storage of stones piled up in some connection with the besieging of the fort. We also might have been dealing with some supply left unused from certain construction works during the using of the hill fort. From the point of view of relative chronology it is only certain that the stone structure was later than the birch-bark formation. Birch-bark could be found everywhere in the northern trench. In the latest excavation year when the human origin of the birch-bark formation was already brought into question, it was here where altogether 3 m of a 10–15-cm thick birch trunk (Fig. 6.5) was unearthed which seemed to confirm the natural origin of the bark formation.

In order to adequately concentrate on the development of birch-bark formation, we should first briefly dwell on the processes of the development of fens and their becoming dry land, as well as the peat growth which all have had a role in the progress of the formation of the birch-bark strata in the supposed kettle basin[3] at the foot of the hill fort. The origin and formation of Estonian wetlands is connected with climate, the composition of earth and hydrogeological conditions. Although the whole geological development of the area is important, special attention should be paid to processes taking place during the Late Glacial and the Holocene. Mire as a landscape element can only develop in certain conditions and while evolving it starts to influence the surrounding landscape (Kink et al. 1998, 14). The area under mires in Estonia is constantly expanding at

[3] The possible kettle basin will be discussed in greater detail below. Here the different layers of peat under the birch-bark formation are briefly introduced that characterize the existence of water body or its overgrowing, but unfortunately these layers have not been more thoroughly analysed or dated.

Fig. 6.5. Birch trunk unearthed in the northern trench. Photo by Valter Lang.

the expense of both water bodies and dry land. Due to the water flowing from mire to mineral land and damp climate every year humidity-loving plants spread further and further towards mineral land, thus causing the development of peat and the growth of the surface area of mire (Valk, U. 2005, 38). Mineral lands have been swamped due to the groundwater and atmospheric water. The areas that swamp have low relief; groundwater is close to the ground there and the effluence scarce. In the areas between rivers the development of mires has started from valleys and depressions (ibid.; see also Kink et al. 1998, 14). The described scheme of swamping of mineral land could be used to explain the expansion of the mire to mineral land above the birch-bark formation as well; the mire developed in kettle basin started to expand to the surrounding mineral land where the mire gained vitality due to the scarce or absent effluence. At the same time human activity can probably be seen behind the afforestation of mire because

> …mire encroaches the forest and not vice versa; peat but not mineral land is the topmost layer in the contact area of mire and mineral land (Valk, U. 2005, 22).[4]

[4] Actually there is another side of the process – the forest itself drains the mire, so mire can start to mineralize. Little mires the outflow of which is behind a relatively low "bank", can in dry years forest for a couple of decades and then during one overmoist year with rich precipitation again become excessively damp. The advance of mire onto mineral land is hardly a linear and even process (T. Oja, personal letter to the author, 27.02.08).

Thus, here we can 'blame' the development of draining conditions, for example the digging of an irrigation trench to reforestate the mire.

The average thickness of peat of Estonian mires is bigger in higher layers. Peat mosses are very easily compressed, thus the deeper the layer, the more it is degraded and the more it will be compressed. According to this knowledge, the average speed of peat formation has been calculated; for example, during the last 1700 years it has been 1.1 mm per year, in the period of interest in the current contexts 3700–4800 years ago 0.5 mm/year; 4800–6600 years ago 0.6 mm/year and 6600–9900 years ago 0.3–0.4 mm/year (Valk, U. 2005, 17). The numbers calculated after the results of the sample from a local spot in Verevainu are even smaller: 0.13 mm/year in 3200–600 years BC and 0.23 mm/year in 600 BC–AD 500 (see Koot 2004, 20, 25). However, the peat layer on top of birch-bark formation was relatively thin, considering its age. How to explain that? We should pay attention to the fact that the deposition of peat is not a uniform process where layers are even and regularly subsequent. When trunks of trees fall criss-cross into one place, there is plenty of room between them, some may be pressed into the moss. Prior to the decomposition and compression of trunks, it will take at least a few decades when sphagnum relatively quickly grows between the trunks (Tõnu Oja, personal letter to the author 27.02.2008). It would be thus risky at this point to calculate the age or development speed of peat layers between the bark layers on the basis of their thickness. Silver birches can live up to 300 years (Kuresoo et al. 2005, 135) and although it took several decades for the kind of birch-bark formation to develop, it would still leave enough time for new trees to grow and a similar situation to recur more than once.

The quest for explanations

Although in the light of a later solution it might even seem inappropriate to discuss the different interpretation possibilities of the birch-bark formation, the process of introducing, testing, neglecting or casting aside hypotheses is a part of any fieldwork. In case of the birch-bark formation the process was made more complicated by the absence of find material, the absence of archaeological sites in the vicinity that would be dated to the same period with the birch-bark formation as well as the absence of knowledge about any similar birch-bark structures either from Estonia or from the neighbouring countries. All these aspects only fed the fantasy but were not helpful for either proving or rejecting any of the hypotheses. At the same time the unprecedented and unmatched nature of the situation offered so many different possibilities for interpretation, which encouraged seeking and generating new alternatives all the time. It is natural that when finding something unknown or strange, it has to be named somehow at least for the researcher himself/herself and some speculations should be offered, if only for creating a new starting point for the future research. In any case, the excavation of a 'mysterious' object like this might be a necessary practice of

widening one's horizon and accepting the absence of good solutions for an archaeologist of any age and qualification.

After the excavations of 2003 and 2004 the majority of speculations around the development processes of birch-bark formation concentrated naturally on the man-made constructions. The main reason for this was the belief in the initial assumptions by the geologists that could not be disconfirmed by the fact that despite the extensively opened area no finds were obtained during the two years of excavations. One of the first hypotheses to be suggested was a path or a track-way founded in the bog. After the radiocarbon dates were obtained the suggested path could no longer be connected with the hill fort, however, the formation was immediately considered a pavement laid down during the Neolithic. Although at first no Stone Age sites were known from the immediate neighbourhood, in 2004 scarce quartz and flint finds were collected from the excavation of Jüri Peets at the Linnaaluste III settlement site, at the so-called smithy, which seemed to refer to the presence of man in the close vicinity of the birch-bark formation during the Stone Age.[5] From an excavation plot of this size one would expect considerably more finds, for example the find density in the Mesolithic settlement site of Ihaste in Tartu was on the average 10–15 finds/m^2, whereas in find-rich sections the number was several times bigger, at the same time only 1 find/m^2 was gathered from the parts considered the periphery of the settlement site (see Johanson & Kriiska 2007). When the excavation of Linnaaluste III is compared to the Ihaste settlement site, it could be speculated that the former with its 0.5 finds/m^2 should probably represent a periphery of a settlement site or some other place of human activity. Also the quartz core determined among the finds refers to some activities (quartz flaking) during the Stone Age on the spot. However, an independent problem is the possible connection of the quartz and flint flakes with the birch-bark formation. On the basis of flint and quartz finds the settlement cannot be dated to a certain period, although as a rule stone items found without Stone Age pottery are regarded a sign of Mesolithic activity. At the same time the absence of pottery does not give reason for ruling out the simultaneity of the possible Stone Age settlement and the birch-bark formation. In the latter case the birch-bark formation, even if naturally formed as a whole, could still have constituted a part of the world perception of the people during the Neolithic. In any case the worked stone finds show that the near vicinity of the Linnaaluste and Verevainu mires and Keava hill fort were already 'discovered' in the Stone Age. Therefore more certain traces of human activity in the Mesolithic, as well as Neolithic and even Early Bronze Age might and should be looked for in the neighbourhood in the future, which is important predominantly from the local as well as the settlement archaeological point of view.

[5] The excavation site of Jüri Peets with the area of 32 m^2 yielded the following find material of the Stone Age: 11 quartz flakes, quartz barb, quartz core and two flint flakes (the identification of stone finds by Aivar Kriiska and Silja Möllits). According to Peets, quartz and flint finds and the absence of Stone Age pottery seem to refer to the existence of people during the pre-pottery Stone Age, in other words the Mesolithic (Peets 2007).

Returning to the hypothesis of a Stone Age birch-bark track or a certain bridge site (see for example Peets 2007), this was made improbable by the results of the geological drillings and calculations on the basis of which the size of the mire during the Early Neolithic was only 100 × 150 m (Koot 2004, 30). Therefore establishing a track-way or a crossing through it would have been a rather meaningless and implausible undertaking. In addition, doubts were raised by the area covered by birch-bark that would be meretricious for any track-way crossing the bog. At the same time the absence of finds would hardly be surprising for a track-way in mire.

Similarly with the previous hypothesis, a birch-bark platform in mire for the preservation of groceries would naturally have assumed a nearby settlement site. The kind of platforms are possible due to the quality of birch-bark to preserve humidity and coolness, thus keeping groceries in a mire or wrapped inside birch-bark would probably be the best way to achieve a refrigerator effect. From ethnographic literature it is known that the only way to preserve groceries for a longer time would be placing them inside birch-bark containers. For example the Orochen (Evenks) often used to cover a special meat platform *delken* with birch-bark (Brandisauskas 2006, 19). From the archaeological find material all kinds of boxes and other containers made of wood and bark are known, mostly from Iron and Middle Ages, but there can be no doubt that during the Stone Age, especially in the period before pottery, wood and bark containers were widely spread. The oldest bark vessel known from Europe is a container from the Mesolithic settlement site of Friesack, Brandenburg in Germany, and it is dated to 8950 ± 110 uncal. BP (Gramsch 1992, 68). From the settlement site of Nizhneye Veretye I a birch-bark container made from a single strip of bark was found, with a few flint implements and plenty of flint working debris inside it (Mithen 2001, 99). Vessels have been found from the Luistari Viking Age cemetery, as well as from several other Late Iron Age sites in Finland (Lehtosalo-Hilander 1982, 68). Late Iron Age birch-bark vessels with coin hoards have been found from Piibe, Järve, Mäetaguse, Arkna, Maidla and Kostivere II in Estonia (Tõnisson 1962); a well-known birch-bark bin was found from the well of Lõhavere hill fort (Jaanits et al. 1982, 333, fig. 220). From ethnographic sources we know that some of these vessels have even been used to boil water as birch-bark holds water well and is a poor heat conductor and thus there is no danger of the bark box catching fire (Relve 2007, 49). So, food in bark containers stored on a platform of bark would be an explanation also to the patches of bark at uneven heights: these could mark the half-preserved containers, partly fallen to pieces. What makes the hypotheses implausible is the fact that no archaeological finds and no bones were found during the excavation. First, if the place was to serve as a storing platform, at least something would have been left behind. Second, if we were dealing with some storage platform, then the reaching to the platform would have been more disguised or hidden, or even not present at all. It would perhaps only have needed some logs when people tried to get on the platform but in Keava bark layer started right from the edge of mineral land.

Guests, after seeing the birch-bark formation, often considered it to be a part of some building construction – usually from a roof or a floor. It is known from ethnographic material that birch-bark has been used as an isolation between the foundation and wall construction, as well as between the framework and the covering material (peat, reed, etc.) in roof (Relve 2007, 48). *Chums* – temporary dwellings of reindeer herders of north-western Siberia – covered with birch-bark are known from different ethnographic contexts, for example the Orochen (Evenks) use them (Brandisauskas 2006, 19). Ethnographic parallels show that the using of birch-bark in construction works was active in Estonia as late as the 19th century. During the winter ice-catch the fishermen of Lake Peipsi lived in little cabins made of birch-bark that were brought to the catching places on sledge. The cabins measured 5 × 5 m, the poles were covered with birch-bark. A small stove was built in the cabin for the cold periods (Viires 1975, 88).

Also from archaeological material we know several examples of using birch-bark as construction material even from very early periods, although for example in Estonian sites, bone and bone artefacts excluded, other organic material is usually very scarce from layers older than the medieval. We could mention for example logs and twigs as well as birch-bark used as parts of funerary construction from Tamula I Neolithic settlement and burial site (Jaanits et al. 1982, 81 f., fig. 58). However, from Denmark many floor remains are known from the peat settlement sites from Mesolithic Maglemose Culture period, Ulkestrup Øst I, Holmegaard IV, Duvensee, Sværdborg I to name just a few. The floors of the dwellings of the Maglemose Culture were usually made from bark sheets placed alternately on each other and split birch and pine logs. From Ulkestrup settlement situated on an island in a small lake, a well-preserved floor was found which consisted of large birch-bark strips that were nearly 180 cm long, 45 cm wide and 2.5 cm thick and covered an area of 6 × 4.5 m (Klindt-Jensen 1957, 20). Walls and roof here were probably made of birch-bark as well, supplemented by reed and twigs (Mithen 2001, 103). Analogous constructions have been found from several wetland settlement sites from eastern Europe as well, for example from the Ukraine (Usvjaty, Krivina, Zatšenye) and Latvia (Eini and Sārnate). In the latter place rectangular houses have been unearthed, where the floors are covered with pine and birch-bark (Jaanits et al. 1982, 90). In Sārnate and probably other similar settlement sites roofs were made, at least partly, of bark as well and covered with dirt (ibid.). Besides floor remains there are several examples of roofs made at least partly of birch-bark. One of these examples is offered by the Forcegarth Romano-British farm from the 1st century AD where the roofs were constructed using birch. The structure of the roof was of timbers; birch-bark was placed on twigs, used as roofing material underneath the thatch for keeping the rainwater from leaking into the house. It is not certain whether the birch-bark would have covered the entire inside of the roof or just the places where a thatched roof was likely to leak, such as around the porch. The roof was then finally covered with heather thatch (see more http://www.pastperfect.org.uk/sites/forcegarth/).

Among the theories of birch-bark as means of construction, the one supporting the bark floor seemed more credible than the one emphasizing the roof since archaeological parallels demonstrate that birch-bark floors have been repeatedly repaired and patched and the uneven formation that was unearthed in Keava would fit perfectly for a pattern like this. From the other side the absence of archaeological finds did not support the floor theory, because if we were dealing with a residential building, at least some household items or in the case of a ritual building something else referring to human activity could be expected. The roof theory seemed plausible because if it were a roof repaired several times with peat deposited between and on the layers, we do not expect any archaeological finds on or between the bark layers but underneath. The few test-pits dug deeper did not reveal any finds under the birch-bark, however, removing the bark entirely would have been extremely time-consuming and impossible because of the damp conditions.

After the second year of excavation the theory that seemed the most plausible was the one emphasizing the place of collecting and preserving birch-bark, in order to use it later either for construction work, making vessels or other smaller items, etc. There seemed to be several reasons to believe in the theory of the storage place of birch-bark. First, we were dealing with a cool and a wet place with many birch trees, both living and dead ones, in the neighbourhood, so the natural conditions for the existence of such a formation were suitable. Second, the formation started right from the edge of the mineral land, so it seemed that there was simply no need to found it deeper into the bog as it would be in case of a storage platform for groceries. Thirdly and most importantly, the system of the birch-bark layers in the turf – two or sometimes three solid or tangible layers of bark were separated by peaty turf or soil containing thin white flakes of bark. During the excavation it was possible to see that when removing a patch of the solid bark, what remained in the turf was a fine layer of bark, or to be more exact, small flaky delicate strips that are visible on the trunks of growing birch trees. As the turf between the solid layers was full of these strips, it seemed most plausible that there had been many layers of bark once and most of these have been removed. The question concerning the amount of turf between the possible bark layers was answered as follows: during the removal of some layers of collected turf from the storage place, some soil was unavoidably carried by feet on the bark deposition, and before placing the next layer of bark, the soil was not cleaned off.[6]

[6] This, by the way, is the best example of an interpretation process where appropriate supporting arguments are found for the hypothesis that seems the most plausible, unfortunately too often in a very careless way. The delicate flakes in peat found a credible explanation this way. The wish to believe in the human origin of the birch-bark formation was so overwhelming that although there were two-sided (bark deposited with both sides up in one place) and one-sided (bark deposited only with the upper white side up) birch-bark patches, it was decided that the two-sided bark patches were birch trunks accidentally fallen into the bark store, one-sided bark patches collected and deliberately deposited bark. As it turned out later, we should have looked at the aspect from an opposite angle, namely the two-sided patches (which actually formed the majority) referred to birch trunks collapsed to the kettle basin, fewer one-sided patches to partial preservation of trunks

Certain parallels to this kind of a storage place of birch-bark could not be found from archaeological material. Therefore specific uses of the collected bark could not be suggested either. Ethnographic as well as archaeological material naturally offers many possible usages for birch-bark, since due to its good isolative qualities birch-bark has been a valued and much used material. However, the absence of birch-bark artefacts or utensils from Keava, as well as the lack of knowledge of undeniable Stone Age settlement in the neighbourhood, failed to give any specific answers as to how the birch-bark collection was used.

However, besides all the theories emphasizing the human origin of the bark formation, a single theory supporting the natural origin – namely a beaver dam – was not completely excluded from the list of possible explanations. The theory was supported by the bast layer under the bark. As mentioned above, what is most remarkable about the 'saga of the birch-bark' is the fact that totally contradictory explanations could be found for many phenomena – for example the bast layer seemed to refer to the natural origin of the bark formation; however, bast layer also comes off with the bark when peeling dead trees. At this point attention should be paid to footnote No. 6 where the one- and two-sidedness of bark technique is discussed. On the one hand, certain signs that we choose not to see, are being ignored (which is unavoidable in the interpretation process), on the other, there are many aspects about phenomena, like the birch-bark formation, that can be interpreted in many different ways and in order to find the 'right' solutions we will have to start over several times, play with different scenarios, consult as many people as possible, etc.

Discussion and solution – natural formation

The greatest charm as well as the greatest problem of interdisciplinarity is the fact that every researcher with his/her own background (i.e. training, experience) sees things from his/her point of view. Thus in the case of the formation where archaeological finds were absent and in the case where it seemed necessary to explain the process of peat formation and peculiarities of landscape, it was natural to ask the help and opinion of somebody with the background of palaeo-ecology or geography. And the result was – for natural scientists the formation could be explained and covered by reasonable arguments, but not for archaeologists.[7] This

and twigs. Another example: bark patches deposited between and on top of each other, but not horizontally and next to each other were explained with preservation problems and with the partial removal of bark now and then. The answer turned out to be simpler than that: naturally birches collapse at random.

[7] Tõnu Oja emphasized that we can never be sure enough, as being an investigator of natural processes he has insufficient background knowledge for deciding that the birch-bark formation could not have formed as a result of human activity. At the same time he had convincing arguments for the natural formation of the structure that after thorough discussion were declared more plausible than a human establishment (path, store, building, etc.) at least by the author of the present article.

does not mean that absolute truth lies with natural scientists, but in the current case for me the scales are tipped in their favour.[8] So, upon my request Tõnu Oja, the professor of geoinformatics and cartographics at the University of Tartu, visited the excavation. After cursory inspection of the surroundings, observation of soil, landforms and vegetation, as well as examining the birch-bark formation he suggested a possible natural mechanism for the origin of the phenomenon. As a result it was ascertained – after three years of archaeological excavation at the Keava birch-bark formation or pavement – that in case of this much debated object we might be dealing with a natural structure after all. The following is very much based on concepts written down from the conversations.

In the case of the given site, the small overgrown fen on the foot of the hill fort, we are dealing with a landform that during the formation of the birch-bark structure was probably a kettle basin,[9] which was surrounded by a considerably low bank of mineral land from one side (in the direction of the outflow of water). During a water-rich season if the spring flood did not retreat, water could inundate the kettle basin; water inundating the place for a longer time can be a result of the activity of a beaver – so-called beaver dam. Since in the given case birch-bark has formed on peat layer, it can be supposed that we were dealing with a previously swampy ground. The presence of the spores of sedges and ferns in peat refers to fen environment and not a constantly inundated area (Koot 2004, 30). The fact that the place has not been a constantly inundated or wet place is indicated by the character of birch-bark that originates from big trees and not scrawny rods. It can be suggested that the swampy area with birch forest was inundated accidentally when suitable conditions were formed. Birches cannot stand the kind of floods very well wherefore complete inundation of the root system for the whole vegetation period can lead to trees dying and collapsing after 10–15 years and finally decaying. Birch wood decays quicker than its bark.

It was probably not a completely closed kettle basin, since the presence of certain natural outflow is referred to by the well-degraded peat on top and often under the birch-bark as well. As is known, peat needs plenty of oxygen for decomposition and it decomposes very slowly in anaerobic layers (Valk, U. 2005, 16).

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[8] At this point one should agree with the statement by Lang & Konsa (2004, 115) that "...there is a 'slack' in the interpretation of both archaeological as well as palaeo-ecological material that enables to move and adjust the interpretations to some extent and to better adapt them to one another." At the same time in case of the Keava birch-bark formation we are not dealing with a treatment of one problem from the angle of different sciences, but rather with a false perception of primary data by the archaeologists, but successful interdisciplinary discussion can only begin after a common insight of preliminary facts.

[9] Kettle basins (*sulglohk* or *söll* in Estonian) are thermokarstic landforms from the last mainland glacier – kettle- or more seldom funnel-shaped closed depressions in the ground. Their diameter is usually up to a few hundred metres, depth up to a few tens of metres. There is usually a small mire or a lake in the kettle basin, dry kettle basins are more rare. Kettle basins have formed with the melting of ice float buried inside the sediments (moraine, gravel, sand) left behind after the retreat of glacier or as a consequence of the erosion of meltwater under the glacier (or in front of its edge) (EE 9, 77).

As birch-bark was detected from the other side of the present irrigation trench as well, it can be suggested that the kettle basin once covered an area on both sides of the present trench or probably the former natural outflow.

One of the main arguments against natural formation and for human origin were birch-bark strips that seemed to have been all laid in the same way – namely the white (top) layer faced downwards. Unfortunately it was ascertained that in the case of 6000 years old bark it is practically impossible (especially for a non-expert) to state, which is the outer and which is the inner side of the birch-bark. In one soil sample three thinner layers could be distinguished in the half centimetre thick birch-bark strip, a fragment of a whole trunk that had been pressed flat by the weight of the peat: two layers of bark, with the wood between long decayed, and a very thin layer of organic matter could be distinguished instead. Thus another argument speaking for the human origin of the birch-bark formation was refuted.[10]

The uneven thickness and distribution of the birch-bark in the excavation could be considered another proof of natural origin of the structure with birch trees collapsing at random. In addition it is very likely that the formation of the discussed birch-bark structure following the described process of inundation is not connected only with just one event and time gap. Similar inundations have probably taken place more than once at different periods but the later peat layers have pressed the collapsed birch remains together into one stratum. It is likely that natural water flow was not present during the time when birches collapsed, but developed or was developed sometime later. After that birches were no longer the subject for inundations wherefore signs of similar bark strata in the peaty soil are concentrated only in a section with certain thickness and absolute elevation. Thus it could be suggested that both the beginning as well as the end of the birch-bark formation can be dated to the Neolithic. As mentioned, natural water flow may have caused by people since the results of geological research in the Linnaaluste and Verevainu mires have shown the increase of mineral particles only from the border of the Bronze and Pre-Roman Iron Ages when people began to actively influence nature (Koot 2004, 25; chapter 9).

The traces of burning on peat and bark strips are not difficult to connect with natural origin either as forest fires have always been quite common. For example, it is shown in the description of mire sediments based on the results of geological drillings conducted in the Verevainu and Linnaaluste mires that 77–170 cm from the ground level we are dealing with averagely decomposed tree-sphagnum peat with three thin coal layers in it that all indicate at fires (Koot 2004, 15, table 1). In addition to birches, traces of bark and twigs of other trees could visually be noticed inside the peat in the same layer with birch-bark structure. This again

[10] At this point the statement by Jüri Peets (pers. comm.) on the second excavation year should not be concealed. According to him, peeled and deliberately deposited birch-bark should not have preserved bast layer that he discovered on the bark in Keava, since only upper layers come off with the peeling of birches. On the contrary, as a result of the decomposition of independently collapsed birches which decay fast, namely bark with bast layer can be found.

indicated that we are probably dealing with the result of a natural process where the dominance of birches is connected with the habitat and not a species preferred for making pavements. In the last year of excavation, remains of certain birch trunks (Fig. 6.5) and twigs were found (or noticed), which in the first year were rather interpreted as a single uneven layer of bark. The distinguishing of birch trunks is probably one of the main reasons why the bark formation on the foot of the hill fort cannot be regarded as man-made.

However, the question about the size of the area where the collapsed and decayed birches were spread on the foot of the Keava hill fort, is still unanswered. During the excavations a few test pits were dug at random on both sides of the irrigation trench and only one of these, on the other side of the trench, contained birch-bark. However, the test pits without birch-bark and the western excavation trench that did not contain any birch-bark either, might not show the extent of this natural formation. Birches collapsing at random can obviously form areas where bark is not present at all, but that does not mean that in a few metres distance it is still the case. Certain parallels can be drawn with areas that undergo respective processes today, for example by the Tartu–Võru road near Maaritsa (Fig. 6.6). In order to ascertain the whole extent of the phenomenon the area should systematically be covered with test pits, but whether this will bring any new results that should justify the trouble and energy, is the question to be answered in the future.

Fig. 6.6. A possible analogical situation to the development of the birch-bark formation in Keava. Photo by Kristiina Johanson.

Interpretation and unanswered questions

The need for archaeological interpretation is obvious; everybody agrees that without interpretation the research of archaeological material would be relatively pointless. At the same time we could speak of the compactness of archaeological interpretation (what it is) and its reliability (the question of objectivity and subjectivity). On the one hand, interpretation can be regarded as a subjective narrative, since truth will never be established ('what is truth' is an unanswered question too), everything that we write down about our excavations and research, remains more or less a speculation. Archaeologists have sometimes been compared with writers, since

> …we all engage in acts of intuition, in pattern recognition, in linking previously unrelated observations and ideas: the very processes that are fundamental to imaginative thought. Where archaeologists differ from writers – or believe that they do – is that this process is beset by inhibitions, and is very easily disrupted (Bradley 1993, 133).

Bradley talks of the imagination of archaeologists as a necessary skill for fostering ideas but very often archaeologists in their texts (and actually in the research process) are stuck in the conventions of their discipline and the expectations of the public (other archaeologists?). In their writings scientists try to correctly link theory and method, express their 'material' as objectively as possible, rely on reasoned arguments. According to Bradley, this kind of behaviour leads to exhaustive idealism that ends with having in fact nothing to say. It is usually said that archaeologists should abandon imagination and creativity, and follow the rules. Bradley proves that there are rules in creative arts as well (poetry, art, music, etc.) and archaeologists in the process of writing would follow these, at the same time thinking barriers that restrain the development of ideas should be renounced. Bradley (1993, 133): "...it would do no harm if we accepted that archaeology is more closely allied to the creative arts than it has seemed respectable to say." Would we really accept archaeology as a fantasy-rich fiction?

Objectivity and subjectivity in the treatment of history have been a problematic issue and the matter of debate for many philosophers through time.[11] As Michael Harrower (2006, 17) puts it:

> Although familiarity with philosophical positions on epistemology and ontology is important, philosophers engaged in long-standing debates about subjectivity versus objectivity in the social sciences (e.g., Bunge 1998; Turner & Roth 2003) cannot conclusively resolve similar problems in archaeology for us.

According to Michael Shanks and Christopher Tilley, archaeologists have remained surprisingly reluctant to discuss the issue of objectivity or the possibilities of being value-free in archaeology in spite of claims made over a decade ago for the dawn of critical self-consciousness. This self-consciousness has mostly been about

[11] See, for example, William Henry Walsh (1992), Günther Patzig (2002), Paul Ricoeur (2002).

the search for a method to obtain objective knowledge of other cultures and the concern to find an objective means of access to the past (Shanks & Tilley 1992, 46). So being objective and avoiding the scary subjectivity have been the key issues in archaeological writing. For Shanks and Tilley (1992, 14) the search for scientific objectivity in archaeology (the science of material culture) is futile since "…there can be no objective link between patterning perceived in material culture and processes which produced that patterning". When the topic of objectivity has come afore, it usually ends with the statement that the degrees of objectivity and subjectivity are (to a substantial degree) problem specific (Harrower 2006, 17), so that it seems impossible to resolve the identity of and tensions between object and subject except in practice. However, as Ian Hodder has mentioned: "What matters is whether we can develop archaeological techniques [...] which are adequately integrative" (Hodder 1999, 24). Despite the fact that the majority of archaeologists exclude the possibility of objective knowledge of the past, most of them still aspire towards being as objective as possible or at least eliminate 'the subjective bias' in their writings (Shanks & Tilley 1992, 46).

In natural sciences objectivity has traditionally not been challenged (see for example Walsh 1992). Although in the case of archaeology it has always been debated whether it rather belongs to the humanities or science (however, archaeology is in most cases connected with the humanities), the question of objectivity and subjectivity has always been important in the treatments and interpretations of archaeology; the subject is generally not touched on, especially in non-theory-specific writings. While talking about interpretation, another similarly important issue besides the two-sided coin of objectivity and subjectivity is the question of context and contextuality. As it has been put: in contextual archaeology, "archaeology is focused on as an interpretative practice" (Johnsen & Olsen 2000, 97). One could even say that interpretation begins from the acknowledgement and cognition of the context. In case of the question of contextuality in both theoretical as well as historiographical plane the most important is the Hodder's postprocessual, contextual or interpretational archaeology. Hodder considers the main task of archaeological interpretation to be the recovery of buried or lost meaning (Johnsen & Olsen 2000, 107). For Hodder in the process of interpretation past and present constitute one another. The notion that past and present can enter into a dialogue of sorts is accepted by many (Thomas 2000, 4 and the references therein). In the light of this attempt – a dialogue between past and present – the critique of Hodder's ideas (see the critique in Johnsen & Olsen 2000) is especially surprising. Namely the contextual archaeology of Hodder only warned against dangers in interpretations that are not concerned about the wider archaeological context, for example considering the settlement material while interpreting burials, etc. (Trigger 1989, 350), at the same time the context of the archaeologist, the researcher, was not important in the theory of contextual archaeology. Thus the context respected in interpretations is inadequate and ignores subjectivity (Johnsen & Olsen 2000, 97). It means that for Hodder, the original context is of

major importance, overriding the contextuality of the archaeologist (interpreter). His statement that an object outside context is not readable, clearly reflects that he has specifically meant the original context.

> In prehistoric archaeology, the further one goes back in time, so that survival rates diminish, the more difficult it becomes to ground hypotheses in data. [...] In many areas contextual archaeology can hardly begin until more data have been collected (Hodder 1986, 141 f.).

Johnsen and Olsen argue with the idea that 'readability' and 'understanding' are limited to the past since according to this the context, life experience, etc. of the interpreter are irrelevant to this understanding. They ask why Hodder gives the priority to the original context and answer that it can only be because Hodder equalizes meaning and intention. Thus, when somebody reads a book, he/she has to know the context of its production in order to grasp the intentions of the author, in other words, the meaning of the text. Accordingly, the author and the original context together can be the only entrance to a proper interpretation of the text (Johnsen & Olsen 2000, 107). Hence, for Hodder's contextual archaeology the context of interpreter seems to be of no importance and in case of the absence or deficiency of original context we should not even dream about any archaeological understanding or readability.

Considering the above-said, it seems that according to the 'rules' of conventional contextual archaeology in case of the birch-bark formation excavated on the foot of the Keava hill fort we should forget interpreting altogether. The original context here was deficient, instead we had plenty of possibilities to think that all depended on the background, knowledge, the literature read, fantasy and other aspects of different interpreters. Even though I agree with the critique of Hodder's approach and take the liberty to speak of reaching the final reliable conclusion (natural formation).[12] And this gives a historiographical additional value to the interpretation process preceding the final conclusion where every single aspect or detail for some researchers might refer to one interpretation, for the others to a different solution and where every new suggested angle of approach or idea changes the current and 'valid' interpretations. Added new data increasingly excluded some of the work hypotheses and favoured others until the present moment when the gathered 'objective' information allowed the formulating of an interim finish. This is actually natural in every research – interpretation changes according to constantly added primary sources. For example in Keava new data were continually produced in accordance with the progress of the excavation, where the absence of finds excluded several of the hypotheses. Some hypotheses were excluded only

[12] At this point I should critisize the current article myself since I give a somewhat larger credibility to the representatives of natural scientists than those of archaeology, which with its 'hazy interpretations' is more connected with humanities (fiction?). It is remarkable that probably the majority of archaeologists would agree that the true solution to the Keava birch-bark formation came from the constructive speculation of Tõnu Oja and the hands (shovels?) of archaeologists were just too short. At this point there is no reason to argue against this solution.

after the fieldwork while seeking for parallels to the birch-bark formation and 'testing' its human origin and natural derivation in different situations. The rejecting of the hypotheses emphasizing the human origin of the birch-bark formation and the now final interpretation or intermediate finish was reached with the help of Tõnu Oja[13] whose interdisciplinary experience and competence outplayed the fantasy of archaeologists.[14] At this point we should briefly return to the question of objectivity and subjectivity. When agreeing with the critique of contextual archaeology that the context of researcher is important (or just as important) as the archaeological 'site contexts', one should not have a critique-free attitude towards the seemingly adequate solutions since natural scientists also have their researcher's background that predominantly depends on the phenomena and objects that they have had the most contact with.[15]

To sum up, it has to be said that although the final result was reached with the help of natural scientists (although according to geologists, the birch-bark formation was initially studied with archaeological methods), the strength, reliability and objectivity of archaeological research method should be emphasized, since the initial unobjective fact of the human origin of the birch-bark formation (as pointed

[13] In order not to overemphasize the role of one person in reaching the solution, it should be stressed once again that many scientists were involved in the interpretation process of the given case from the start and their preliminary statements were quickly integrated into the false initial presumption ("this birch-bark depositon cannot be natural"). Further on, only solutions were sought in order to explain hypotheses and the initial presumption. We only returned to the preliminary presumption in the last excavation year when archaeological methods had not helped to find a solution. Thus, time was ripe to create a new preliminary presumption. Oja: "My task included finding a possible natural mechanism and it seemed likely to exist" (27.02.08, personal letter to the author).

[14] Although this professional background could become an impediment to the free flight of thought (see Bradley above), at this point we could only discuss in which case experience and competence play a more important role than fantasy. I believe that in the given situation experience out-played fantasy but since it is my personal and subjective opinion the truth about the Keava birch-bark formation might not be clear and finished after all. When new data appears (either as a result of fieldwork, finding parallels or something else) it could bring along a total change in the interpretation process and we should be ready for it.

[15] Lang & Konsa (2004, 115) have written that among archaeology, history and palaeo-ecology the evidence of the latter are unquestionably the most objective (pollen is more objective than anything written down or done), at the same time it does not mean that "the interpretation of this data is objective per se as well. The latter depends on our knowledge and understandings about the mechanism and reasons of the formation of preliminary data and these have changed with time and will change in the future. [...] Emanating from these circumstances the relationship of objectivity and subjectivity and the problematics of the interpretation of data are similar in archaeology and palaeo-ecology." Oja (personal letter to the author 27.02.08) argues that the relationship of objectivity and subjectivity (and not only their proportion but the links between them) in natural sciences as well as humanities and social sciences is still different. However, the absolute objectivity of natural sciences (as palaeo-ecology) is a myth and the opinion that they are completely independant of subjective explanation, is not true either. Even if there is the striving for complete objectivity and if theoretically it could be a possible final outcome, natural sciences today are definitely not ready to have nothing but objective truth.

out by some geologists) could not be explained with archaeological methods. However, no method, whether based on experience or fantasy, is not completely trustworthy and therefore we should believe the result of this interim finish or have doubts about it. At least until new data is gathered and new interpretations are established.

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I wish to thank everybody who has helped to generate new ideas, rejecting some and supporting other hypotheses. In trying to find the 'right' solution my special gratitude belongs to Tõnu Oja who kindly agreed to invest his time and experience to search for the most reasoned choice between natural and human. The present chapter could not have been completed without his help.