

## BOOK REVIEW

Evert Baudou, Roger Engelmark, Lars Liedgren, Ulf Segerström, Jan-Erik Wallin, *Järnåldersbygd i Österbotten. En ekologisk- arkeologisk studie av bosättningskontinuitet och resursutnyttjande*, Acta Antiqua Ostrobotniensia 2, Vasa 1991, 207 p.

The history of settlement in Southern Ostrobothnia offers a fascinating, and enigmatic, complex of problems in Finnish archaeology and early history. Was there continuous settlement in this area from the Merovingian Period (550/600–800 AD) through the Viking and Crusade Periods to the Middle Ages, or did permanent settlement cease at the end of the Merovingian Period? According to the latter alternative, this area would not have been resettled until the early Middle Ages, i.e. from the 12th century onwards.

The accepted view among Finnish archaeologists and historians of discontinued settlement in Southern Ostrobothnia is based on the fact that burial finds ceased around the beginning of the 9th century, and stray finds from later periods are rare. Isolated palynological observations of cereals from the 9th century and later times are not regarded as sufficient evidence of continued settlement in this region.

Under the direction of Evert Baudou, Professor of Archaeology at the University of Umeå, a team of researchers from the university's Departments of Archaeology and Ecological Botany have recently studied the settlement history of Southern Ostrobothnia. Their project focused on the period from the Iron Age to the Middle Ages. The main problem of the study was the issue of settlement continuity vs. discontinuity, and pollen analyses had a central role in the research work. Thorough excavations and a wide range of paleoecological analyses were carried out at the Kalaschabrännan site in Maalahti (Sw. Malax). The various studies of the project and a broader synthesis of

its results have recently been published by the *Österbottniska fornforskningsällskapet*, a local archaeological body, in *Järnåldersbygd i Österbotten* ('Iron Age Settlement in Ostrobothnia').

This work contains several highly interesting contributions. Roger Engelmark's and Lars Liedgren's articles present the results of excavations at the 8th-century Kalaschabrännan dwelling site, with information on Iron Age buildings and structures, fossil fields, and the composition of flora utilized by man. Ulf Segerström's and Jan-Erik Wallin's chapter on pollen analyses contains interesting conclusions regarding the nature of cannabis-type pollen. They point out that in many Finnish and Swedish studies pollen of this group occurs in periods during which agriculture was not yet practised, with the conclusion that it is a poor indicator of settlement activity. Where pollen indicating farming activities is lacking, cannabis-type pollen is apparently from populations of wild hops. This point is of considerable importance for interpreting palynological diagrams.

The main conclusion of *Järnåldersbygd i Österbotten* is that in Southern Ostrobothnia permanent settlement continued without interruption from the Merovingian Period to the Middle Ages. Accordingly, the ending of burials around the year 800, or slightly later, does not mean the end of permanent agrarian settlement in the region.

The researchers of the project suggest that Iron Age settlement in Southern Ostrobothnia was highly mobile, with an economy mostly based on animal husbandry. Maintaining a supply of fodder led the population to follow the shoreline, receding as a result of land uplift, and to settle in the coastal zone characterized by grasses and leaved forest. Keeping to such an environment made it necessary to relocate at frequent intervals. In many cases, land uplift paludified sites and fields, again leading to relocation. This is suggested as an explanation for the lack of graves later than the beginning of the

9th century, as finds of later burials are not in locations that were undisputedly inhabited until the end of the 8th century.

The suggested mobility of settlement is shown in the pollen diagrams by an abundance of cereal pollen and other indicators of settlement in the coastal-zone stage. The decrease of indicators of human activity, especially the cereal pollen in the diagrams, is explained by the relocation of settlement as the shoreline receded. It is also suggested that most of the cemeteries of the Viking and Crusade Periods were destroyed by later field clearing.

This interpretation of settlement history in Southern Ostrobothnia poses a number of problems. In their review of economic practices and the utilization of natural resources in the Iron Age and the Middle Ages, the authors rely mostly on Swedish studies, without due consideration of features specific to areas east of the Gulf of Bothnia and the Baltic. Information from documentary sources of the Middle Ages and early Modern Times is mostly ignored.

Reviewing Iron Age agriculture in Southern Ostrobothnia on the basis of the Kalasabrännan excavations, Engelmark (pp. 86–93) arrives at the conclusion that slash-and-burn cultivation could not have been practised in the region before the Middle Ages. This conclusion is based on the fact that barley was the main cereal crop in this region in the Iron Age, and the assertion that rye was the only swidden-grown cereal that could thrive in the coniferous zone. The palynological and macrofossil analyses show that barley was in fact the dominant species of *Cerealia* in the Iron Age. This concept of slash-and-burn cultivation and its chronology can be based only on a complete ignorance of available literature on the history of agricultural technology in Finland.

Rye as the sole swidden-grown species is limited to the so-called *huhuhta* plots, cleared in heavy stands of conifers. The normal type of slash-and-burn plot, known as the 'leaved-forest swidden', was cleared in deciduous forest or mixed forest dominated by leaved trees. Both rye and barley could be sown in such plots. However, rye was the main crop even in this type of swidden in the 17th and 18th centuries.<sup>1</sup> In his study of slash-and-burn methods used by the population of Savo in the 16th and 17th centuries, Kauko Pirinen comes to the conclusion that in the Middle Ages there was obviously no clear difference between the ordinary or normal swidden and the *huhuhta* method, as is concluded from sources of later periods. Pirinen also points

out that place-names in 16th and 17th-century sources show that the Savo Finns also grew barley in their *huhuhta* swiddens.<sup>2</sup>

Sowing barley in burn-cleared fields was by no means exceptional in the inland regions of Finland. A graphic example of this is given by 18th-century assizes records from Nastola, a parish located east of Lahti on both sides of the Salpausselkä Ridges. An official investigation carried out at the assizes in 1746 showed that almost all farmers in the parish sowed barley in the burn-cleared fields, albeit in smaller amounts than rye.<sup>3</sup> There is also information from Ostrobothnia concerning the growing of barley in swiddens. In 1650, 35 of the 65 peasant farmers of Lapua had sown their burn-cleared plots with cereals; of these, 34 grew barley, and 7 grew rye.<sup>4</sup> There is also information from North-West Russia that the best barley crops were obtained from burn-cleared plots.<sup>5</sup>

The dominance of barley and the secondary role of rye do not prove that Iron Age agriculture in the studied region was solely based on field cultivation methods. Finnish archaeologists and historians have pointed out that arable farming and slash-and-burn methods indisputably co-existed since the second half of the first millennium, and pollen analyses have also been interpreted in this way.<sup>6</sup> In fact, even Segerström's and Wallin's own material supports the view that slash-and-burn farming was practised in Southern Ostrobothnia in the Iron Age. The decline of spruce, and the increase of birch and alder, for example in the sample from Katamossen bog, clearly supports the case for slash-and-burn farming (pp. 37, 68–69). The sporadic occurrences of cereal pollen in the period following the end of the 8th century can also be interpreted as indications of slash-and-burn farming. Weeds in the pollen diagrams do not directly contradict the possibility of slash-and-burn methods; Russian studies show that slash-and-burn plots were free of weeds only in the first year after clearing.<sup>7</sup>

*Järnåldersbygd i Österbotten* deals in various connections with the use of clayey soils in Iron Age field cultivation, which has also been discussed by the present author.<sup>8</sup> The project's researchers categorically deny the possibility of Iron Age field clearing on the light Litorina clays of Southern Ostrobothnia (pp. 69, 74, 93). On the strength of this, they arrive at conflicting claims. Segerström and Wallin appear to be highly skeptical of possible Iron Age agriculture in the Kyröjoki River (Sw. Kyröälv) valley, while Baudou feels that conditions for farming in

the same area were already suitable in the Iron Age (p. 153).

It was not technically impossible to till clayey soils in the Iron Age. Experiments have shown that wooden curved-bow ards without iron shares can be used to plough fallow fields in clayey soils.<sup>9</sup> Below the 50-metre a.s.l. contour in Southern Ostrobothnia, the soil cover is dominated by light, sand-mixed Litorina clays, which are more easily worked than the heavier varved clays. In Southern Ostrobothnia, settlement in the Migration and Merovingian Periods was not solely concentrated in the coastal zone. There is clear evidence of permanent settlement also in the Kyröjoki River valley, an environment characterized by Litorina clays, mainly along the high river banks in Vähäkylä and Isokylä.

In the Iron Age, as in later periods, means of livelihood played a major role in the choice of dwelling sites and settlements. Providing fodder for livestock was undoubtedly an important factor that had to be taken into consideration, but since foods made from cereals were a main element of the diet of northern peoples, it is quite probable that opportunities for growing cereals were taken into account in selecting sites. In view of this, it is not surprising that the Iron Age cemeteries in Isokylä (Sw. Storkyro) were mostly near the Kyröjoki River. Until the 16th century, the river banks, rising slightly above the surrounding plain, were the only farmed areas in the whole of the Kyröjoki River valley. In the mid-16th century, fields in Kyrö extended only two 'arrow-shot lengths' from the river shore.<sup>10</sup> Earlier studies have already pointed out that Late Iron Age settlement in Isokylä and parts of Vähäkylä (Sw. Lillkyro) ceased to be bound to the shore areas.<sup>11</sup>

Baudou maintains that the locations of Iron Age settlement in the Kyröjoki River valley were solely dictated by the pastures and fodder resources of the river valley (p. 23). Ensuring the feeding of livestock was no doubt an important factor, but the present author is of the opinion that relatively advantageous locations for grain cultivation also played a role. In this perspective, the utilization of the light clays of the river valley was a natural alternative. We must also take into account the fact that grain was most probably grown by both field cultivation and slash-and-burn methods.

The banks of the Kyröjoki River valley do not appear to have been any less advantageous to cereal cultivation in the Merovingian Period than in the 16th century. According to basic survey maps (scale 1:20 000), the level of the Kyröjoki

River is 6.2 metres above sea level at the boundary of Koivulahti (Sw. Kvevlax) and Vähäkylä, 11.8 metres at the boundary of Vähäkylä and Isokylä, and 16.6 metres a.s.l. at the old church of Isokylä. This means that in Isokylä and in the eastern parts of Vähäkylä sea levels did not affect the flooding of the river in the Merovingian Period any more than at present. Since the 18th century, rapids have been cleared in the Kyröjoki River, and its present flooding cannot be compared to the situation in the 17th century or in earlier times. Reconstructions of the situation prior to clearing the rapids involve a number of problems, as the nature and extent of flooding over long periods are influenced by conflicting factors. Land uplift is faster near the mouth of the river than further upstream. The present rate of uplift near the mouth is c. 8.6 mm/yr, while the corresponding figure at the boundary of Isokylä and Ylistaro is c. 8.2–8.4 mm/yr. We must also take into account the slowing of land uplift, which is estimated at 1.3 % of yearly uplift over the course of one century. This means that since the 8th century land uplift at the river mouth was c. 0.5 m greater than in Isokylä. On the other hand, it has been suggested that the slowing of flow resulting from a faster rate of uplift at the mouth was compensated by continuous wear on the rapids. It would thus seem that in late prehistoric times the river flooded in Isokylä and parts of Vähäkylä in much the same way as in the 16th and 17th centuries.<sup>12</sup>

In Vähäkylä and Isokylä soil acidity is much lower along the river banks than in low-lying locations. This is advantageous for cultivation, but we must point out that low acidity is largely the result of long-term land use.<sup>13</sup>

Evert Baudou is responsible for the analysis of archaeological materials. He points out in several connections that grave finds do not necessarily give the right picture of the real development of settlement, and especially its continuity. Archaeological surveys of sites and antiquities are incomplete; a large number of Iron Age cemeteries and graves have been destroyed over the years; and only a few of the preserved ones have been studied (pp. 19, 51).

Datable finds are available from dozens of Iron Age graves and cemeteries of Southern Ostrobothnia. In all parts of the region, burials ceased around 800 AD at the latest. Over the centuries, prehistoric graves have been destroyed in Ostrobothnia, as elsewhere. It seems, however, curious that only Viking and Crusade Period cemeteries would have been destroyed. It

is, of course, possible that certain factors led to a situation where graves and cemeteries of a certain type and/or in certain types of locations were more susceptible to damage than ones in other settings. This could have led to the almost complete destruction of graves of a certain period. Such a possibility is, however, remote in Southern Ostrobothnia, for in Finland burial practices clearly appear to have remained similar from the Merovingian Period through the Viking and Crusade Periods.

Baudou, however, suggests that the lack of Late Iron Age graves and cemeteries was caused by the introduction of new burial customs. He does not present any concrete process of destruction which would explain the systematic disappearance of Viking and Crusade Period cemeteries in the region. Nor can we compare Southern Ostrobothnia with those central, intensively cultivated, regions of Sweden where the lack of Iron Age cemeteries is generally believed to have been the result of field clearing.

We must also take into account the fact that in Finland cemeteries were generally located in places that could not satisfactorily be used for cultivation, and their disappearance in Ostrobothnia cannot be explained by field clearing. It is possible that even a large number of cemeteries may have been destroyed by later villages along the river banks, but even in this case it is not likely that all Viking and Crusade Period cemeteries were destroyed. Such a process of destruction conflicts with Baudou's basic view that the locations of Iron Age settlements and dwelling sites in Ostrobothnia were determined by the requirements of animal husbandry and not grain cultivation. The continual relocation of settlement following the receding shoreline would in fact lead to a situation where Iron Age graves and cemeteries should have been preserved to an exceptionally high degree. The opinion that settlement dependent on the coastal zone, and thus dispersed along it, must have left archaeological evidence has already been presented by Tapio Seger in his criticism of Jukka Luoto's theory concerning continued settlement in Southern Ostrobothnia throughout the Viking and Crusade Periods.<sup>14</sup>

The level-ground cremation cemeteries common in the Late Iron Age are notoriously difficult to observe in the terrain, and it is probable that future surveys will reveal previously unknown cemeteries of this type even in Southern Ostrobothnia. At present, over a dozen level-ground cemeteries are known from the region, and most of them have been investigated. The

last burials in these are from the beginning of the Viking Period. This material is by no means insignificant.

Baudou also discusses to what degree stray finds may in fact be from graves. He tends to regard most Iron Age stray finds from Southern Ostrobothnia, with the exception of oval striking stones, as originally belonging to graves. On these grounds, he arrives at the conclusion that the cemeteries of this region remained in use until the 11th century (pp. 179–183, 203). The dating of the Kaparkullen/Kaparåkern cemetery in Vöyri (Sw. Vörå) is mainly based on a spearhead dated to the 11th century. C.F. Meinander, however, doubts whether this object was actually from the cemetery in question. The finds from Kaparkullen were at some stage mixed with material from other contexts, and the assumed provenance of the actual spearhead is a matter of doubt.<sup>15</sup>

The problems of stray finds are not, however, treated systematically in the publication. The archaeological literature gives the impression that areas with Iron Age settlement will normally include sites, cemeteries and other antiquities, as well as stray finds. Finnish archaeologists have not, however, discussed the proportions and relative frequencies of various categories of finds and other material in any systematic fashion. Despite this, it appears that a situation where all artefacts of a certain period are solely from graves is clearly anomalous.

Typical of Baudou's discussion of the archaeological material is to bypass or summarily reject interpretations differing from his own. A good example of this is his discussion of finds from the wilderness zone along the boundary of Southern Ostrobothnia and the province of Satakunta (p. 185). The Sapsalampi find from Alavus was originally described by Alfred Hackman as a hoard or cache. Baudou duly refers to Hackman's opinion, but goes on to describe the find as a grave, without giving any grounds for his opinion. Ville Luho has pointed to the uncertain nature of this find, suggesting that it could be either a hoard or a burial.<sup>16</sup> Baudou also describes the Tuiskula find from Kurikka as a grave, again without any reservations, and ignores the views of Luho, who personally investigated the find. Luho suggests that it was a hoard, giving a number of reasons for his interpretation. Luho also suggests a Lapp sacrifice as an alternative, and gives the find a later date than Baudou.<sup>17</sup>

Three rune inscriptions found in Vöyri in the 1970s and '80s have been cited in various connections as the main evidence of continued

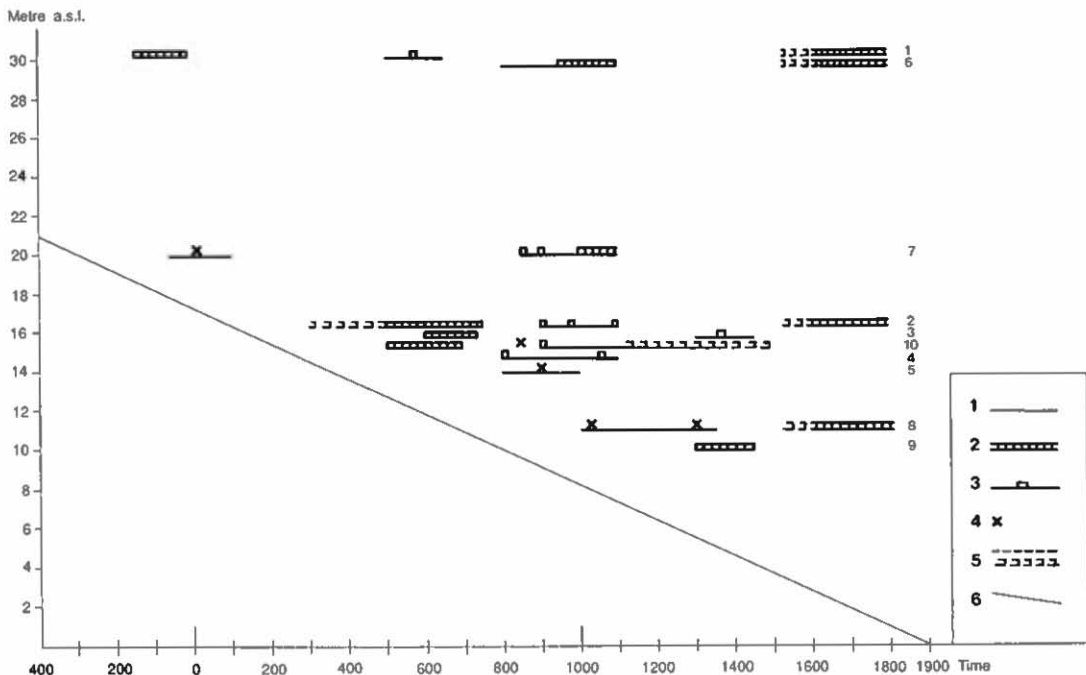


Fig. 1. Schematic diagram showing shore displacement and information given in Diagrams 3:2-3:11 and 3:16 of *Järnåldersbygd i Österbotten*.

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| 1. Occurrences of cultural indicators      | 4. Individual particles of cereal pollen |
| 2. Continuous occurrences of cereal pollen | 5. Uncertain chronology                  |
| 3. Sporadic occurrences of cereal pollen   | 6. Rate of shore displacement            |

settlement in Southern Ostrobothnia. However, a number of serious doubts have been raised regarding their authenticity.<sup>18</sup> For this reason, it is surprising that these inscriptions are not referred to at all in the arguments for continued settlement. *Järnåldersbygd i Österbotten* does not even mention their existence. This suggests that even the supporters of the continuity theory are now convinced that the Vöyri inscriptions are not authentic.

On the basis of pollen analyses and his review of the archaeological material, Baudou arrives at the conclusion that settlement in Southern Ostrobothnia continued uninterrupted from the Iron Age to the Middle Ages, although with a clear decline beginning in the 9th century. As pointed out by Baudou, this conclusion is based on the hypothesis that settlement in the region concentrated in the coastal areas. This mobile form of settlement was mostly based on the need to secure a supply of fodder for livestock. According to the researchers of the project, mobility explains why cereal pollen occurs only sporadically and in small amounts in the layers of

the Viking and Crusade Periods.

Baudou feels that the results confirm the suggested hypothesis. This is, however, based on two basic assumptions: 1) sporadic occurrences of cereal pollen in the Viking and Crusade Periods indicate continued settlement, although for only short periods at individual locations; 2) Iron Age agriculture in southern Ostrobothnia was based on arable farming and not slash-and-burn methods.

The researchers do not discuss alternative explanations for the results of the different methods of analysis. If, on the other hand, the above assumptions are incorrect, the results of the Umeå project lend support to a different hypothesis, which has the advantage of not conflicting with available results of archaeological research.

Strictly speaking, cereal pollen in the palynological samples can indicate only agricultural activity in the surroundings of the sampling location, and not necessarily permanent settlement. The relationship of agriculture and settlement depends on our understanding of the

means of livelihood of the community utilizing the area studied. In arable farming, the fields could not have been far from the dwelling sites, but a completely different picture emerges where grain was grown in swiddens.

According to Finnish studies, the depopulation of Southern Ostrobothnia in the early 9th century was followed by a period of a few centuries during which this region was a wilderness zone utilized by people from the inland, mainly the present region of Satakunta. According to this view, the stray finds of the Viking and Crusade Periods are evidence of long-range utilization of the region. In view of geographical conditions, the utilization of the natural resources of Southern Ostrobothnia from the inland, i.e. by people from eastern Satakunta and Häme, is by no means an unlikely alternative.

Documentary sources from the mid-16th century mention inhabitants of central Häme owning wilderness tracts as far away as Pihlipudas, Reisjärvi, Pyhäjärvi, and Pielavesi in the border regions of the provinces of Ostrobothnia, Häme and Savo. These tracts could be up to 300–350 kilometres from their owners' home villages, and often beyond geographical watersheds.<sup>19</sup> The settlements of so-called Upper Satakunta were 150 to 200 kilometres from the Iron Age settlements of Southern Ostrobothnia, and these areas were linked by good land and water routes. Where customary water routes were used, it may not even have been necessary to arrange the portage of boats across isthmuses; at least in later times in Upper Satakunta several boats were successively used on church routes crossing several isthmuses.<sup>20</sup>

Evidence of cereal pollen from the 9th century and later times poses a number of problems for the above interpretation, as cultivating grain in far-off hunting areas does not, at first sight, appear to have had any meaningful function in the economy. Cereals, however, were an indispensable element of the diet of Nordic peoples, as pointed out by Jørn Sandnes.<sup>21</sup> This is in agreement with information on the transport of cereals to wilderness tracts. An alternative, especially in outlying areas, was to grow the grain in cleared swiddens. Slash-and-burn methods did not require draught animals or fertilization, and sowing and harvesting could be carried out alongside hunting, trapping and fishing.<sup>22</sup> Palynological studies from Uusimaa in Southern Finland have revealed evidence of slash-and-burn farming in a period during which the area was not permanently settled.<sup>23</sup>

The depopulated coastal zone of Southern

Ostrobothnia and the Kyröjoki River valley could thus have been utilized by people from the inland in the Viking and Crusade Periods, despite sporadic indications of grain cultivation. In theory, it is equally possible that this region was exploited from the western shores of the Gulf of Bothnia. According to Swedish experts in ecological botany, slash-and-burn cultivation was not practised west of the Gulf of Bothnia, and long-range wilderness exploitation from Sweden in the Viking and Crusade Periods does not thus seem likely. Studies of place-names also show that the first to use these areas were Finns.<sup>24</sup>

The above hypothesis has the advantage of not conflicting with archaeological evidence or place-name studies, which cannot be said for the hypothesis suggested in *Järnåldersbygd i Österbotten*, where various hypothetical constructs are used to accommodate the archaeological record to the model of interpretation adopted in the palynological studies. Since the authors of the work also suggest that place-name etymologies should be re-interpreted on the basis of their palynological studies, they present all the elements necessary for an exercise in circular reasoning.

In actual fact, the palynological results of the study support the alternative hypothesis of Southern Ostrobothnia as a wilderness area utilized from elsewhere in the Viking and Crusade Periods. This is clearly shown by the diagram in Fig. 1, schematically summarizing the occurrences of cereal pollen in diagrams 3:2–3:11 and information presented in diagram 3:16 of *Järnåldersbygd i Österbotten*. Fig. 1 also shows the rate of land uplift in the region.

The information in this diagram does not reveal any clear connection between cereal cultivation and the coastal zone. The locations of samples 1, 2, 3, 4, 7 and 10 were close to the coast around AD 250, but they do not show any definite concentration of cultivation activity at this time. Samples 5, 8, 9, and 10 were near the coast around AD 800, but in most cases pollen classed as cereals occurs only sporadically in the 9th century. The occurrence of cultivation indicators is not very marked. On the other hand, we can observe the end of an unbroken succession of cereal pollen in the 8th century (samples 2, 3 and 10).

The most plausible interpretation of the information compiled in the diagram is that a definite change occurred in the late 8th century, bringing to an end continued agricultural activities, based on both arable and slash-and-burn methods. This was followed by a period possibly extending to

the end of the first millennium, during which small-scale and highly mobile cultivation was practised, apparently in swiddens. Before the end of the millennium, cultivation appears to have been more permanent only in the Lampertmossan area, but even here the large proportion of birch and alder pollen clearly suggests slash-and-burn methods. This interpretation is in fact supported by Segerström's and Wallin's conclusion that cannabis-type pollen is from wild hops, and not cultivated hemp.

Possible future discoveries of individual Viking or Crusade Period graves in Southern Ostrobothnia do not pose problems for the alternative hypothesis, as those who died in the wilderness were most probably buried there, and not taken home over long distances for burial. Of course, if whole cemeteries and accumulations of graves from the Viking and Crusade Period are found in the future, the hypothesis outlined here must be reviewed. However, some of graves in the wilderness zone contain evidence of new settlers advancing from the south. — In this connection we must note Baudou's suggestion that the graves of the end of the Iron Age in the boundary zone between Ostrobothnia and Satakunta indicate the spread of coastal settlement into the inland regions. This is assumed to have coincided with a radical change in the economy, whereby hunting and fishing took the former role of field cultivation and animal husbandry (p. 190). Baudou implies a radical change towards more primitive means of livelihood. Such a course of development appears to be completely exceptional in the northern parts of Scandinavia. Jørn Sandnes of Norway has stressed the role of grain cultivation and animal husbandry as the basic means of livelihood for permanent settlement in all parts of Scandinavia. It was only when grain could be obtained through trade that specialization occurred, as in the adoption of fishing in parts of Norway.<sup>25</sup> Baudou's interpretation would thus dispute the whole phenomenon of long-distance wilderness utilization in prehistoric Finland.

In *Järnåldersbygd i Österbotten* the contributions by Evert Baudou and his co-authors are systematically restricted to information supporting the hypothesis of continued settlement in Southern Ostrobothnia from the Merovingian Period to the Middle Ages. There is hardly any discussion of alternative interpretations that would suggest discontinuity. For this reason, *Järnåldersbygd i Österbotten* loses much of its credibility. The continuity theory finds little support from available results in archaeology,

place-name studies and paleoecology. On the other hand, some of the conclusions based on botanical analyses are in agreement with the discontinuity theory.

Eljas Orrman  
National Archives of Finland  
Rauhankatu 17  
SF-00170 Helsinki

#### NOTES

- <sup>1</sup> E.g. Arvo M. Soininen, *Vanha maataloutemme. Maatalous ja maatalousväestö Suomessa perinnällisen maatalouden loppukaudella 1720-luvulta 1870-luvulle*, Historiallisia tutkimuksia 96, Helsinki 1974, pp. 58–61; Mauno Jokipii, 'Satakunnan talouselämä uuden ajan alusta isoonvihaan', *Satakunnan historia* IV, s.l. 1974, pp. 123–136.
- <sup>2</sup> Kauko Pirinen, 'Rajamaakunta asutusliikkeen aikakautena 1534–1617', *Savon historia* II:1, Pieksämäki 1982, pp. 315–362.
- <sup>3</sup> Anneli Mäkelä, *Nastolan historia* I, Jyväskylä 1979, pp. 229–231.
- <sup>4</sup> Erkki Lehtinen, *Lapuan historia* I, Vaasa 1963, p. 84.
- <sup>5</sup> *Agrarnaja istorija severo-zapada Rossii. Vtoraja polovina XV-načalo XVI v.*, ed. by A.L. Šapiro, Leningrad 1971, p. 345.
- <sup>6</sup> E.g. Irmeli Vuorela, *Pollen Analysis as a Means of Tracing Settlement History in SW Finland*, Acta botanica fennica 104, Helsinki 1975, pp. 38–41; Idem, *Sysmän püäjän asutushistorian tulkinta siitepölyanalyysin perusteella*, Lahden museo- ja taidehautakunta. Tutkimuksia XV/1979, Lahti 1980, pp. 12–14; Mirjami Tolonen, 'Pollen-analytical Evidence of Ancient Human Action in the Hillfort Area of Kuhmoinen, Central Finland', Appendix 5 in J.-P. Taavitsainen, *Ancient Hillforts of Finland*, Suomen Muinaismuistoyhdistyksen Aikakauskirja 94, Helsinki 1990, pp. 251–263.
- <sup>7</sup> *Agrarnaja istorija severo-zapada Rossii*, p. 345.
- <sup>8</sup> Eljas Orrman, 'Om geologiska faktorers inverkan på bebyggelsen i södra Finland mot slutet av järnåldern och under tidig medeltid', *Historisk Tidskrift för Finland* 1987; Idem, 'Geographical factors in the spread of permanent settlement in parts of Sweden and Finland from the end of the Iron Age to the beginning of Modern Times', *Fennoscandia archaeologica* VIII (1990).
- <sup>9</sup> Janken Myrdal, 'Jordbruksredskap av järn före år 1000', *Fornvännen* 1982, p. 85.
- <sup>10</sup> Armas Luukko, 'Keskiaika ja 1500-luku', *Etelä-Pohjanmaan historia* II, Helsinki 1950, p. 268; Niilo Liakka, 'Piirteitä Etelä-Pohjanmaan maataloudellisesta kehityksestä', *Talopoika* V, Porvoo 1928, p. 21.
- <sup>11</sup> C.F. Meinander, 'Esihistoria', *Etelä-Pohjanmaan historia* I, Helsinki 1950, pp. 128–131; Eero Ah-tela, 'Piirteitä Vähäkyrön rautakautisesta asutuksesta', Helsingin yliopiston arkeologian laitos, moniste 25, Helsinki 1981, pp. 97–100.
- <sup>12</sup> *Peruskartta* (Basic survey map) 1:20 000, sheets nos.

- 1333 02, 1333 05, 1333 07, 1333 10/2311 01; Erkki Kääriäinen, 'On Recent Uplift of the Earth's Crust in Finland', *Fennia* 77 (1953), fig. 14 and p. 67; Idem, 'Land uplift in Finland computed by the aid of present levellings', *Fennia* 89 (1964), Appendix map; Esko Kuusisto, 'Etelä-Pohjanmaan vesistöjen hydrologia' appendix 1 to Harri Turunen, 'Lakeuden joet. Etelä-Pohjanmaan vesienkäytön historia', *Kytösavut* XV (1985), p. 272.- On the present situation, see *Kyröjoen tulva-alueet*, Vaasan läänin seutukaavaliitto - Vaasan vesi- ja ympäristöpiiri, Vaasa 1989.
- <sup>13</sup> B. Aarnio, 'Etelä-Pohjanmaan maaperä', *Talopoika* V, Porvoo 1928, p. 52.
- <sup>14</sup> Tapio Seger, 'Rutto ja rautakauden kriisi', *Historiallinen Aikakauskirja* 1985, p. 102.
- <sup>15</sup> Meinander, *Etelä-Pohjanmaan historia* I, p. 178.
- <sup>16</sup> Ville Luho, 'Alavuden esihistoriallisia vaiheita', *Alavuden historia* I, Jyväskylä 1963, p. 49.
- <sup>17</sup> Ville Luho, 'Kurikan esihistorialliset vaiheet', *Kurikan historia* I, Vaasa 1980, p. 47.
- <sup>18</sup> Joakim Donner, 'Bidrag till kännedom om Vörårunornas ålder: Exempel på ristningsteknik använd i runinskrifter och hållristningar', *Fennoscandia archaeologica* III (1986), pp. 73-80.
- <sup>19</sup> *Suomen historian kartasto - Atlas of Finnish History*, ed. by Eino Jutikkala, Porvoo 1959, Map no. 4.
- <sup>20</sup> Mauno Jokipii, 'Vanhan Ruoveden pitäjän historia eräkaudesta isoonvihaan', *Vanhan-Ruoveden pitäjän historia* I, Vammala 1959, pp. 139-140.
- <sup>21</sup> Jørn Sandnes, 'Bosetning og næringsliv i Nordvestskandinavia i yngre jernalder og tidlig kristen middelalder, en oversikt', *Nord-Skandinaviens historia i tvärvetenskaplig belysning*, ed. by Evert Baudou och Karl-Hampus Dahlstedt, Acta Universitatis Umensis. Umeå Studies in Humanities 24, Umeå 1980, pp. 67-68, 74-77.
- <sup>22</sup> Orrman, 'Geographical factors in the spread of permanent settlement in parts of Finland and Sweden', p. 14.
- <sup>23</sup> Kimmo Tolonen, Ari Siiräinen & Anna-Liisa Hirviluoto, 'Iron Age Cultivation in SW Finland', *Finskt Museum* 1976, p. 59.
- <sup>24</sup> E.g. Carl-Eric Thors, 'Ortnamsskicket i svenska Österbotten', *Svenska Österbottens historia* IV, Vasa 1983, pp. 582-587; Lars Huldén, 'Bynamnen i Österbotten', *Studier i Nordisk Filologi* 67, ed. by Lars Huldén, Helsingfors 1987, pp. 149-156.
- <sup>25</sup> Jørn Sandnes, op. cit. pp. 67-68, 74-77.