STRATIGRAPHIC STUDIES OF FARM MOUNDS IN NORTH NORWAY

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Introduction

Farm mounds are a special type of stratified deposits built up from debris connected with human occupation. Farm mounds are common in North Norway (Bertelsen 1979). The main hypothesis for the formation of the farm mounds has been put forth in articles by A. Brox (1965) and G. Stamsø Munch (1966, 1973). They suggest that the buildup started in connection with a change in the economy of the coastal North Norway in the 13th century due to increased trading with stock fish. Cultivation of cereals, which often was unreliable due to climatic factors, was abandoned, as cereals now could be bought. Therefore it was not necessary to fertilize the fields. Animal manure and latrine were instead deposited close to the barn. The cool and wet climate contributed to a slow breakdown of the organic matter and thus a buildup started.

In connection with the construction of economic maps, archaeological surveys came to cover large parts of North Norway. Many new farm mounds were registered. Archaeological excavations were also carried out in several farm mounds. A large number of radiocarbon age determinations have shown that the age of the basal layers of farm mounds range from c. A.D. 50 to c. A.D. 1600 (Bertelsen 1979, Jørgensen 1984). The origin of the farm mound described by Stamsø Munch (1966) was shown to go back to Viking time.

In view of these new investigations there were reasons to put forth doubts of the validity of Brox's views of the cause for the buildup of farm mounds (Bertelsen 1973, 1979; Holm—Olsen 1978, 1979, 1981). The basal layers of the farm mounds were evidently in several cases older than the origin of the stock fish trade; dung was not always the major part of the accumulation; the farm mounds consisted mostly of remains of buildings and general household debris.

The aim of this study is to test how soil analysis, with special reference to plant macrofossils, can contribute to the interpretation and correlation of layers in farm mounds. It is possible to identify plant remains like fruits and seeds from meadow plants in animal manure. Likewise, fruits and seeds of food plants like berries, fragments of cereal grains, fish bones, etc. are indicative of latrine deposits. These types of deposits are very commonly encountered in medieval town excavations (Griffin 1979; Griffin, unpubl.).

The present work started in 1981 in cooperation with Reidar Bertelsen, Univ. of Tromsø, in connection with the excavation of the farm mound at Soløy, Lavangen, in which I took part. In 1982 analyses of soil samples from the farm mound at Bleik,

Andøya, were carried out in cooperation with Roger Jørgensen, Tromsø Museum, and from the excavation of a farm mound on Måsøy, Finnmark, lead by Inger Marie Holm-Olsen, Tromsø Museum. The location of the sites are shown on figure 1.

The work with the farm mounds at Soløy and Måsøy is a joint project with Polska Akademia Nauk, Instytut Historii Kultury Materialnej (IHKM), Warzawa, on the initiative of Przemyslaw Urbanczyk, who took part in both excavations. The object of this cooperation has been to develop methods for archaeological analysis of multistratified sites (Bertelsen and Urbanczyk 1985).

A small number of soil samples from two other farm mounds (Bøgård, Andøya, and Vassås, Bindalen) have also been examined for comparative reasons. From all the mentioned excavations a great number of soil samples were collected. This paper deals with a small number of soil samples selected from different types of deposits.

A study of the localization of farms in the Lofoten-Vesterålen area has been done by Bertelsen (1983). The local geology, the topography and the climate at a site will probably influence the development of farm mounds. The soils that develop, for example, on weathered acidic bedrock and on shell-bearing sand will differ in composition. The local climate varies with the topography i.e. the exposure to wind and sun, the orographic effect on the amount of precipitation, etc. The drainage pattern will also vary from site to site.

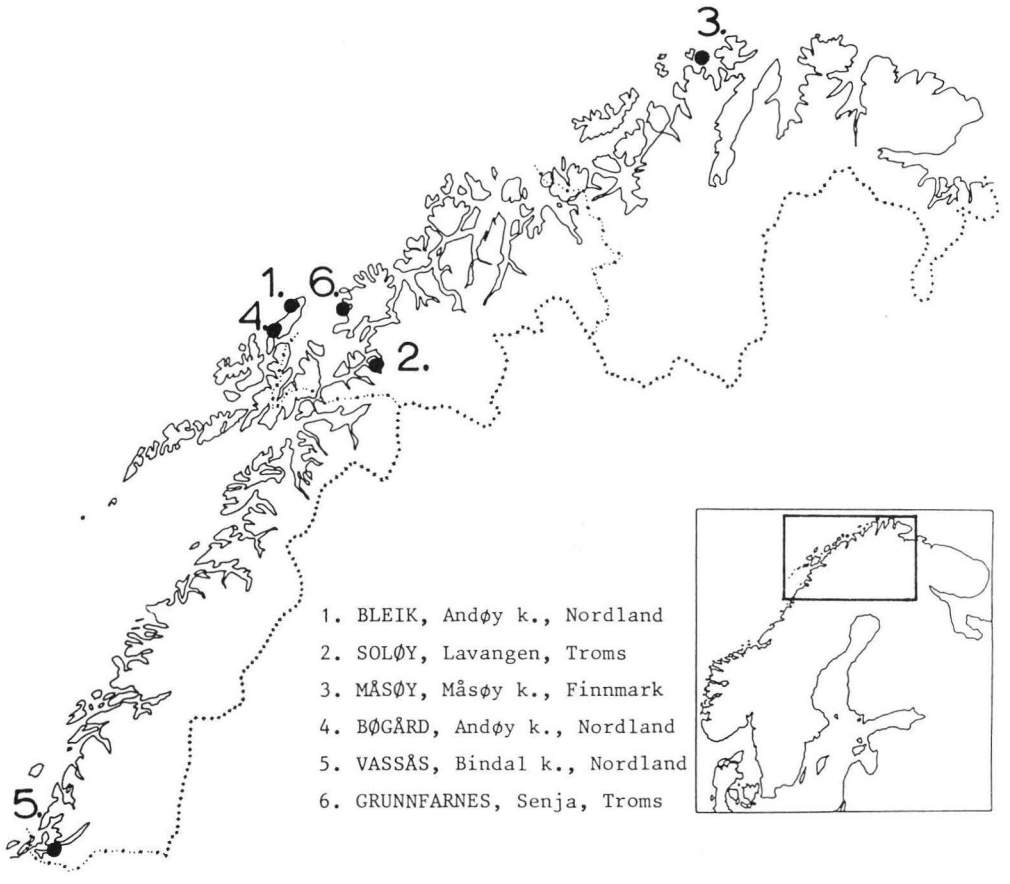


Fig. 1. Map of North Norway showing the sites mentioned.

Methods

Bleik:

Subsamples of 100 cc were analyzed for plant and animal remains. The presence of stones, gravel and sand were also recorded for each sample. A large sample from a posthole was analyzed especially for charred material, but only charcoal was found.

Soløy:

From the upper layers of the farm mound large soil samples (1000—2000 cc) were sieved in the field. Another eight soil samples were analyzed in the laboratory.

Måsøy:

Different types of soil samples were collected for several specific reasons. Samples for pH-measurements about 20 cc in volume, were collected in a grid system within distinctly recognized layers. All the samples from one layer were lumped together and sieved through a 500 μ sieve in the field. The fraction larger than 500 μ was saved. Larger soil samples were also collected. So far one sample from each recognized layer has been analyzed. The plant macrofossils identified are presented in a preliminary table (Table 3).

Results and discussion

Bleik, Andøya, Nordland (described in Jørgensen 1984)

Soil samples from two excavations of the farm mound at Bleik have been analyzed (Griffin 1982). A ^{14}C-date from a basal layer of the farm mound gave an age around A.D. 50, making it one of the oldest farm mounds known. The farm mound is situated

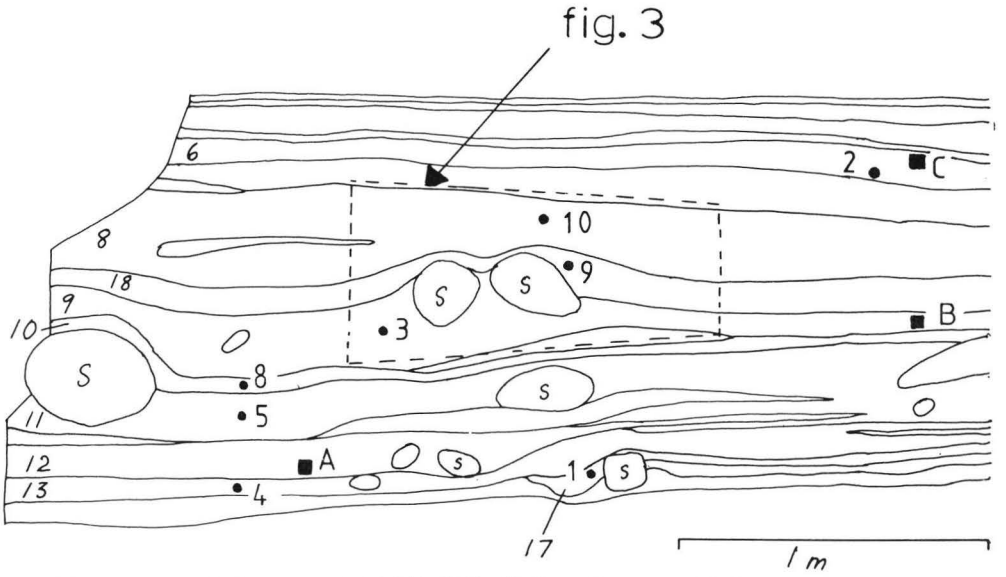


Fig. 2. Section through farm mound at Bleik (Sollund) (from Jørgensen 1984).
▪ ^{14}C-dates: A = A.D. 215 ± 105, B = A.D. 580 ± 70, C = A.D. 895 ± 65, 6 = number of layer, • = analyzed sample, s = stone

in an old culture landscape. There is evidence from pollen of cereal cultivation on Andøya as early as 1400 ± 90 B.C. (Vorren 1975).

The samples from Bleik yielded very few plant macrofossils (Fig. 2, Table 1.). The preservation of organic matter was not good. The bone material was very badly preserved and iron artefacts were damaged (Jørgensen 1984). The excavated part of the farm mound does not fit the hypothesis that farm mounds were built up by accumulation of dung. In figure 3, based on the analyses of samples 3, 9 and 10, some of the layers are interpreted as 1. deposited household debris (rubbish), and 2. developed soil horizons on top of rubbish. Layers of household debris may have been deposited in different areas at different times on the farm mound. After a period of time vegetation

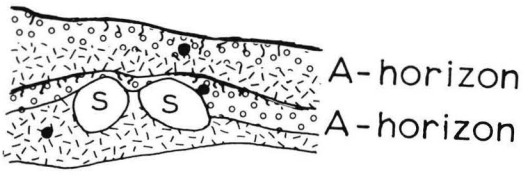


Fig. 3. Detail of figure 2. Interpretation of layers based on analyzed soil samples (Sollund, Bleik). (Symbols, see figure text in fig. 4)

Table 1. Farm mound, BLEIK, Andøya, Nordland: Plant macrofossils.

Site		Sollund									Vollheim		
Sample no.		1	4	5	8	3	9	11[1]	10	2	12[2]	6	7
Layer		17	13	11	10	9	18	—	8	6	—	15	7
Alchemilla sp.	cf	.	.	.	.	.	.	.	.	1	.	.	.
Campanula sp.	s	.	2	.	1	.	1	.	.	.	.	.	.
Eleocharis sp.	f	.	25	.	1	.	1	1	.	.	.	.	.
Menyanthes trifoliata	cs	.	.	.	.	.	.	1	.	.	.	.	.
Polygonum sp.	cf	.	.	.	.	.	.	.	.	.	.	½	.
Stellaria media	s	.	.	1	.	.	.	.	.	.	.	.	.
Unknown	s, f, cf	.	.	.	.	.	1	1	.	1	.	.	.
Selaginella selaginoides	ms	.	.	.	1	.	5	.	30	50	.	.	.
other spores		.	.	1	.	.	.	.	.	.	.	.	3
Coenococcum geophilum	fb	1	.	2	1	7	3	1	17	15	.	.	70
rootlets		.	+	.	.	+	.	⊕	+	+	+	.	⊕
moss		.	+	.	.	.	.	.	.	.	.	.	.
wood		.	.	.	.	.	.	.	.	.	+	.	.
charcoal		.	+	+	+	.	.	⊕	+	+	+	.	.
fish bones: vertebrae		.	.	+	+	.	.	.	.	.	.	+	.
needleshaped		.	.	.	.	+	.	.	.	.	.	.	.
scales		.	.	+	.	+	.	.	.	.	+	+	.
teeth		.	.	1	.	3	1	.	.	2	.	1	.
mammal bones		.	+	+	⊕	+	+	+	+	+	+	+	.
Mollusc shells		.	+	.	.	.	.	+	⊕	.	.	.	.
insect remains		+	.	.	.	.	.	.	.	.	.	.	.
fine detritus		+	⊕	+	⊕	+	⊕	+	⊕	.	.	+	+
sand. c.%		40	.	10	.	20	5	10	25	20	25	20	15
gravel		.	.	+	+	.	+	.	+	+	+	+	+
stones		+	.	.	+	.	+	.	.	+	+	.	+

s = seed, cs = charred seed, f = fruit, cf = charred fruit, ms = macrospore, fb = fruiting body, + = present, ⊕ = abundant

1. Sollund no. 11 — hearth, 2. Vollheim no. 12 — posthole

Table 2. Farm mound, SOLØY, Lavangen, Sør-Troms: Plant macrofossils

Building		2				3			1
Unit		16				35	34	31	36
Sample		A6	B12	F9	I10	H23	H22	D15	A10
number		10	11	12	10	5	3	3	2
Achillea millefolium	f	.	.	.	.	.	+	.	.
Alchemilla sp.	f	.	.	+	.	.	.	.	.
Carex sp.	f	.	+	.	.	.	.	.	.
Chenopodium album	s	.	.	.	.	.	.	.	+
Stellaria medium	cs	.	.	.	.	+	.	.	.
Taraxacum sp.	f	.	+	.	.	.	.	.	.
Selaginella selaginoides	ms	+	+	+	+	+	+	+	+
Coenococcum geophilum	fb	+	+	+	+	+	+	+	.
rootlets		+	+	+	+	.	.	.	.
wood		+	.	+	+	.	+	.	.
charcoal		+	+	+	+	+	+	+	+
minerogenic particles									
sand		+	+	+	+	+	+	+	+
gravel		+	+	+	+	+	+	+	+
stones		.	.	.	.	.	.	+	.

ms = macrospore, fb = fruiting body, f = fruit, s = seed, cs = charred seed
Interpretation and field description of units (Bertelsen and Urbanczyk, 1985): Unit 16 = floor; greyish brown gravel, Unit 31 = the younger floor; dark brown soil, Unit 35 + 34 = levelling layers; dark brown soil, Unit 36 = turf roof; brown soil.

covers the ground and roots grow down through the debris layers. The farm mound at Bleik seems to consist of well drained mineral-rich soil. The accumulation of organic material from the vegetation cover will not become very thick if the site is dry. The presence of Lesser club moss *(Selaginella selaginoides)* macrospores may indicate that the plant was growing on the surface. The fungus *Coenococcum geophilum* commonly occurs in soils. The plant remains recorded are the fruiting bodies, small black spheres, of the fungus.

Soløy, Lavangen, Troms (described in Bertelsen and Urbanczyk 1985)

The basal layers in the farm mound at Soløy have been dated to 1160 ± 70 A.D. From layers dated to around 1600 A.D. charred barley *(Hordeum vulgare)* was recovered. Deposits older than 1500 A.D. consisted mainly of clay, sand and gravel. A few soil samples turned out to be rotten wood, probably remains of old floors. Besides the wood fibers some weed seeds were found.

A large number of different units were recognized in the excavation. Some of these units were interpreted as yards, middens, floors, etc. Groups of units were interpreted as representing buildings. Eight samples from floors, levelling layers and a turf roof, representing three buildings, were examined (Table 2.). The four samples from unit 16, interpreted as a floor, and part of building 2, had a very similar composition. The bulk of the samples were made up of sand, gravel, charred and non-charred wood. Macrospores of the Lesser club moss were present in all samples while fruiting bodies of the fungus *Coenococcum geophilum* occurred in seven samples. Based on the presence of rootlets in the samples, unit 16 could be interpreted as a vegetation surface. The signifi-

Table 3. Farm mound, MÅSØY, Finnmark: Plant macrofossils (preliminary list).

	Age	Layer 40 = c. 1600 A.D.														Top layer 1 = A.D. 1944								
	Layer	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	23	22	21	19	18	17	11
	CEREALS																							
	Hordeum vulgare	f*	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Triticum aestivum	f*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Cerealia, indiff.	f*	+	.	.	+	.	+	.	.	.	+	+	+	+	+	+	.	.	.	.	.	.	+[1]	.
|	*WEEDS IN CEREAL FIELDS*																							
|	Agrostemma githago	s	+	+	+	+	.	+	+	+	+	+	.	+	+	+	+	+	+	.	.	+	.	.	.
|	Centaurea cyanus	f	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
|	Raphanus raphanistrum	f	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
|	*BERRIES (for food?)*																							
|	Empetrum hermaphroditum	s	+	+	+	+	+	+	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	+	+
|	Rubus chamaemorus	fs	+	+	+	+	.	+	+	+	.	+	+	+	+	+	+	+	+	+	+	+	.	+	+
|	Vaccinium myrtillus/spp.	s	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.
|	Cornus suecica	s	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Arctostaphylos uva-ursi	s	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+
|	*BEER FLAVOURING?*																							
|	Humulus lupulus	f	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	*RUDERAL WEEDS/SEA SHORE PLANTS*																							
|	Matricaria inodora	f	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.
|	Polygonum lapathifolium	f	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Taraxacum vulgare	f	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	*NITROPHILOUS WEEDS*																							
|	Chenopodium album	s	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
|	Montia fontana	s	.	+	.	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.
|	Stellaria media	s	.	+	+	+	+	.	+	+	+	.	+	+	+	+	+	+	+	+	.	+	+	+	+
|	Urtica urens	f	.	.	.	.	.	.	.	+	+	.	.	+	+	+	+	+	+	+	.	+	+	.	.
|	*MEADOW PLANTS*																							
|	Carex spp. digynous	f	.	+	+	.	.	+	+	.	.	.	+	+	+	+	+	+	+	+	+	+	+	+	+
|	Carex spp. trigonous	f	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
|	Alchemilia sp	f	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
|	Anthriscus sylvestris	f	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Cerastium sp.	s	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Lychnis flos-cuculi	s	.	+	+	+	.	.	.	+	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.
|	Melandrium rubrum	s	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	cf. Pimpinella saxifraga	f	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
|	POACEAE	f	+	+	.	+	+	.	+	+	+	.	+	+	+	+	+	.	+	+	.	.	.	.	.
|	Ranunculus sp.	f	.	+	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+
|	Rhinanthus minor	f	.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.
|	Rumex acetosa	f	.	+	+	+	.	+	.	+	+	.	.	+	+	.	+	.	+	.	.	+	.	.	+
|	Rumex acetosella	f	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Stellaria sp.	s	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
|	Viola sp.	s	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.
|	Viscaria alpina	s	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	*WET MEADOW/BOG PLANTS*																							
|	Carex diandra	f	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	Comarum palustre	f	.	.	+	+	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.
|	Filipendula ulmaria	f	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	*HEATH/BOG PLANTS*																							
|	Betula nana	f	.	+	+	.	.	.	+	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+
|	Juniperus communis	n	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
|	Selaginella selaginoides	ms	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
|	*ECOLOGICALLY INDIFFERENT*																							
|	APIACEAE	f	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
|	BRASSICACEAE	s	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
	FUNGI																							
	Coenococcum geophilum	fb	.	+	.	.	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	+	+	+	.

LATRINE COMPONENTS — MANURE COMPONENTS

f = fruit, s = seed, fs = fruitstone, n = needle, ms = macrospore, fb = fruiting body, * = fragment

1. one whole fruit

cance of the presence of the mentioned plant macrofossils is not yet fully understood. The same combination is found in soil samples from interglacial sites in Northern Sweden, dated to more than 40,000 years old (Griffin, unpubl.). Lesser club moss is a common ground cover and its microspores are commonly found in analyzed peat samples.

Måsøy, Finnmark (described in Urbanczyk, unpubl.)

This is the first excavated farm mound in Finnmark. The basal layers are dated to around 1600 A.D. based on finds of clay pipes. The top is dated to 1944 when the farm was burned at the end of the war.

A comparision between the field description and the laboratory analyses of the samples from two of the layers will be discussed. The plant macrofossils are listed in Table 3.

Layer 40, which is the first accumulation on top of the natural ground, in this case beach pebbles, is described by P. Urbanczyk as a sandy peat »3—10 cm thick with a fairly hard even surface, containing numerous flat sea pebbles». The laboratory analysis shows that the layer contained twigs, bark, leaves, roots, moss leaves, sand, bone fragments and fish teeth. The identifiable plant remains were divided into two groups. One was the latrine component which was represented by fragments of the outer wall of cereal grains, fragments of the resistant seed wall of corn cockle *(Agrostemma githago),* and seeds of crowberries *(Empetrum hermaphroditum),* cloudberries *(Rubus chamaemorus)* and blueberries *(Vaccinium myrtillus).* Corn cockle is a weed in the cereal fields. The seeds are about 3 mm in diameter and often ground together with the cereals. Today it is nearly extinct due to efficient seed cleaning methods.

The other component consisted of fruits and seeds from flowering plants and macrospores from Lesser club moss *(Selaginella selaginoides).* The identified plant macrofossils come from plants growing in a wet meadow environment or on the shore.

The presence of a latrine component immediately connects the layer with human activity. Cereals were probably not grown on Måsøy and the presence of the fragments indicates import of cereals either as grains or as ground flour. Fragments of the corn cockle seeds are characteristic for latrine deposits all over northern Europe (Knørzer 1967). The presence of a whole fruit of *Polygonum lapathifolium* is of interest as the plant does not occur on Måsøy today according to Lid (1974) or Hultén (1971). If the plant was growing on Måsøy in the 17th century it may very well have arrived there together with cereal grains. As the fruit is whole it can not have been ground with the cereals.

Layer 34 consists of shell bearing sand. The surface of the layer is very hard and it is suggested that it has been subjected to trampling (Urbanczyk, unpubl.). The analysis of the sample revealed latrine components such as fragments of cereal grains. Fragments of wheat *(Triticum)* were also found. One fruit of hop *(Humulus lupulus)* and one of dandelion *(Taraxacum vulgare)* were also present. Hops were probably imported for beer brewing. In the early 20th century hops were commonly cultivated as far north as Namdalen, from where also export took place. The outer coast lacked hop cultivation (Olafsen 1908—10).

On the basis of the field description and the laboratory analysis the layer seems to have been formed during a period of time when little deposition was made. The sand may represent an attempt to make a drier surface. Different activities could have been going on, like grinding of flour (fragments of grains), beer brewing (fruit of hop), etc. Weeds like the dandelion and chickweed *(Stellaria media)* would spread on the surface.

The presence of fruiting bodies of the fungus *Coenococcum geophilum* also supports a development of a soil surface.

Bøgård, Andøya, Nordland

In the periphery of the farm mound at Bøgård, Andøya, samples from a vertical section were collected. Already in the field, it was noticed that some layers contained well preserved plant material, such as twigs, leaves, fruits and seeds. One sample from a massive layer of twigs (layer 7) and one from an underlying black organic layer (layer 17) were checked. The preliminary results are shown in Table 4. The twig layer contained identifiable pellets of dung, most likely from sheep. The analyzed sample contained few latrine components (i.e. fragments of cereals, seeds of berries) and few weed

Table 4. Farm mound, BØGÅRD, Andøya, Nordland: Plant macrofossils.

	Section Profile Layer	F-G I 35 7	D-E by E 17	Suggested interpretation
BERRIES				
Cornus suecica	s	+	.	Latrine components?
Rubus chamaemorus	fs	+	.	or accidental
Rubus idaeus	fs	+	.	
WEEDS				
Chenopodium album	s	+	.	Weeds growing in the
Galeopsis sp.	f	+	+	area or fodder for
Polygonum aviculare	f	+	.	animals (humans)?
Ranunculus repens	f	+	.	
Spergula arvensis	s	+	.	
Stellaria media	s	+	.	
OTHER				
Betula nana	t, l	+	.	Twigs for fodder and/or
Betula pubescens	t, l	+	.	bedding material
Alchemilla sp.	f	.	+	
BRASSICACEAE	s	+	.	
Carex sp.	f	+	.	
Cerastium sp	s	+	.	
Rumex sp.	f	+	+	Meadow plants
Stellaria sp.	s	+	+	
Urtica dioica	f	+	.	
Viola sp.	s	.	+	
sheep dung pellets		+	.	Manure
fish bones: vertebrae		+	.	Fish for food, animal
needleshaped		+	.	and/or man?
tooth		+	.	
fragments of leather with cut edge		+	.	Household debris
insect remains		.	+	
charcoal		+	.	Ash
shell sand		+	+	windblown or deposited by man
stones		+	.	

f = fruit, s = seed, fs = fruitstone, t = twig, l = leaf
Description of layer: 7 = twig layer, 17 = black organic material

seeds. It could therefore represent twigs used for animal fodder. This has been practised up to today (Vorren 1979). The animals could have been fed the twigs outside the barn, also in the winter time (cf. Vorren 1979, fig. 6). The accumulation would then contain few latrine components and maybe also few weed seeds. Twigs were also used for bedding material for the animals.

The sandy black organic layer contained very few plant macrofossils. The layer may have been exposed for a long time with a high oxidation rate of organic material. The few fossils found came from plants belonging to a meadow community.

A sample (K4) from the layer 5 stratigraphically above layer 7, was ^{14}C-dated to A.D. 1465 ± 45, and a sample (K8) from layer 27 below layer 17, was ^{14}C-dated to A.D. 1155 ± 85 (I. Storli, written comm.).

Vassås, Bindal, Nordland

The farm mound is located close to the Vassås church on cultivated ground. Samples were collected from two excavations, one in the center of the farm mound and one in the periphery. Charcoal from a cooking pit in the periphery of the mound gave a radiocarbon age of A.D. 530 ± 70, while charcoal from a basal charcoal layer in the center of the farm mound turned out to be A.D. 1430 ± 170 (B. Wik, written comm.).

A number of samples have been analyzed but no plant remains were recovered. The layers consisted mostly of sand and gravel with various amounts of finely decomposed organic matter and charcoal.

A theoretical reconstruction of the development of a farm mound stratigraphy based on the analysis of soil samples from several farm mounds is shown in figure 4.

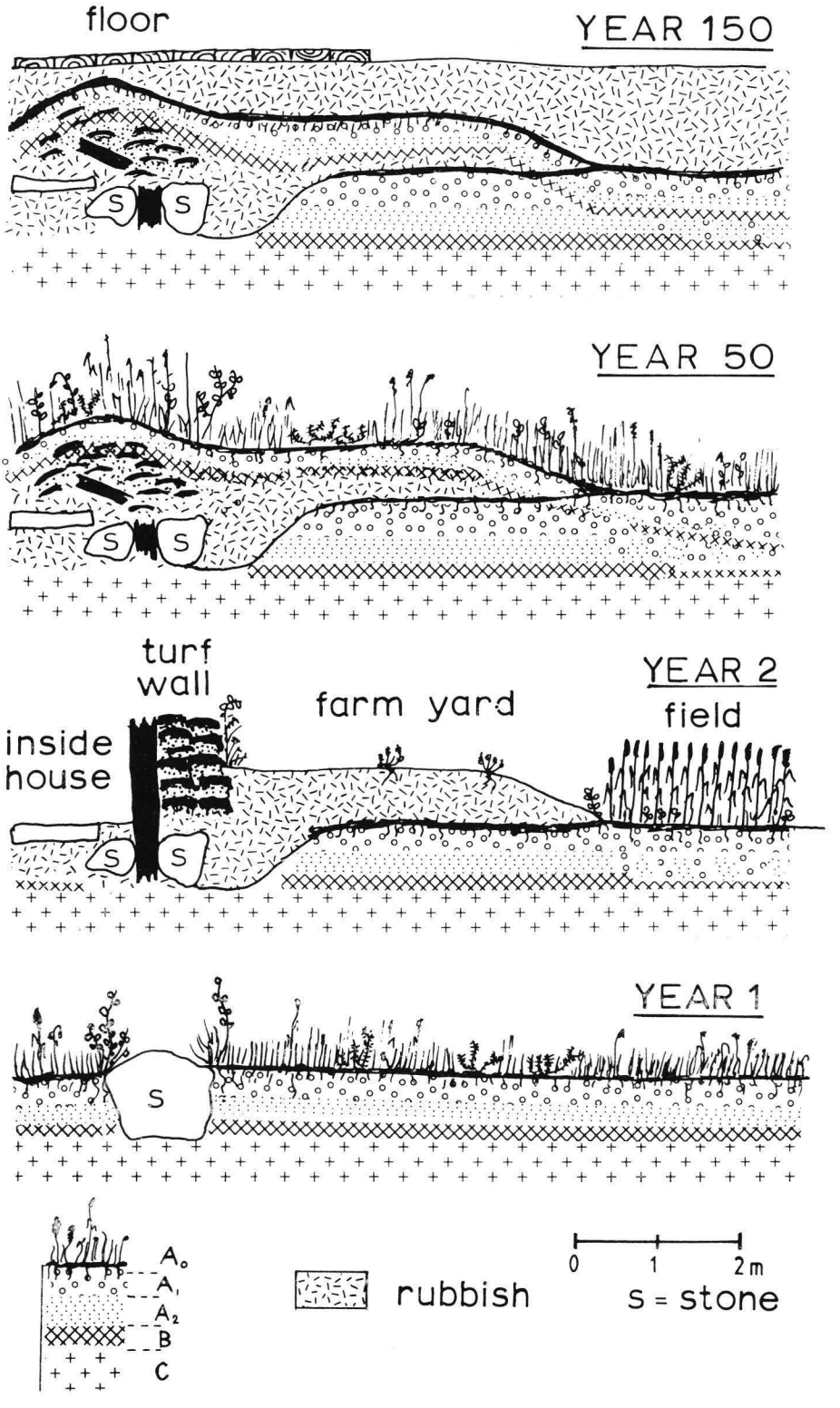
Year 1. The site is represented by an undisturbed ground with a vegetation cover of grasses, sedges, and other herbs. The climate is humid and cool. A podzol soil profile has developed over a long period of time. The characteristic zonation is shown; A_o = unchanged not decomposed litter, A_1 = slightly decomposed organic material mixed with mineral matter, A_2 = a gray structureless horizon leached for some minerals (Fe, Al), B = enrichment layer where the leached minerals precipitate, C = the unchanged parent material i.e. shell-bearing sand, till, clay, etc. The B-horizon may be dark brown in colour due to down-transported organic material, but it often has a reddish tint due to iron-oxides.

Year 2. A house has been constructed at the site and the vegetation cover has been disturbed. To the left, stones have been aggregated to make the foundation of a wooden post. In the center and to the right digging for wall material and ploughing has taken place. Rubbish has been deposited outside the house. The old soil profile is only preserved where no digging has taken place. In a section, the old surface will show up as a layer rich in organic matter containing rootlets, fruits, seeds and pollen from the local plants.

The disturbance of the vegetation cover would enable weedy plants to flourish. Nettles *(Urtica urens)* and goosefoot *(Chenopodium album)* and others which benefit from nitrogen-rich environment would suddenly be well represented in the macrofossil material.

Year 50. The site is abandoned and a vegetation cover has developed on top of the rubbish and the remains of the turf wall of the house. A beginning differentiation of a soil profile can be distinguished. The soil developing process would go on independent of what composition the underlying substratum had.

The developing soil horizons may be interpreted as distinct layers and in that way


floor
YEAR 150
S
S
YEAR 50
S
S
turf
wall
farm yard
YEAR 2
field
inside
house
S
S
YEAR 1
S
A₀
A₁
A₂
B
C
0
1
2m
rubbish
s = stone

be confused with depositional layers. A description of a humus-rich brown layer (Bøgård, farm mound) turned out to be a well developed B-horizon with iron oxide giving the brownish colour. B-horizons with well developed iron oxide (ironpan) are commonly developed on acid heath-land especially when the parent material is sandy (Stålfelt 1960).

Stamsø Munch (1966) describes a layer in the farm mound at Grunnfarnes which fits the description of a B-horizon with a well developed ironpan. The material was identified as ironpan by the Tromsø Museum Geology Department. As long as people lived on the farm mound and trampled, dug and ploughed there would be no time for the development of a soil profile. Therefore, the recognition of a vegetation surface with a developed soil profile in a stratigraphic section of a farm mound would suggest that this particular area had been abandoned, or undisturbed for a period of time. It could for example have been used for harvesting hay or for grazing. The possibility of finding buried vegetation surfaces in the periphery of a farm mound is very small. The layers are usually very thin due to very little accumulation, and reworking, in connection with cultivation, usually has destroyed any traces of stratigraphy (R. Bertelsen, pers. comm.).

Year 150. The illustration shows the construction of a new house on the same spot. The levelling layer may consist of old rubbish evened out to make place for a new house. It could also consist of sand being brought into the site. Sand layers are commonly encountered in medieval town sites, where they seem to be used for levelling the ground. In the farm mound at Soløy most of the depositional layers consist of sand, gravel and stones.

A distinct sand layer was detected in the peat on Værøy in connection with a wood layer (Griffin 1977). Human influence on the vegetation causing destruction of the vegetation cover may have been the reason for that sand layer. Beach sand could also have blown onto the site in a storm. The farm mound at Bleik contains layers of shell-bearing sand. The sand may have been blown in over the site. Eolian sand rich in lime is present at Bleik today (Vorren 1975). A sand layer could be deposited in a very short time i.e. during a single storm event. It could also represent a phase of abandonment during which sand was deposited within the existing vegetation cover, which would act as a trap.

The floor in the new house is indicated by boards, although wooden floors were not common in North Norway in medieval time. At the farm mound at Soløy, however, the soil between two wooden floors, probably from the 17th century, was analyzed. It contained large amounts of fruits and seeds of goosefoot and nettle. The soil contained a lot of charcoal, but the seeds were not charred. Two possible interpretations are 1. The lower floor was inside a house which burned. Before a new house was built a certain time passed. A few years, or depending on the time of the fire maybe only one growing season, would be sufficient to have weeds enter the site and produce the fruits and seeds found. The plants were probably growing in the vicinity. The large production of seeds by those plants, should ensure that a few of them reached the

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Fig. 4. Theoretical reconstruction of the development of stratigraphy in a farm mound.
Year 1: Undisturbed vegetation surface with a well developed soil profile.
Year 2: A house is built, grass turf removed for use as wall material, rubbish is deposited in the farm yard, and cereals are cultivated in the periphery of the farm mound.
Year 50: The site is abandoned, the collapsed house walls overgrown, a faint soil profile is developing.
Year 150: The site is levelled to make place for a new house; the levelling material may be sand or redeposited rubbish.
(A_o = duff; A_1 = humus; A_2 = leached layers; B = enrichment layer; C = parent material; s = stone)

house by i.e. wind transport or by animals. The seeds would sprout, as soon as the weather permitted, within the burned house. 2. The house was a barn and the weeds were collected on purpose and stored here. Both plants were used for food and fodder. However, the seeds were not charred which makes this explanation less likely.

Earlier work

The first detailed description of the stratigraphy in a farm mound was done by G. Stamsø Munch (1966) and the site was at Grunnfarnes, Senja. Stamsø Munch described a compact, but more or less heterogenous, dung layer stretching in time from 1100 to 1600 A.D. In the description of the dung layer several different components that are not related to dung, if with this is meant only animal manure, can be distinguished. The layer was composed mostly of organic matter, but with twigs, roots, moss, sand, shells, wooden boards, etc. within it. The moss layer described in the 11th »omgang» (excavation layer) and the 12th »omgang» may represent a vegetation surface. The description of a rust-coloured dark layer, identified as ironpan, probably is the B — horizon in a well developed podzol profile.

It is not possible to prove these suggestions from only reading the description, but the effect of soil development (podzolization) on culture deposits, such as the farm mounds, should be kept in mind. It has been observed that a first stage of soil development could be recognized after only 40 years. A several cm thick depletion layer (A_1) and a 10—15 cm rust-coloured enrichment layer (B) could be developed within 100 years (Tamm 1920). For the development of a faint stratification due to leaching and enrichment processes as short a time as 14 years has been recorded (P. Nørnberg, pers. comm.). Stamsø-Munch (1966) did not believe it could be an ironpan i.e. part of a soil profile, because there were artefacts beneath the rust-coloured layer. However, a time span of 50—100 years could have passed before this specific area on the farm mound was covered up with new waste deposits. Thus there may have been ample time for a soil profile to develop.

Very well developed soil profiles were recognized in the turf walls of the houses at the Norse settlement at L'Anse aux Meadows in New Foundland (Henningsmoen 1977). Layers of dark turf alternated with lighter sandy layers which in some cases were rust-coloured. The turf was in general highly humified with or without recognizable plant remains, such as roots, rootlets, pieces of epidermis, etc. The sand probably came from the underlying sandy mineral soil. Layers of sand interspersed with roots were frequently seen as part of the wall material.

Well defined repetitive layers like the ones described above, have not yet been recorded in the investigated farm mounds. However, detailed analysis of stratigraphic sequences, interpreted from other criteria as walls, may reveal similar patterns.

The present study does not agree with the hypothesis of farm mound development presented in the introduction. Of the analyzed farm mounds the one on Måsøy would fit the description of being built up mostly of manure/latrine. But the basal layers are dated to around 1600 A.D. and the change in the economy should have occurred in the 13th century.

The farm mound on Bøgård contains a few prominent twig layers, of which at least one is related to sheep, possibly as fodder. From the other three farm mounds no samples of animal manure (dung) were encountered. In the excavated areas mineral rich layers with very little organic matter were found. The organic matter could have been oxidized or never been present. The location of the excavation on the farm mound may be of importance. However, a section through a farm mound on Helgøy did not

contain organic layers characterized as manure (I.M. Holm Olsen, pers. comm.). And in several small-scale excavations in farm mounds around Helgøy no organic layers were recorded (Holm Olsen 1979).

Analysis of soil samples from farm mounds may aid in the interpretation of their development. Stratification independent of man, such as vegetation surfaces, soil horizons and sand layers may be distinguished from depositional layers of rubbish, latrine and manure. The results presented here are only a first attempt. It is important that more samples will be analyzed and the results compiled, then the analysis of soil samples will become a useful tool in understanding the complex stratigraphy of farm mounds.

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