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Site Status and the Palaeoecological Record: A Discussion of the Results from Bessastaðir, Iceland

Thomas Amorosi, Paul C. Buckland, Guðmundur Ólafsson, Jon P. Sadler, and Peter Skidmore

Introduction

Status in a community is frequently displayed in terms of the possession of prestige items. In societies where the architectural tradition might otherwise indicate egalitarianism, the contents of the midden might imply social division not apparent elsewhere. Such simple statements lie at the back of much archaeological interpretation, yet the pathways by which artefactual material may enter the archaeological record are often complex and may bear little relationship to their primary attributes in terms of status. Items are as likely to be cascaded down through a hierarchy as curated up. Sometimes this is a reflection of fluctuating supply patterns, an aspect perhaps most evident in pottery assemblages, but perhaps equally likely to be apparent in beads and fish hooks. In situations where the artefactual record is at the best sparse, as in much of North Atlantic island archaeology, the few finds may provide little evidence of site status and what there is may be seriously misleading both because of preservational bias and taphonomic problems. There is therefore a need to look beyond the purely artefactual record and consider what contributions the palaeoecological data might be able to make to the examination of a site's regional context as well as the immediate on-site interpretation. In Iceland, where the documentary record for some sites is particularly good, the opportunity exists for examining any model of status indication from the archaeofauna with a view to the application of similar criteria in less well documented and prehistoric contexts.

From the 8th century onwards, emigrants from the Scandinavian cultural *milieu* in north west Europe exported a largely subsistence-based farming system, based primarily upon secondary products from cattle and sheep, supplemented by limited amounts of cereal production and a variety of additional protein sources. This expansion left a series of local adaptations to available resources across the North Atlantic from Shetland (Bigelow 1984; 1989) to Faroe (Arge 1991), Iceland (Amorosi 1989; 1991), Greenland (McGovern 1985; 1991) and, abortively, also North America (Wallace 1991). At the core lay a system of land division and resource partition under the control of chiefdoms (Byock 1988), whose ultimate power, from the 13th century onwards, lay in the hands of an often dis-interested Norwegian and later Danish Crown. In Iceland, this control was increasingly exercised from the Governor's residence at Bessastaðir on the Álftanes peninsula, south of Reykjavík.

Bessastaðir

In terms of its later medieval and post-medieval history, Bessastaðir holds a prime position in Iceland and the house remains the official residence of the Icelandic president. The site lies on a narrow isthmus on the Áltanes peninsula some 16km southwest of Reykjavík (Fig. 1). To the north and

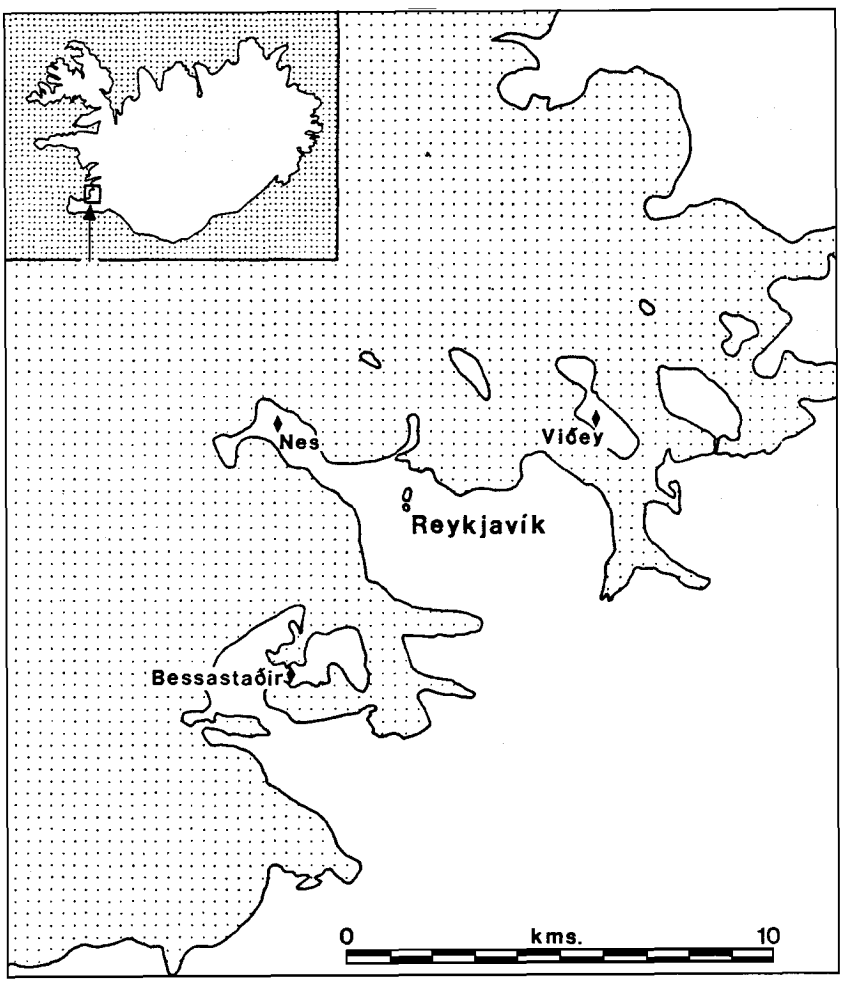

Figure 1. Location map of Bessastaðir. (Source: G. Ólafsson, National Museum of Iceland.)

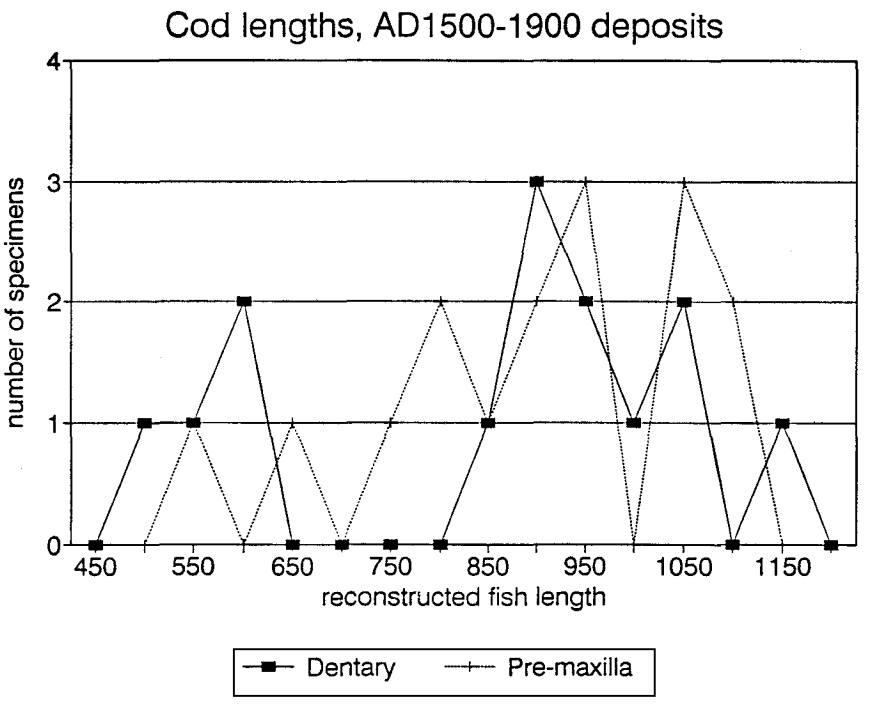

Figure 2. Distribution of reconstructed cod lengths based upon the length of dentary and premaxilla recovered from Early Modern (A.D. 1600 –1849) deposits.

south, shallow bays bring marine resources into close proximity to the site and eastwards the peninsula opens out into an extensive area of potential hayfield and grazing. First mentioned in the 13th century, the farm became part of the holdings of Snorri Sturluson and later was the seat of the Danish Governor. The existing buildings preserve a core of the 18th century stone house (Laxness 1985).

From 1986 onwards, the extensive rebuilding of the official residence has necessitated a series of rescue excavations both within the existing buildings and in the adjoining areas (G. Ólafsson 1991). The constraints which the construction work placed upon the archaeology are such that the sampling strategy can hardly be considered ideal and the diachroneity between the deposits sampled for invertebrate remains and those with usable vertebrate assemblages are largely a reflection of availability of areas for excavation: there was extensive access to the 17th and 18th century midden between the house and church (Fig. 3), where the sediments were too aerated to preserve invertebrate

Taxa		NISP	% of whole sample
Bos taurus	cattle	26	27.4
Equus caballus	horse	25	26.3
Sus scrofa	pig	1	1.0
Ovis/Capra sp.	caprine	39	41.0
Alopex lagopus	fox	1	1.0
	Bird sp.	1	1.0
Gadus morhua	cod	2	2.1

Table 1: The Late Medieval (A.D. 1450 – 1500) vertebrate and molluscan fauna at Bessastaðir.

remains, and only limited 'keyhole' excavation of the earlier deposits, north and west of the house, where the medieval midden and some floor surfaces provided excellent conditions for insect and plant remains but only small samples of animal bone.

Vertebrate remains

The post-medieval animal bone assemblages provide a large and diverse group, with a total of 14,992 pieces. The data from the late medieval and early modern levels are presented in Tables 1 and 2. The later elements reflect what McGovern (pers. comm. and in prep.) has termed the Georgianisation of the North Atlantic, with plate-sized cuts of meat being reflected in the nature of butchery. The image is reinforced by a number of contemporary accounts of dinner at Viðey and Bessastaðir; Holland's (in Wawn 1984) description of dinner at Viðey provides an interesting contrast with the more traditional fare described by Wright (1789, 133 in West (ed.) 1970), from which only the cod head might appear in the palaeoecological record. The presence of pig is also noteworthy in this context. Although pig bones appear on a number of medieval sites (McGovern unpubl.), Aðalsteinsson (1982) has noted that this animal ceased to be kept in Iceland during the 17th century and it is tempting to see the Bessastaðir material as evidence for the importation of salt pork. It is unfortunate that similar recent assemblages have usually been neglected, but, in the extensive late bone groups from both Stóraborg in Eyjafjallasveit on the south coast and Svalbarð in Þistilfjörður on the north coast, pig is absent. The direct linkage between Bessastaðir and the world trade network is further emphasised by the presence of the brown rat (*Rattus norvegicus* (Berkenhout)) in the midden. Despite its Linnean name, the brown rat appears to have originated in northern China and to have reached Europe during the early 18th century (Óskarsson 1982). Corbet (1974) suggests that it first arrived in Britain about 1720, although it may have arrived in Denmark somewhat earlier (Óskarsson 1982). This rat also appears in New World ports such as New York by the early 1680s (Greenfield 1985; 1989). New York's brown rat populations become quickly established by the late 1680–90s (Amorosi 1984: 1991b) and started to extend into the countryside. It is likely that brown rat introductions were the result of accidental infestations of European trade commodities. In contrast with the ship or black rat (*Rattus rattus* (L.)), the brown rat is more able to exploit natural habitats away from human occupation.

The rat remains from Iceland are considerably earlier than the earliest documented occurrence in the general Reykjavík area in 1865 (Óskarsson 1982). It is also interesting to note that these bones

Taxa		NISP	% of whole sample
Bos taurus	cattle	285	2.6
Equus caballus	horse	15	0.1
Canis familiaris	dog	7	0.0
Sus scrofa	pig	7	0.0
Ovis aries	sheep	146	1.3
Ovis/Capra sp.	caprine	1324	11.9
Phoca vitulina	common seal	1	0.0
Phocid sp.	seal indet.	2	0.0
Cetacaea sp.	whale indet.	3	0.0
Alopex lagopus	fox	1	0.0
Ursus maritimus	polar bear	2	0.0
Odobenus rosmarus	walrus	1	0.0
Rattus sp.	rat indet.	20	0.2
Rattus norvegicus	brown rat	6	0.0
	Bird sp.	346	3.1
Gadus morhua	cod	3860	34.8
Salmo sp.	salmon family	1	0.0
	Fish sp.	4747	42.8
Mollusca sp.	shellfish	322	2.9

Table 2: The Early Modern (A.D. 1600 – 1849) vertebrate and molluscan fauna at Bessastaðir

are derived from the quasi-Danish residences at Nesstofa and Bessastafir. The Nesstofa rats date to the mid-1700s. The Bessastafir rats may be a bit earlier, with tentative dates of 1600–1650 based upon the associated imported pottery, although there may be a curation element in this, implying a slightly later date. The larger ships of the later and post-medieval period required unloading by small boats, where transport for the rat is less likely, or a a quay. It is tempting to relate the arrival of the brown rat to the provision of wharfage in either Reykjavík or Hafnarfjörfur, since both Bessastafir and Nesstofa have shallow water approaches, otherwise ideal for beaching boats.

As well as being the Governor's residence, Bessastaðir was also a fully functioning farm and much of the bone assemblage is as likely to reflect the exploitation of its own immediate resource as the utilisation of food materials gained by way of taxation of its hinterland. In the absence of wheeled vehicles and the limited capacity of pack horses, stock animals are more likely to have been moved on the hoof than as butchered units and would therefore be indistinguishable from the farm's own produce. Several elements, however, do imply the broader context. Neither polar bear nor walrus are

likely to have occurred in southern Iceland during the 18th century and both reflect important trade items which would have accrued to the Danish trade monopoly. Recent polar bear sightings are restricted to the north west peninsula, some 250km from the site and the walrus is similarly an infrequent visitor to the north. Investment in their hunting is unlikely to have been an option for farmers with limited labour resources and their presence reinforces the site's elite status. One other wild mammal is present in the post-medieval bone groups, the arctic fox. Fox have generally been regarded as a pest by the Icelandic farming community, taking seabird and eider duck chicks and eggs, as well as being blamed for the death of lambs (H. Ólafsson 1989). Bounties were paid on the animals, presenting a distinct taphonomic unit in any assemblage, encompassing the entire skull, mandible, one or two cervical vertebrae or sets of caudal vertebrae. As such units were taken to the local assembly and destroyed after payment of any bounty (Hersteinsson pers. comm.). The Bessastaðir piece is an unusual find. It may, however, indicate that the fur was used, perhaps as a trading object, and that the killed foxes were skinned at home. The presence in the contemporary fish bone assemblages of Atlantic salmon seems also to support the view of high status. Although it could have been caught locally, it has only been noted in the samples from the wealthier church farms, including Viðey, near Reykjavík, and Svalbarð in the north east.

The smaller bone groups from the medieval deposits provide a number of less certain indicators of difference. A pit, apparently sealed by tephra from the *c.* 1485 eruption of Katla, contained many sawn and burin-scored fragments of horse tibia and metapodia, debris from a bone workshop. The finds may indicate the manufacture of combs, where pieces of a high tensile strength were required (*cf.* MacGregor 1985). Whether such activities were restricted to sites where the acquisition of a sustainable surplus allowed the long term patronage of specialist activities or were the work of itinerant craftsmen is uncertain, but the only other Icelandic site with similar evidence is the church farm at Svalbarð in Þistilfjörður (Amorosi this vol.). Similarly close to the house was found a deposit which was particularly rich in fish bones. These remains consist entirely of remains of the Atlantic cod (*Gadus morhua*). The size of these fish can be estimated through a regression analysis, first outlined by Casteel (1976, 93 and 123) and later detailed by Bigelow (1984). Based upon this type of analysis, the size of codfish at Bessastaðir ranges between two modes, 450 to 600mm and 900mm (see Fig. 2). Although this research should be viewed cautiously, this bimodal curve is of interest. These two size classes represent two different age and seasonal classes within the Atlantic cod population. The smaller size individuals could indicate a July to September seasonal date where shallow water fishing was carried out (Kristjánsson 1982– see English translation on 479–480; Bigelow 1984, 130–133). Such seasonal fishing within near shore waters would have been primarily for household consumption and done in order to avoid conflict with the harvesting of summer grasses used for winter fodder. Fall (September to December) and winter (January to May) months brought the run of larger sized fish most often used for the stockfish trade. As labour requirements eased around the farmstead during the fall and winter, large rowing boats could fish off-shore shoals for the larger 900–1000mm cod. It is also interesting to note that this size class is in excess of the modern size of Icelandic cod (Amorosi 1989, 211).

Invertebrate remains

Whilst the bulk of the animal bone came from post-medieval deposits to the east of the house, towards the church, several layers of cultural deposits were recorded to the north of Bessastaðastofa the main 'old' house (Fig. 3). The samples for insect analysis were excavated from this area and can be placed into three groups on the basis of archaeological and stratigraphic data. First, samples from Profile 2 which were rich in occupational debris (Sample Nos. 10, 11, 12 and 14; see Fig. 4).

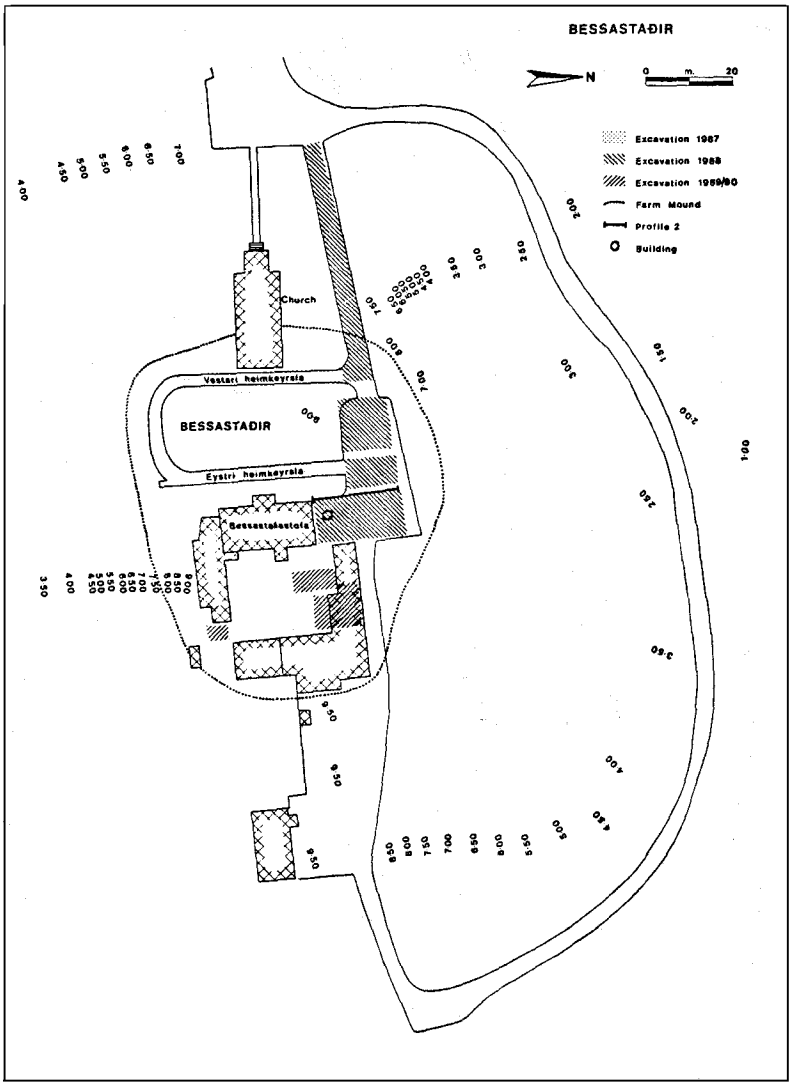

Figure 3. Plan of the excavated areas at Bessastaðir. (G. Ólafsson, National Museum of Iceland.)

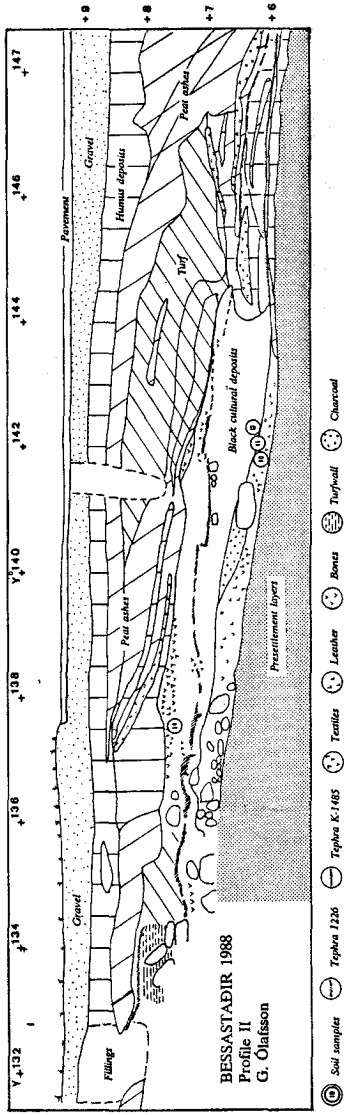

Figure 4. Profile II, Bessastaðir 1988. Exact location of Samples 10 – 12 and 14 are shown. (G. Ólafsson, National Museum of Iceland.)

Secondly, sediments within a structure and thought to represent floor layers (Sample Nos. 15 and 19) and thirdly, a small profile overlying the floor layers (Sample Nos. 17 and 18). The sediments from Profile II have been dated using tephrochronology. Sample No. 10, comes from below the 'Medieval layer', an ashfall originating from a submarine eruption off the Reykjanes peninsula and dated on historical evidence to A. D. 1226 (Jóhannesson and Einarsson 1988). Samples 11 and 12 lie under the tephra from Katla A. D. 1485 (Þórarinsson 1975) and probably date to the 13th and 14th centuries. Sample 14, overlies this ash and is probably of 16th century or later date (Fig. 4).

The samples from Bessastaðir have produced faunas which, in terms of their size and diversity, are unprecedented in the examination of archaeological deposits in Iceland (Table 3). The majority of the species are synanthropic and it is no surprise that many make their first appearance in Iceland immediately after *Landnám* (Buckland 1988; Buckland *et al.* 1991). The human louse, *Pediculus humanus* occurs in Samples 11, 14 and 18. The preservation of the specimens is such that it is not possible to assign the lice to the subspecies, *Pediculus humanus humanus* (L.), the body louse, or *P. h. capitis* (Deg.), the head louse. Where conditions are conducive to their preservation, lice are common in Norse and later deposits around the North Atlantic, occurring at Stóraborg and Reykholt in Iceland (Sadler *et al.*, this vol.), and in many of the sites investigated in the former Western Settlement of Greenland (Sadler 1990). Indeed, several references (*cf.* Joseph Banks in Rauschenberg 1973; Sveinbjarnardóttir and Buckland 1983) indicate that the bite of a louse was familiar to the Norse and later settlers in Iceland. The species feeds on human blood and heavy infestations can cause severe skin irritation, insomnia and anaemia (Marshall 1981). Whilst there is a tendency to associate lice with poverty and lack of hygiene, a point evident in one anonymous reviewer's comment on a short note on a body louse from Sandnes in Norse Greenland (Sveinbjarnardóttir and Buckland 1983) – 'This louse could have come from an ESKIMO! (sic)' – as Sveinbjarnardóttir and Buckland have discussed, they are no respecters of station and are likely to have been as at home on the Danish governor and his family as on anyone else; it took, however, an English cleric to make a virtue of inevitably. A measure of the saintliness of Archbishop Thomas à Becket was the level of infestation of his hair shirt with lice (Sveinbjarnardóttir and Buckland 1983). The decline in frequency of lice, particularly the body louse, is a relatively recent event and lice were common in Iceland and elsewhere in the world until the 20th century (Busvine 1976; Overgaard 1942); head lice, less of a problem than body lice, which are the vectors in the spread of typhus, remain frequent at all levels of society, if less frequently admitted.

The sheep louse, *Damalinia ovis* (L.) and the sheep ked, *Melophagus ovinus* (L.) are present in Samples 10, 11, 12, and 14. Both species are highly specialised insects, feeding and spending their entire life cycle on their hosts (Hutson 1984; Marshall 1981). In Iceland, the earliest documentary reference appears in the 17th century (Ólafsson and Pálsson 1943, 143) and Thoroddsen (1919) discusses the incidence of *D. ovis*, *hafíslús* and *M. ovinus*, *færilús*, on sheep in the early part of the 20th century. Their occurrence in samples dating from the 11th and 12th centuries are the earliest records of the species in Iceland, although both species also have been recorded in 11th century midden deposits in Norse Greenland (Sadler 1990). These ectoparasites are present in low abundance and it could be argued that their occurrence reflects either the heterogeneous nature of midden accumulation or the presence of humans and domestic stock under one roof. Wool preparation, however, would have been a feature of any active farm with sheep, and the ectoparasites are best seen as a trace after such activities. High concentrations of sheep lice and keds from one sample at Stóraborg have been interpreted as the result of the preliminary processing of fleeces, perhaps using urine as a cleansing agent (Buckland and Perry 1989); the fewer occurrences in the

Taxa	Sample Numbers							
	10	11	12	14	15	17	18	19
Anoplura								
Pediculidae								
Pediculus humanus (L.)/ *capitis* (Deg.)		2		14			1	
Mallophaga								
Trichodectidae								
Damalinia ovis L.		1		4				
Hemiptera gen. indet.		1						
Homoptera gen. indet.		1						
Trichoptera gen. indet.	3	3	4	2				
Coleoptera								
Carabidae								
Nebria gyllenhali (Sch.)			1		1			1
Notiphilus biguttatus (F.)			1					
Bembidion bipunctatum (L.)	2	1			1	1	1	
Bembidion grapei (Gyll.)						1		
Trechus obtusus (Erich.)			1					
Patrobus septentrionis (Dej.)	1	2			1			
Trichocellus cognatus (Gyll.)					1		1	
Pterostichus diligens (Sturm)	2		1		1			
Pterostichus nigrita (Payk.)				1				
Pterostichus adstrictus (Esch.)		1						
Calathus melanocephalus (L.)	8	13	2	1	1	1	2	1
Amara quenseli (Schoen.)		2			1			
Dytiscidae								
Hydroporus nigrita (F.)	2	6	3	1	9	1		1
Agabus bipustulatus (L.)		1			1			
Hydrophilidae								
Cercyon analis (Payk.)	1							
Cercyon litoralis (Gyll.)	2	6	2					
Cercyon spp.					1	1		
Leiodidae								
Catops fuliginosus Erich.	10	23	8	2				
Scydmaenidae								
Stenichnus collaris (Mull. & Kunze)		1						

Taxa	Sample Numbers							
	10	**11**	**12**	**14**	**15**	**17**	**18**	**19**
Staphylinidae								
Omalium rivulare (Payk.)	5	1	5	11	2	9	4	1
Omalium excavatum Steph.	1	1	1		3	9	3	1
Omalium laeviusculum (Gyll.)	1	3		1		3		
Xylodromus concinnus (Marsh.)	2	8	1	2	3	3	2	
Micralymma marinum (Strom.)		1						
Acidota crenata (F.)		2	1					
Lesteva longoelytrata (Goez.)	2	4	1	1		1		
Phyllodrepa floralis (Payk.)	12	11	3		1			
Stenus spp.	3	6	2	3	10	2	2	1
Lathrobium brunnipes (F.)	1	1	1					
Othius angustus Steph.			1					
Philonthus politus (L.)			1					
Philonthus sordidus (Graven.)	1	1						
Philonthus cephalotes (Graven.)	3	6	7	1				
Gabrius spp.	2	3	1	1	3	1	1	1
Creophilus maxillosus (L.)			1	1		1		
Quedius mesomelinus (Marsh.)	3	6	3	1				
Quedius umbrinus Erich	1	1	1					1
Quedius fulvicollis /boops		2	1					
Quedius fulvicollis (Steph.)				2				
Tachinus corticinus Graven.	7	13	5	8		1		
Gymnusa brevicollis (Payk.)	1		1					
Atheta spp.	4	18	2	11	16	48	16	9
Oxypoda spp.	2	4	3	3	1	1	1	
Aleochara sparsa Heer	7	15	8	6	2	1		
Pselaphidae								
Bryaxis puncticollis (Denny)		1						
Elateridae								
Hypnoidus riparius (F.)		2	2	1	1	1		1
Byrrhidae								
Cytilus sericeus (Forst.)		1						
Byrrhus fasciatus (Forst.)			1	1		1		
Silvanidae								
Oryzaephilus surinamensis (L.)	4	7						
Oryzaephilus spp.			2	2		2		

Table 3 continues on p. 184.

Taxa	**Sample Numbers**							
	10	**11**	**12**	**14**	**15**	**17**	**18**	**19**
Cryptophagidae								
Cryptophagus scanicus (L.)	1	1						
Cryptophagus pilosus Gyll.		2					1	
Cryptophagus spp.	3	8	3	3	2		1	1
Atomaria spp.	2	5	1	1	2	3		
Coccinellidae								
Nephus redtenbacheri (Mulsant)	1				1			
Lathridiidae								
Lathridius minutus (L.) group	8	17	9	6	8	8	1	
Corticaria elongata (Gyll.)	1	7		3	1	1	3	
Mycetophagidae								
Typhaea stercorea (L.)	2	3						
Ptinidae								
Tipnus unicolor (Pill. & Mitt.)	2	1	1					
Ptinus fur (L.)	1							
Scarabaeidae								
Aphodius lapponum Gyll.	1	2			1	1	1	
Oxyomus sylvestris (Scopoli)		1						
Curculionidae								
Otioryhnchus arcticus (F.)	1	2	2	2	2	3	3	2
Otiorhynchus nodosus (Mull.)	1	1		1	1		1	2
Barynotus squamosus (Germ.)	1							
Tropiphorus obtusus (Bonsd.)	1	1		2			1	
Sitophilus granarius (L.)	1	3		1				
Rhinoncus percarpius (L.)	1							
Diptera								
Hippoboscidae								
Melophagus ovinus L.	3	9	1	1				
Cladocera								
Daphnia s.l. spp.			1		2			

Table 3. The insect species recorded from Bessastaðir. Taxonomy follows Lucht 1987. Table is continued from pp. 182 and 183.

Bessastaðir samples might be residual from such a process, or later stages in wool processing when the remaining dead lice would be likely to be combed or carded out before spinning.

By far the largest component of the Bessastaðir assemblages is associated with rotting organic material, which account for between 12 and 64 percent of the insect species per sample. Several different types of organic debris are indicated including dry mouldering plant material, mainly hay, wet foul matter, dung and seaweed. Although Bessastaðir lies in the warmer part of Iceland, it was still essential that sufficient hay be collected to ensure that the farm's resource base, namely its animals, survived over winter. It is the insect fauna associated with this winter storage of fodder that dominates the rotting component of the Bessastaðir assemblages. Members of this assemblage include feeders on fungal hyphae such as the mould beetles, *Lathridius minutus* (group), *Cryptophagus* spp., *Atomaria* spp., *Corticaria elongata* (Gyll.) and *Typhaea stercorea* (L.), and the predatory staphylinids, *Xylodromus concinnus* (Marsh.) and *Philonthus sordidus* (Graven.), which are common in byres and hay ricks in Iceland at the present day (Larsson and Gígja 1959; Lindroth *et al.* 1973); all were introduced by the earliest Norse settlers (Buckland *et al.*, 1991). The heavily microsculptured elytra and thoraces of the rove beetle, *Phyllodrepa floralis* (Payk.) occur in some abundance in Samples 10, 11 and 12. This species was previously thought to have immigrated into southwest Iceland 'in rather recent time and to have not yet attained its final distribution' (Larsson and Gígja 1959, 58). Although on the European continent the species is found on flowers, in hollow trees, under bark, in animal nests and in vegetable refuse (Lohse 1964; Tottenham 1954), it is synanthropic in Iceland and is restricted to old hay and compost. In a farm complex, hay had other uses besides fodder. In the past it has been used for bedding, flooring material and insulation. Two species of spider beetles, *Tipnus unicolor* (Pill. & Mitt.) and *Ptinus fur* (L.), were recovered in low abundance from Samples 10, 11, and 12. The single occurrence of the latter species in Sample 10 is the first record from archaeological deposits in Iceland. Both species are flightless and strongly synanthropic and have small restricted populations in Iceland at the present day (Larsson and Gígja 1959). The insects are common in buildings and outhouses where they require high relative humidities to breed successfully (Howe 1965) and feed on a wide variety of animal and vegetable substances including cereal debris (Howe 1956). *T. unicolor* has been recorded in some abundance in samples from a post-medieval house floor at Reykholt (Buckland *et al.* this volume) and the species seems to be associated with the slightly drier, less foul conditions of human living quarters rather than the higher humidities encountered in byres.

Fouler rotting plant material is suggested by a suite of predatory species which include the rove beetles, *Omalium excavatum* (Steph.), *O. rivulare* (Payk.), and *Quedius mesomelinus* (Marsh.), the leiodid, *Catops fuliginosus* (Erich.) and the hydrophilid, *Cercyon analis* (Payk.) (Hansen 1987; Larsson and Gígja 1959). There is considerable overlap between the insects found in this type of habitat and those which inhabit herbivore dung (Skidmore 1991). Many of the *Cercyon* spp. and the eurytopic rove beetles, *Philonthus* spp. and *Quedius* spp. are common to both pabula. In Iceland, however, *Philonthus politus* (L.) and the large and distinctively marked *Creophilus maxillosus* (L.). are associated mainly with manure and animal waste (Lindroth *et al.* 1973). Perhaps the best indicators of dung are members of the Scarabaeidae, or dung beetles. *Aphodius lapponum* (Gyll.) is common in dung of all types of herbivore (Landin 1961; Larsson and Gígja 1959), but *Oxyomus sylvestris* (Scopoli) is found in both vegetable waste and well-rotted dung (Jessop 1986; Machatschke 1969). The occurrence of the carinate elytra of the latter species in Sample 11 is the only record of the insect in Iceland. It is apparent that, like the species of *Aphodius* recovered from post-medieval deposits from Stóraborg and two species of ant from Reykholt, *O. sylvestris* was introduced to Iceland by the Norse but failed to establish a population. Introductions, which either find a suitable man-made

habitat and survive, or fail and become extinct, are not infrequent in the post-medieval and modern record (*e.g.* Buckland *et al.* this vol.; Ólafsson and Richter 1985), where larger ships and large scale imports provide many opportunities for casual transport. Outside the basic synanthropic fauna found on most farms and originating at *Landnám* (Buckland *et al.* 1991) and the grain fauna discussed below, medieval examples are rare, and restricted to the primary sites. The species probably made the journey from Europe to Iceland in rotting vegetation, perhaps hay, that had been used for dunnage in the clinker-built Norse vessels (Sadler 1991). Examined from the point of view of the probability of the presence of temporary imported species, its occurrence at Bessastaðir is a further indication of the site's contacts with Europe.

The occurrence of the saw-toothed grain beetle, *Oryzaephilus surinamensis* (L.) and the grain weevil, *Sitophilus granarius* (L.), indicate the presence of stored grain in Samples 10, 11, 12 and 14. Remains of barley from Bergþórshvoll (Friðriksson 1960) and Gröf in Öræfi (Friðriksson 1959) may belong to locally grown cereals, but the grain at Bessastaðir has another source. Recent experiments have shown that both grain beetles are deleteriously affected, as adults and imagines, by fluctuating relative humidities and prolonged periods of reduced temperatures (Evans 1983; 1987) and, that a high proportion of the eggs of *O. surinamensis* are killed when temperatures fall markedly (Jacob and Fleming 1986; Mullen and Arbogast 1979). It is doubtful whether the minimum temperature requirements necessary to maintain breeding populations, which lie between 15° and 21° Celsius (Howe 1956), were ever continuously maintained in Icelandic medieval farms. In addition, although there is evidence for barley cultivation in the first part of the medieval period (Þórarinsson 1943), its later decline and the possibility of crop failure, would further have made the maintenance of permanent pest populations unlikely. Importation with meal or cereals from Europe seems probable. It is again relevant in this context that examples of these pests only appear very infrequently at Holt in Eyjafjallasveit, Stóraborg and Reykholt and their appearance in four of the Bessastaðir samples probably implies regular import of this commodity from Europe. The species might have been deposited with spoiled grain which was discarded but the presence of the puparia of the fly *Heleomyza serrata* L. may indicate human faecal matter in the samples. The combination of faecal material and grain offers an alternative hypothesis. As Osborne (1983) so pointedly illustrated, grain pests can pass through the human digestive tract without damage, and it is possible the grain and beetles were deposited together in faeces.

Human faeces might also explain the presence of two grape pips in Sample 12, which provide the earliest record of importation of grapes, or more probably raisins, to Iceland. It is again probable that such foodstuffs were restricted to the more important farms and it is not surprising that they have not been found in samples from any of the other sites studied.

The remaining insects are not generally encountered indoors in Iceland and they offer an insight as to the wider environment of the farm and its relationship with the local landscape. The small rove beetle, *Omalium laeviusculum* (Gyll.), and the hydrophilid, *Cercyon littoralis* (Gyll.) are present in very low numbers in Samples 10, 11, 12, 14 and 17. Both are littoral species, common under decaying seaweed and coastal drift on sandy beaches (Hansen 1987; Larsson and Gígja 1959). Seaweed was widely collected and used in the North Atlantic region, for food, animal fodder, fuel, bedding (Henderson 1819; Kristjánsson 1980), salt production (Finnbogason 1943) and the manuring of arable (Fenton 1985). The low frequency of this faunal element (Table 1), however, which is matched by the virtual absence of seaweed breeding flies, suggests it might represent casual occurrences in an area where coastal drift would have been abundant on beaches.

The extent to which peat was used for purposes other than fuel in the past tends to be forgotten and the fossil faunas associated with it cause several problems in sample interpretation. It is difficult to

distinguish such assemblages from those common to structural turf or, in some cases, the unimproved hayfield. Several species might have been introduced to the deposits along with peat. Although the ground beetle, *Trichocellus cognatus* (Gyll.) is the only strictly acidophile species, commonly associated with heathland on sandy substrates (Larsson and Gígja 1959; Lindroth 1974; 1986), several of the others are found in wetlands. *Acidota crenata* (F.), *Quedius umbrinus* (Erich.), *Lesteva longoelytrata* (Goeze) and *Lathrobium brunnipes* (F.) are recorded from bogs and marshes (Harde 1981; Larsson and Gígja 1959; Lohse 1964), and the carabids, *Pterostichus diligens* (Sturm) and *P. nigrita* (F.), are inhabitants of oligotrophic bogs (Lindroth 1986). The larvae of caddis flies, the ephippia of water fleas, *Daphnia* sp., and the water beetle, *Hydroporus nigrita* (F.) are, arguably, clearer indicators and are likely to have been introduced to the farm along with peat. This assemblage has been consistently recovered from pre-*Landnám* peat deposits at various sites in Iceland (*e.g.* Buckland *et al.* 1986a) and direct evidence of peat cutting, infilled by tephra from the *c.* 1357 eruption of Katla, has been noted at Ketilsstaðir in southern Iceland (Buckland *et al.* 1986). The palaeoecological problems of the presence of peat in archaeological deposits was first noted in Roman York (Hall *et al.* 1980) Faunas from Norse farms in Greenland appear to show similar utilisation (Fredskild and Humle 1991; Sadler 1988). Kåland (1986) has illustrated the Norwegian practice of stripping the turf from peat bogs and allowing the exposed peat to weather during the winter. During the spring, the dried peat was collected up and used for animal bedding, soaking up the liquid part of the dung, being eventually used, with household waste as manure.

The ground beetle fauna, includes several elements less likely to have been introduced as fossils in peat. *Bembidion bipunctatum* (L.) is found on open sandy ground, including the seashore, whilst both *B. grapei* (Gyll.) and *Amara quenseli* (Schoen.) occur on open rocky ground. The phytophages afford some indication of the types of plants in the local area. The weevils, *Barynotus squamosus* (Germ.) and *Tropiphorus obtusus* (Bon.) feed on the vegetative parts of clovers and dicotyledonous herbs (Larsson and Gígja 1959). Knotweed, *Polygonum* sp., and dock, *Rumex* sp., are the hosts of the small weevil, *Rhinoncus pericarpius* (L.), the larvae of which live in the plant's stalks or roots (Larsson and Gígja 1959; Lohse 1983).

An examination of the species lists (Table 3) indicates that the assemblages recovered from the samples differ markedly. The samples from Profile II are similar, and can be grouped together. They are characterised by the presence of human and animal parasites, grain beetles and an abundance of rotting plant debris. The two floor layer samples seem to be composed entirely of insects associated with decomposing material, particularly hay and peat whilst the samples from the small profile are intermediate between the other two sample groups. The heterogeneity of the groups gives an indication of the mode of accumulation of the samples. The samples from Profile 2 and, probably the small profile samples, represent waste or midden sediments. The presence of synanthropic insects associated with decomposing material and ectoparasites implies that a considerable proportion of the material originated from within a structure. These midden samples compare well with midden material examined at the site of Stóraborg (Perry *et al.* 1985) and midden samples from Norse Greenland (Sadler 1988). The floor samples are markedly different from those examined from the midden. The sediments seem to comprise decomposing material (mainly hay residue) and peat.

This evidence is not in accord with floor layers examined from Icelandic sites at Stóraborg (Perry *et al.* 1985) and Reykholt, Viking deposits in York (Hall *et al.* 1983), Dublin (Coope 1981), Oslo (Kenward 1980) and Greenland (McGovern *et al.* 1983). In each of these cases, there is a certain unsavoury continuity between the midden outside and the floors inside the farms. The latter seem to have been warm, foul, well-trodden nutrient-rich areas comprising decomposing vegetation and other organic waste. There are two possible explanations which might account for this inter-site

variation. First, the floor material accumulated in a phase of abandonment and/or the structure was used as a store for hay and peat. Recent work examining insects from the floor of a modern byre used to overwinter cattle at a farm in South Yorkshire supports the second explanation. This work has indicated that the pooling of ammoniacal materials restricts the development of faunas associated with decomposing vegetation and animal waste products. The floor samples were found to contain fragmented remains of mould-feeding insects introduced in the hay and straw used for fodder and litter (Smith 1991). Since it is well documented that stock were overwintered in byres in Iceland one could apply a similar line of reasoning to Bessastaðir. It seems likely, therefore, that the sediments were deposited in a byre, where peat and hay were utilised as fodder and litter.

Conclusion

The presence of grape pips and the consistent occurrence of the grain fauna has wider implications, since grain beetles are only rarely encountered in Icelandic deposits. The grain weevil, *S. granarius* has been recorded only twice from Stóraborg and once from Reykholt. There are also only three records of the saw-toothed grain beetle, *O. surinamensis*, from Holt, Stóraborg and Reykholt. Elsewhere records are similarly scarce and the species have not been recorded in Norse Greenland or Viking York, England (Hall *et al.* 1983; Sadler 1988). It is an indication of the prime status of the farm at Bessastaðir that grain beetles occur in such abundance reflecting regular importation and, perhaps, strong trading links with the Scandinavian core and the European continent. Similar indications of the sites status can be found in the vertebrate record. The occurrence, for example, of the bones of walrus, polar bear, pig, and perhaps ironically, the brown rat serve to emphasise the cultural links of the Bessastaðir farm.

Although the interpretation of further samples has yet to be undertaken, the analysis of the large and diverse faunas from Bessastaðir has aided the interpretation of the archaeology. The insect remains from the midden indicate both an unhygienic household environment when compared to present day standards and suggest also that the farm site enjoyed primary status from the Commonwealth into the better documented later periods. The faunas do not differ significantly over the time period investigated which mirrors the consistent nature of the pastoral system carried out on the farm. Further work will undoubtedly refine and augment this interpretation.

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