Chapter 16

Archaeology and the Palaeoecology of the Norse Atlantic Islands: a Review

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Introduction

Palaeoecological research on the Atlantic islands has been seen as an essential part of many archaeological projects for over twenty years, and work has ranged from the immediate contexts of very particular archaeological environments (e.g. Buckland & Perry 1989) to the more regional off-site studies of human impact, from viewpoints which range from the sedimentological (e.g. Jakobsen 1991a & b; Amorosi *et al.* 1997; Simpson *et al.* 2001) to the palynological (e.g. Fredskild 1978; 1988; Hallsdóttir 1987; 1995; Jóhansen 1985). To these should also be added the remarkable framework of isochrones that tephrochronology has provided (cf. Dugmore & Buckland1991; Dugmore & Newton 1998; Larsen *et al.* 1999; 2001), the sub-annual record of climate change that the new Greenland ice cores have yielded (Barlow *et al.* 1998; more generally, Mayewski & White 2002), increasingly detailed studies of animal bone assemblages (e.g. Barrett 1997; McGovern *et al.* 1996), and an ever improving understanding of the historical record, both from a purely historical approach (e.g. Vésteinsson 2000) and from that of teasing climatic and other data out from contemporary and near contemporary records (Ogilvie *et al.* 2000; Ogilvie & Jónsson 2001). In addition, knowledge of the archaeological record has been improved by the re-assessment and publication of old finds (e.g. Sveinbjarnardóttir 1996; Friðríksson & Vésteinsson 1997) and important new excavations, particularly that of the site of Gården under Sandet (GUS) in the Western Settlement of Norse Greenland, where palaeoecological sampling formed an integral part of the research design (Arneborg & Gulløv 1998). Most aspects have been brought together in the volume published to accompany the Smithsonian Museum exhibition on the Vikings in the North Atlantic (Fitzhugh & Ward 2000), and previous Viking Congress papers have examined various aspects of the Norse farm, which the palaeoecological, inevitably largely insect record, can elucidate (Buckland *et al.* 1993; 1994) This short contribution does not attempt an overall review, and probably poses more questions than provides answers. It does, however, indicate some of the directions in which palaeoecological research can make further contributions to the Norse and later North Atlantic, and should serve as a means of accessing the rather scattered literature on North Atlantic island human palaeoecology.

The Faroe Islands

Landnám in the Faroe Islands has been the subject of much discussion, stemming initially from the late Jóhannes Jóhansen's (1971; 1979) palynological research, in which he claimed to have evidence of significant pre-Viking impact on the vegetation of the islands, principally in the presence of cereal pollen. The data have been queried on both stratigraphic and historical grounds (Buckland 1992; Krogh 1986), and more recent work on one of his original sites, at Tjørnuvík on Streymoy, has produced opposing interpretations (Buckland & Dinnin 1997; Hannon & Bradshaw 2000). Similarly the site at Ulahlíð on Mykines, the most remote of the islands, has also produced divergent interpretations (Buckland *et al.* 1998; Jóhansen 1979). Part of the problem lies in the location of sites, the first at the base of a steep slope, and the latter at the edge of grassland which elsewhere shows extensive disturbance by puffin nest burrows. At Tjørnuvík, insect faunas show a significant taxonomic radiation as human impact provides a more diverse range of habitats, but the problem lies in dating a site where that same impact results in massive slope instability, as conversion from willow and juniper scrub on the basalt ledges to grassland allows soils of many hundred years development to erode into the valley bottom, taking with it any biological materials. In addition, despite the proximity of a group of pagan burials (Dahl 1956), the palaeoecological evidence does not indicate the presence of any structures, and only the scarabaeid beetle, *Aphodius lapponum*, reliant on the dung of introduced grazing stock, provides an unimpeachable indication of human activity (Buckland & Dinnin 1998). It is interesting to note that several of the species which are often associated with farms and their middens occur in the Ulahlið samples, the highly eutrophic nature of the puffinery providing very similar habitats (Buckland *et al.* 1998). Sites which are less likely to have been disturbed by natural and later man-made processes are therefore essential for sorting out Faroese Landnám, which if we are to believe the one near contemporary source, Dicuil (Tierney 1967, but see Thorsteinsson, this vol.), must have taken place before *ca.* AD 825. The site at Toftanes in Leirvik on Esturoy, excavated by Steffen Stummann Hansen (1989), largely fulfils these conditions. Lying just above sea level adjacent to a stream, its three buildings and associated deposits are partly preserved in anaerobic conditions and underlying deposits are also waterlogged. Whilst dating cannot yet be further defined, it is clearly a farm belonging to Norse Landnám, which was occupied for a relatively short period (Edwards *et al.* 1998). Underlying deposits consist of moss peat, with few identifiable insect or plant remains, similar to the pre-Landnám deposits at Tjørnuvík. The few samples in the original pilot study (*idem*) produced surprisingly few beetles associated with stored hay, a feature which is characteristic of all Norse and later sites examined across the North Atlantic region (*cf.* Amorosi *et al.* 1998), and this was taken to indicate that Faroese farmers at Landnám did not need to store winter fodder for their stock. More recent work (Burrows, pers. comm.), however, has yielded significant hay insect assemblages, and the faunas are similar to those from other medieval sites. In itself, this indicates the dangers of relying upon a small number of spot samples, rather than a detailed programme of sampling all suitable deposits, for palaeoenvironmental analysis on archaeological sites; the cost and time implications of this are considerable. Whilst assemblages from archaeological contexts may allow very detailed interpretation (e.g. Buckland & Perry 1989), outfield faunas from both Suðuroy and Sandoy show little change across Landnám, remaining dominated by small staphylinids and a few carabids. Only at Tjørnuvík is the change apparent, and this probably reflects the site's taphonomic catchment, the same which creates the problems over dating. It is curious that the relatively flat mire sites appear to show no change, in that even exploitation by grazing is likely to have altered their trophic status. Plant macrofossils may possibly show more change in composition in the outfield sites than the beetles, whose faunas are beset by the low taxonomic diversity of island assemblages. Despite the excellent preservation of insects and plant macrofossils, the sediments at Toftanes are too acidic for the preservation of animal bone, and there is still no sizeable modern assemblage of bone published from the Islands to compare with the extensive material from similar sites in Iceland (Amorosi 1991) and Greenland (McGovern 1985; McGovern *et al.* 1996). It is simply not known, whether faced with a landscape of raised mires, juniper and willow scrub and a few tree birches in the more protected localities, the landnámsmen immediately modified their stocking regime accordingly, or whether, bringing a fixed North European pastoral mental model with them, modification of initial strategies was left to natural selection, which lead farms like Toftanes to be abandoned early. Processes leading to site abandonment have been examined in Iceland by Sveinbjarnardóttir (1992), and are critical to the study of Norse Greenland (e.g. Barlow *et al.* 1998), but suitable techniques have yet to be applied to the Faroes. This is an area where a more forensic approach to excavation, including more detailed palaeoecological sampling, would make a major contribution.

Iceland

Since the first tentative attempts at integrated study both on and off-site at Stóraborg in Eyjafjallasveit (Sveinbjarnardóttir *et al.* 1981) and Ketilsstaðir in Mýrdalur (Buckland *et al.* 1986), several lines of palaeoecological research, occasionally sufficiently integrated to be almost holoptic, have been pursued, in particular at Holt in Ejyafjallasveit (Buckland *et al.* 1991) and on the island of Papey, off Berufjörður, where the work suggested only Norse Landnám, and no pre-existing Culdees (Buckland *et al.*1995), One major on-site study, however, that of Stóraborg, remains unpublished in detail. Whilst animal bone assemblages have been comprehensively reviewed (Amorosi 1996), and study of the timing and intensity of soil erosion examined to a fine degree (Dugmore & Buckland 1991; Dugmore & Erskine 1994; Olafsdóttir 2001; Simpson *et al.* 2001;), work on other aspects has been patchy, partly as a result of varying preservation of the archaeological record. Despite early promise (Buckland *et al.* 1992), the earlier deposits at Reykholt in Borgarfjörður have so far produced only the biased sample provided by charred plant remains and no insects (Sveinbjarnardóttir, this vol.). In Mývatnssveit, the important re-excavation of Hofstaðir has similarly produced no anaerobic sediments, essential for the overall preservation of organic materials, although application of soil thin section and biochemical techniques have provided important new data (Simpson *et al.* 1999). Molluscan and fish remains from the same deposit showed a surprising marine connection (McGovern 1998) for a site next to Icelandic best known salmon river (Laxá), and this serves to drive home the extended network of the early medieval Icelandic economy, a point which the palaeoecological record is also capable of adding to the Greenland story.

Despite an attempt to wring data from poorly preserved deposits at Svalbarð in Þingeyrar (Zutter 1999), where only bone preservation was good (Amorosi 1992), there are still no integrated studies from the North-East. In the North-West peninsula, the middens at Finnbogastaðir and Gjögur have good organic preservation, but whilst useful for an overview of activities on the farm through time, and regarded as ideal for sampling animal bone assemblages, recent palaeoecological research has moved towards the examination of use of individual structures, rooms or activity areas (cf. Rowley-Conwy 1994) and effective spatial sampling across houses, as was carried out only intermittently at Stóraborg, and more recently at GUS, is needed in order to advance site interpretation. In post-medieval Reykholt, it was possible to localise one activity, delousing, by a high concentration of human lice, including the only North Atlantic record of the crab louse, *Pthirus pubis* (Buckland *et al.* 1992), and wool preparation could be inferred from high concentrations of sheep lice, *Damalinia ovis* and keds, *Melophagus ovinus* at Stóraborg (Buckland & Perry 1989). Preservation, however, may be problematic, for whilst keds may be the only recognisable material in poorly preserved samples, lice, and indeed fleas, are usually the first casualties in the sliding scale of preservation. At Bessastaðir, where the house floor material was recovered in one metre square units and sorted by Garðar Guðmundsson, preservation varied extensively across the floor, and no lice or fleas were recovered, although the Greenland palaeoecological evidence would suggest that both people and sheep carried heavy ectoparasite loads (*cf.* Buckland & Sadler 1989; Sveinbjarnardóttir & Buckland 1983); the presence of sheep parasites within structures otherwise regarded as primarily for human occupation is likely to reflect wool processing, rather than the actual animal. In the initial study of the Bessastaðir midden material (Amorosi *et al.* 1992), the possibility of examining settlement hierarchy based upon the palaeoecological record was raised. The additional material includes two species, the blind flightless colydiid *Aglenus brunneus* and the golden spider beetle, *Niptus hololeucus*, with few modern casual records in Iceland, which are likely to have been accidentally introduced to this high status site.

Greenland

The presence of permafrost in the Western Settlement of Norse Greenland provides perhaps the most ideal of conditions for the preservation of the palaeoecological record, and preliminary work on several sites has been published (e.g. Buckland *et al.* 1983; McGovern *et al.* 1983). More recently, the evidence has been used in parallel with the climate data derived from the ice cores to examine the abandonment of the settlement *ca.* 1350 (Buckland *et al.* 1996; Barlow *et al.* 1998). The extensive excavation of the farm at GUS provided an opportunity to carry out an extensive sampling programme, with material being recovered from many of the house floors and related contexts. Interim reports on both the plant macrofossil and the insect data have been published (Buckland *et al.* 1998; Ross 1997). As on the other sites examined in the Western Settlement, house floors for rooms occupied by both humans and animals were equally foul, with animal faeces and the protein feeding flies, *Heleomyza borealis* and *Teleomarina flavipes*, often occurring by the hundred in samples of the flooring material, a mix of twigs, moss and hay debris. Such floors have a long history for animal bedding in Scandinavia (*cf.* Göransson 2002), but their use for humans reflects the need to provide insulation from the permanently frozen ground (Buckland *et al.* 1994). Dissection of the five litre samples of flooring material over a graded series of sieves reinforces the picture of unhygienic conditions. As Tom McGovern (e.g. 1985a & b) long ago noted, fragments of walrus maxilla, the debris from chipping out the valuable ivory tusks, are frequent (pl. 1a), but there is much other bone, a few clearly having passed through the gut of the farm's dog (pl. 1c), but most in sharp, angular fragments (pl. 1b). Based on the paucity of carrion flies, Calliphoridae, and marrow-feeding Diptera, Piophilidae, Skidmore and McGovern (in Buckland *et al.* 1996) have suggested that the degree of bone fragmentation reflects a potential fat deficit in the diet of the

Norse farmers, and Skidmore has contrasted the fly fauna (pl. 2) with that of the Palaeoeskimo site at Qeqetarssuaq, where the carrion fauna is extensive, and Outram (1999) in a re-examination of the bone material from earlier excavations on Norse sites has been able to show that domestic animals show a higher degree of fragmentation than the seals in the same assemblages. The need for sufficient fat to metabolise proteins is a common problem in cultures where the seasonal round lead to a potentially disastrous lean meat diet during the late winter and spring (Speth 1983), but it should be noted that this pattern of bone fragmentation is apparent throughout the occupation of sites in the Western Settlement and does not represent a late response to a dietary crisis. Similar fly faunas and degrees of bone fragmentation are apparent in late and post-medieval deposits at Stóraborg in Iceland, and the assemblages perhaps reflect an inevitable cultural adaptation amongst the more marginal environments occupied by farmers. In addition, there is also a taphonomic problem in comparing the permanently occupied Norse farm with the gluts in abundance, and inevitable wastage, that a Palaeoeskimo kill-site represents. What the tentative conclusion serves to stress most is the need to sieve the bulk of excavated material down to 5mm, subsample for invertebrate and plant macrofossils to at least five litres, and to quantify the scale of bone fragmentation with some agreed index of identifiable against unidentifiable fragments (Outram 2001). With over one hundred additional five litre samples processed, largely from GUS, the virtual absence of fish bone is again apparent, with a few more small vertebrae to fill a guillemot's gullet and little more than a few palatal teeth. It should be stressed that sieving is down to 300μ, and fishbone would easily be recovered at this level. The contrast with Iceland (McGovern & Perdikaris 2001), the Northern Isles (Barrett *et al.* 1999) and even Arctic Norway (Perdikaris 1999) remains, yet study of nitrogen and carbon isotope rations in bone from Norse Greenlandic cemeteries (Arneborg *et al.* 1999) confirms a significant and increasing marine component in the human diet. The most likely pathway for this is via seal meat, but there remains the possibility that fish were taken from outer fiord stations, gutted and beheaded there, and returned as fillets. The absence of fishing gear in the artifact assemblages, to the extent that Vebæk had to use fishhooks from Lofoten to illustrate Norse Greenland fishing, may merely reflect its storage in remote nausts, now lost to rising sea level. Even if the bulk of fish were returned to the farms for consumption, it is possible that both the feeding of residues to cattle and the grinding of bones to make a palatable mush for domestic animals, and occasionally humans, would have left little trace. This would certainly explain the present of rotary querns on sites in Greenland, but the contrast with sites in Iceland, where bones of marine fish are abundant from the earliest deposits even on sites far inland, like Hofstaðir in Mývatnssveit (McGovern 1998), must be significant; Norse Greenlanders balanced their diet in different ways from the Icelanders. Continuing with the dissection of the floor sample, much of the material consists of twigs (pl. 1d). These often retain their buds and bud scales are frequent amongst the plant macrofossils. Whilst the net of birch and willow twigs, mixed with wood chips, almost entirely of conifer driftwood (pl. 1e), whose ultimate origin is likely to have been largely Siberian (Eggertsson 1993; 1994) provided the bulk of floor insulation (Buckland *et al.* 1994), the twigs also had another use, that of fodder for animals. Use of leaf fodder extends back to the Neolithic (Troels-Smith 1984), and has many ethnographic parallels, a North Atlantic example being provided by Jón Jónsson's diary (1887), where in desperation in an attempt to keep his overwintered stock alive in a year when summer arrived late in Mývatnssveit, he went out and cut every exposed new growth of twigs he could find. In Norse

Greenland, gathering of twig fodder is likely to have been the norm (Amorosi *et al.* 1998), a point indicated by pollen from ovicaprid dung pellets, which shows >98% *Betula* (birch) (Craigie & Edwards, pers. comm.). This should not, however, be taken to indicate stress or marginality. McGovern (pers. comm.) has indicated the greater frequency of goats over sheep in Greenland compared with Iceland, and these are better able to metabolise woody tissue. Wear patterns on the teeth of both Norse and modern Greenlandic sheep have been studied by Mainland (2000).

Further exploitation of marine resources, as animal food, is also evident in the sample. The fragments of large mussel, *Mytilus edulis*, shell (pl. 1f) have fractures which would be consistent with breakage by large herbivore teeth, and it seems probable that these were collected up and fed to cattle, whose long annual stalling regime could easily have lead to calcium deficiency. Seaweed also turns up on both coastal and inland farms (pl. 1g), indicated either by the charred bladders of *Fucus* sp., fragments of the hydroid *Dynamena pumila*, which lives attached to seaweed, and is almost ubiquitous on sites across the Norse Atlantic (Buckland *et al.* 1993), or occasional members of the wrack fauna, either the Coleoptera in *Micralymma marina* or the numerous flies which breed along the strandline. Both sheep and cattle will freely graze among the heaps of seaweed cast up on the shore (pl. 3), but there are other uses for the material, and charred debris is unlikely to reflect fodder. In balancing a diet, a frequent limiting factor is salt, and in the internal subsistence economy of the farms there was no place for its import from Europe. Whilst additional salt is unlikely to have been essential in a diet where meat was eaten either air-dried in skemma or smoked rather than boiled, it may have been used in the preservation of some foods such as seal meat and seabirds. Martin Martin (1695) in his account of the Western Isles off the Scottish coast, refers to meat preservation in seaweed ash as a particular delicacy. At GUS, the contents of a soapstone pot consisted of charred seaweed and large numbers of the puparia of the fly *Heleomyza borealis*, a species which Skidmore (1996) has dubbed the Viking Housefly; it seems probable that these were feeding on meat preserved in the pot in seaweed ash.

The end of the Norse farms in Greenland never ceases to fascinate (see most recently, Seaver 1996; Lynnerup 1998). Explanations have ranged from abduction by pirates to 'it got cold so they died' (with apologies to Tom McGovern). Having refined the models of landscape exploitation, from stocking models to input from wild plant and animal sources (*cf.* McGovern, in Barlow *et al.* 1998), it is here that the palaeoecological record might be expected to provide the answers. In fact, the evidence is often enigmatic. Despite Vebæk's (1992, 108) conviction that the scattered fragments of human bone in the passage at Ø167 represent the last Norse inhabitant, countered by Lynnerup *et al.*'s (1992) study of the bones, no site has yet yielded its last occupants. At Nipaitsoq (V54), however, Skidmore (1996) was convinced that the fly faunas indicate not only the cooling down of the farm in its final phase of occupation, but also that the presence of a carrion fauna in the room interpreted as the sleeping quarters indicates that the last inhabitants died there, although if that is the case, there were still people around to bury the dead. Across the river at GUS, there is no clear evidence of any terminal decay, although there is some support for Schweger's (1998) suggestion, based on geomorphological mapping that the farm's grazing and hayfield were being damaged by the river in its later phases. It is curious that the complete goat in Room 22, an animal which apparently crawled into the room and died, has neither a carrion fauna nor evidence of other activities at the farm. The animal belongs to Phase VI of the farm, dated to 1250-60 by the excavators (Arneborg, pers. comm.), and the room is reused in a subsequent phase, although not the terminal one. Is there a suggestion here that the site was abandoned for time before being rebuilt? The insect faunas from over the burnt long house of phase I-II would also suggest a significant gap before the site was re-occupied. The palaeoecological record is hinting at the dynamics of site occupation and desertion, something well known from the better documented medieval to post-medieval record in Iceland (Sveinbjarnardóttir 1992), but there remain serious sampling and taphonomic problems, as well as financial ones; detailed palaeoecological research is time intensive, requires specialists to be on site for much of the time, informing the sampling strategy, and individual samples may take a person-week to process and identify, employing specialists from several fields – such a fully integrated programme has yet to be carried out, or rather funded. The terminal phase of GUS is instructive. In pools, which developed in the collapsed depressions of the turf roof, there is no trace of the fauna, which was able to thrive in the artificially warm rooms of the farm, in its stored fodder and flooring materials, but there are still sheep, curiously indicated by large numbers of their lice but no keds. The picture is of the animals using the shelter of the abandoned buildings after its inhabitants had long gone, but were the sheep animals of another farm still occupied, or perhaps some of those seen by Ivar Barðarsson (Halldórsson 1978)? Lynnerup's (1998) model of gradual attrition of the communities and a final abandonment by the last families, moving first to the Eastern Settlement, and perhaps finally to Iceland, gains some support from the palaeoecological research – "This is the way the World ends, not with a bang but a whimper".

The Lofoten Islands, Norway

Despite lying north of the Arctic Circle, the Lofoten group of islands, from Andoya in the north to Rust in the south enjoy a cool temperate climate. In the medieval period, their abundant fisheries, largely for cod, underpinned urbanisation further south by providing stockfish, and the foundation of the first town in the Arctic, Vågan on Vågoya, reflected the king's need to exercise his monopoly of violence (*sensu* Skovgaard-Petersen 1981) in the North in collecting taxes on this product (Bertelsen 1985). Although it is possible to ripen barley this far north, the fishing connection made the balance, cereals in and stockfish out a more viable option, and it is not surprising that amongst the few insects remains recovered from the earliest deposits at Vågan is the grain weevil *Sitophilus granarius*. Further north, at Langenes, on the north end of Vesturoy, extensive organic sediments remain from a fishing station which was finally abandoned for a nearby deeper harbour site at Stø in the middle of the last century. Two series of samples have been examined, one adjacent to the beach where the fishing boats were drawn up and another closer to the church where any associated farm might be expected (Buckland *et al.* in press). A previous study of soil micromorphology (Simpson *et al.* 2000) had suggested that neither site included substantial evidence for permanent occupation as a farm, and the insect faunas similarly indicate no evidence of farming, and the site is interpreted as a fishing station. In addition, the occurrence of the grain fauna again showed the importation of cereals from the south, and a number of elements in the beetle faunas imply origins either in England or the southern Baltic. In addition, the successions, through separate middens include elements which may indicate the medieval warm period and the subsequent decline in temperatures into the Little Ice Age (Buckland & Wagner 2001), although more work on the modern faunas is required to substantiate this.

Faunal Connections

The origins of Atlantic island biota have been much discussed (e.g. Buckland & Dugmore 1991; Buckland *et al.* 1998; Rundgren & Ingólfsson 1999), and a baseline established for the nature, if not the detail of landscapes at Landnám. The scale of human introductions in the recent past to both flora (e.g. Daviðsson 1967; Pedersen 1972) and fauna (e.g. Böcher 1988; Ólafsson & Richter 1985), and the fossil record from archaeological sites has shown how much of this extends back, often to Landnám (e.g. Buckland *et al.* 1991). In terms of insects, the ectoparasite and fodder faunas are all early immigrants (Sadler & Skidmore 1995; Amorosi *et al.* 1998), the former inevitable uninvited guests and the latter an inevitable consequence of transporting domestic stock by sea. Cleaning out of thin-skinned clinker-built boats on arrival explains the initial arrival of many species, from the relatively thermophilic fly *Teleomarina flavipes* to the slime mould feeding plaster beetle *Lathridius pseudominutus*, and other species, like the stored grain fauna at Bessastaðir (Amorosi *et al.* 1992), came in with commodities, but differences between the synanthropic insect communities of the islands is interesting, and not merely a reflection of the stochastic nature of hitchhiker success, or the differing scale of research, although both the Faroes and Greenland's Eastern Settlement are so far poorly served. The dung beetle, *Aphodius lapponum*, is introduced at Landnám in both the Faroes and Iceland, but seems to fail to establish itself in Greenland, despite the presence of indigenous caribou, and their dung. It is unlikely that it failed to obtain a lift – several species of the same genus later make it to North America (Buckland *et al.* 1995b), and it is widespread north of the Arctic Circle in Scandinavia (Landin 1961). Is the answer relevant to archaeological interpetation? Whilst there is much well preserved dung from the farm sites, was most dung in the fields assiduously collected up either for fuel or manure, and therefore denied as habitat to the insect population? The grain fauna, particularly the weevil *Sitophilus granarius* and the saw-toothed grain beetle *Oryzaephilus surinamensis* are a useful indicator of imported cereals in Iceland, but have yet to be found in Greenlandic samples. Considering the ubiquity of these pests elsewhere (Buckland 1991), Greenland's rotary querns were not for imported barley. In the few samples examined from two midden succession at Ø34 in the Eastern Settlement, the range of imported insect pests is significantly greater than in the numerous samples from sites in the Western Settlement. Does this indicate more regular contacts with either Iceland or Europe in the Eastern Settlement, is it merely stochastic, or were there differences in the resource base of the farmers, something which the animal bone data has already suggested (McGovern 1992)? It should also be noted that the speed with which the hay fauna disperses to inland sites implies slightly more than a few casual travellers on the pack horses of the landsnámsmen, but an integrated community in which hay, as well as the results of the communal hunt or in the case of Iceland, fish, could be shared; both historical records and animal bone data support this point (Amorosi *et al.* 1998).

Interpretation of the palaeoecological record relies heavily upon ecological information, and extensive pitfall trapping of the modern fauna has been carried out on all the islands (Bengtson 1981; Buckland *et al.* 1991; 1998), as well as higher in the Arctic on Ellesmere Island (Godfrey & Skidmore 1997). Inevitably this has added new species to the lists. In trapping around GUS, the small staphylinid *Mycetoporus nigrans* was found to be common; its presence in a sample from the site shows that it is not a recent introduction. The fossil record from sites has also confirmed the native status of several species. The flightless Nearctic moss beetle, *Arctobyrrhus subcanus* is known from the Rockies and SW Canada, and the Narssarssuaq region of Greenland. Given the close connection of the former airbase there with the US, an accidental recent introduction seemed possible; it appears in a sample from GUS. For those given to flights of fancy, much could be made of this, but the probability is that it is native to Greenland and not a Norse accidental traveller from North America. Similarly the rare omaliine staphylinids *Orochares angustatus* also from GUS, with only two records from SE England (Lott 2002) and a few from southern Scandinavia and Holstein, is probably part of the native fauna. These examples serve to emphasise the point that palaeoecological research is a process which leads in many directions, informing biogeographic and ecological questions, as well as archaeological ones.

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