Table 7.1 *Numbers of bird bones and minimum numbers of individuals in Period I.*

species		number of fragments from 44 contexts	minimum number of individuals
gannet	*Sula bassana*	5	2
cormorant	*Phalacrocorax carbo*	47	4
shag	*Phalacrocorax aristotelis*	30	3
cormorant/shag	*Phalacrocorax* sp	15	
goose (domestic/greylag)	*Anser anser*	8	3
cf goose		3	
eider duck	*Somateria mollissima*	3	1
domestic fowl	*Gallus gallus*	2	1
wader	Family Scolopacidae	2	
herring/lesser black-backed gull	*Larus argentatus/fuscus*	71	12
greater black-backed gull	*Larus marinus*	3	1
gull sp	*Larus* sp	14	
black-headed gull/kittiwake	*Larus ridibundus/Rissa tridactyla*	2	
kittiwake	*Rissa tridactyla*	9	3
guillemot	*Uria aalge*	68	9
razorbill	*Alca torda*	11	2
guillemot/razorbill		4	
great auk	*Alca impennis*	3	
cf great auk		1	1
rock dove	*Columba livia*	5	2
indeterminate bird species		28	
total		334	

Table 7.2 *Numbers of bird bones and minimum numbers of individuals in Period II.*

species		number of fragments from 44 contexts	minimum number of individuals
gannet	*Sula bassana*	2	2
cormorant	*Phalacrocorax carbo*	81	9
shag	*Phalacrocorax aristotelis*	45	37
cormorant/shag	*Phalacrocorax* sp	37	
goose (domestic/greylag)	*Anser anser*	23	2
cf shelduck	*Tadorna tadorna*	2	1
cf mallard	*Anas* cf *platyrhynchos*	1	1
eider duck	*Somateria mollissima*	13	2
domestic fowl	*Gallus gallus*	20	3
wader	Family Scolopacidae	2	2
black-headed gull	*Larus ridibundus*	2	1
herring/lesser black-backed gull	*Larus argentatus/fuscus*	147	12
greater black-backed gull	*Larus marinus*	12	2
greater black-backed/herring gull		1	
gull sp	*Larus* sp	3	
black-headed gull/kittiwake	*Larus ridibundus/Rissa tridactyla*	7	
kittiwake	*Rissa tridactyla*	5	1
guillemot	*Uria aalge*	127	13
razorbill	*Alca torda*	12	2
guillemot/razorbill		8	
great auk	*Alca impennis*	5	2
puffin	*Fratercula arctica*	2	1
rock dove	*Columba livia*	4	1
indeterminate bird species		74	
total		642	

7 Environmental evidence

7.1 Introduction

This chapter discusses the environmental analysis that was undertaken. The six structural phases of the site described in the previous section have been grouped into three broad periods:

Period I early medieval
Period II medieval
Period III post-medieval

The environmental material has been grouped by period for the sake of comparison rather than by phase as some structural phases produced very little material. Because of financial constraints only representative samples of the mammal and fish remains were examined, but because of the importance of the island as a nature reserve all of the bird remains were analysed.

This analysis emphasises the importance of seabirds as a food resource throughout the history of the May, and in particular of the presence of the now extinct great auk and an absence of puffins (despite being abundant at the present time). Fish bones were also present from all periods, cod and haddock being the predominant species. Fish were brought whole to the site for processing and consumption, there being no suggestion of the presence of a fish processing station. Both deep-sea and line fishing from the shore were practised. The remains of seashells include edible species and those used as bait in fishing. Also the St James scallop and the queen scallop were deliberately brought to the site. The mammal bone analysis has highlighted the butchery of seal as well as cattle, sheep, pig and rabbit. These animals could have been kept on the island, but the few deer bones are likely to have been imported as joints of meat and antler fragments.

A representative sample of the botanical remains was examined and indicated an increasing level of agriculture in the medieval period, the importation of cereals and the presence of plants possibly used for medical purposes. The palaeoenvironmental investigations have analysed the pollen from two sites on the island at the South Plateau and Three Tarn Nick (Illus 1.2) from which radiocarbon dates were achieved.

7.2 The bird bone

Catherine Smith

7.2.1 Introduction

All the hand-retrieved bones from the excavations were examined and recorded. Bird bones were found in small quantities in most of the non-structural contexts. In Period I, 44 contexts produced bird bones, with higher numbers of bones (>20) from the fill of burials 423 and 443 (beneath the chapter house), context 960 (a layer of shells within the cemetery containing a Burgred coin) and 988 (a layer sealed by the paving 883). In Period II, 72 contexts produced bird bones, with higher numbers from contexts 304 and 402 (floor layers in the Cluniac church), 329 (a floor layer in the chapter house), 362 (a layer beneath the E wall of the last church) and 1118 a layer in Trench V sealing the two medieval burials). In Period III, 65 contexts produced bird bones with higher numbers from topsoil and contexts 199 (infill of the slype) and 257 (midden infilling the courtyard). While these layers are predominantly redeposited rather than being primary middens, the presence (and absence) of pottery within these contexts has been taken as a broad indication of the date of the deposited midden material and therefore provides some indication of the bird exploitation activities during the broad periods identified, although there is a possibility of a degree of residuality. The bones were generally in a well-preserved condition, so a high rate of identification was possible.

A full account of the methodology used, together with supporting data, may be found in the Archive.

7.2.2 Results: frequency of occurrence and age structure of the seabird populations

Tables 7.1, 7.2 and 7.3 present the numbers of bones from each bird species in each Period. Minimum numbers of individuals, based on the most commonly occurring bone from each species in each phase, are also shown alongside the fragment count in Tables 7.1–7.3.

From these data it can be seen that the most plentiful bones proved, not surprisingly, to come from seabirds, in particular, Laridae, Alcidae and Phalacrocoridae families (gulls, auks, cormorants or shags respectively). *Sula bassana* (gannet) and *Somateria mollissima* (eider duck) were also present, as well as a small number of species which may have been passage migrants, for example *Buteo buteo* (buzzard) and *Turdus* sp (blackbird or thrush species). Domesticated species were represented by bones of *Gallus gallus* (domestic fowl) and *Anser anser* (goose). Omitted from these tables is a small quantity of bones retrieved from the >4mm sieved residues. These samples contained the same species as the hand-excavated assemblage, with the addition of one bone from a diver, either *Gavia arctica* (black-throated) or *G stellata* (red-throated diver), which was retrieved from a Period II context.

The frequency with which the various species occurred did not remain static in each period. In the case of the seabirds, there was a marked decrease in the numbers of Phalacrocoridae (cormorants/shags) found in the later Period III, compared with Period I. This decrease is also apparent in the case of the Laridae

Table 7.3 Numbers of bird bones and minimum numbers of individuals in Period III.

* 56 bones are from an individual fowl skeleton   ** 20 bones are from an individual raven skeleton

species		**number of fragments from 44 contexts**	**minimum number of individuals**
gannet	*Sula bassana*	34	4
cormorant	*Phalacrocorax carbo*	84	6
shag	*Phalacrocorax aristotelis*	145	10
cormorant/shag	*Phalacrocorax* sp	31	
goose (domestic/greylag)	*Anser anser*	30	5
pink-footed goose (or ?bean goose)	*Anser brachyrhynchus*(or *Anser fabalis*)	1	1
cf mallard	*Anas* cf *platyrhynchos*	4	1
cf shoveler	*Anas* cf *clypeata*	1	1
scaup/tufted duck	*Aythya marila/fuligula*	1	1
eider duck	*Somateria mollissima*	21	3
duck sp	Anatidae	1	
buzzard	*Buteo buteo*	1	1
domestic fowl	*Gallus gallus*	182*	11
curlew	*Numenius arquata*	1	1
wader	Family Scolopacidae	5	
black-headed gull	*Larus ridibundus*	11	4
herring/lesser black-backed gull	*Larus argentatus/fuscus*	109	10
greater black-backed gull	*Larus marinus*	17	2
gull sp	*Larus* sp	10	
black-headed gull/kittiwake	*Larus ridibundus/Rissa tridactyla*	10	
kittiwake	*Rissa tridactyla*	68	8
guillemot	*Uria aalge*	599	54
razorbill	*Alca torda*	21	2
guillemot/razorbill	*Uria/Alca*	63	
puffin	*Fratercula arcticai*	2	1
black guillemot (tystie)	*Cepphus grylle*	1	1
small auk sp		2	
great auk	*Alca impennis*	5	1
rock dove	*Columba livia*	19	4
blackbird	*Turdus merula*	1	1
thrush sp	*Turdus* sp	2	1
small passerine		1	1
jackdaw	*Corvus monedula*	1	1
raven	*Corvus corax*	20**	1
indeterminate bird species		201	
total		1705	

(gull family). In contrast, the number of Alcidae (auks, guillemots and razorbills) increased noticeably between Period II and III. Also most noticeable is the increase in the numbers of *Gallus gallus* (domestic fowl) bones in Period III as compared with the low frequency in the earlier periods.

Reference to the ages at which the birds were harvested indicates that in the case of the smaller gull species *Larus argentatus/fuscus* and *Larus ridibundus/Rissa tridactyla* (herring/lesser black-backed gull and black-headed gull/kittiwake), substantial numbers of the bones came from osteologically immature birds, particularly in the earliest period. Linked with the decreasing numbers of all species of gull in the assemblage with the passage of time, it may be speculated that the killing of large numbers of young gulls had an impact on the breeding population on the island, and it is therefore possible that hunting by man was a factor in this decrease.

In contrast, in the case of the auks most of the bones in all periods came from adults. However, the cull pattern may be explained by the birds' behaviour; the young of both guillemots and razorbills take to the sea at the age of only two to three weeks, before the chicks have fully fledged (that is, have formed their full complement of flight feathers) (Tuck and Heinzel 1978, 125). As with the auk family, a similarly high bias towards adult birds was noted in the cull pattern for cormorants/shags. Although the young birds leave the nest at about 5–6 weeks, they still remain with the colony, becoming independent at about 10–12 weeks (Tuck and Heinzel 1978, 71). It is more difficult to discern an age pattern in the case of the gannet because far fewer of its bones were found compared with the other seabirds. However, here too it seems that adult birds are better represented in the sample than immatures, although ethnographic evidence suggests that immature birds are preferred for ease of capture (Beatty 1992).

7.2.3 Butchery

There is no doubt that the birds recovered from the excavation were consumed as food. Some of the bones bear the marks of butchery, most often in the form of cuts made by metal knives. In Period I, six bones, five of which came from the wings of *Phalacrocorax carbo* (cormorant), *Uria aalge* (guillemot), *Larus argentatus/fuscus* (herring/lesser black-backed gull) and *Anser anser* (domestic/greylag goose), all bore knife cuts.

In Period II, bones of *Sula bassana* (gannet), *Phalacrocorax carbo* (cormorant), *Phalacrocorax aristotelis* (shag), *Phalacrocorax* sp (cormorant/shag), *Anser anser* (domestic/greylag goose), *Somateria mollissima* (eider duck), *Anas* cf *platyrhynchos* (cf mallard duck), *Larus argentatus/fuscus* (herring/lesser black-backed gull), *Gallus gallus* (domestic fowl) and *Uria aalge* (guillemot) all bore knife cuts. The femur, which bears the 'drumstick' meat, was the most commonly affected bone (seven examples). The cuts most probably came about when meat was removed from the bones, either before or after cooking. Some of the marks, however, were probably inflicted during disjointing of the carcasses to form smaller joints of meat. Cuts on the proximal articulation of an *Anas platyrhynchos* (mallard) ulna, for example, were most likely to have been made during removal of the wing. Several *Uria aalge* (guillemot) tibio-tarsi displayed small areas of damage on the distal articulations of the bone which indicated that the tarso-metatarsi (bones of the lower leg and feet) were twisted off at this joint, to be discarded.

In addition to cuts, some bones also appeared to have been chopped across the shafts. In most cases this was probably the result of butchery for meat, but in a few instances the chopped bones may represent broken or unfinished artefacts. For example, a small cross-section from a *Phalacrocorax carbo* (cormorant) ulna shaft, a trimmed shag (P. aristotelis) ulna shaft and a trimmed *Sula bassana* (gannet) radius may fall into this category. Likewise, two tibio-tarsi (one from *Phalacrocorax carbo* (cormorant) and one from a young *Phalacrocorax* sp (cormorant or shag) were butchered in such a way that the proximal bony crests were trimmed off, perhaps in a deliberate attempt to modify the shape of the shaft.

In Period III, the same species as in Period II, as well as probable *Anser brachyrhynchus* (pinkfooted goose), (or perhaps *Anser fabalis* (bean goose)), *Buteo buteo* (buzzard) and *Larus marinus* (greater black-backed gull), were all butchered and showed a similar pattern of cuts at the wing and leg articulations. In addition, bones of the shoulder girdle and even the toes and skull all bore cut marks. Several furculae (wishbones) of *Anser anser* (domestic/greylag goose) were chopped in half at the midline, implying division of the birds into two equal halves. A goose coracoid (a bone of the shoulder girdle) bore a depressed circular fracture consistent with the mark made by a small or medium bore shotgun pellet and may therefore be relatively recent.

Two individual skeletons from Post-Medieval Period III, one raven and one domestic fowl, probably came from birds which did not form part of the diet. The substantially complete raven skeleton (257), was probably a scavenger. Raven bones are commonly found on Scottish urban sites of medieval date, often associated with the middens from which they made their living. The domestic fowl skeleton (1216) showed no signs of butchery, and may represent a bird which died naturally, or was discarded as unfit for human consumption because of disease.

7.2.4 Status of bird species from the May

Sula bassana *(gannet)*

Excavations of prehistoric and Early Historic coastal settlement sites in the N and NW of Scotland, where substantial assemblages of bird bones have been found, have shown that the species most commonly exploited was the gannet (Serjeantson 1988, 213). This appears to be true from the Neolithic period (for example at Knap of Howar, Orkney) until as late as the 16th/17th centuries (the Udal, Outer Hebrides). This is in contrast with the assemblage from the May, where the gannet forms only 2 per cent of the total bird bones, compared with about 22 per cent in the Norse levels at the Udal (*ibid*, Figure 3). The nearest gannet breeding station at the present day is the famous colony on the Bass Rock, where they have been harvested from at least the 16th century until the late 19th century (Nelson 1989, 22). It is not inconceivable that the residents of the May made boat trips to the Bass in the breeding season in order to obtain gannet eggs and *gugas* (young gannets). However, gannets readily form new colonies (Nelson 1989, 22; Lloyd *et al* 1991, 78) and it is possible that the bones from the May represent birds which bred there. Certainly Baxter and Rintoul (1953, 466) quote evidence that young birds were taken from nests on the May some time before 1850, and that breeding was again attempted in 1922.

Phalacrocorax *sp (cormorant and shag)*

Although cormorants have not bred on the May since the early 19th century, up to a hundred birds may roost on the island's West Cliffs (Eggeling 1974). In the period represented by the excavated samples, it is possible that the birds, both young and adult, were captured on the island itself. Since the timing of the breeding season of both the cormorant and shag varies from year to year (Lloyd *et al* 1991, 83–4), the availability of the eggs and young birds would have been spread over a longer period than with the other seabirds.

Shags (also known variously by their local names of scarts, scarfies, etc) currently breed on the May. It seems that in the Early Historic period, shags may have been as numerous on the island as they are at the present day.

Auks
Uria aalge *(guillemot),* Alca torda *(razorbill),* Cepphus grylle *(black guillemot) (tystie),* Fratercula arctica *(puffin) and* Alca impennis *(great auk)*

The guillemot is currently one of the most numerous breeding seabirds in Britain (Lloyd *et al* 1991, 247). Historically, they were recorded as breeding on the May in 1710 by Sibbald (Baxter and Rintoul 1953, 682). However, archaeological evidence from the May indicates only a small number of young birds, the vast majority of the substantial numbers of bones found having come from adults.

Razorbills usually breed in company with guillemots and in Scotland are far outnumbered by the latter (Baxter and Rintoul 1953, 677). They are recorded as nesting on the Bass Rock in 1710 (*ibid*) and were possibly overlooked on the May at that time. Despite the difficulties in differentiating between the morphologically similar bones of Guillemot and Razorbill, there appeared to be far fewer razorbills than guillemots present in the archaeological assemblage.

Contrary to expectations, given that this species is now extremely common on the May, very few puffin bones were recovered from either the hand-excavated or the sieved samples. Puffins were first noted as breeding on the Forth islands in 1710 (*ibid*, 693).

Also of note were the bones of great auk. These were not numerous, but of great interest because, being flightless and thus relatively easy to catch, this bird was driven to extinction through hunting and egg collection by man by the mid-19th century. The eggs of the gairfowl, as it was known, were large and thus much prized as food. The great auk occurs regularly in Scottish archaeological bird assemblages, but is more frequent on prehistoric coastal sites than on Early Historic ones. They are recorded from broch sites in Caithness and Orkney; for example at Howe of Howe, Orkney, great auk bones were found in Late Iron Age contexts (Bramwell and Ballin Smith 1994, 153–4). However, great auk bones of Norse date have been recorded at Buckquoy, also on Orkney (Serjeantson 1988, 214). At Castle Park, Dunbar (East Lothian) from which the Forth Islands are easily accessible, a small number of great auk bones were recorded in the Iron Age phases (Smith 2000, 202–3).

Ducks
Somateria mollissima *(Eider duck),* Tadorna tadorna *(shelduck),* Anas platyrhynchos *(mallard),* Anas cf clypeata *(*cf *shoveler) and* Aythya marila/fuligula *(tufted duck/scaup)*

The first reference to the eider on the May was made in the early 17th century by the mapmaker Blaeu, who stated it was one of the commonest birds on the island (Baxter and Rintoul 1953, 426). In the Farne Islands, the eider was known as 'St Cuthbert's Chicken', since the seventh-century saint and hermit had an affinity for wild animals, and especially the eider. According to the 12th-century monk who wrote his *Life*, the eiders were assured of 'a continuity of peace and quiet, allowing no one to touch them, slaughter them, or molest them with any mischievous intent' (Grigson 1962, 183). It would seem that the May's inhabitants during the monastic period had not heard of this injunction, since eider duck bones were found with unmistakeable traces of knife cuts in both Periods II and III.

The other duck species found during the excavations occurred in only small numbers. Two shelduck bones were found in Period II contexts; this species is recorded by Sibbald in 1684 as the skeeling goose (Baxter and Rintoul 1953, 384). The single bone from *Aythya* sp in Period III is more likely to be from scaup (*A marila*) than from tufted duck (*A fuligula*) (A-M Smout pers comm); the scaup currently winters in substantial numbers off the coast of Fife (Smout 1986, 69–70). The bone identified as cf shoveler (*Anas* cf *clypeata*) matched a recent comparative specimen very well, but, since this species is unlikely to have bred on the May, the identification must remain tentative at best.

Gulls
Larus argentatus/fuscus *(herring /lesser black-backed gull),* Larus marinus *(greater black-backed gull)*

Unfortunately, the bones of herring gull and lesser black-backed gull are too similar in terms of their size and morphology to allow separation of the species. The herring gull was present in the Firth of Forth in 1710 (Baxter and Rintoul 1953, 644), although the lesser black-backed is not mentioned in historical records for the area until the later 19th century (*ibid*, 648), perhaps because of the same difficulty in distinguishing between the two.

Both species have apparently increased steadily from the low levels of the 19th century to the present day; Eggeling (1974, 133) was moved to remark on the 'fantastic expansion of the gull populations' which, he goes on to say, has 'profoundly altered the character of the island's vegetation and ... affected the stability of its soils'. From the archaeological evidence, it would appear that the population in the pre-Christian and medieval periods more closely resembled that of the present day than that of the 19th century, and that the fall in numbers during the post-medieval period may have marked the beginning of that decline in numbers.

The greater black-backed gull was recorded by Sibbald in the Firth of Forth in 1710 (Baxter and Rintoul 1953, 652). Being a large bird, the greater black-backed gull provides as much meat as a cormorant, although less than a gannet or greylag goose, making the meat worth the effort of capture. Kittiwakes and black-headed gulls are far less closely related than the herring and lesser black-backed gull, yet their bones are morphologically similar making them difficult to separate. Kittiwakes bred on both the May and the Bass in 1710 (Baxter and Rintoul 1953, 659).

7.2.5 Discussion

The bird assemblage from the excavations on the May has illustrated both the importance of seabirds as a food resource, and the nature and complexity of fluctuations in seabird population numbers. The large number of bones found demonstrates that seabirds, primarily those which bred on the May, or perhaps the Bass in the case of the gannets, provided an important source of food, in the form of eggs, meat and fats, for the inhabitants of the island throughout its occupation. Both immature and adult birds were killed and eaten, probably resulting in overexploitation of some species. This may explain the fall in the numbers of cormorants and shags killed in post-medieval Period III, compared with their earlier abundance. However, while the numbers of Phalacrocorids fell, the numbers of guillemots and razorbills which were killed rose. This may represent either a change in preference for the meat of the auk family because of overexploitation of larger species, or more likely, an increase in the local auk population. Such an increase is shown by records of the numbers of puffins breeding on the May. Despite currently breeding prolifically on the island, the excavation provided very little evidence of their presence. Since the people of the island appeared to capture all available bird species it is unlikely that they would have ignored puffins, had they been available. Indeed, ethnographic evidence from other Scottish island sites such as St Kilda shows that puffins are no less edible than other auk species. They are still enjoyed as food in the Faroe Islands at the present day, despite the disparagement of more modern writers who describe the flesh as 'excessively rank' (Simon 1983, 593). *Fulmarus glacialis* (fulmar), now a regular breeder on the May, was not represented in the excavated assemblage. Its absence would agree with the thinking that the distribution of the fulmar was much more restricted than at present and that it has spread steadily from Iceland to the Faroes and Shetland, particularly during the last 350 years. The availability of offal from whaling fleets and fishing trawlers is one factor which may have advanced the spread of the fulmar (Lloyd *et al* 1991, 38–9, 48).

An extreme example of change in status is shown by the bones of the great auk, now extinct. Found at European sites from the earliest prehistoric period onwards, the species is known to have declined greatly in numbers until the 19th century. With the destruction of its largest breeding colony, Funk Island off Newfoundland, about 1800, there was little chance for the species' recovery (Fisher and Lockley 1989, 67–9). The last great auk seen off the British coast was an individual killed on Stac an Armin, St Kilda, about 1840 (*ibid*, 71). While great auk bones were not plentiful in the period of occupation on the May, they did appear sporadically throughout the assemblage.

These birds did not only provide meat and fats for human consumption. Their feathers would have been a source of insulation and warmth for coverings and clothing; eiderdown is still renowned for these properties. In the early modern period, although the meat of seabirds began to fall out of favour in Scotland, the feathers were of economic importance, and formed for example, one of the few sources of monetary income for the people of St Kilda (Thompson 1988, 70–3) and Fair Isle (Hunter 1996, 24).

7.3 The mammal bone

Catherine Smith

7.3.1 Introduction

Due to financial considerations, only a fraction of the bone assemblage recovered from the site was studied in detail. A sampling strategy was thus employed to select contexts which were considered to be of archaeological importance from the 1994 and 1995 seasons of excavation. After inspecting the contents of all the bags of bone, twenty-two contexts were selected from Period I, 16 from Period II and five from Period III, on the basis of the context's archaeological significance. These contexts contained a total of 2530 mammalian fragments. A list of the contexts studied is included in the site archive. A separate catalogue of the bones from the 1993 season, amounting to 222 identified fragments, is given in Thoms (1994, *see* Archive).

Sampled contexts

Period I 420, 423, 438, 443, 453, 939, 952, 960, 964, 967, 973, 988, 1023, 1025, 1026, 1030, 1033, 1042, 1043, 1044, 1045, 1047

Period II 131, 329, 436, 1111, 1112, 1114, 1115, 1116, 1120, 1127, 1129, 1134, 1137, 1138, 1216, 1220

Period III 199, 257, 288, 471, 474

For methods and measurements used, see full finds report in the Archive.

7.3.2 Species found

The total number of bones identified from the sampled contexts is shown in Table 7.4. It should be noted that although the quantity of bones recorded from Period III was greater than from the other two periods, the number of contexts from which the Period III bones came was proportionately smaller. Although it is hoped that a representative sample has been taken from each period, this should be borne in mind when comparing the data.

Bones of domesticated mammals not surprisingly dominated the assemblage from the earliest to the latest periods. Most numerous in all three periods were the bones of sheep/goats, which probably all came from sheep. Only one bone, a fused radius and ulna, could definitely be ascribed to goat (Period III). Cattle were the next most numerous species present. Pigs were not plentiful, although a few bones were found in most of the contexts. Horse bones were present in very low numbers in each period. As for smaller domesticated mammals, only one bone of cat was found. Dog bones were not present in the sampled contexts; neither were they noted in the initial inspection of the whole assemblage. However, the effects of gnawing by carnivores, assumed to be dog, were noted on a number of the bones of the larger mammals.

Wild mammals, notably seal species, were also present in all three periods. Several skull fragments proved to be from *Halichoerus grypus* (grey seal), but, as many of the long bones came from juveniles, it was not possible to determine whether these were from the grey seal or from *Phoca vitulina* (common seal). Seals were most probably utilised as a food source since knife cuts and chop marks were found on many of the bones from the earliest to the latest period.

Other wild mammals, which were present in the latter two periods were *Oryctolagus cuniculus* (rabbit, most numerous in Period III), *Vulpes vulpes* (fox, Period II), cf *Lepus capensis* (probable hare, Period III), and *Rattus norvegicus* (rat species, possibly the brown rat in Period III). Most unusually, however, two species of deer were represented: a skull and some small antler fragments of *Cervus elaphus* (red deer) occurred in Period II and a group of phalanges (toe bones) from *Capreolus capreolus* (roe deer) in Period III. It is extremely unlikely that these animals were native to the May. In the case of red deer, the skull was probably imported to the island for its antlers, which had been butchered off. The roe deer feet may have been imported either as part of a carcass (of which no other trace remained), or attached to a partly prepared hide. A single pelvic fragment, possibly from red deer, was noted in the assemblage from a previous season of excavation on the May (Thoms 1994), so it seems possible that deer carcasses, or joints of meat were imported from the mainland. Whether the fox and hare bones came from animals native to the island is a matter of conjecture, but pressure from the human population would soon have driven them to extinction.

7.3.3 Ages of animals at death

Cattle

Data from those long bones which it was possible to assign to an age category are shown in Table 7.5. Newborn or foetal animals died, or were killed, in all periods, but it is notable that the highest proportion of very young calves was found in Period III (46.5 per cent). However, it is difficult to compare the rate of infant mortality across the periods, since the available sample number was much lower in Period I than in Period III. Juvenile animals were also killed in fairly high numbers in Period III. Some animals did, however, survive into adulthood in all three periods. Mandibular evidence of age at death of the cattle was rather sparse, but one mandible from Period II came from a newborn or foetal calf (Grant's (1982) mandible wear stage (MWS) 1). One other mandible from Period III was from a juvenile (MWS 4), one was from an adult, and one in which the fifth cusp of the third molar was in wear came from an older adult (MWS 47).

The reason for the relatively high infant mortality in Period III may be, at least in part, because the herd was kept primarily for milk: the older animals would therefore represent breeding cows, the calves being kept alive only in order that their mothers would provide

Table 7.4 *Total number of mammal bones in sampled contexts (1994 and 1995 seasons). Number of contexts sampled: Period I = 22, Period II = 16, Period III = 6.*

species		Period I	Period II	Period III	total
cattle		28	78	230	336
sheep/goat		50	88	441	579
goat				1	1
pig		13	29	23	65
horse		1	1	3	5
red deer	*Cervus elaphus*		3		3
roe deer	*Capreolus capreolus*			4	4
cat				1	1
fox	*Vulpes vulpes*		1		1
seal sp	*Halichoerus/Phoca*	19	14	31	64
cf seal		16	7	19	42
hare	*Lepus capensis*			1	1
rabbit	*Oryctolagus cuniculus*		9	216	225
rat sp	*Rattus* sp			3	3
large ungulate		18	55	124	197
small ungulate		41	80	315	436
indeterminate mammal		180	133	254	567
total		366	498	1666	2530

milk. In primitive cattle breeds, cows will not 'let down' their milk unless the calf is within sight of the mother. An alternative explanation for the high numbers of calf deaths is that weather conditions, especially during winter, may have been severe. There would also have been the problem of providing winter fodder, of which some presumably would have to be brought from the mainland. Animals may have been killed deliberately before the winter set in. Their carcasses could then have been preserved by salting to provide meat.

Sheep/goat

Epiphyseal fusion evidence is detailed in Table 7.6. Although very young animals died in each period, the survival rate in Period III was higher than for cattle; that is, more calves were slaughtered than were lambs. Mandibular evidence for sheep/goats corresponded very well with that from epiphyseal fusion. Approximately 38.1 per cent of the sheep died at Payne's (1973) stage D, between the ages of one and two years, in modern terms. This age stage corresponds with age category J and J/I, for long bones. Culling at this age indicates that the sheep would have produced at least one crop of wool, or one woolfell (the skin with wool attached) at slaughter. A number of older sheep/goats was also present: in Period II one individual lived to an age of between six and eight years, as did at least one animal in Period III (Payne's stage G). Long bone evidence also indicates that some animals were able to survive to older adulthood. These mature individuals probably represent breeding female sheep.

Pig

No pig mandibles were found. Long bone evidence is shown in Table 7.7. Despite the paucity of the evidence, it seems that the highest mortality was in the juvenile/immature range; few adults survived. This pattern of pig husbandry makes sound practical sense. Unlike cattle, which produce milk for human consumption, and sheep, which produce wool, pigs produce only their meat and fat, and unless they are required for breeding can be slaughtered as soon as the optimum carcass weight is reached. This seems to have been the case on the May; a few older animals did indeed survive, but in Periods II and III, these were in the minority.

7.3.4 Size of domestic livestock

The anatomical measurement data from Period III were compared with other sites in Scotland which have also produced post-medieval material, notably Meal Vennel, an urban site in Perth, and later phases from Castle Park, Dunbar. It was found that cattle measurements from the May compared favourably with those from Meal Vennel and Dunbar. Estimates of the withers heights of the live animals from the May were possible. These have been calculated for cattle from the greatest length of the metacarpal. Thus two animals from Period III stood at 0.98m and 1.042m at the withers (shoulders). Only one metacarpal was available from post-medieval Meal Vennel, and this too came from an animal of about 1.042 m. The animals from both the May and Meal Vennel also fell within the size ranges for medieval animals recorded at Perth High Street

Table 7.5 *Cattle long bones arranged by age category and Period.*

age category	Period I		Period II		Period III		total	
	number	*%*	*number*	*%*	*number*	*%*	*number*	*%*
foetal/neonatal/juvenile	1	6.3	2	6.3	46	46.5	49	33.3
juvenile	6	37.5	10	31.3	2	2.0	18	12.2
juvenile/immature	4	25.0	4	12.5	21	21.2	29	19.7
immature					1	1.0	1	0.7
immature/adult	3	18.8	15	46.9	17	17.2	35	23.8
adult	2	12.5	1	3.1	12	12.1	15	10.2
total	16	100.1	32	100.1	99	100.0	147	99.9

Table 7.6 *Sheep/goat long bones arranged by age category and Period.*

age category	Period I		Period II		Period III		total	
	number	*%*	*number*	*%*	*number*	*%*	*number*	*%*
foetal/neonatal	1	4.8	2	4.8	2	0.9	5	1.8
foetal/neonatal/juvenile	1	4.8	4	9.5	8	3.7	13	4.7
juvenile	1	4.8	4	9.5	26	12.0	31	11.1
juvenile/immature	8	38.1	8	19.0	80	37.0	96	34.4
immature					16	7.4	16	5.7
immature/adult	7	33.3	12	28.6	48	22.2	67	24.0
adult	3	14.3	12	28.6	36	16.7	51	18.3
total	21	100.1	42	100.0	216	99.9	279	100.0

Table 7.7 *Pig long bones arranged by age category and Period.*

age category	Period I		Period II		Period III		total	
	number	*%*	*number*	*%*	*number*	*%*	*number*	*%*
foetal/neonatal	1	20.0					1	2.9
juvenile/immature	4	80.0	13	76.5	10	76.9	27	77.1
immature			1	5.9			1	2.9
immature/adult			1	5.9	2	15.4	3	8.6
adult			2	11.8	1	7.7	3	8.6
total	5	100.0	17	100.1	13	100.0	35	100.1

(PHSE), where the withers height range was 0.956–1.134m (Hodgson *et al* forthcoming).

Measurements of sheep/goats were more plentiful than those of cattle, particularly in Period III. As with cattle, in the majority of the May measurements sheep compared well with those from post-medieval Meal Vennel. However, although a few individual measurements from the May were larger than those from post-medieval Perth, some were noticeably smaller. Calculations of withers heights using Teichert's (1975) factors for the humerus, radius and metacarpal indicated a size range for the May of 48.6–55.2cm. The size range for Meal Vennel was 50.7–59.9cm and for post-medieval Castle Park, Dunbar, 55.3–56.7cm. However, the medieval range estimated from the large sample at Perth High Street (46.8–65.8cm) encompassed the size ranges of all of these post-medieval assemblages. It is interesting to compare the height calculated from a modern defleshed Soay sheep which had an estimated withers height of 59cm. The small size of some of the sheep from the May possibly indicates the effect on their growth of more severe and exposed environmental conditions than those on the mainland.

7.3.5 Evidence of butchery

There was ample evidence of butchery, and of the implements used, on the bones of cattle, sheep, pig, red deer, seal and rabbit. The carcasses of the larger mammals were in general divided into sides or equal halves using axes or cleavers. Carcasses divided in this way must first be hung from a hook or a rail. Vertebrae of cattle, sheep and seal were chopped in this way, although there was also evidence from vertebrae which had been chopped along their lateral edges that not all the carcasses were hung up in order to be split into sides. Lateral splitting usually indicates that the carcass has been divided on a floor or other flat surface (Armitage 1982). There was no evidence that saws were used to divide carcasses. Instead, the chopping or hacking cuts on the bones indicated that, as was the practice in medieval and post-medieval Scotland, fleshers' axes or cleavers had been used. An axe had also been used to remove the antlers from the skull of a red deer in Period II. This is a fairly rough way to do the job, as the valuable antlers may be damaged in the process. Even at sites of early date it is more usual to find that antlers were sawn off, more or less carefully. The implication is that perhaps no saw was available for the task. Smaller mammals usually produce less evidence for butchery as it is not always necessary to dismember a small animal before cooking it. However there was evidence of knife cuts on the bones of rabbits in Period III, an important indicator that the animals were not intrusive, as is often the case on archaeological sites.

7.3.6 Discussion

The animal bones from the May provide essential evidence of diet and living conditions both for the animals and the human inhabitants of the island. Although it is possible that some animals were imported on to the island as preserved carcasses, for example, those of deer, it is unlikely that all of them arrived in this way. Eggeling (1960, 56) considered the water supply on the island to have been adequate to supply 'a few milking cows', although he did not think that they could have grazed there in any great number. The bone evidence does indeed seem to indicate that a milking cattle herd was kept. An early 17th-century source indicates that the May was used for grazing sheep, and in the 18th century the climate and conditions on the island were considered ideal for improving the coarse fleeces of sheep raised elsewhere in Scotland (*ibid*, 59). Possibly the grazing on the May was more suited to raising sheep than cattle.

Besides the domesticated animals, the inhabitants exploited a variety of wild species. Seals seem to have been butchered from the earliest period onwards, presumably for their meat, although the oil which could be obtained from them was also greatly valued. Vertebrae, presumed to be from seals, were chopped in half in the sagittal plane, indicating that they had been butchered in a similar way to the domestic animals. Knife cuts on seal skulls also indicate that the carcasses were skinned for their waterproof pelts. Young seals were also killed, possibly by clubbing them when they were hauled out on the rocks, as Martin Martin observed in North Uist in the early 18th century (Bonner 1989, 113). The value of seal meat to a religious community should not be underestimated since it was classed as 'fish' rather than 'flesh' and could therefore be eaten in Lent and on other days of fast and abstinence when all other meat was proscribed (*ibid*, 114). Some of the adult seals were *Halichoerus grypus* (the grey species) and although the juvenile bones were not definitely identified to species, it is more likely that these were also the grey rather than the common seal, since the former could be killed when basking on the rocks. The common seal is regularly seen off the May, but only rarely comes ashore (Eggeling 1985, 85) and would therefore be more difficult to kill without resorting to traps. Seal hunting on the May is documented in the Lord High Treasurer's Accounts for 1508, when the hermit of the May 'brocht ane selch [seal] to the King' and was paid 13 shillings for it (*ibid*, 87).

Rabbit bones were extremely plentiful in the assemblage, and were certainly utilised by the people of the May. On mainland Scottish sites of both medieval and post-medieval date the presence of rabbits has been difficult to prove, since they can burrow through archaeological deposits. However, since some of the rabbit bones from Period III of the May bear the evidence of knife cuts, there is proof that they were eaten or skinned and did not intrude into the deposits of their own accord. The establishment of a rabbit warren on the May is first noted in documentary sources in 1329 (*ibid*, 1960, 61). The rabbits were probably caught using ferrets, and it is notable that during the earlier season of excavation a mandible of polecat/ferret was found (Thoms 1994).

Although the inhabitants of the island would have had to be more or less self-sufficient in food production, as the wealth of cattle, sheep, rabbit and seal bones shows, there is also evidence that carcasses or parts of animals were imported. This is the only real explanation for the presence of red deer, roe deer, fox and hare bones, since the tree cover on the May cannot ever have been more than scrub (*see* Archaeobotanical analysis chapter 7.6).

7.4 The fish remains

Ruby Ceròn-Carrasco

7.4.1 Introduction

This report incorporates assessment analysis done by Dr James Barrett in 1993 and the results of the analysis of two contexts done by this author in 1994. Fish bones from 40 contexts from all three periods were selected for analysis. Methods used and a catalogue of species are in the Archive.

Period I Contexts included 420, 423, 443, 453, 831, 832, 848, 880, 912, 952, 960, 913, 939, 967, 987, 988, 1042 and 1043.
Period II Contexts included 131, 226, 238, 281, 282, 329, 374, 473, 865, 838, 906, 1118, 1127, 1134 and 1220.
Period III Contexts included 199, 225, 257, 288, 471 and 541.

Preservation of bone

The level of preservation was consistent across the site, in terms of fragment size and condition. Bones were most frequently 50–70 per cent complete. Their condition score was generally in the range of 7–9, indicating poorly to extremely poorly preserved bone.

Taxonomic analysis

The assemblage is dominated by fish of the cod family, in particular *Gadus morhua* (cod), *Melanogrammus aeglefinus* (haddock) and *Molva molva* (ling). *Pollachius pollachius* (Pollack) and *Pollachius virens* (saithe) were also present. cf *Merlangus merlangius* (possible whiting) was noted by Barrett in the 1992 assessment, but was not identified among the samples selected for this final report.

Non-Gadidae fish included *Clupea harengus* (herring), *Raja clavata* (rocker), *Scomber scombrus* (mackerel), *Eutrigla gurnardus* (grey gurnard), *Labrus bergylta* (ballan wrasse), *Lophius piscatorius* (angler fish), *Solea solea* (sole), tentative identifications were also made for cf *Scophthalmus maximus* (turbot), cf *Dicentrarchus labrax* (sea bass), *Anharichas lupus* (catfish) and *Scyliorhinus canicula* (dogfish). Also present were species of *Myoxocephalus scorpius* (bull-rout) and *Pholis gunellus* (butterfish). The only freshwater fish present was *Salmo salar* (salmon) or *Salmo trutta* (trout).

7.4.2 Discussion by Period

Period I

Eleven different species were identified from this period, with cod the main species represented followed by haddock. Ling and possible pollack were also present. Non-gadoid species included herring, rocker, grey gurnard, mackerel, ballan wrasse and Salmonidae.

Period II

Fifteen different species were identified from Period II cod (Gadidae family) and herring (Clupeidae family) were the main species represented; these were followed by other Gadidae identified to ling and haddock. Saithe is also present and pollack. Other non-gadoid species were represented by rocker, grey gurnard, mackerel, ballan wrasse, sole, possible halibut, possible bass, bull-rout and butterfish.

Period III

Sixteen species were identified. Haddock followed by cod were the main species represented in this period; these were followed by other Gadidae identified as ling, pollack and saithe. Non-gadoid species recovered from this phase included rocker, herring, ballan wrasse, sole, angler fish, dogfish and catfish, bull-rout, dragonet and butterfish vertebrae and salmon/trout.

7.4.3 General discussion

Gadidae was the main group represented in the assemblage and this was constant throughout all

Table 7.8 *Number of individuals identified to species (NISP) per Period.*

species		Period I	Period II	Period III	topsoil
cod, haddock, whiting or pollock	Gadidae	90	627	1293	20
cod	*Gadus morhua*	53	392	380	11
?cod	?*Gadus morhua*	2	3	22	
haddock	*Melanogrammus aeglefinus*	35	214	237	
?Haddock	?*Melanogrammus aeglefinus*		6	1	
ling	*Molva molva*	4	92	77	1
?ling	?*Molva molva*		1	4	
pollack	*Pollachis pollachius*		21	66	
?pollack	?*Pollachius pollachius*	1	71	8	
saith	*Pollachius virens*		5	143	
?saith	?*Pollachius virens*			16	
total Gadidae elements		185	1432	2247	32
rocker	*Raja clavata*	1	8	30	
dogfish	*Scyliorhinus canicula*			1	
herring	*Clupea harengus*	16	32	162	
grey gurnard	*Eutrigla gurnardus*	2		6	12
mackerel	*Scomber scombrus*	1	11		
ballan wrasse	*Labrus bergylta*		29	28	
angler fish	*Lophius piscatorius*			4	
sole	*Solea solea*			8	
flounder	Pleuronectidae			1	
?turbot	?*Scophthalmus maximus*			3	
?sea bass	?*Dicentrarchus labrax*			1	
catfish	*Anarhichas lupus*			2	
bull-rout	*Myoxocephalus scorpius*			1	
butterfish	*Pholis gunellus*			1	
salmon/trout	Salmonidae	1		14	
total non-Gadidae elements		21	80	262	12
unidentifiable fragments		236	2397	2839	15

periods. Cod was the main species identified from this family group, followed by haddock. Ling, pollack and saithe were also present. The quantities of fish bones suggest that they were brought to the island on a relatively small scale, probably for immediate consumption, rather than as part of any industrial processing. All the above species have had a long history as important sources of food and some, in particular cod, ling and haddock, may have been either consumed fresh or as salted, dried or smoked products. The industry of salting and/or drying fish had been in practice from at least Norse times, and expanded during medieval and post-medieval times to cater for Christian dietary norms. Meat was a forbidden food by papal decree on more than a quarter of the days of the year (Lockhart 1997), and so fish was an obvious alternative dish. From 1490 there have been fishing treaties, and disputes with Denmark and Iceland over cod fishing grounds can be traced back over many centuries (*ibid*). *Gadus morhua* (Cod) has been one of the most important food fish in the British fish fauna, and has been exploited ever since people began to fish the seas of Europe. Its value as prime food is enormous and when salted or dried it keeps for winter consumption or trade (Wheeler 1978).

Importance of herring

Herring (Clupeidae family) has been one of the most important species in Scotland's fishing history. The fishing of herring in Scotland can be traced over centuries with documents showing an early export trade with Holland. By the Middle Ages the Dutch were fishing in Scottish waters themselves and, given the large distance to travel with their catches, they were probably the first to gut and salt herring while still at sea (Lockhart 1997). Although the Stuart kings had made efforts to strengthen the home fishing fleet by restricting foreign landings, by the 1600s the Dutch introduced armed fishing protection. However, after their fleet was defeated at the Battle of Camperdown, the Scottish herring fleet held dominance until the end of the 19th century. As a food source, herring is more nourishing and contains more essential vitamins and minerals than any other fish, flesh or fowl. They are at their best in the summer and early autumn when they are well-fed and plump in appearance. There is no closed season, but those caught in the spring are generally thin and tasteless. Being a fatty fish, it cannot be cured by simple salting and drying or it would soon became rancid. Heavy salting and smoking over a wood fire is needed if it is to be transported over long distances (Lockhart 1997). It was also preserved by salt pickling. Such techniques became an important economic asset during the medieval period in northern Europe and led to the development of large-scale fishing (Wheeler and Jones 1989).

Fishing methods

The size range of the Gadidae remains indicates that fishing was practised using at least two methods. The first was simple line fishing for young Gadidae specimens from locations on the rocky shore and the second the use of boat, line and hook for the larger species of Gadidae like cod, haddock and ling which inhabit deeper waters. This is apparent throughout the three periods. Fishing for rocker, dogfish, catfish, wrasse, gurnard and possibly the Salmonidae species would also have been done from boats using lines. The presence of elements from dragonet, bull-rout and butterfish may be explained in terms of accidental catches from the rocky shore or as residue left by the feeding activities of marine mammals or birds. These species are of no nutritious value for human consumption. Fishing may have been undertaken throughout the year. It is likely that deep sea, offshore fishing was pursued during summer months when the weather would have provided safer conditions.

Economy and diet

To medieval people fish was almost as vital as bread. Dietary proscriptions meant that for about half the days of the year everyone had to eat fish (Black 1993). Fish resources have thus played an important part in the religious and social history of Scotland. Many abbeys and other religious houses were granted fishing rights by the kings of Scotland, for example the Valliscaulian priories of Pluscarden, Beauly and Ardchattan derived a large part of their incomes from salmon fisheries (Anson 1950). It is also known that in 1298 the monks of Coldingham obtained free rights to fish the neighbouring waters around Eyemouth (March 1970, 86).

The May is mentioned in this way shortly before the middle of the 12th century when it is alleged King David I, who was responsible for setting up many of the religious houses in Scotland, made a gift of the May and its fishing grounds to the abbey of Reading in Berkshire. Duncan (1959) pointed out the value of such endowment: according to the life of St Kentigern, written between 1147 and 1164, the fishings of May 'abounded so much that from every shore came many fishermen, English, Scots, and men from the shores of Belgium and France for the sake of fishing, all of whom the May receives in its harbours'. In 1153, among the laws of King David I which dealt with commerce was one providing that all goods brought by sea should be landed prior to sale, except salt and herring, which might be sold on board the vessels (Samuel 1918). Apart from the emphasis in the priory writs on fishing, there is independent evidence to support this statement in a writ from King William protecting the canons of Holyrood from illegal distraint 'either in *Scotia* or at the May, when the men (of Holyrood) came there to fish' (Duncan 1959).

Evidence for fish processing

Most of the elements of the fish skeleton seem to be well represented in the assemblage which suggests that the species were brought whole to the site, on a relatively small scale. Even cleithra, which is sometimes left in exported stockfish (dried cod family fishes) in early modern Europe, are well represented, although most were in such eroded conditions they could only be assigned to the Gadidae family. The only exception to this were cleithra from haddock which are quite robust, survive well in archaeological assemblages and are quite distinct and easily identifiable.

Elements with cut-marks were recovered from context 226 belonging to Period II which include a supraclavicle from Gadidae of 'large' category and an atlas vertebra tentatively assigned as belonging to cf *Gadus morhua* (a 'large' cod) which displayed longitudinal cuts. A basioccipital from a 'very large' Gadidae displayed longitudinal cuts (context 257). Contexts from Period III contained elements with cut marks which included a branchiostegal and post-temporal from Gadidae of the 'very large' category (context 129), a branchiostegal from a 'medium' size Gadidae and a branchiostegal and a supraclavicle from 'very large' Gadidae (context 541). Cut-marks on basioccipital and atlas vertebrae may have been incurred during the removal of the head, while cut-marks on posttemporal, branchiostegals and supracleithra are usually incurred during gutting. The presence of burnt elements is also important as these usually indicate cooking and/or rubbish burning, indicating domestic activity. Only two contexts from Period II contained remains which were burnt or black suggesting burning. These are two hearth contexts, 238 and 282.

Comparison with other sites

The fish bone assemblage from the May can be compared to those of other Scottish sites of similar dates. A small assemblage from the late medieval friary at Jedburgh yielded fish remains which included herring, freshwater eel and cod (Ceròn-Carrasco 1992). At Carrick Castle, herring and cod were the most represented species in the 14th–15th centuries. While in the early to mid 16th century herring was the main species present, Gadidae, rocker and possible sea bass were also represented. The late 16th to early 17th centuries produced herring and cod as the main species, with saithe, pollack, haddock, Salmonidae, rocker, *Limanda limanda* (dab) and *Pagellus bogaraveo* (red sea bream) also present. In the later 17th century there were remains from cod, pollack, saithe, *Merluccius merluccius* (hake), herring, Salmonidae, dab, possible red sea bream and rocker (Ceròn- Carrasco 1997).

The excavations at Chambers Street, Edinburgh, produced contexts dating to the 15th to the 17th century, which produced mainly herring and Gadidae (cod, haddock and saithe). These species formed during this period the basis of the people's diet in growing urban areas with easy access to sea resources. Other species present were rocker, freshwater eel and Salmonidae (Ceròn-Carrasco 1995).

7.4.4 Conclusions

It is important to understand that fishing added not only to the subsistence of life throughout the periods here in question, but that it has also been an important contributor to the development of religious, social and political issues. Throughout the history of the May, there are accounts of the abundance of fish in its waters. This has proven to be the case when looking into the times of the monks, not only with written references but now with archaeo-ichthyological evidence which also add to the history of a flourishing fishing industry in Fife from the 17th century until its decline in the early 1900s.

7.5 The marine shell, with notes on the crustacean and echinoidea remains

Ruby Ceròn-Carrasco

7.5.1 Introduction

The methods and tables of results are in the Archive.

Period I Contexts (sieved) 327, 391, 418, 420, 459, 912, 946, 952, 960, 980, 987, 988, 994, 1016

Period II Contexts (sieved) 238, 281, 282, 329, 357, 363, 364, 374, 436, 446, 492, 884, 966, 1031, 1032, 1127, 1218, 1219, plus hand-collected shells from 130, 147, 150, 154, 156, 160, 220, 228, 492, 496, 819, 938, 950, 1211

Period III Contexts (sieved) 1009, 402, 1007, 257, plus hand-collected shells from 100, 102, 130, 143, 157, 197, 199, 257, 271, 280, 298, 300, 331, 476, 484, 494, 495, 509, 512, 528, 540, 564, 800, 801, 807, 809, 903, 932

7.5.2 Species present

The most common edible species present were the *Patella vulgate* (limpet) and the *Littorina littorea* (edible periwinkle). *Patella vulgate* is the most common limpet and is found throughout the Scottish coast on all rocky shores. Edible periwinkle is found on rocks, stones and seaweed on the middle and lower shore, but is found by the shore during breeding seasons. Other edible species included the *Buccinum undatum* (common whelk), which is found on sand and mud from shallow water down to about 100m, *Mytilus edulis* (common mussel), found on rocks in estuaries and on rocks in exposed shores often in extensive beds, and *Ostrea edulis* (the common oyster), also found in shallow waters. Very few specimens of *Cerastoderma edule* (common cockle) were recovered; these are found on the lower shore burrowed in sand, mud or gravel. Two species of scallop were recovered: *Chlamys opercularis* (the queen scallop) and *Pecten maximus* (the St James' shell scallop). Both these species are found on sand and gravel: the queen scallop is found on extreme lower shore down to about 200m, while the St James' shell scallop is usually found in quite deep water.

Other non-edible species recovered were *Littorina littoralis* (flat periwinkle) found on seaweed (*Fucus vesiculostus* (bladderwrack) and *Ascophyllum nosodum* (knotted wrack), *Littorina saxatilis* (rough periwinkle) and *Littorina neritoides* (small periwinkle), both of which inhabit crevices and cracks on stones, *Gibbula cineraria* (grey topshell) found under stones and seaweed on the lower shore, *Trivia monaca* (the European cowrie), usually found among rocks on the lower shore, *Nassarius reticulatus* (the netted dogwhelk), found under stones often in muddy areas on the lower shore, and the *Nucella lapillus* (dogwhelk) which inhabits rocky shores in crevices and among barnacles (on which it preys). *Neptuna antiqua* (the spindle shell) was also present: this is very similar to *Baccium undatum* (the common whelk) but with a smoother surface and very pronounced ridge whorls. They are very seldom found alive on the shore, but empty shells are not uncommon in the Scottish coast (often occupied by hermit crab).

7.5.3 Discussion of Periods

Period I

A total of 1978.5g of shells was retrieved from sieved contexts in Period I, dominated by 749g from context 960 which consists of shell sand, probably brought from the beach and so is not representing an exploited resource. Edible periwinkle (*Littorina littorea*) is the most common species from the other contexts in this period, followed by the flat periwinkle (*Littorina littoralis*) and rough periwinkle (*Littorina saxatilis*). The flat periwinkle is found on seaweed, bladderwrack (*Focus vesiculatus)* and knotted wrack (*Ascophyllum nodosum)*. Both types of seaweeds are common around the Scottish coast, found on rocks on the middle shore (Campbell 1989) and the species of flat periwinkles may therefore have been attached to the rotted seaweed found in this period. There is much evidence of burning (contexts 459, 952, 980 and 987), in particular from species of edible shell such as the edible periwinkle and the common limpet (*Patella vulgata*) and the edible mussel (*Mytilus edulis*), which may indicate rubbish burning of food residue as well as cooking in the form of baking of the molluscs on top of open fires.

Period II

A total of 1404.4g of shells was retrieved from sieved contexts in Period II. The most common species present in this phase is the flat periwinkle (*Littorina littoralis*), with evidence of burning from context 238 which derives from a hearth. Edible periwinkle is also well represented in this phase, including burnt samples also from context 238 and from context 1032 (fill of cist burial 1033). The common limpet (*Patella vulgata*) is also represented, and some burnt fragments were recovered.

Contexts 156 and 819 contained specimens of the St James' shell scallop (*Pecten maximus*) and context 492 contained a sample of the queen scallop (*Chlamys opercularis*). Neither of these species is included in the species represented in the locally collected beach sand, which indicates that they were deliberately brought into the site. The common limpet (*Patella vulgata*) appears crushed and burnt in context 131.

Period III

A total of 648g of shells was retrieved from sieved contexts in Period III. The most represented species in this phase is the common limpet (*Patella vulgata*). Oyster (*Ostrea edulis*) and mussel (*Mytilus edulis*), and appear to be more common in this phase compared to the earlier periods. It is also apparent that hand-collected samples of the queen scallop (*Chlamys opercularis*) and the St James' shell (*Pecten maximus*) are more common in this phase. The oyster and both species of scallop represented in this phase have been introduced from a source other than the beach sand.

7.5.4 General discussion

Beach sand samples taken from the May show the accessibility of the marine molluscs analysed here. The beach sand sample contained mainly flat periwinkle (*Littorina littoralis*) and grey topshell (*Gibbula cineraria*). Also present were edible periwinkle (*Littorina littorea*), limpet (*Patella vulgata*), small periwinkle (*Littorina neritoides*) and fragments of mussel (*Mytilus edulis*). Most of the contexts from the three periods contained species which would have been easily collected from the beach.

Limpets are edible and, although chewy, when boiled they produce a milky broth or they can be fried. Limpets have also been used traditionally as fishing baits. They are gathered by sharply knocking them from their toeholds on rocks, a technique which requires swiftness, accuracy and practice. Edible periwinkles are found in rockpools along the shoreline and are still gathered by hand. They have always been plentiful and are usually eaten boiled. Whelks are caught from the sea in baited pots or baskets and eaten boiled. Mussel (*Mytilus edulis*) can be found around the Scottish coast. It is abundant in clean conditions especially where salt and fresh water meet, such as the mouth of burns entering the sea. The Firth of Forth has been one of the most productive areas in Scotland. In Scotland mussel has also been a prime bait used for lines (Lockhart 1997). The oyster (*Ostrea edulis*) in Scotland is particularly associated with the E coast, around the Forth before 1800s there was a productive exploitation of this shell (*ibid*).

The scallop shell in particular is of great interest in this assemblage as this has been considered as the symbol of St James and the cult of pilgrimage to Santiago de Compostela in Galicia, northern Spain (see Chapter 10.3.2). One of the most interesting finds regarding the shell from May is the scallop found in the mouth of skeleton 155. This scallop has been identified as a specimen of the St James' shell (*Pecten maximus*). Both types of scallop – the queen scallop and the St James shell scallop – recovered at the May are common in Scotland and both are edible. Queen scallops (*Chlamys opercularis*) were extensively fished in the last century and very large beds existed in the Firth of Forth which were fished for bait (Tebble 1976). As the St James shell scallop has to be fished at deep water, the samples from the May were either deliberately fished or perhaps brought to the island by a pilgrim.

7.5.5 Notes on the crustacean and echinoidea remains

Fragments of burnt crab were recovered from Period I. These were chela and claw fragments of the edible crab *Cancer pagurus*. All the fragments were burnt, implying possible rubbish burning of food residue. *Cancer pagurus* is common in the North Sea where it inhabits rocks from the lower shore down to about 100m (Campbell 1989). Crab remains were recovered from all phases. Fragments of the edible sea urchin *Echinus esculentus* were also recovered from Period I. Sea urchin, like most marine species, is a food rich in iron and must have been an important addition to the diet of people in coastal sites. *Echinus esculentus* is widely distributed in the North Sea and is found among rocks and seaweed from the extreme lower shore down to 50m (Campbell 1989). The manner of cooking sea urchin is by to boil it or to roast it on hot stones (Renfrew 1991), although they can also be eaten raw. Sea urchin was present in all periods. Tube remains of *Pomatoceros triqueter* were also recovered from Period I. These belong to the family Serpulidae which are tube-dwelling polychaetes (bristle worms) common in the North Sea. These are found in the lower shore and in shallow water, often on small flat stones or on shells.

7.6 Archaeobotanical analysis

Dr Jennifer Miller and Dr Susan Ramsay

7.6.1 Introduction

During the course of the excavations some environmental samples were assessed with a view to prioritising them for closer consideration, and several were examined more fully (Boardman and Thomas 1993; Alldritt 1995; Aldritt 1997). The results obtained by these earlier studies have been collated with those obtained here and discussed collectively at the end. The May has an exposed aspect and the cold, easterly winds coming in from the North Sea ensure an open, almost tree-less landscape today. It is most likely that this situation has remained since antiquity. The examination of plant macrofossils from an archaeological site can reveal a great deal of information about the local and regional environment and the community's impact on it in terms of agriculture and exploitation of materials for construction, fuel, bedding and other household activities. In a well-drained, dry-land site such as the May the only plant materials which remain are all carbonised. This puts a particular bias on the kind of information which can be revealed about the area, but has the advantage of both ensuring the likely influence of the community on their deposition, and of enabling a simplistic way to recognise likely modern contaminants which are not carbonised. Samples were selected for analysis based on preliminary assessments which had identified the relative abundance of plant macrofossils in each context. A further consideration was to give a representative spread of samples across the three periods of the site, and, wherever possible, to include samples of particular environmental interest.

7.6.2 Discussion of Periods

Period I: Early Christian

These contexts are not primary midden deposits but were redeposited between the fifth and twelfth centuries, during construction of the burial cairn, burial cists and within burnt patches beneath the priory.

Charcoal identified from Period I included small amounts of *Quercus* (oak), *Salix* (willow), *Betula* (birch) and *Fucus vesiculosus* (bladderwrack seaweed). It is unlikely that oak was growing in any great numbers on this exposed island, and so oak charcoal may have come from either imported timber from the mainland or driftwood. However, willow and birch are small, hardy shrub/trees which are more likely to have grown on the island itself. Neither species is favoured for construction, lending themselves more to small item turnery (Edlin 1973) or firewood. Consequently they are less liable to have been imported. The seaweed fragments are indicative of either tinder or lye manufacture, but the contaminated nature of the contexts and small number of fragments make further conclusions impossible. These samples also contained cinder, bone (some burnt) and shell.

Carbonised seeds present were generally low in number, but are representative of a range of habitats, most especially damp grassland and heath. Arable indicators were scarce, and the one *Hordeum* sp (barley) found may be contemporary or contaminant from later periods of the site. In Period I contexts there were proportionately more non-carbonised seeds than carbonised seeds, the majority of which were probably modern. These were also indicative of a damp grassy environment. Presence of modern rabbit faeces in one sample emphasises the disturbed nature of the contexts.

Period II: medieval

These contexts consist of hearths, midden and latrine deposits.

Hearth deposits
Surprisingly for hearth contexts, the levels of charcoal found were very low, although the abundant indeterminate cinder may have been from this origin. Types found included *Quercus* (oak), *Corylus* (hazel), *Salix* (willow) and *Betula* (birch). The provenance of all these species can be explained as in the Period I contexts, with the addition of hazel in a natural scrub woodland.

By far the greatest abundance of carbonised seeds came from the hearth deposits, reflecting the bias of environmental evidence to be found on the majority of dry land sites. Cereals present in the assemblage include *Avena sativa* (cultivated oat), *Hordeum vulgare* (6-row barley) including var *vulgare* (hulled barley) and *Triticum aestivum sl* (bread/club wheat). Low numbers of each species and inconsistency of spread throughout the samples means it is not possible to suggest which crop (if any) was favoured. Small amounts of chaff in the samples and the frequency of common medieval crop contaminants implies that the early stages of crop processing, including parching, occurred on the island itself. Weeds identified from the assemblage are numerous, including *Agrostemma githago* (corncockle), *Avena fatua* (wild oat), Brassica *rapa* spp *campestris* (wild turnip), *Bromus* spp. (brome), various Caryophyllaceae (pink family) including *Cerastium* and *Stellaria* species and *Spergula arvensis* (corn spurrey), *Chenopodium album* (fat hen), *Galium aparine* (cleavers) and various Polygonaceae (knotweeds and docks) including *Persicaria* and *Rumex* spp. Their frequency suggests crops which have not yet been thoroughly gleaned to remove weed seeds. Many of the weeds found are annuals and indicative of spring-sown crops, suggesting a fertile soil which has been deeply ploughed (Jones 1988) as would be expected from this period. The presence of seeds of low-growing species such as *Spergula arvensis, Stellaria media* (chickweed) and *Cerastium* sp (mouse-ear) indicates that crops have been cut low on the culm. However, is not possible to suggest whether the cereals were grown on the island or imported. Barley tolerates a degree of salinity (Zohary and Hopf 1993) and more marginal conditions than wheat, and oats are a valuable crop on marginal exposed land including the Western Isles. Consequently, it is at least possible that some of the crop assemblage could have been grown locally. Nevertheless it is more likely that cereals would have been grown in more sheltered mainland conditions and transported to the island. The very low levels of cereal pollen found (Milburn and Tipping unpubl) concur with this theory.

Grassland and heath are indicated by small Poaceae (grasses) including *Agrostis* (bents), *Danthonia decumbens* (heath grass) and *Poa* (meadow grass), Cyperaceae (sedges) including *Carex* (sedge) and *Scirpus* spp (club-rush). With *Menyanthes trifoliata* (bog bean),

Table 7.9 *Samples wet sieved by period*

Period	context	description
I	418	Loose soil which sealed the burial 444 also contained a few very small charred fragments of woven wool
I	420	White, red and black ash, lying over the platform and beneath the earliest church foundations. Also contained a late-tenth century coin fragment
I	459	A deposit of loam with burnt patches (459) beneath the priory church which contained small amounts of oak
		charcoal, and one sherd of SWGW (which could be intrusive)
I	879	A burnt orange/red layer with black and grey ash patches in Trench L, sealing the raised-beach platform. It contained a large, broken, round-headed bone needle, a piece of bloomery bottom, but no pottery
I	988	Beneath the paved road 883 in the cemetery
II	238	Layer of burnt sand within an open hearth in the E range also contained sherds of SWGW.
II	281	Primary layer of black and grey ash with charcoal, along beneath layer 238 in the E range
II	282 x 2	Another hearth (239) in the E range contained mixed burnt material with sherds of SWGW, animal bone, window glass and tile
II	402	The earliest surviving floor in the Cluniac church, comprising sandy silt with shells
II	446	Deposit of dark-brown silty clay sealing the human waste deposits within the latrine
II	1013	A midden layer in Trench X, possibly related to an external S range
II	1218	Patch of charcoal within the latrine
II	1219	A layer of grey clay in Trench V containing a SWGW handle
II	1220	A thin layer of yellow brown fibrous material within the latrine
III	257 x 2	Redeposited midden within the cloister
III	903	Post-medieval layer in the cemetery
III	1012	A post-medieval midden layer in Trench X

they suggest varied habitats ranging from damp to distinctly wetter conditions. A capsule and some stem fragments of *Calluna vulgaris* (heather) and seeds of the low-growing *Potentilla erecta* (tormentil) are further indications of the presence of heath in the vicinity. Carbonised cleistogenes (vegetative reproductive units) of *Danthonia decumbens* in the hearth suggest burning of cut turf rather than hay, and it is most likely that turf cut from the local environment was an additional source of fuel. Turf has been used for burning and construction since antiquity, and has frequently been recorded in hearth contexts on archaeological sites (e.g. Howe, Orkney: Dickson 1994; Easter Kinnear, Fife: Dickson 1997) where it formed a supplement to other fuels (Fenton 1978). Fenton further suggests the use of turf to slow down a fire for parching cereals, and the association of arable/crop assemblages and turf indicators in these contexts make this supposition a distinct possibility.

The stripping of the organic turf layer from the underlying soil leads to soil impoverishment and sometimes erosion. This contrasts with the conditions required for arable agriculture, and indeed with the arable weed flora found. This may be further indication of cereal importation rather than local cultivation. Little charcoal was discovered in the hearth contexts compared to the frequency of carbonised seeds, and the local pollen record (Milburn and Tipping unpubl) shows very low levels of tree pollen, which could be due to long-distance wind transport from the mainland. It is possible that the high levels of carbonised grassy/heath turf indicators reflect the use of local resources following the depletion of the scrub woodland on the island in the pre- or early monastic phase of the site.

Some unburnt coal implies the use of fossil fuel, and indeterminate cinder could have been from any source, although coal or wood is suspected.

Many wild plants have medicinal possibilities, but in these contexts *Hyoscyamus niger* (henbane) and cf *Chelidonium majus* (greater celandine) are notable. The acrid latex of *Chelidonium majus* has medicinal use against stomach, intestinal and liver problems, and the fresh sap is effective against warts (Stuart 1989). The plant grows today in ruderal communities near habitation (Stace 1997). In an archaeological context the species has been associated with medieval monastic sites in England and Europe and the only known Scottish record for the species is also monastic, from the 15th-century drains of Paisley Abbey (Dickson 1996). Henbane has a coastal distribution and still grows on the May today (H James pers comm), but the species is not commonly occurring and its appearance in a monastic settlement such as this one must be considered relevant. The medicinal constituents of henbane are found in the greatest concentration in the leaves but are represented to a lesser degree in the rest of the plant, including the seeds. The active constituents include hyoscyamine, atropine and hyoscine, to which narcotic, analgesic and sedative properties are attributed (Stuart 1989). Seeds have been found in association with *Papaver somniferum* (opium poppy) and *Atropa belladonna* (deadly nightshade) at the medieval hospital at Soutra Hill near Edinburgh (Moffat 1992). These are thought to have been used in sleep-inducing concoctions prior to major surgery. Although presence on this site does not imply use, both these species would have been available and are likely to have been exploited. There was very little evidence of modern contamination in the hearth contexts.

Toilet/midden deposits
The samples delivered for examination were not waterlogged, and consequently it is not surprising that few plant macrofossils were found in the toilet deposits. Those found were carbonised and may indicate midden rather than human waste due to their intact, non-processed, nature and the presence of 0.15g *Salix* (willow) charcoal in context 1219. Seeds found include *Bromus* sp (brome), indeterminate cereals, *Galium aparine* (cleavers), *Rumex* sp (docks), *Stellaria* cf *media* (cf chickweed) and one *Triticum* sp (wheat), all of which represent crop processing waste. Low levels of modern contamination imply only moderate disturbance in modern times. The recurring presence of various types of bone, shell and cinder is further evidence for the suggestion that these contexts represent midden rather than toilet deposits.

Period III: post-medieval

The contexts included in this period were very mixed midden deposits. Few carbonised macrofossils of any description were recovered from this phase. The only direct evidence of crop remains is one cf *Hordeum* sp (cf barley) from context 1012, although there is indirect evidence in the form of two *Chenopodium album* (fat hen) from context 257 and one *Chenopodium* sp (goosefoot) and one *Galium aparine* (cleavers) from context 402. The *Fragaria vesca* seed from 402 is evidence for possible wild food. Other carbonised macrofossils from 402 were indicative of damp grassland and may be the remains of burnt turf. As these were the only carbonised plant macrofossils recovered from Period III, they may represent contamination from earlier phases or represent activities following the decline of the monastic settlement. Modern seeds in the assemblage were also few in number and there was no identifiable charcoal, but abundant cinder and bone. The results here concur with the theory of redeposited post-medieval midden material. No further environmental conclusions can be drawn from the results outlined for Period III.

7.6.3 Conclusions

There is a distinct difference between the macrofossil results obtained here for each of the three phases identified on the May. Period I, the pre-monastic settlement, has proportionately more charcoal but very few indications of agriculture, and is more contaminated by relatively modern influences. This means that it is not possible to make accurate conclusions about the economy of this community other than those outlined above, but the pollen evidence of Milburn and Tipping (unpubl) suggests that the landscape may have been more wooded in this phase than at any time since. This agrees with the higher levels of charcoal found in Period I contexts.

Period II, in contrast, has less charcoal and higher levels of carbonised seeds, especially in the hearth contexts. These were significantly richer in seeds than any other context on the site. Cereal crops of barley, wheat and oats were found in hearth contexts in association with large numbers of arable weeds implying that the later stages of crop processing were carried out on site. It is considered that, due to the open, exposed location of the May, crops were not grown on the island itself but may have been transported from the mainland nearby. The significant proportion of grassy/heath indicators are highly suggestive of the use of burnt turf as either a supplementary fuel or to slow down the fire during crop processing. Henbane and cf greater celandine seeds in hearth assemblages represent medicinal possibilities. Low levels of charcoal and proportionately higher levels of coal and cinder concur with the theory of a diminishing scrub woodland on the island.

The majority of the Period III contexts were almost barren with respect to plant macrofossils and cannot be used to reconstruct environmental conditions on the May. Only context 402 contained more than trace levels of carbonised macrofossils.

7.6.4 Previous palaeobotanical assessments

The results obtained in preliminary reports by Alldritt (1995, 1997) tend to support the findings of this study, with the only additional taxon found being cf *Picea/Larix* (cf spruce/larch). However, the Period III contexts examined by Boardman and Thomas (1993) contained a greater variety of carbonised remains than those contexts included in the present study. Unfortunately, as this report was only preliminary, there is no indication given as to quantities involved. The additional charcoal taxa found by Boardman and Thomas include Pomoideae (*Sorbus* type), *Alnus* (alder), *Fraxinus* (ash), cf *Ulmus* (cf elm) and *Picea/Pinus* (spruce/pine). Pomoideae and *Alnus* may have grown on the island, and *Sorbus* spp seeds were found during this investigation. All other types could have been imported or arrived as driftwood. Boardman and Thomas also found several cereal types in their Period III contexts which were not identified from similar phased contexts during the present study. These include *Avena* sp (oat), *Hordeum vulgare* (6-row barley) var *vulgare* (hulled barley) and *Triticum aestivum* (bread/club wheat). No other carbonised macrofossils are recorded, and the similarity of this assemblage to the Period II context cereals found by the present authors would tend to support the theory suggested that the Period III samples are from redeposited Period II midden material.

7.7 Palaeoenvironmental investigations at South Plateau and Three Tarn Nick

Dr Paula Milburn and Dr Richard Tipping,

Reconnaissance in August 1993 by Dr Richard Tipping established that sediment accumulations on the island were few. However, two sites containing organic deposits

Table 7.10 *Radiocarbon dates obtained on peat samples from the Isle of May.*

laboratory number	site	depth	date 1σ	date 2σ
GU-3886	South Plateau	0.36–0.38 m	930 ± 50 BP 1024–1166 (1σ) cal AD	1010–1220 (2σ) cal AD
GU-3887	Three Tarn Nick	0.45–0.47 m	1070 ± 50 BP 897–1012 (1σ) cal AD	880–1030 (2σ) cal AD
GU-3888	Three Tarn Nick	0.001–0.025 m	modern	modern

Table 7.11 *Summary of results from analyses of subsamples of concretions.*

Remains scored on a three-point scale, from + (ne or a few examples noted) to +++ (major component of the subsample(s) examined

samples	**11**			**42**					**45**
contexts	**459.1**	**459.2**	**459.3**	**1216.1**	**1216.2**	**1216.3**	**1216.4**	**1216.5**	**1220**
amorphous organic material	++	+	+	?	?				+
diatoms									+
charcoal					+				
unidentified plant epidermis or other tissue (including mineral-replaced material)	+	+	+		+	+	+	+	+
xylem spiral thickenings	+								+
tracheids	+								
mineral-replaced wood fragments							?		
plant hairs	++					+			+
phytoliths	+			?					+
Gramineae/Cerealia epidermis	+								
Triticum/*Secale* 'bran'	+	?							?
unidentified pollen	+		+				+		+
large Gramineae/Cerealia type pollen	++								+
Centaurea cyanus pollen	+								
Trichuris eggs	++								+
arthropod cuticle	+					+	+	+	
mineral-replaced fly puparia							+		
?cancellous bone	+								

were located, at South Plateau (NT 690 893) and Three Tarn Nick (NT 637 947) (Illus 1.3). Pollen was preserved quite well in all of the samples examined from Three Tarn Nick, and in nine of the fourteen samples from South Plateau. Low pollen concentrations, poor pollen preservation and low organic content (between 0.44–0.48m at South Plateau, and 0.42–0.65m at Three Tarn Nick) suggest the development of a poor organic soil. The transition from soil development to the start of peat accumulation was indicated by an abrupt increase in pollen concentrations at 0.38m (c1020) at South Plateau and a gradual increase in pollen concentrations and organic content from 0.42m (c955) at Three Tarn Nick.

7.8 Concretions from the latrine and early church

Allan Hall

Two samples of concreted material from the fill of a rock-cut chute (1216) beneath the reredorter of the priory and one from beneath the priory church (459) were submitted for investigation of plant and invertebrate remains, with the specific aim of looking for eggs of parasitic worms and for food remains as evidence that the concretions contained faecal material.

There is little doubt that several of these concretions contained or, indeed, consisted of faecal material, and on the basis of the measurements of *Trichuris* eggs this was probably human in origin (they are closely similar in size to the eggs reported by Jones (1983) from a human stool of Anglo-Scandinavian date from a site at 6–8 Pavement in York). Slight evidence for cereal-based foods in the form of 'bran' and (probably also the grass/ cereal and cornflower pollen) was found in one of the samples, but in general plant material was not well enough preserved to be identified. The presence of fly puparia in some specimens is typical of, but not necessarily diagnostic for, concretions containing faecal matter.

The full report is in the Archive.