The Bulletin of the Board of Celtic Studies, 36, 1989

Analyses of a Cesspit Fill from the Tudor Merchant's House, Tenby, Dyfed

The Archaeological Context

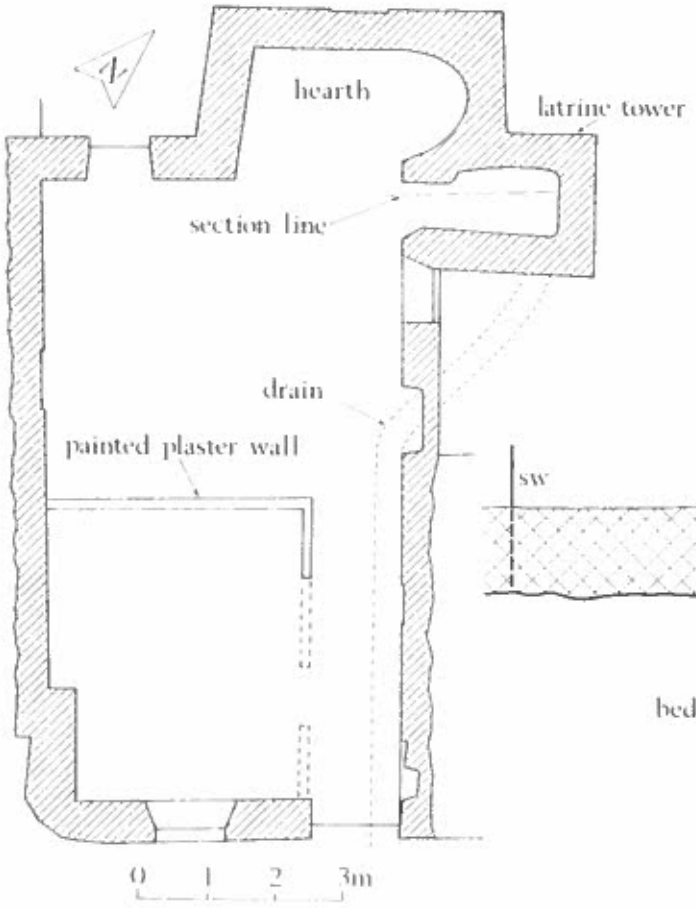
THE Tudor Merchant's House (formerly called The Old House) stands in Quay Street, Tenby, Dyfed, and represents the only reasonably complete example of early domestic architecture in the town, although houses immediately to the south and west possess features indicative of an early date.

Tudor Merchant's House is a three-storey, stone-built structure, with a massive ground floor fireplace (Fig. 1), a hearth on the north wall of the first floor served by a circular chimney and a chimney serving the top floor partly corbelled out over the street. Four raised crucks, resting on corbels, support the roof (Perry and Tonkin 1975, Thomas 1964). Entry to the house is now by a door opening onto the street, with access between floors by means of modern staircases. A blocked doorway on the north wall of the first floor may indicate an original entrance to the building, which would have been reached by an external flight of stone steps, an architectural feature that survived on some houses in Tenby up to the beginning of the 19th century (Norris 1812, 73). Attached to the north-west corner of the house is a latrine tower which would have served all three floors. It was at the base of this tower that the cesspit was excavated.

A 15th century date for the house is generally accepted (Perry and Tonkin 1975, 31, W. G. Thomas pers. comm.), and clearly it was built for a personage of some wealth, perhaps the 'Merchant' element in the modern house's name is not a misnomer.

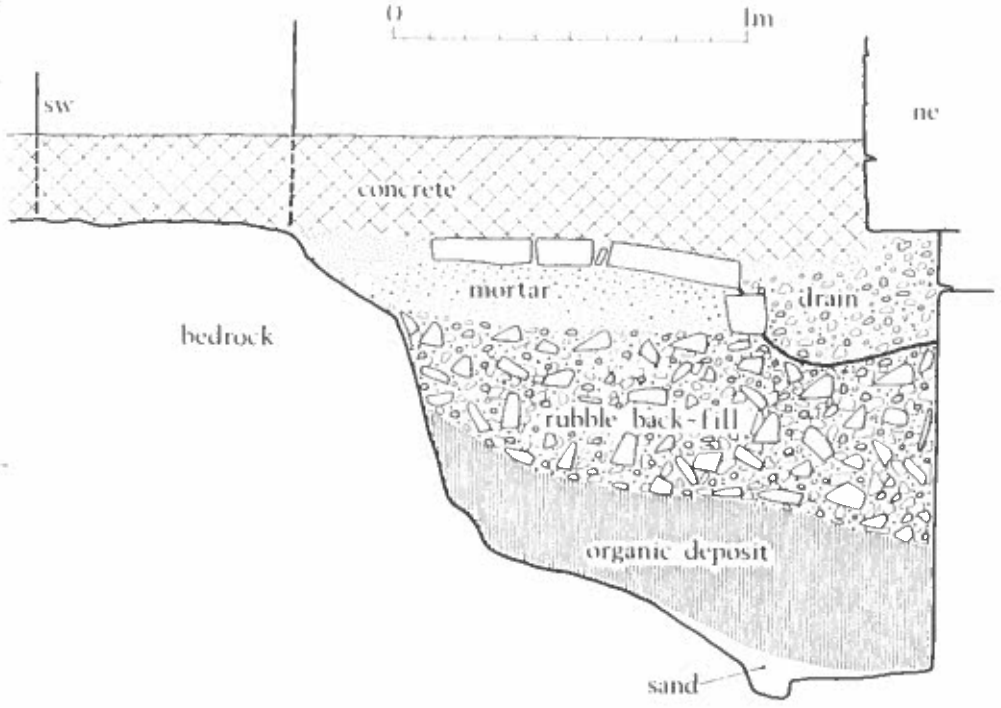
In 1939 the house was restored by the National Trust. By 1984 further renovation was required, including the removal of a massive concrete raft floor which was laid in 1939. During the ripping up of this floor limited archaeological investigation was undertaken by the author and two other members of the Dyfed Archaeological Trust. A quantity of pottery was recovered during excavation; this has been published elsewhere (Murphy and O'Mahoney 1985). It was possible to demonstrate that *in-situ*, early, stratified floor deposits survived (these are preserved under a new cement floor), and that a painted partition wall was not an original feature of the house. However, the most important discovery was organic remains in a cesspit at the base of the latrine tower.

The cesspit, (Fig. 1) carved out of the shale bed-rock, measured 1.5 m. in length and 1 m. in width (i.e. the internal dimensions of the latrine tower), and was 1.3 m. deep. A drain sprang from the top of the eastern side of the pit, although it is not certain if this was an original feature. All three floors were served by the cesspit, but a narrowing of the entrance to the latrine tower on the ground floor suggests a door was located there, perhaps a tight-fitting door which was kept closed, only used when the cesspit needed emptying. Even so, the presence within the house of a large quantity of mature sewage must have been unhygienic in the extreme, especially considering its location next to the large fireplace—the main cooking area of the house.



ground floor plan

section of cess pit



Covering the bed-rock at the bottom of the cesspit was a thin layer of beach sand, probably laid down during the last emptying of the pit with the purpose of absorbing excess fluid. A 0.45 m. thick heavily mineralised organic layer overlay the sand. During excavation it was assumed that human faeces made up the majority of this organic layer; a bulk sample of it was therefore taken, with the hope of obtaining environmental, economic and dietary evidence. The results of analyses of this sample appear below.

With such a relatively small cesspit the dumping of domestic refuse in it was probably discouraged; this is reflected in the small quantity of discarded pottery and other rubbish in the organic layer. Apart from the pottery the only other domestic debris was a few small pieces of greenish coloured window glass, the remains of two bronze pins and a quantity of ash, cinders, and charcoal; these latter items perhaps deposited to absorb odours and excess liquid. Sherds of four pottery vessels (Murphy and O'Mahoney 1985, 29-30, Fig. 2) were recovered from the organic layer; two north Devon jars, a jar of unknown origin and Merida type vessel (from Spain or Portugal), all compatible with a 16th century date.

Above and compressing the organic layer was a mass of rubble and mortar backfill. Pottery in this layer was of different types from that in the organic layer and of a later date—17-18th centuries (Murphy and O'Mahoney 1985, 32-33, Fig. 2). Over the rubble backfill was built a cement-lined drain, which was sealed by the concrete floor laid in 1939.

The contrast in the assemblages of pottery from the organic layer and rubble backfill is not easy to explain. Possibly the cesspit was boarded over when it fell into disuse, without first being cleaned out. When the organic material had subsided, perhaps up to a century later, rubble was tipped into the pit, further compressing the lower fill. On the basis of the pottery the final use of the cesspit can be tentatively dated to the 16th century, though it may be later, with the backfilling of the pit dated to the 17-18th centuries.

Acknowledgements:

I would like to express my gratitude to members of the National Trust for allowing the excavation to take place. Also I would like to thank M. G. Bell and W. G. Thomas for their help and comments on drafts of this paper.

KENNETH MURPHY

BOTANICAL REMAINS

A 6 kg. sample of the organic material was wet sieved using 1.7 mm., 0.5 mm. and 0.25 mm. mesh sieves. Some of the brittle concreted lumps of organic material recovered were then disaggregated using caustic soda, resieved and then dried. All the 1.7 mm. fraction and subsamples of finer fractions were scanned for biological remains using a stereoscopic microscope at × 10 magnification. Sorting of the finer fractions ceased as soon as no more new species were noticed.

Much of the plant material was mineralised; conditions in cesspits seem to favour calcium phosphate replacement of certain organic compounds (Hall *et al.* 1983, Green 1979). Also present were unaltered plant fragments and carbonised material. Some of these remains were cemented together forming brittle lumps, on the surface of which tissue impressions could also be noted.

Table 1 lists the species identified. Many were identified from fragments of the testa or seed coat which was often not mineralised. Breaking of the testa could have occurred during the grinding involved in food preparation or mastication. Indeterminate mineralised kernels lacking the distinguishing features of the seed coat were also present. Many of the other fragments and impressions noted, probably remains of the leafy and root parts of the diet, were ignored, although identification of such material is not impossible (Tomlinson 1985, Morris 1917), but impracticable in the time available.

The plants identified are discussed below, first the mineralised and non-mineralised remains under the headings of (a) fruit, (b) herbs, (c) cereal, and (d) fibres and stems, then (e) carbonised plant remains.

(a) Fruit

As seems to be usual in such deposits a high proportion of the species identified were of fruit (Greig 1983). These could have been preserved as today for consumption throughout the year by drying, pickling etc. Some of these techniques include the pips and stones, although the waste from jellies etc. may have been disposed of in the latrine. Some fruit, e.g. fig and blackberry, do include large numbers of small pips and may thus appear a more important part of the diet than is possibly the case.

The *Prunus* stones recovered compare well in size with modern damson and sloe stones. Few were entire. Entire stones of what are today considered to be the more palatable cultivated varieties of *Prunus* were not found, and pieces of their endocarp if present would probably be indistinguishable from those of damson or sloe. Impressions of *Prunus* fruit skin were noted in a concreted lump (pers. comm. Tomlinson).

It is impossible to determine whether the strawberries, raspberries and apples were of wild or cultivated varieties, they were certainly cultivated in medieval Britain (Turner 1882, Tyssen Amherst 1898, Hendrick 1972), but could have been collected in local woods. Elderberries, hips and haws could have been collected and used to make conserves, jellies, sauces and wine.

Figs, grapes, raisins and prunes were imported through Welsh ports in the Elizabethan era (Lewis 1927). Figs and grapes could have been grown locally, and it is possible that the *Prunus* stones attributed to damson above were from the imported prunes.

Table 1

Botanical list

Nomenclature as used by Clapham, Tutin and Warburg, 1962. Taxonomic order as in Dandy, 1958.

* = carbonised material

Pteridium aqualinum (L.) Kuhn		pinnules*	bracken
Chelidonium majus L.	3	seed	greater celandine
Brassica sp.	4	seed	cabbage/mustard
cf. *Lepidium latifolium* L.	1	seed	dittander
Chenopodium album L.	4	seed	fat hen
Atriplex sp.	2	seed	orache
Linum usitatissimum L.	2	seed	flax
L. usitatissimum/ Cannibis sativa L.		fibre	flax/hemp
Vitis vinifera L.	205	seed	grape
Ulex sp.		spines*	gorse
cf. *Rubus ideaus* L.	7	seed	raspberry
Rubus fruticosus agg.	440	seed	blackberry
Fragama vesca L.	100	seed	strawberry
Rosa cf. *camina* L.	1	seed	dogrose
Prunus sp.		fruit skin/ fruit stone (endocarp pieces)	plum species
species	n	plant part recovered	common name
Prunus spinosa L.	100	fruitstone	sloe
Prunus domestica ssp. insititia (L.) C. K. Schneid	28	fruitstone	damson
Crataegus monogyna Jacq.	1	seed	hawthorn
Malus sylvestris Mill.	9	seed	apple
Coriandrum sativum L.	3	seed	coriander
Foeniculum vulgare Mill.	2	seed	fennel
Polygonum lapathifolium L.	1	seed	pale persicaria
Rumex sp.	1	seed	dock
Rumex acetosella agg.	1	seed	sheep's sorrel
Humulus lupulus L.		?bracts/calices	hop
Ficus carica L.	180	seed	fig
Sambucus nigra L.	10	seed	elder
Lapsana communis L.	1	seed	nipplewort
Gramineae	1	seed*	grass
Gramineal sect. Cerealia	12	grain* straw* straw bran (pericarp)	indeterminate cereals
Triticum sp.	2	grain* bran (pericarp)	wheat
Hordeum vulgare L.			
Avena sp.			
indeterminate plant part			
Bryophytes indet.			
Hypnum cupressiforme			
egg shell/membranes			
animal hair			

(b) Herbs

Today, orache, fat he
as weeds of cultivatic
accidentally collected,

Greater celandine, c
ruins and town walls;
disorders.

Lepidium latifolium, c
until pepper and horse
area, but is found near
plant (Ellis 1983).

Coriander, fennel a
seeds, which have culi

Bracts of hop were
hedgerow plant. Apart
(Grigson 1975).

Flax has long been
to eat after heating. T

(c) Cereal

There was not a lot of
(pers, comm. Hall). T
however, records from
(Mead 1931) indicate t
had been sifted.

(d) Fibres and stems

Small pieces of woven
hemp or flax (pers. com
flax and linen are reco

Hordeum vulgare L.	2	grain*	barley
Avena sp.	14	grain*	oat
indeterminate plant parts		charcoal	
		twigs/stems*	
		straw	
		kernels	
		epidermis	
Bryophytes indet.		shoot*	mosses
Hypnum cupressiforme		shoot*	mosses
egg shell/membranes			
animal hair			

(b) Herbs

Today, orache, fat hen, nipplewort, pale persicaria, sheep's sorrel and dock grow commonly as weeds of cultivation, in waste places and in coastal habitats. They could have been accidentally collected, although some may have been used as food.

Greater celandine, once a garden plant (Grigson 1975), is today common on waste places, ruins and town walls; it produces a yellow latex, which has been used to treat warts and eye disorders.

Lepidium latifolium, dittander or poor man's pepper, was once cultivated and used as spice until pepper and horse-radish replaced it (Grigson 1975), now it does not grow in the Tenby area, but is found near Swansea (Perring and Walters 1976). It is not considered a native Welsh plant (Ellis 1983).

Coriander, fennel and black mustard (*Brassica nigra*) could have been cultivated for their seeds, which have culinary and medicinal uses.

Bracts of hop were recovered embedded in a concreted lump of material. Hop is a native hedgerow plant. Apart from its use in brewing the young shoots can be cooked as a vegetable (Grigson 1975).

Flax has long been cultivated for its fibre and seeds, the latter are poisonous but are safe to eat after heating. They also have medicinal uses.

(c) Cereal

There was not a lot of cereal bran recovered, some of which was identified as wheat pericarp (pers. comm. Hall). This could suggest that cereals did not form a large part of the diet; however, records from a Tudor house at Ingatestone, Essex (Emmison 1964) and elsewhere (Mead 1931) indicate that at this time bread was being made from flour from which the bran had been sifted.

(d) Fibres and stems

Small pieces of woven material were recovered from the cess pit, the fibres of which were either hemp or flax (pers. comm. Tomlinson; see also Textile Fragments pp. 259-60). Hemp and Irish flax and linen are recorded as imports into Tenby in the 16th century (Lewis 1927, 154, 165

and 70). These pieces could be the remains of 'toilet paper' and sanitary towels. The sheep's wool recovered could have had the same purpose.

Abundant fragments of mineralised stems were recovered. They could possibly be the remains of hay used as 'toilet paper' and/or rushes and straw used as floor covering, which once soiled could have been thrown into the pit to absorb excess liquid.

(e) Carbonised plant material

Carbonised plant material, coal, cinder and charcoal were present. These materials could have been useful in absorbing odour, possibly essential as the pit was next to the cooking area of the house. Carbonised gorse spines were identified. Gorse burns very hot and may have been used in a bread oven or for kindling. There were many carbonised twigs of small diameter (1-2 mm.), possibly gorse. The bracken and bryophytes could have been collected with the gorse.

Carbonised cereal grains might have been produced either when cereal grains fell on to the floor during food preparation and were then swept into the fire, or when straw and chaff including a few grains were used for kindling.

The presence of carbonised barley, as well as hop bracts, suggests the brewing of beer, although the barley grain recovered had not germinated; oats and wheat could have been used instead of barley. The port books record that hops and barley malt were imported into Tenby (Lewis 1927, 155 and 136) and that oat malt was traded along the south Wales coast (op. cit. 224-25).

SUMMARY

The boticanal remains from the cesspit proved to be predominantly of fruit pips and stones, maybe suggesting the consumption of fruit all the year, or that the sample was deposited in the summer and early autumn. Also recovered were seeds of some weeds of cultivation, and bits of plant tissue, some of which could be identified as wheat pericarp. The fabric fragments and sheep's wool noted were possibly used for sanitary purposes. Many stems, maybe the remains of hay or sedges and herbs, perhaps used for strewing and then thrown into the pit to absorb excess liquid were present. Some of these plant remains were mineralised, especially the seed kernels and plant stems, the rest appeared unaltered. Also found was carbonised material, very likely from the fires in the house and used to absorb odour.

The range of plant remains recovered from this cess pit are similar to those noted from others (pers. comm. Robinson; Dennell 1970, Greig, 1981 and 1983). The most noticeable features being the abundance of fruit remains, and the preservation by mineralisation caused by the chemical environment created by the concentration of urine and faeces.

Acknowledgements

I would like to thank P. Tomlinson, A. Hall, H. Kenward, J. Greig, M. Robinson and M. Bell for their help and criticism.

SANDRA NYE

THE POLLEN

The pollen was extrac
was prepared using st
perfectly preserved. C
enough for mineralisa
(oil immersion), and
one were both scanne
the numbers of poller

Pollen types in taxonom

taxon
Pinus
Cruciferae
Spergula
Caryophyllaceae
Chenopodiaceae
Vitis vinifera
cf. *Medicago*
Trifolium repens
Lotus tp.
Vicia faba
cf. *Lathyrus*
Leguminosae
Potentilla tp.
cf. *Agrimonia* tp.
cf. *Prunus* tp.
cf. *Crataegus* tp.
Rosaceae
Hedera helix
Umbelliferae
Polygonum bistorta tp.
Polygonum persicaria tp.
Polygonum convolvulus
Urtica
Cannabiaceae
Corylus tp.
Quercus

THE POLLEN

The pollen was extracted from a few grams of the organic material from the cesspit. The sample was prepared using standard methods. The pollen was fairly plentiful and quite well, but not perfectly preserved. One would not expect there to be good preservation in conditions alkaline enough for mineralisation to occur. The pollen counts were made under × 100 magnification (oil immersion), and when enough had been counted the rest of that slide and the duplicate one were both scanned for extra pollen types, which are recorded as '+' in the column giving the numbers of pollen grains found (Table 2).

Table 2

Pollen list

Pollen types in taxonomic order (Clapham, Tutin and Warburg, 1962).

taxon	n	%		macrofossil record
Pinus	+	+	pine	—
Cruciferae	23	10	cabbage family	*Brassica* sp.
Spergula	1	+	corn spurrey	—
Caryophyllaceae	1	+	pink family	—
Chenopodiaceae	2	1	goosefoot	*Chenopodium*
Vitis vinifera	1	+	grape	*Vitis vinifera*
cf. *Medicago*	3	1	lucerne	—
Trifolium repens	4	2	white clover	—
Lotus tp.	3	2	birdsfoot-trefoil	—
Vicia faba	+	+	field bean	—
cf. *Lathyrus*	+	+	vetchling	—
Leguminosae	1	+	pea family	—
Potentilla tp.	1	+	cinquefoil	*Fragaria vesca*
cf. *Agrimonia* tp.	1	+	? agrimony	—
cf. *Prunus* tp.	1	+	plums etc.	*Prunus institia*
cf. *Crataegus* tp.	1	+	hawthorn	*Crataegus*
Rosaceae	9	4	rose family	perhaps *Rubus*
Hedera helix	1	+	ivy	—
Umbelliferae	13	5	umbellifers	*Foeniculum* etc.
Polygonum bistorta tp.	1	+	bistort	—
Polygonum persicaria tp.	1	+	persicaria	*P. lapathifolium*
Polygonum convolvulus	1	+	black bindweed	—
Urtica	2	1	nettle	—
Cannabiaceae	1	+	hop/hemp	*Humulus lupulus*
Corylus tp.	+	+	hazel	—
Quercus	4	2	oak	—

Ericaceae	1	+	? heath	—
Borago	1	+	borage	—
Rhinanthus tp.	2	1	yellow rattle etc.	—
cf. *Stachys*	2	1	? woundwort	—
Labiatae	1	1	mint family	—
Plantago media	+	+	hoary plantain	—
Plantago lanceolata	7	3	ribwort plantain	—
Campanulaceae	3	1	harebell family	—
Rubiaceae	+	+	bedstraw family	—
Dipsacaceae	+	+	scabious family	—
Compositae Aster tp.	6	3	daisies etc.	—
Anthemis tp.	7	3	mayweeds etc.	—
Cirsium/Carduus tp.	1	+	thistles	—
Centaurea scabiosa	1	+	greater knapweed	—
Centaurea cyanus	1	+	cornflower	—
Centaurea nigra	6	3	knapweed	—
Compositae [L]	36	15	dandelions etc.	*Lapsana communis*
Potamogeton tp.	1	+	pondweed	—
Cyperaceae	5	2	sedges	—
Gramineae	53	22	grasses	*Gramineae*
sect. Cerealia	27	11	cereals	*Avena, Hordeum, Triticum*
total	237	94		
unknowns	21			
Pteridium	2		bracken frond	
Polypodium	1		clubmoss	
Trichuris	+ +			
Ascaris	+			

The pollen results add something to the information already obtained from macrofossils. Dealing with the foodplants first, cereals are quite abundant in the pollen record (11%) although this could have come from straw or bran in the macrofossil record. There is not much sign in the pollen record of the abundant fruit remains, although it is interesting to note that pollen of grape, hawthorn and plums etc. was found and the Cannabiaceae pollen probably corresponds to the hop (*Humulus lupulus*) which was found. Two pollen records, of borage (*Borago officinalis*) and field bean (*Vicia faba*) show the presence of food plants not in the macrofossil record.

The pollen of various weeds, especially cornfield ones, was found such as corn spurrey (*Spergula*), black bindweed (*Polygonum convolvulus*), cornflower (*Centaurea cyanus*) and perhaps the mayweed group (*Anthemis* tp.). Only goosefoot (Chenopodiaceae) and the dandelion group

(Compositae [L]) seeme
album), orache (*Atriplex* sp
should be more evidence
cornfield weed seeds are

Grassland plants were
such as birdsfoot-trefoil (
lanceolata), the knapweed
record too (Gramineae).
might be expected if ger

Part of the pollen reco
a few extra taxa that are
and borage, and others
and coriander. The corn
at the same time the seec
The absence of such we
enough to remove them
records are harder to ex
may have been found at
ivy pollen. This represen
calcareous grassland and
might possibly have come
seems possible for the po
in preparation).

FLY PUPARIA

The sample consists of m
which are completely diss
I have found useful for p

Most of the puparia ar
the larvae of which live in
I have also found them a
York. The Tenby sample
some evidence that the pu
pupae, which I believe to
to be sure of this even w

There are also some fra
mentioned above these c

(Compositae [Ll) seemed to have corresponding macrofossil records, of fat hen (*Chenopodium album*), orache (*Atriplex* sp.) and nipplewort (*Lapsana communis*). It is a little surprising that there should be more evidence of cornfield weeds from the pollen than from the macrofossils; usually cornfield weed seeds are very much in evidence.

Grassland plants were also present in the pollen records, including a range of Leguminosae such as birdsfoot-trefoil (*Lotus* tp.) and white clover (*Trifolium repeus*), ribwort plantain (*Plantago lanceolata*), the knapweeds (*Centaurea scabiosa* and *C. nigra*) and probably the large grass pollen record too (Gramineae). There is no indication from the macrofossils of grassland plants, as might be expected if general rubbish was present in the pit.

Part of the pollen record compares well with what would be expected from the macrofossils; a few extra taxa that are more easily preserved and identified from the pollen such as field bean and borage, and others not recorded such as fig, or not specifically identified such as fennel and coriander. The cornfield weed pollen component is often found in such sewage, although at the same time the seeds of the weeds are present either whole or in a broken (milled) state. The absence of such weed seeds could be evidence of flour that was milled or sifted finely enough to remove them, yet still containing some of the pollen. Some of the other pollen records are harder to explain where there are no corresponding macrofossils, although these may have been found at other sites, such as the grassland plants, the heath and perhaps the ivy pollen. This represents very diverse habitats not probably present in Tenby itself, such as calcareous grassland and heathland, as well as ivy. Most of them are insect pollinated and might possibly have come from honey, although it is difficult to prove it. A similar explanation seems possible for the pollen from the latrine of the Provost of Oriel College, Oxford (Greig, in preparation).

JAMES GREIG

FLY PUPARIA

The sample consists of mineralised insect remains (picked out during the botanical analysis) which are completely dissolved in strong HCl and can therefore not be treated by the methods I have found useful for puparia.

Most of the puparia are identifiable as those of the ephydrid fly *Teichomyza fusca* Macquart, the larvae of which live in foul water, especially in cesspits or at least materials soaked in urine. I have also found them adhering to the outside of faecal masses in samples from Coppergate, York. The Tenby sample contains mineralised masses which may well be faecal and there is some evidence that the puparia were partly embedded in these. There are also some 'naked' pupae, which I believe to have dropped out of damaged puparia, but it would not be possible to be sure of this even with well preserved material.

There are also some fragments of larger puparia, possibly of Muscidae, but for the reasons mentioned above these cannot be further determined.

JOHN PHIPPS

THE VERTEBRATE REMAINS

The vertebrate remains were extracted from a 6 kg. sample of the organic material sieved to 0.3 mm. Most of the bones are less than 10 mm. in size and are generally well preserved. Many of these small bones may have passed through the human gut and will therefore give a direct reflection of the diet of the inhabitants of the house.

Table 3 summarises the species represented in terms of fragment counts. Some of the fish vertebrae had a slightly squashed and distorted appearance typical of bones which have passed through the gut.

The presence of at least fifteen species indicates a rich and varied diet. Fish are particularly well represented. Comments on habitats and fishing techniques given below are from Wheeler (1978) and Wilkinson (1979). Herring and bass are the most common, but the majority of the bones of these two species are extremely small, indicating that they were probably eaten as whitebait. Large schools of young herring are common inshore and are taken by surface net, where they make up a large part of the whitebait catch. The eel vertebrae are also small, suggesting that they are from young eels at the fresh-water stage of their lives. The elvers enter the rivers to feed and grow until sexual maturity when they return to the sea. Bass are found inshore and in estuaries, where they may venture into almost fresh water. They may be taken in nets or on lines. Mullet are also attracted to estuaries and may enter fresh water. Conger eels usually live in shallow water and are common around rocky shores, they are mainly caught on lines. Members of the cod family inhabit the shallow waters off the continental shelf and may be taken by net or on lines. Flatfish, skates and rays are bottom-dwelling fish and are usually captured by trawl, although they will take a hook. Scad are found in deep water in winter and close inshore during the summer. They are not common enough to support a fishery and are not regarded as a prime food fish.

The presence of rat bones indicates that rats were probably scavenging in and around the latrine. The greenfinch, finch and warbler bones are probably accidental additions, since the partridge is the only bird represented which is likely to have been a source of food. The occurrence of some larger mammal bones suggests that the latrine may also have been used for the dumping of a small amount of domestic rubbish.

CONCLUSION

There is evidence for sea water fishing using surface nets, hooks and lines and possibly trawls, and for fishing in fresh water and possibly estuaries. The sample is too small to make any conclusions relating to the relative importance of the fish, but the variety of species and habitats represented reflects the exploitation of quite a wide range of resources, although probably fairly localised in the case of sea water fish. It is not possible to comment on the importance of birds and mammals in the diet, although undoubtedly they would have been important, but the fish remains shed some light on the wealth of the inhabitants, since such a wide variety would probably not have been included in the diet of a poor household.

Acknowledgements

B. Levitan, Bristol City Museum and Art Gallery, and J. Coy, Faunal Remains Unit, Southampton University.

JANE EVANS

MAMMALS		ANATOMY											
SPECIES	N	%	HUM	ULN	RAD	MT	PEL	MC	PHL	CEV	THV	CAV	CAR
CATTLE (*Bos taurus*)	1	0.31	1R										
SHEEP/GOAT (*Ovis aries*/*Capra hircus*)	1	0.31		1L									
RABBIT (*Oryctolagus cuniculus*)	2	0.62					1	1L					
RAT (*Rattus sp.*)	[illegible]												

MAMMALS

SPECIES			ANATOMY										
	N	%	HUM	ULN	RAD	MT	PEL	MC	PHL	CEV	THV	CAV	CAR
CATTLE (*Bos taurus*)	1	0.31	1R										
SHEEP/GOAT (*Ovis aries/Capra hircus*)	1	0.31		1L									
RABBIT (*Oryctolagus cuniculus*)	2	0.62				1	1L						
RAT (*Rattus sp.*)	5	1.55							5				
UNIDENTIFIED SMALL MAMMAL	17	5.28			1				5	3	1	6	1
TOTAL MAMMAL	26	8.07											

BIRDS

SPECIES			ANATOMY																			
	N	%	HUM	ULN	PHL	VER	CMT	FUR	SCM	FIB	SCP	TBT	CDR	RIB	STR	ANT	POS	COR	PYG	OP
PARTRIDGE (*Perdix perdix*)	3	0.93	1L							1L	1L									
WARBLER (Muscicapidae)	1	0.31											1R							
GREENFINCH (*Caruelis chloris*)*	1	0.31	1L																	
FINCH (Fringillidae)	2	0.62					1R1L													
UNIDENTIFIED BIRD	45	13.98		1L	21	5		2	1	1	1L			2	2	2	3	2	1	1
TOTAL BIRD	52	16.15																		

FISH

SPECIES			ANATOMY		
	N	%	VER	DED	FRG
HERRING (*Clupea harengus*)	100+	31.06@	100+		
COMMON EEL (*Anguilla anguilla*)	11	3.42	11		
MULLET (Mugilidae)	1	0.31	1		
FLAT FISH	3	0.93	3		
PLAICE/FLOUNDER (*Pleuronectes platessa/Platichthus flesus*)	2	0.62	1		1
SKATE/RAY (Rajidae)	4	1.24		4	
CONGER EEL (*Conger conger*)	1	0.31	1		
COD FAMILY (Gadidae)	1	0.31	1		
SHARK FAMILY (Lamniformes)	2	0.62	2		
SCAD (*Trachurus trachurus*)*	1	0.31	1		
BASS (*Dicentrarchus labrax*)	97	30.12	97		
UNIDENTIFIED FISH	21	6.52	21		
TOTAL FISH	244	75.78			

KEY

* Identification not confirmed. @ Assuming N = 100

In addition there were a number of bone fragments which were not identifiable.

MAMMAL ANATOMY: HUM = humerus, ULN = ulna, RAD = radius, MT = metatarsal, PEL = pelvis, MC = metacarpal, PHL = phalanx, CEV = cervical vertebra, THV = thoracic vertebra, CAV = caudal vertebra, CAR = costal cartilage.

BIRD ANATOMY: As for mammal except: VER = vertebra, CMT = carpometatarsus, FUR = furcula, SCM = sacrum, FIB = fibula, TBT = tarsometatarsus, COR = coracoid, RIB = rib, STR = sternum, ANT = anterior phalanx, POS = posterior phalanx, PYG = pygostyle, OP = occipital process.

FISH ANATOMY: VER = vertebra, DED = dermal denticle, FRG = unidentified fragment

Molluscs and Crustaceans

Table 4

Cockle	(cf. *Cerastoderma edule* L)	shell fragments
Oyster	(Ostrea edulis L)	1 valve
Common periwinkle	*Littorina littornia* (L)	shell fragment
Limpet	*Patella* spp	shell fragment
Crustaceans—crab/lobster		fragments
barnacles		1 plate

MARTIN G. BELL

PARASITOLOGICAL INVESTIGATION

Abundant *Trichuris* ova (3,900 ova per gram deposit) were found and smaller numbers of *Ascaris* ova (approximately 500 ova per gram) were also recovered. There can be no doubt that human faeces was a major component of the organic deposit.

The sample was examined using a technique based on the procedure outlined by the Ministry of Agriculture, Fisheries and Food (1977, 3) for examining modern faecal samples. Recent experiments have shown that, although parasite ova can withstand the rigours of pollen analysis, the size of the eggs can be modified by the reagents used to extract pollen (Hall *et al.* 1983). Accurate identification is therefore only possible if samples are carefully prepared using reagents which do not affect egg size.

Two kinds of ova were observed in the Tenby pit sample. The most common kind of egg was a barrel-shaped structure typically possessing two polar apertures. (A single ovum possessed a polar plug.) These barrel-shaped structures were readily identified as ova of whipworms—the genus *Trichuris*—a genus of parasitic nematodes which infest the lower intestine and caecum of many mammals throughout the world. Trichurids produce ova in large numbers which are shed into the gut lumen and passed with faeces. Light infestations may cause little harm to the host, while heavy worm burden can cause prolapse of the rectum, diarrhoea and blood in the faeces. Chronic *Trichuris* infections in man are commonly associated with stunted growth.

The condition of the *Trichuris* ova was assessed by considering the numbers which fell into the following categories:

(1) complete, i.e. possessing two polar plugs;
(2) damaged, i.e. the shell is complete but the condition of either one or both plugs suggests that the ova are beginning to disintegrate;
(3) shell complete lacking any trace of a polar plug;
(4) shell broken or crumpled.

Most of the *Trichuris* ova lacked polar plugs (condition 3), two fragmentary and several thin-walled ova were observed indicating that the material was not particularly well preserved.

Preservation was, however, good enough to allow the ova to be measured in order to determine which species of *Trichuris* was present. The length minus polar plugs (mean 49.7

microns, n = 13) and width (mean 25.5 microns) of the *Trichuris* ova leave doubt that they were from the human whipworm *T. trichiura*. The comparison of egg size was based on modern measurements of whipworm eggs gleaned from several sources including parasitological textbooks, data given by Beer (1976) for the whipworms of man and pig, the size of whipworm eggs from Lindow Man (Jones 1986), and egg measurements of *Trichuris* ova from the coprolite from 6-8 Pavement, York (Hall *et al.*, 1983).

The second kind of egg present in the samples possessed a mammillated outer shell characteristic of the large roundworm—genus *Ascaris*, a common parasite of pigs and man. This nematode can grow to 30 cm. and, like the whipworm, produces large numbers of eggs which are passed with faeces. The larvae, which hatch from ingested embryonated eggs, migrate through the host tissues and can cause considerable damage. Nevertheless, many people harbouring small numbers of worms do not suffer severe symptoms. *Ascaris* ova were classified as fertilized, unfertilized.

The ova of *A. lumbricoides* and *A. suum*, the large roundworms of man and pigs respectively, produce ova of identical size. There are only two hosts indigenous to north-west Europe which can harbour *Trichuris* and *Ascaris*, man and pig. However, because they were associated with large numbers of *Trichuris trichiura* ova, the *Ascaris* ova are assumed to be *A. lumbricoides*.

Ascaris and *Trichuris* eggs have been reported from several archaeological deposits in Britain and mainland Europe. Finds have been made in samples from Danish bog burials, Roman sites and medieval towns (Jones 1982). Lindow Man, a bog burial, probably of Iron Age date, from Cheshire has recently proved to have been parasitized by both species (Jones 1986). The results from Tenby compare closely with those obtained from Anglo-Scandinavian deposits at 16-22 Coppergate and other sites in York, where large numbers of parasite ova were present in many pit fills examined (Jones 1985). The material from Tenby illustrates that intestinal parasites were harboured by at least some of the occupants of the town in the Tudor period.

Acknowledgements

The bulk of the practical work for this report was carried out by Colin Nicholson while employed on a Community Programme scheme funded by the Manpower Services Commission.

ANDREW K. G. JONES

TEXTILE FRAGMENTS

Ten very small (maximum size 15 mm. × 7 mm.) pieces of textile were found in the organic deposit. They were identified using the techniques described by Walton and Eastwood (1983). Two distinct textile types were identified:

(i) dark brown textile made from protinaceous fibres. Medullae were present on several of the fibres but a more precise identification was not possible as the fibres had lost their scale patterns. Yarn tight 'S' spun, weave pattern not identifiable due to felting and degradation. One fragment of this textile contained a stitch in a linen yarn which was clearly identifiable by characteristic dislocations and cross markings.

(ii) white/cream coloured textile made from fibres, almost certainly of vegetable origin, identifiable by cell ends and lumina. No further identification was possible due to the degradation of the fibres. Yarn loosely 'Z' spun and tabby woven at an average of 17 threads per centimetre.

Identifications were made at a magnification of 200 × under transmitted light. There was no visible indication of dye on the textile fragments. Further analysis was not carried out.

MAUREEN K. WILLIAMS

SYNTHESIS

The frequency at which the cesspit in the Tudor Merchant's House had to be emptied would have been dependent on many variables and so cannot be calculated accurately; however, given the relatively small size of the pit in comparison to the building it would have probably filled-up within a year, and possibly a lot quicker. The analyses of the organic fill of the pit thus provide a unique insight into the dietary habits, health and economic status of the household over a short period of time in the sixteenth century.

Clearly a wide variety of foods was being consumed. The fish bones and residues of other sea foods were, perhaps, the least surprising contents of the pit, given the house's proximity to the sea and Tenby's harbour. However, the number of species present indicates that a wide range of marine habitats were being exploited, not just the coastal waters near the town. Bones of cattle and sheep/goat further expand the carnivorous portion of the diet, although these mammals may have played a more important role in the household's food intake than the two bones in the pit indicate; the majority of the larger bones are likely to have been disposed of elsewhere with other household refuse. The presence of numerous fragments of egg-shell provides additional evidence of the rich non-vegetarian portion of the diet.

Dr. Nye's report of the plant macrofossils provides valuable evidence not only of diet and other possible former uses of plants, but also demonstrates that trade existed between Tenby and countries to the south. Modern locally grown figs and vines will produce fruit in good years, but the presence of vast quantities of seeds of these fruits in the cesspit presumably reflects the extensive trade recorded in Elizabethan port books (Lewis 1927) between south Wales and France, Spain and Portugal. Trade recorded in the port books was particularly intense between south Wales and the Iberian peninsular, attested by the presence of Spanish/Portuguese pottery in the cesspit (Murphy and O'Mahoney 1985).

The other species of plant recorded in the macrofossil report and in the pollen analysis could all have been collected in Tenby's hinterland. Of interest is the putative evidence of food processing and preservation; jams were possibly made from sloes and blackberries, brewing may have taken place, indicated perhaps by the carbonised cereal grains, and Greig in the pollen report suggests the presence of wide variety of pollen grains may be due to honey having been eaten. The comparatively few cereal grains and bran in the macrofossil record is not supported by the pollen evidence where there is ample data, in the form of pollen of cereals and of cornfield weeds, to propose that wheat, barley and oats did constitute a significant portion of the diet. The suggestion by Nye and Greig that flour had been ground after the separation of bran and weed seeds from the grain is the most likely explanation.

Parasitic infestation appears to have been the norm, rather than the exception, in all cultures and periods, apart from our own. Equally, rats and large numbers of flies would have been accepted as part of urban life up and into the 20th Century.

KENNETH MURPHY

REFERENCES

Beer, R. J. S. 1976 — The relationship between *Trichuris trichiura* (Linnaeus 1758) of man and *Trichuris suis* (Schrank 1788) of pig, *Research in Veterinary Science,* 20 (1976), 47-54.

Clapham, A. R., Tutin, T. G. and Warburg, E. F. 1962 — *Flora of the British Isles* (2nd ed.) Cambridge: University Press, 1962.

Dandy, J. E. 1958 — *List of British vascular plants,* London: British Museum (N.H.) and B.S.B.I., 1958.

Dennell, R. W. 1970 — Seeds from a medieval sewer in Woolster Street, Plymouth, *Economic Botany,* 24 (1970), 151-154.

Ellis, R. G. 1983 — *Flowering plants of Wales,* Cardiff: National Museum of Wales, 1983.

Emmison, F. G. 1964 — *Tudor food and pastimes,* London: Ernest Benn Ltd., 1964.

Green, F. G. 1979 — Phosphatic mineralization of seeds from archaeological sites, *J. Archaeol. Sci.,* 6 (1979), 279-284.

Greig, J. 1981 — The investigation of a medieval barrel latrine from Worcester, *J. Archaeol. Sci.,* 8 (1981), 265-282.

Greig, J. 1983 — Plant foods in the past: A review of the evidence from northern Europe, *J. Plant Foods,* 5 (1983), 179-214.

Grigson, G. 1975 — *The Englishman's flora,* London, Paladin, 1975.

Hall, A. R. *et al.* 1983 — Cereal bran and human faecal remains—some preliminary observations, *Site, environment and economy,* ed. B. Proudfoot, 85-104, BAR International Series 173 (1983).

Hedrick, U. P. 1972 — *Sturtevant's edible plants of the World,* New York: Dover Publ. Inc., 1972.

Jones, A. K. G. 1982 — Human parasite remains: prospects for a quantitative approach, *Environmental archaeology in the urban context,* eds. A. R. Hall and H. K. Kenward, 66-70, CBA Res. Rep. 43 (1982).

Jones, A. K. G. 1985 — Trichurid ova in archaeological deposits: their values as indicators of ancient faeces, *Palaeobiological Investigations: Research Design, Methods and Data Analysis,* eds. N. J. R. Fieller, *et al.,* 105-114, BAR International Series 266 (1985).

Jones, A. K. G. 1986 — Parasitological investigations on Lindow Man, *Lindow Man the body in the bog*, I. M. Stead, *et al.*, 136-9, London: British Museum, 1986.

Lewis, E. A. 1927 — *The Welsh Port Books (1550-1603)*, Cymmrodorion Record Series, 12 (1927).

Mead, W. 1931 — *The English medieval feast*, London: Allen and Unwin, 1931.

Ministry of Agriculture, Fisheries and Food, 1977 — *Manual of veterinary parasitological laboratory techniques*, Technical Bulletin No. 18. London: HMSO, 1977.

Murphy, K. and O'Mahoney, C. 1985 — Pottery from the Tudor Merchant's House, Tenby, *Medieval and Later Pottery in Wales*, 8 (1985), 25-39.

Morris, T. N. 1917 — *Microscopic analysis of cattle foods*, Cambridge: University Press, 1917.

Norris, C. 1812 — *Etching of Tenby*, London, 1812.

Perring, F. H. and Walters, J. M. 1976 — *Atlas of the British flora*, Wakefield EP Publishing Ltd., 1976.

Perry, R. C. and Tonkin, J. W. 1975 — Two Dyfed Houses with jointed crucks, *Vernacular Architecture*, 6 (1975), 31.

Thomas, W. G. 1964 — The Old House, *Archaeol. J.*, 119 (1964), 324.

Tomlinson, P. 1985 — An aid to the identification of fossil buds, bud-scales and catkin-bracts of British trees and shrubs, *Circaea*, 3(2) (1985), 45-130.

Turner, W. 1882 — *The names of herbes*, Facsimile of the English Dialect Society Reprint (1882).

Tyssen Amherst, A. M. 1896 — *A history of gardening in England*, London: Bernard Quaritch, 1896.

Tyssen Amherst, A. M. 1898 — A fifteenth century treatise on gardening. By "Mayster Ion Gardener", with remarks by the author, *Archaeologia*, 54 (1894), 157-172.

Walton, P. and Eastwood, G. 1983 — *A Brief Guide to the Cataloguing of Archaeological Textiles*, (York).

Wheeler, A. 1978 — *Key to the Fishes of Northern Europe*, London: Warne, 1978.

Wilkinson, M. 1979 — The Fish Remains, *Faunal Studies on Urban Sites, The Animal Bones from Exeter 1971-1975*, M. Maltby, 74-81, Sheffield: University of Sheffield, 1979.