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SHELLFISH FROM THE ABBOT'S KITCHEN, GLASTONBURY (GAK 13)

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Introduction and Methods

39 bags of shell from samples taken during the course of excavations of 12th – 14th century deposits at the Abbot's Kitchen in Glastonbury Abbey were analysed. Shells and shell fragments were sorted from the residue caught on a 10mm mesh by volunteers under the supervision of staff from GeoFlo. Shells were identified as closely as possible by comparison to a reference collection.

For gastropod species, the most commonly represented non-repetitive element (usually the shell apex, umbilicus, or body whorl with mouth) was counted to determine the minimum number of individuals (MNI) present. This avoids the underestimation reported when only shell apices are counted (Giovas 2009). Fifty whelk shells from sample 10 were measured following Claassen (1998). Notes were also made about the presence of epibiont organisms.

For bivalve taxa, the left and right umbones were separated and counted, and the higher number used as MNI. Fifty left valves and fifty right valves of the European or flat oyster, *Ostrea edulis*, from sample 10 were measured following Claassen (1998). Notes were also made about the condition of the one hundred shells, presence of any epibiont organisms and signs of damage.

The current protocol for determining the MNI of crabs in a sample is to count the number of chelae (claw) tips and divide by four (Milner 2009), although it is possible to recognise the propodus and dactylus tips from each side of the crab to arrive at a figure closer to the actual number of individuals. The crab assemblage in samples 10 and 11 were dominated by fragments of the carapace (the thin shell which encloses the top of the animal) however. Data on the variation in carapace thickness within an individual at any one time (in common with other crustacea, crabs moult their exoskeletons and regrow them as they grow) are not available, although personal observation of modern *Cancer pagurus* from Orkney suggests that it is not great. Therefore, carapace fragments of distinctly different thicknesses are likely to be from different individuals. Mixture analysis was carried out on measured fragment thicknesses in PAST (Hammer *et al.* 2001) to divide the carapace fragments into likely subpopulations by thickness category. These were then used in place of MNI values.

Sources consulted for ecological information for were Barrett and Yonge (1958), Eales (1967), Hayward and Ryland (1995), and Fish and Fish (1996). Molluscan nomenclature follows CLEMAM (Checklist of European Marine Molluscs, online at http://www.somali.asso.fr/clemam/).

Results

MNI values for shellfish from the Abbot's Kitchen, along with counts of left and right valves of the most frequent bivalves are presented in Table 1. Measurements of left and right valves of oysters from sample 10 are presented in Figures 1 and 2. Measurements of whelks in sample 10 are presented in Figure 3. Measurements of carapace thickness of brown crabs in samples 10 and 11 are presented in Figures 4 and 6 respectively, with results of mixture analysis presented as Figures 5 and 7. Detailed records of observations of whelks, oysters and crabs are supplied in separate spreadsheets.

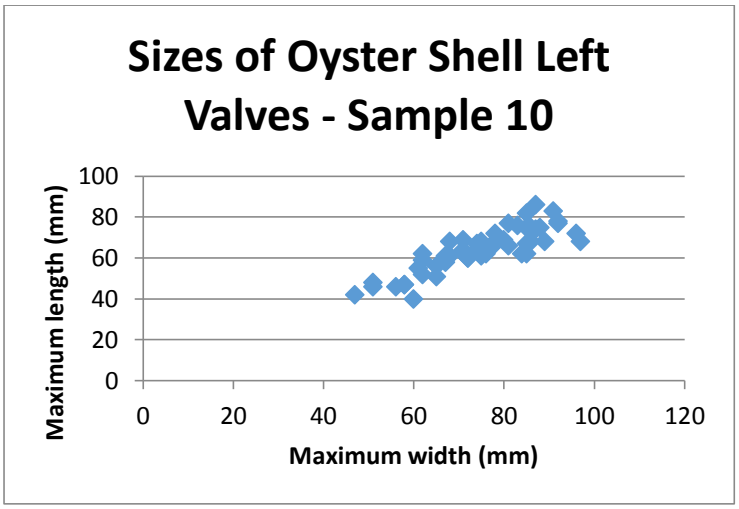

Figure 1: Size of 50 oyster shell left valves from sample 10.

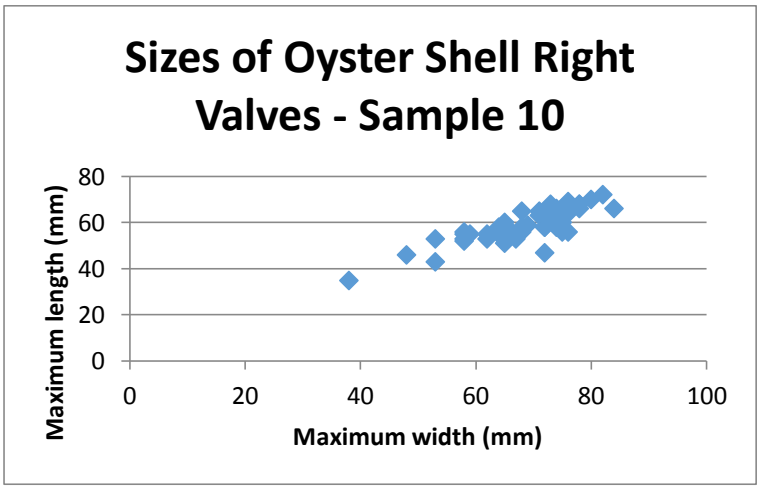

Figure 2: Size of 50 oyster shell right valves, sample 10.

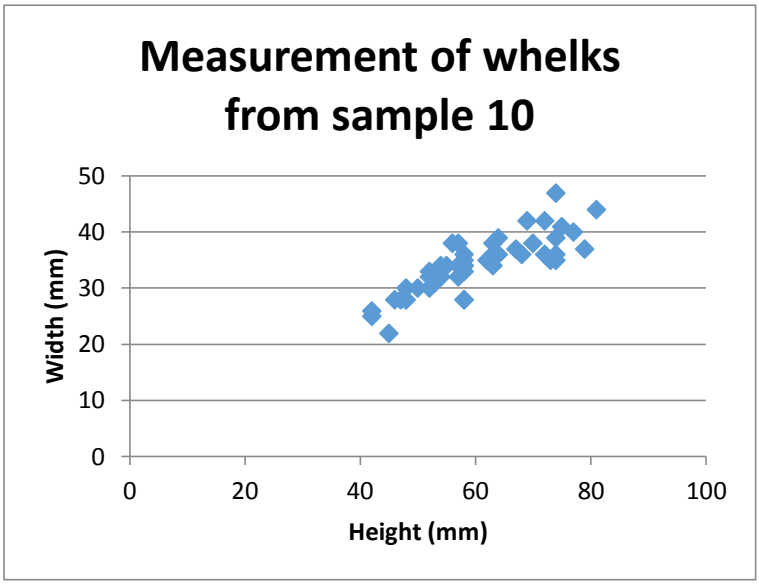

Figure 3: measurement of 50 whelks from sample 10

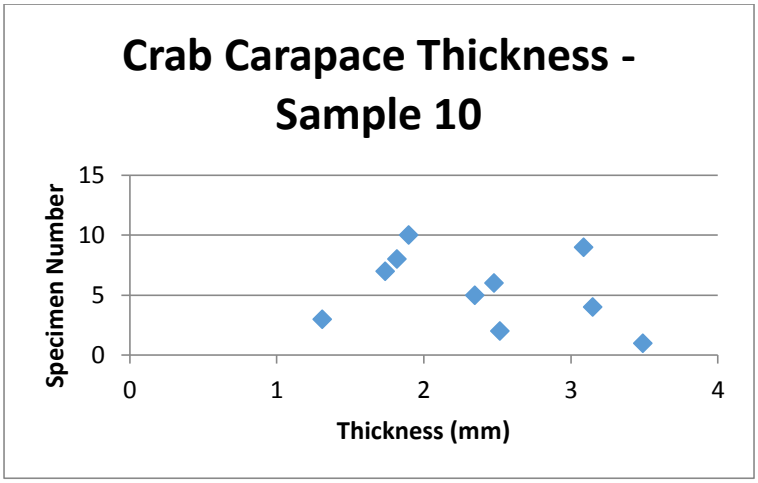

Figure 4: Thickness of crab carapace fragments from sample 10

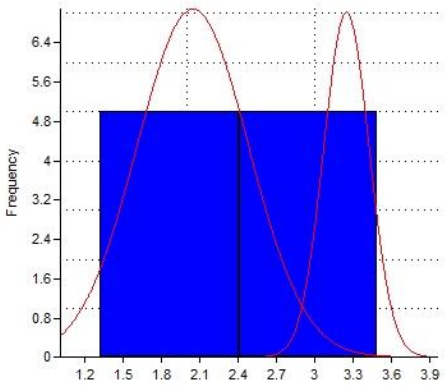

Figure 5: Mixture analysis of crab carapace fragment thickness from sample 10

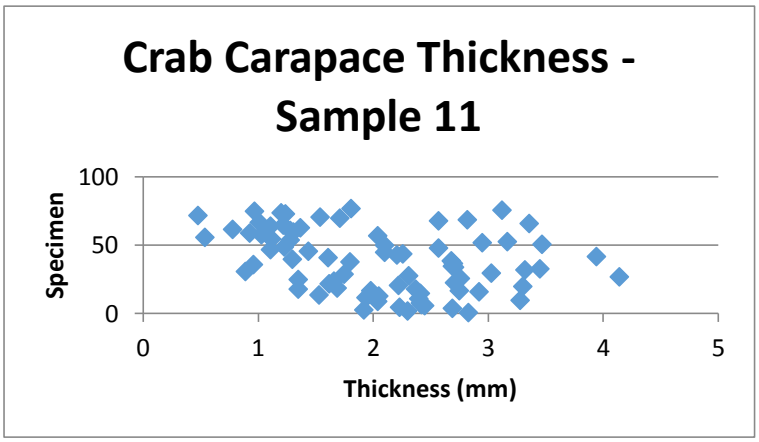

Figure 6: Thickness of carapace fragments from sample 11

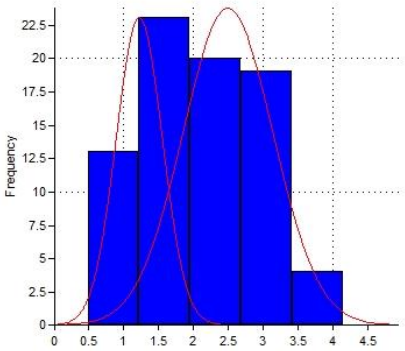

Figure 7: Mixture analysis of crab carapace fragment thickness from Sample 11.

Discussion

General observations

The shell assemblage is dominated by fragments of mussel shell and both intact and fragmentary oyster shells. Sample 10, from context 53, which underlies a hearth, was especially rich in shells. Samples with fewer shells, such as samples 2, 5, 6, 7 and 12, may be secondary deposits.

Oysters

Oysters are native shellfish, found from the lower shore to about 80 metres depth on sandy and muddy substrates. They were popularised as a foodstuff by the Romans, who particularly sought British oysters (Stott 2004, 39), and remained a high-status dish until the growth of railways

late in the nineteenth century made transporting oysters in barrels of seawater practical and cheap. Oysters are traditionally served in their liquor in the left (lower, cupped) with the right (upper, flat) valve removed (Law and Winder 2009), although their use as an ingredient shucked from their shells is recorded in the *Forme of Cury*, a fourteenth century collection of recipes (Pegge 1791, XX.VI.I and XX.VI.III). The right valve is more robust and tends to survive in greater numbers in archaeological contexts (Law and Winder 2009). Oyster shells harvested from wild stocks may have acted as substrates for a variety of other encrusting and boring organisms in life.

Many of the oysters from the Abbot's Kitchen deposits were represented by fragments of shells rather than complete valves, however measurement of intact valves from sample 10 suggests that oysters between 60 and 90 mm wide were preferentially selected. Although right valves generally survive in greater numbers archaeologically, left valves were more numerous in these samples, although many of these were not intact. The association of left and right valves together in the same deposit suggests that food preparation waste was not disposed of separately to waste from the dining table. 15 of the measured right valves from sample 10 bore notches or cuts on their margin consistent with the use of a knife to sever the adductor muscle and open the shell. Five of the measured left valves and one of the right valves bore the tubes of the serpulid worm *Pomatoceros triqueter.* This is common on all British coasts, but mainly sublittoral and particularly adjoining deep water, suggesting that at least some of the oysters were harvested from the below the intertidal zone. Another left valve bore an encrustation of the bryozoan *Escharella variolosa.* This is also common on all British coasts. Irregularly shaped oysters, with encrusting fauna, are usually from wild rather than managed stocks. A small number of the oyster shells showed some green staining. This may suggest an association with nightsoil or organic midden waste in the burial environment.

Mussels

Mussels are common bivalves of all British coasts from the upper shore to shallow sublittoral on rocky, stony or muddy substrates. Recipes for their use also appear in the *Forme of Cury* (Pegge 1791, XX.VI.II; and XX.VI.IIII) Mussel shells dominate the assemblage, although they are largely fragmentary. This is to be expected as they are rather more fragile than oyster shells. The degree of damage means that few conclusions can be drawn about the preferred size of mussels.

Whelks

Whelks are large gastropods which live in the sublittoral zone down to 1200m on muddy sands, gravels and occasionally rock. They are common

on all British coasts. One of the sample of fifty whelks measured bore a tunnel created by *Pomatoceros triqueter,* which is common in the sublittoral zone, while another had been bored by the worm *Polydora ciliata*, which is also found on all British coasts. The measured whelks from sample 10 were mostly between 50 and 90 mm tall and 25 to 45 mm wide. One of the whelks had a teratological shell, misshapen due to a developmental problem, perhaps suggesting that shellfish was not selected by appearance of the shell.

Other Molluscs

A small number of other taxa were present in low numbers in the samples. The common cockle, *Cerastoderma edule*, and the great scallop and queen scallop (*Pecten maximus* and *Aequipecten opercularis*) are almost certainly food waste. Cockles live intertidally on sandy and muddy substrates and may be harvested at low tide, while the scallops live offshore to 100m depth on sandy and gravelly substrates, and need to be dived or dredged for. Other shells are unlikely to be food waste, although both the common periwinkle (*Littorina littorea*) and common limpet (*Patella vulgata*) are edible. It is likely that they are accidental arrivals at the site, either collected accidentally during harvesting, or were carried among seaweed and seawater in barrels of shellfish to the site. The sting winkle, *Ocenebra erinacea*, is a predator of oysters. There are relatively large numbers of saddle oysters, *Anomia ephippium*, especially in sample 10. These live in similar environments to oysters but are inedible.

Crabs

Fragments of the brown crab, *Cancer pagurus*, are present in samples 3, 4, 5, 9, 10 and 11. Sample 11 contains the most crab shell, a total of 95 fragments. Some of these were from especially thick carapaces, over 3mm. These are likely to be from particularly large crabs. Brown crabs are found on rocky shores around Britain to 100 metres depth, and require the use of baited rods or baskets to catch. One of the crab fragments from sample 11 bore the encrusting tube of *Pomatoceros lamarcki*, which is common on all shores around Britain. Another from sample 10 bore an unidentifiable bryozoan colony and a tube of the spirorbid worm *Circeis armoricana*, which is only found on western coasts.

Conclusions

Mussels and oysters predominate in the shellfish assemblage, with significant numbers of whelks and crab, and low numbers of cockles and scallops. The assemblage reflects a diversity of exploited environments. Crabs, some particularly large, were harvested from rocky coasts in western Britain; oysters and mussels from sandy or muddy shores. Whelks, scallops and crabs require additional effort to catch beyond

simply harvesting at low tide, and may be expected to have commanded a high market value. It is likely that shellfish were transported live to the Abbey in barrels of seawater, perhaps protected by seaweed, and smaller shells of other taxa may have been introduced to the assemblage in this way. Overall, there is a sense that the Abbey was provisioned at some considerable expense, although the contribution of shellfish to the overall diet is likely to have been low. It is conceivable that each of the shell-rich deposits represents the waste of one particular event. Waste from the kitchen and dining table do not appear to have been treated separately, although it is possible that oysters were served shucked from their shell as an ingredient in a dish such as 'oysters in gravey' or 'oysters in cyney' found in the *Forme of Cury*.

References

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		Sample Number	<1>	<2>	<3>	<4>	<5>	<6>	<7>	<9>	<10>	<11>	<12>
		Context Number	69	71	73	74	75	76	77	52	53	54	56
		Provisional Date	C12/13	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14	C12-early C14
		Bag weight (g)	735	421	1112	3178	388	60	13	1673	33697	3171	59
CRUSTACEA													
Cancer pagurus	Brown crab				1	1	1			1	2	5	
MOLLUSCA													
Patella vulgata	Common limpet										1		
Buccinum undatum	Common whelk			1		1		2	1	6	179	1	
Ocenebra erinacea	Sting winkle												
Littorina littorea	Common periwinkle					1	1			1	1	1	
Littorina saxatalis	Rough periwinkle										1		
Littorina obtusata	Flat periwinkle						1						
Mytilus edulis	Common mussel		12	7	1	22	12	1	1	53	838	106	1
L. valve			*8*	*5*	*1*	*22*	*11*			*53*	*838*	*91*	*1*
R. Valve			*12*	*7*	*1*	*14*	*12*			*38*	*763*	*106*	
Anomia ephippium	Saddle oyster				2	6	3			3	46	7	
L. valve					*2*	*6*	*3*			*3*	*46*	*7*	
R. Valve											*7*	*1*	
Ostrea edulis	European oyster		12	7	20	68	3	1	1		502		2
L. valve			*12*	*4*	*13*	*37*	*3*	*1*		*10*	*502*	*40*	*2*
R. valve			*5*	*7*	*20*	*68*	*1*			*12*	*467*	*20*	
Cerastoderma edule	Common cockle		*1*	1		*3*	*1*			1	2	*1*	1
Pecten maximus	Great scallop		1										
Aequipecten opercularis	Queen scallop						1				1		
Nucula nitidosa	Nut shell					1					1		

Table 1: MNI values for shellfish recovered from samples