The contribution of insect remains to an understanding of the environment of Viking-age and medieval Dublin

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INTRODUCTION

This paper examines the important contribution that sub-fossil insect remains can make to an understanding of the environment of Viking-age and medieval Dublin. The study of insect remains is one aspect of the increasingly important area of environmental archaeology and can contribute to a more holistic understanding of archaeological contexts. Environmental archaeology seeks to use other scientific disciplines to answer classic archaeological questions of the 'why, how and what' of prehistoric and historic human activity. Environmental archaeology has a particularly significant role to play in the interpretations of urban sites because the matrix of these sites is made up primarily of organic remains – plants, wood, insects, animal bone, shell.

So what of insects in particular? What can they tell us about the prevailing micro- and macro-level environmental conditions in Dublin during the Viking and medieval periods? About the use of structures at a macro-level? About the use of domestic space within structures? About the use of hinterland resources? About the seasonality of that use? And about the hinterland itself and the nature of the landscape around the town? The study of insects can contribute to the answer to all of these questions, particularly as part of an integrated environmental/archaeological strategy, and a number of case studies will be presented in this paper to illustrate this. However, it is important to start with a brief introduction to the subject as a whole and its development and subsequent contribution to urban archaeological research.

HISTORY OF THE SUBJECT

The study of sub-fossil insect remains (often called paleo-entomology or archaeo-entomology) began in Britain in the late 1950s. Its earliest exponents were Russell Coope, a geologist, and Peter Osborne, an entomologist at the Quaternary Research Laboratory in Birmingham University (Ashworth et al.

1997). Here, work on late glacial material had produced fossil insect remains, many of which, through painstaking comparative work, proved to be species that were by then extinct in Britain. The original idea behind looking at fossil insects was to provide an addition biostratigraphical dating technique for the Quaternary, based on the prevailing wisdom among entomologists at the time that insects were rapidly evolving and therefore fossil insects that did not compare to modern specimens must be extinct species. However, Coope's work proved that many of these species while extinct in Britain were in fact still found in other parts of the world (Coope et al. 1961).

Mutual Climatic Range (MCR)

Coope argued for the constancy of species in recent geological time and that faced with climatic stress species changed their distribution patterns rather than evolving into new species (Coope 1978). Thus, the importance of insect remains as a tool for understanding past climatic change was established. Coope developed a model using the thermal preferences of these species and produced a graph of climatic change over the last 14,000 years (Coope et al. 1971). This remarkable graph compared well to those produced from Greenland ice cores and other climatic proxies and became known as the Mutual Climatic Range method (Atkinson et al. 1987). In 1968, Coope and Osborne together devised the Paraffin Flotation method of recovering insect remains and inspired a significant number of researchers to look beyond the use of fossil insects for purely palaeoenvironmental studies into their application to the archaeological record and to landscape change brought about by human influence.

Importance of sub-fossil insect studies to archaeology

The importance of insect remains, particularly beetles, in archaeological contexts lies in the ability to extrapolate important habitat data from the presence and associations of particular species, which sheds light on micro- and macro-level environmental change. All orders of insects can be looked at including bugs, flies, parasites, mites, and even ants. But it is beetles that have proved most useful in archaeological contexts. Flies are particularly important in forensic archaeology and are used in forensic pathology at crime scenes to establish time of death and in some instances original locations in cases where bodies have been moved. On methodology, fossil insect remains are usually, though not always, disarticulated. Whole-insect entomologists will use a set of well-established keys (e.g. the Royal Entomological Society keys or *Die Käfer Mitteleuropas*) plus a comparative collection to identify a particular beetle to species. However, with archaeological material a key is often rendered useless as the diagnostic body parts is missing. The main diagnostic body parts are the head, thorax and elytra (plate 1); however, legs, antennae and male

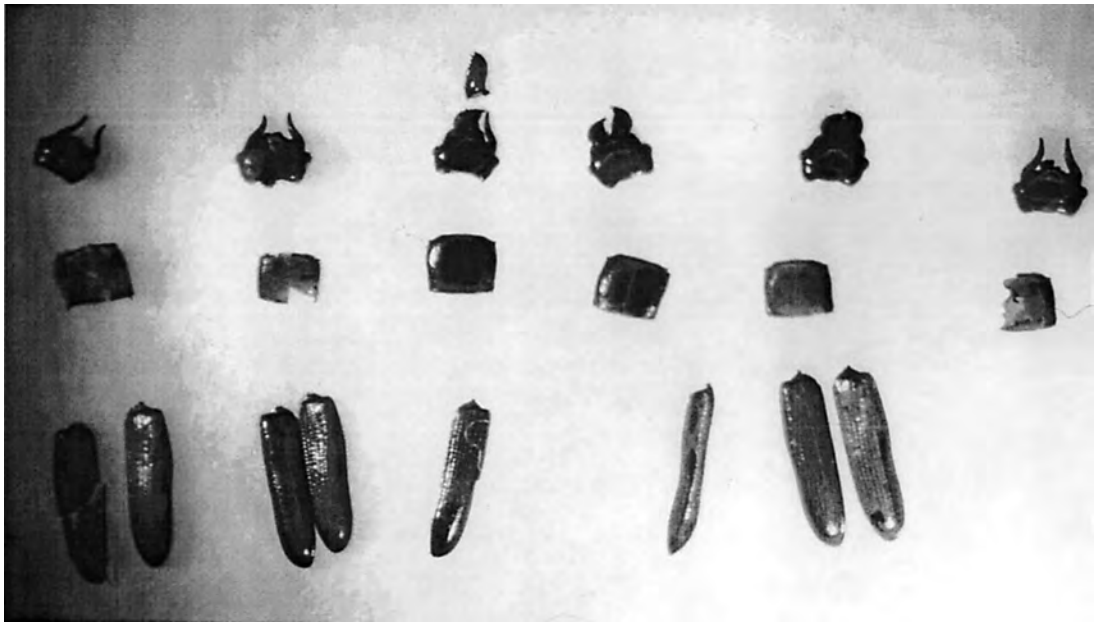
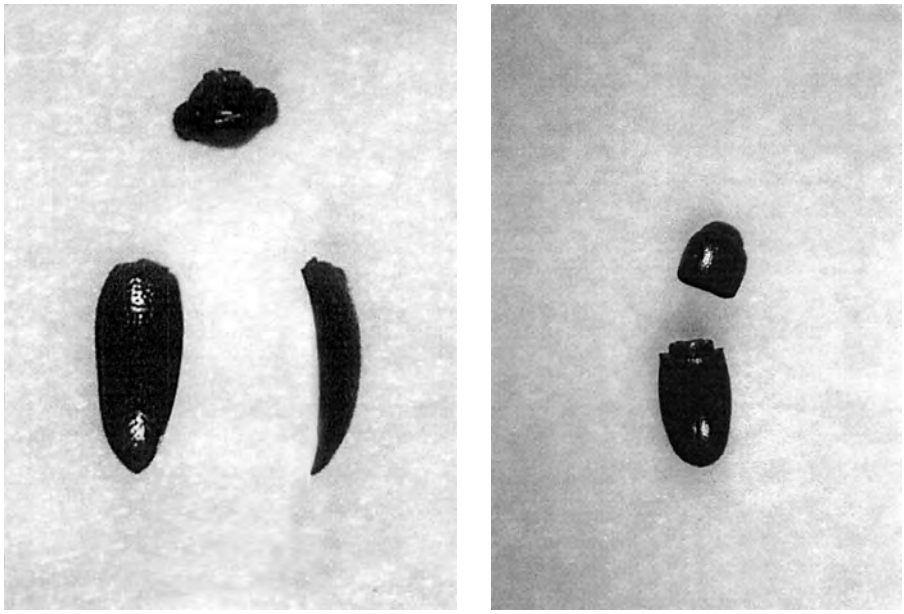


Plate 1 *Prostomis mandibularis* found in Bronze Age contexts from Derryville Bog, Co. Tipperary – heads, thoraces and elytra recovered

genitalia may be needed for an exact identification and these softer or more delicate body parts often do not survive. Identification to genus level is often the highest level of identification possible. However, it is very important to stress the value of good reference collections and many beetles can be taken beyond genus level through painstaking comparisons with modern and archaeological reference material.

URBAN ARCHAEOLOGY AND INSECTS

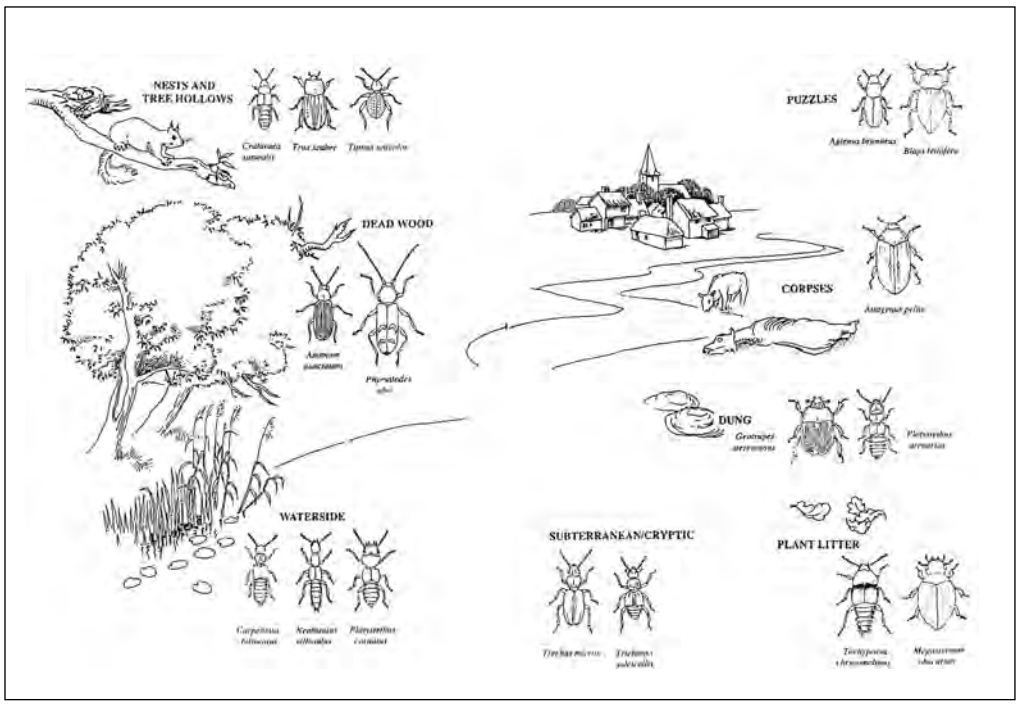
With the large-scale urban excavations of the early 1970s, such as those that took place at York, the need was quickly identified for an integrated strategy to interpret properly the huge volumes of organic archaeological remains being uncovered. Indeed, as Harry Kenward, the leading archaeo-entomologist in Britain, noted, environmental archaeology was seen as one solution to the problems of watching briefs and restricted rapid excavations such as the original excavations at 5–7 Coppergate and 6–8 Pavement (Kenward and Hall 1995). Such sites were difficult to interpret in the field and it was hoped that biological analysis would permit identification of deposits. A number of individuals, many of whom were former students of Russell Coope or



Plates 2a & 2b Decomposer species part of the 'house' fauna – *Mycetea hirta* and *Aglenus brunneus* (from Back Lane, Dublin)

influenced by him, as well as botanists, soil scientists and archaeologists, came together to combine their skills and apply them to this issue of properly integrating the archaeological and environmental information. Ultimately, in the case of York, the Archaeological Environmental Unit was born and has continued to set the standard for others to follow.

Archaeo-entomologists acknowledge the enormous contribute made by Harry Kenward, in particular, to this area of research. He has examined literally thousands of contexts and identified key marker groups of species that occur again and again together in those contexts. He has identified so-called 'house' fauna, made up mostly of decomposer species of beetles, preferring generally drier conditions (plates 2a and 2b); he has also identified groups that generally occupy fouler conditions, be that manure/animal waste or human waste (see Kenward and Hall 1995; Hall and Kenward 1998). He was the first to coin the phase 'urban insect fauna', a general term for these consistent patterns of associations, but more recently he has concluded that 'intensive human occupation fauna' would be a more appropriate term (for more detailed discussion on these terms see Hall and Kenward 1990; Kenward and Hall 1995; Kenward 2001). This is because the so-called urban fauna are being increasingly detected on sites that would otherwise be considered 'rural', Deer



1 Origins of the urban insect fauna (after Kenward and Allison 1994)

Park Farms, Co. Antrim, a rath dating from the eighth century AD being one very clear example of this (Kenward and Allison 1994a). The intensity and longevity of occupation play important parts in the diversity and richness of urban insect assemblages, not necessarily location.

Urban–rural connections

One of his many research interests was trying to detect the 'rural' origins of the insect communities observed in urban archaeological contexts (Kenward and Allison 1994b, 60–1, fig. 26, and fig. 1 above). This was achieved through a combination of looking at the current habitat preferences of certain key species, the types of archaeological contexts being excavated, and the matrix of those contexts using other biological analyses. Many of these species ended up in towns occupying artificially created niches that in effect mimicked their natural habitats. Some, as I will describe later, have become synanthropic over time, that is, dependent to some degree on humans for their survival. This has important implications for their present-day distribution and indeed their survival into the future.

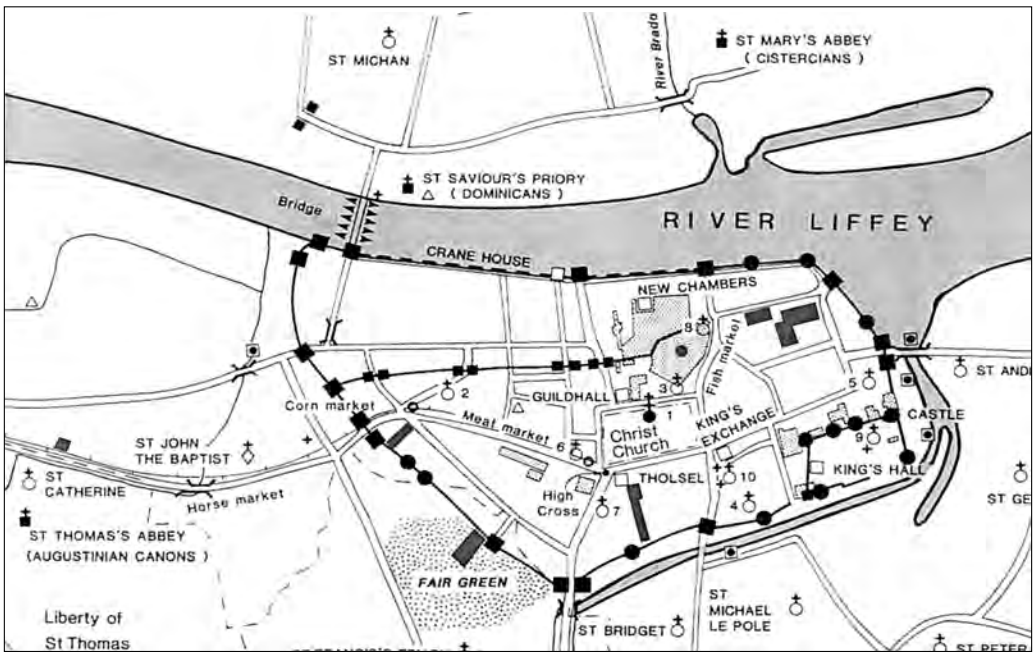
IRELAND

In Ireland, palaeo- or archaeo-entomology is not as well established as most other environmental proxies. There are a number of reasons for this, the most obvious being the lack of an Irish-based researcher in the past. Occasionally, British-based researchers have examined Irish sites (e.g., Coope 1981; Kenward and Allison 1994a) and Roy Anderson, an entomologist based in Queen's University Belfast, examined insect remains from the ditch at Haughey's Fort, Co. Armagh (Anderson 1989). However, up until the mid-1990s the number of sites where sub-fossil insects had been examined could be counted on one hand. This situation has greatly corrected itself over the years with both Irish-based researchers and increasing numbers of British-based researchers working on Irish material.

Background to sub-fossil insect studies in Dublin

Wood Quay A great number of urban sites have been excavated in Dublin over the years and some have produced huge amounts of well-preserved organics, most notably within the Viking town precincts but also extending into the early Anglo-Norman areas of the town (fig. 2). Despite the lack of an Irish-based palaeo-entomologist, some samples from the Wood Quay/Fishamble Street excavations directed by Dr Patrick Wallace were examined by Dr Jim O'Connor of the Natural History Museum (O'Connor 1987). These samples produced the then earliest known examples of a species called *Blaps leithifera*, a scavenger in vegetable waste and products such as flour and grain stored in granaries, barns and old cellars, a species otherwise unknown from Ireland (O'Connor 1979). It is classified in Britain among archaeo-entomologists as a relict-urban species and is considered by Harry Kenward a key species of the house fauna group (Kenward and Hall 1995). Its earliest finding in Britain is from the Roman period and it is considered strongly synanthropic (Horion 1956; Koch 1989). Other insect species noted from these samples were generally not taken beyond family level and the samples were not provenanced, making comparisons difficult.

Christchurch Place Samples were examined by Russell Coope from an eleventh-century house and pit in Christchurch Place, excavated by Breandán Ó Ríordáin in the late 1970s (Coope 1981). These samples were highly productive and most beetles were identified to either species or genus level. While the two samples were taken in order to obtain a contrast between the relatively sheltered 'indoor' environment of the house and the outdoor context of the pit, the pit assemblage appeared to be simply a sub-set of the house assemblage, indicating that the pit was used for the disposal of household waste rather than cess (human waste). The indoor assemblage indicated that while the floor was comprised of a deep litter of mouldering vegetation it was



2 Medieval Dublin showing sites discussed in this paper (after Clarke 1978)

far from what one could call foul and indeed the build-up of vegetation may have been deliberate in order to increase warmth within the building. The presence of the beetle *Aglenus brunneus* in huge numbers from the indoor sample certainly indicated that vegetation was, as Coope says, a 'damp layer with texture akin to the mouldy hay left behind after the removal of haystacks, not a sodden mass'. There were certainly very few foul indicators and only one dung-feeding taxon present. The samples also produced a couple of examples of the long-horn beetle, *Gracilia minuta*, a species on the Red Data book in Britain and considered vulnerable. Its main habitats are thin branches/twigs of species such as hazel, blackthorn, elm and lime (Harde 1966; Hyman 1992). It was a pest of wicker work and hence its occurrence in Dublin and York in early-medieval contexts. Its present status in Ireland is less well known and its semi-synanthropic nature has perhaps contributed to its present vulnerability, as the use of wickerwork disappeared from human habitation building styles.

This work gave us a first insight into the complexity of the material that made up the floor layers, pit-fills and middens excavated in Dublin. In particular, it proved that the floor level was not simply made up of decaying

plant material, but was perhaps the result of deliberate choice made by the occupant to improve internal warmth in the building.

Recent sub-fossil insect studies in Dublin

The site at Essex Street West, excavated by Linzi Simpson from 1996 to 1998 (see Simpson 1999; 2002), provides a good opportunity to examine some of the question raised at the start of this paper. Here it was possible to examine a larger number of samples in a more systematic way. The detailed stratigraphy established by the excavation team meant that sample choice could be more focused on addressing specific questions. Data from a number of other recent excavations will be examined here also including Back Lane, excavated by Tim Coughlan; Thomas Street, excavated by Edmond O'Donovan and Iveagh Markets, excavated by Franc Myles.

USE OF BUILDINGS

One of the first questions addressed – what some building were being used for – was well illustrated by four structures that occurred in the late ninth century levels at Essex Street West (fig. 3). The archaeological evidence was very much pointing in the direction of animal pens, given the morphology of these structures, with only CM/CC indicating a more complex two-phase history that involved animals and humans. CL, in particular, a small enclosure with no evidence for an entrance way or a roof, produced an assemblage indicating that the structure was indeed not roofed as the 'house fauna' element was poorly represented. Also, the diversity of decomposers indicates an area relatively open but with a constant build-up of decomposing plant matter. This factor and the presence of a variety of dung beetles and other foul-loving and moisture-preferring decomposer-species beetles would tentatively point to the use of this structure as an animal enclosure.

Regarding CM, the archaeological evidence identified two distinct phases, the first suggesting its use as an animal pen, the second indicating human occupation. The sample taken came from organic build-up associated with the first phase. Plant decomposers dominated the sample, with significant numbers of those with a tendency towards the moister and therefore fouler end of the decomposer spectrum, with strong indications of the presence of animal dung. However, the 'house fauna' group is reasonably well represented. In particular, *Tipnus unicolor*, usually found in mouldy hay in barns, in roofing material, or decaying timber, but invariably indoors in medieval contexts, was recovered. Its presence may suggest that the structure was roofed at some stage; although this is tenuous. There is also a strong 'hinterland' element in the form of various plant feeders, in particular, a number of weevils that feed at the roots of grasses in coastal locations, species

3 Layout of late 9th-century levels, Essex Street West, Dublin

found on meadow plants, and yet others found on various weed species. The palaeo-botanical evidence indicated a similar range of biotopes. This combination of plant feeding insects and animal dung is generally taken as an indicator of manure (Hall and Kenward 1998). Two examples of *Tenebrio molitor/obscurus* were also recovered. It is cited as a pest of stored products, being found in flour mills and barns today (Brendell 1975). Overall, the assemblage pointed towards animal use of the structure at the time this layer was deposited with some indication that it was roofed. However, this may also be the product of taphonomy caused by post-depositional mixing of the two phases of occupation.

CC was perhaps the most intriguing structure at this level. Two distinct levels of occupation were again tentatively identified by the archaeology and suggested by the finds. The first phase of the main circular part may have been roofed and had a small curious annex attached onto the west wall, which was open to the south. The samples examined for insect remains came from this annex and produced a very clear signature group of beetles indicating the

Plate 3 Structure CC, late 9th century, Essex Street West

presence of animal dung and a deep litter of plant material. The combination of these two features certainly indicated an animal pen; however, included in the assemblage were twenty examples of *Pulex irritans*, the human flea (plate 3). On its own, or within house structures, it is strongly associated with the 'house' fauna of medieval buildings (Kenward and Hall 1995). In this structure however, it was somewhat problematic because the annex was thought most unlikely to be a human occupation structure. One possibility lies though in the origin of *Pulex irritans* as a pest of humans. One theory is that the original main host of the 'human' flea was the wild pig. Today, it is virtually eliminated as a parasite of humans but it continues to be a pest of domestic pigs (Allison and Kenward 1990). The close association between humans and pigs throughout prehistoric and historic times may have meant that this species transferred easily between the two. This would indicate that the annex may have been used as a pig pen, or fallowing pen.

BI, a mid-tenth to early eleventh-century structure, clearly built as a house originally, was later converted into an open-air pen and a house to the south, AY, presumably became the human occupation site. The insects gave a very clear picture of decomposing plant material, dung and general foul con-

4 Plan of Structure BN, early 10th to mid-11th century levels, Essex Street West, Dublin

ditions. The plant remains produced a large number of goosefoot seeds, which grow in nitrogen rich soils and are often indicative of manure heaps (Johnston 2000). The mixture of animal and human occupation continued into the later tenth/early eleventh century and indeed into the twelfth century. From the insect evidence alone, one could almost form the impression that more animals than humans were living in this area during the whole Viking period! However, a certain bias is present if the insect evidence is examined alone due to the fact that many of the houses in these levels were burned and therefore no insect remains were recovered. There is ample evidence for intensive human occupation from the plant macro-fossils and animal bone remains from these levels (Johnston 2000).

USE OF DOMESTIC SPACE

A number of the houses that were unburned and could be examined for insect remains as well as other biological evidence provided useful information on the micro-environment within structures and the use of domestic space. One such structure was BN, a Type 1 house (*sensu* Wallace 1992) dating from the

early tenth century, with three aisles and central hearth, internal roof supports, and entrance in the north and south wall (fig. 4). Here three deposits were sampled from three different locations within the house: the main floor deposit, which extended over much of the central aisle area and was sampled from the northern end of the building; some possible roofing material, which occupied the centre of the aisle close to the hearth; and material from the western aisle.

The three deposits produced different and informative assemblages. The northern material was described archaeologically as trampled organic matter. Certainly it was decaying plant refuse; however, it would appear from the insect evidence to be have been quite wet. The assemblage may have reflected a general problem with drainage in this house (Simpson 2002). There were very few true dung beetles present, so this layer still represented a house floor deposit, but the number of true 'house fauna' species was quite small. As most of these species prefer the dry end of the decomposing spectrum, this is not too surprising. There were a small but consistent number of 'outdoor' or hinterland species too. Most of these were beetles that are found on weeds and plants of disturbed ground and grassland and for the most part probably had a very local origin. Three examples of *Pulex irritans* were also recovered from this sample. Nothing in this samples indicated the storage of animal or plant produce in this part of the house and this may have been due to the underlying damp ground.

The layer from near the hearth was described archaeologically as 'collapsed roofing material'. This sample produced a disappointingly small assemblage and this may be due to one of two factors: firstly, since the material sampled was near the hearth area it would be drier and less organic that the rest of the floor and would inhibit decomposition; secondly, roofing material would tend to be drier than floor material that is being trodden underfoot and would be subject to constant drying from the hearth below. Significantly, however, one of the most characteristic species of any reasonably long-lived roof of this period, *Mycetaea hirta*, is completely absent from this sample. The present writer found it in large numbers in a pit in Thomas Street (O'Donovan 2002a, this volume Reilly 1997a), which appeared to contain the remains of decaying thatch material. By the use of modern comparative locations David Smith established that it is a signature beetle of this ecological niche (Smith 1996). The sample from Structure BN near the hearth also contained a wide variety of plant feeders found on coastal grassland and urban flora, but none that were particular to the kinds of plant material used in roof construction. In effect, it appeared that the assemblage was reflecting either the sod element of the roof, or floor material, rather than the thatch itself. One example of *Pulex irritans* was also found in this sample, which seemed to be a common inhabitant of this house, an unfortunate situation for its human occupants. Obviously, the flea would not be living in roof material but its presence could

be explained by occupational debris from the house becoming mixed with the roofing material after it collapsed. Overall, there is actually very little in this sample to confirm that it is roofing material, a conclusion also reached by the palaeo-botanical results (Johnston 2000).

The third sample, interpreted archaeologically as possible bedding material, or the floor of a bedding area, taken from the western aisle, contains a typical profile for a 'house' sample. Significantly though, the impression that the underlying ground conditions were perhaps wetter than those seen at Christchurch Place is still attested to by the presence of some species more favourable of damper decomposing plant material. The plant feeders were generally indicative of urban flora and were not significant in pointing to the plant materials used for the bedding. However, the palaeo-botanical results indicated a wide variety of sources. This sample is most significant for the number of human fleas present, sixteen in total. In this case, however, unlike structure CC above, it can be safely assumed that these fleas were from a human host. Given the close association between humans and animals on this site it is not surprising that *Pulex irritans* could become strongly established. It is worth noting that no other species of flea was recovered from any of the contexts examined at Essex Street West. Two lice were recovered from this aisle material but could not be identified to species.

HINTERLAND RESOURCE AND SEASONALITY

On the issue of hinterland resource use, seasonality and the storage of foodstuffs, particularly in the early Anglo-Norman town, a number of pits from Essex Street West, Iveagh Markets and some structures from Back Lane produced very interesting findings that address these two issues. Two pits from Essex Street West, in particular, were sampled thoroughly – pit 3136, dated to the late twlefth century and four of its seven identified fills were examined for insect remains; Pit 3065, dated to the very early thirteenth century, and two of its four fills were examined. It should be stated from the outset that the insect fauna produced from pits is, in many cases, simply a reflection of the houses and other structures around them. They can be expected to have a proportion of household waste, and therefore members of the house fauna will be well represented, but if their use is primarily as a cess pit there will also tend to be more foul-loving species. Both of these pits showed these two signature groups, with a tendency for the lower fills to be more reflective of what might be considered their primary use, i.e. a cess pit, while the upper fills tended to be more mixed, possibly reflecting secondary use. Indeed, in the case of the first pit, 3136, the upper three fills examined were more reflective of house floor origin than most of the samples taken from

Plate 4 Stored products pests – *Bruchus rufimanus* and *Sitophilus granarius*

actual houses, the assemblage of the upper two layers comprising 50% house fauna. Species like *Blaps leithifera* and *Mycetea hirta* probably reflected the dumping of hay residue, floor sweeping and old thatch from buildings. This may have been done to dampen down smell emanating from cess-pits when opened during warmer months.

In the lower fills of this pit a number of examples of *Bruchus rufimanus,* a pest of beans, particularly broad beans, were found and it is most likely that they ended up in the pit as part of a cess deposit, having been ingested by humans (plate 4a). It was also found consistently in pits examined by the author in late Viking/early medieval contexts in Waterford (Reilly 1994). Another very important stored product pest that occurred in Pit 3065 is the grain weevil, *Sitophilus granarius* (plate 4b). Again, when found in cesspits, it is usually considered to form part of the cess indicator group (Osbourne 1983). It appears to be able to withstand the human digestive process and its occurrence in cess-pits appears to be as a result of ingestion by humans rather than dumping of spoilt grain. The writer has also recorded this species in samples taken from the medieval city ditch excavated at Iveagh Markets by Franc Myles and from one of the pits there, dated to the late thirteenth/early fourteenth century (Reilly 2001). It has also been recovered from a sixteenth-century context on George's Quay, Limerick (O'Donovan 2002b).

The presence of this species in various contexts has important implications for trade and the manner in which grain was stored in late Viking/medieval Dublin. *S. granarius* is rarely found away from synanthropic (human-associated) situations today and has never been recorded from archaeological layers other than in synanthropic contexts. It is flightless and appears to owe its current worldwide distribution to accidental transport by humans (Buckland 1990). It has been recorded from wheat, rye, barley, maize, oats, buckwheat, millet, chick peas and, less frequently, chestnuts and acorns (Hoffman 1954). It is unclear what its primary host was, the small grains of wild cereals being probably too small for successful breeding. It may, therefore, have originated in acorns and moved to cereals, possibly after first cultivation by humans. Its expansion westward may have been associated with the movement of agriculturalists and early storage of grain; however, its progress appeared to be dependent upon the presence of suitable permanent stores. It is significant that its earliest findings in Northwest Europe are all within the Roman Empire (Buckland 1990). Its first records in Britain date to the Roman period (Coope and Osborne 1968; Buckland 1981). Its recovery from the ditch and pit-fill in Iveagh Markets could either be from wind-blown or household refuse sources or with cess material dumped into the ditch and may be related to the presence of the Cornmarket, located nearby at the north-western end of Francis Street – the main location for trading of grain in the medieval city. Its finding in Limerick was clearly associated with the presence of a nearby mill, Nicholas Arthur's Mill, shown on Hardiman's map of Limerick *c.*1590 (Hill 1997). But it is simply unclear when it first arrived in Ireland. Its earliest recorded finding is from late Viking/early Anglo-Norman pit-fills in Waterford (Reilly 1994) and raises many interesting questions. Did it arrive with the first Viking settlers, who may have brought grain with them on their original raids? How was grain stored within the precincts of the Viking and medieval town? Was *S. granarius* already here in pre-Viking times, perhaps introduced during occasional Roman incursions into Ireland? Or did the proto-towns of the monastic period store and trade grain with settlements in England and Wales and was this its route eventually into the Viking towns during early trading and raiding of agricultural produce? It is clear that this is a species that could benefit from more thorough research, and could contribute to an understanding of the dynamics of agricultural trade in the early historic and medieval period.

An important hinterland resource indicator is *Cercyon depressus*, a strictly seaside or estuarine beetle, which is highly stenotopic to decaying seaweed (i.e. known only from that biotope). It is an increasingly rare species in Britain and is not recorded from Ireland in recent times (Hyman 1994; Anderson et al. 1997). It was found in both the lower contexts of the early thirteenth-century pit F.3065 in Essex Street West; House B and Structure E at Back Lane also produced small but significant numbers of *Cercyon depressus* (Reilly 1997b).

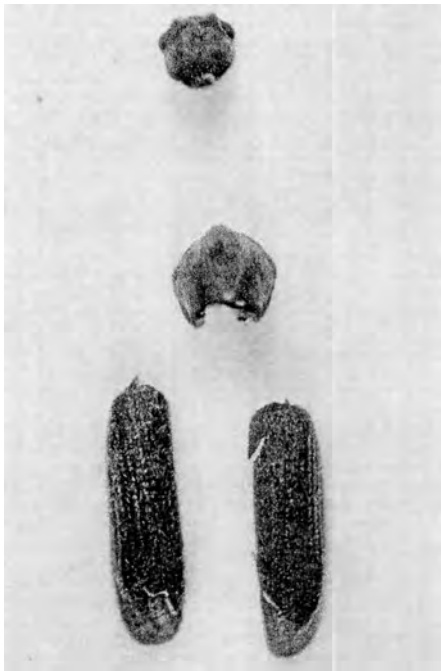
This species continued to be present throughout the early to mid-thirteenth century Anglo-Norman stave-built houses at Back Lane and was present in one of the rubbish pits of this period. In the pits of Essex Street West it occurred together with plant indicators and other species preferring estuarine habitats that clearly indicated the presence of seaweed on site. At Iveagh Markets, a number of other species of decaying seaweed and a ground beetle, *Dicheirotrichus gustavi*, an exclusively coastal species also, preferring saline locations, dunes and salt marshes (Koch 1989), were recovered in the ditch and pit-fills there. These species may confirm the presence of seaweed within the decaying plant matter. Fergus Kelly, in his study of early Irish agricultural documentary sources, details a number that refer specifically to the gathering and use of seaweed for a variety of purposes (Kelly 1998). These included its use as human food, soil fertilizer and animal fodder – one of the specific examples given was that cattle fed with seaweed would become thirsty, drink more and hence increase their milk yields. It is perfectly possible that practices relating to the gathering and use of seaweed from the pre-Viking period were carried on throughout the Viking and Anglo-Norman period and that the insects are simply a reflection of this.

SEASONALITY OF RESOURCE USE?

The two fills from pit 3065 produced two extremely interesting and diverse insect assemblages and perhaps reflect aspects of seasonal use of food resources. The lower fill had stored product pests, *Bruchus rufimanus* and *Sitophilus granarius*, and the palaeo-botanical results showed fewer fruit seeds in this layer (Johnston 2000). This may hint at deposition during a time when fruit was scarce, i.e. winter, spring or very early summer. In contrast the upper layer of this pit had the largest number of *Mycetaea hirta*, usually associated with thatch or other roofing material but also mouldy hay and straw. Coupled with the fact that this deposit had abundant fruit seeds and pips of apple, bilberry, blackberry/raspberry and various Prunus species, it may indicate that this layer was deposited in summer and autumn when these fruits were readily available. Hay or straw may have been thrown into the pit to dampen down smells, particularly in summer time. The pit was possibly sealed shortly afterwards giving us this very clear picture of the final use cycle of this pit.

THE ENVIRONMENT AROUND THE MEDIEVAL TOWN

The insect evidence above indicates the use of coastal resources, the possible grazing of animals on coastal grassland, and the gathering of meadow plants for use in house floors. This gives us some insights into the landscape sur-



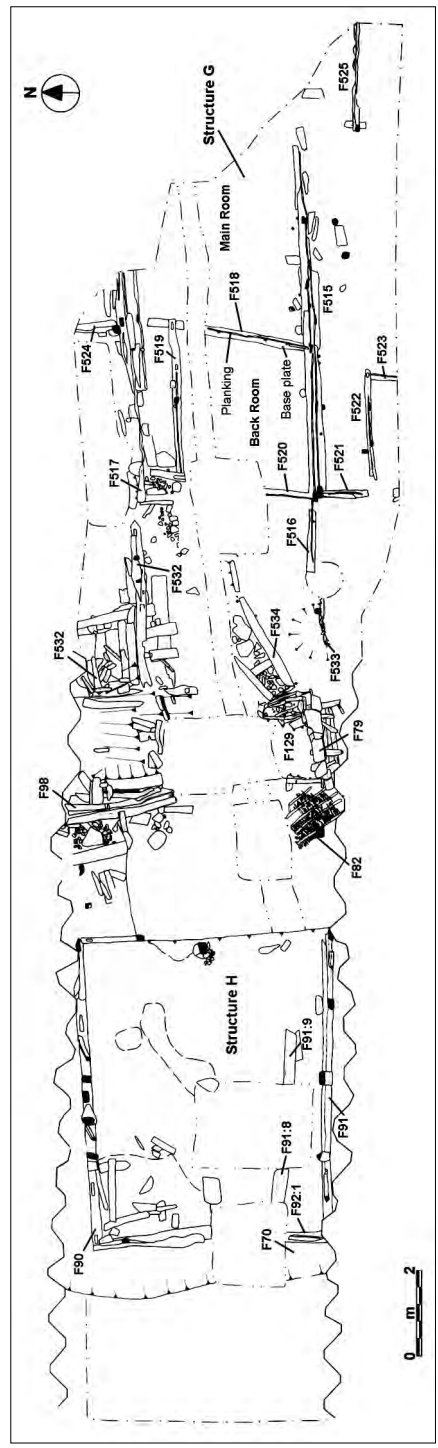
Plates 5a & 5b Wood-dependent species ('structural and/or worked wood') – *Anobium punctatum* and *Scolytus mali*

rounding the medieval town. A very important component of that landscape was woodland and here the insect evidence is extremely important in indicating not just woodland presence, but the nature of that woodland.

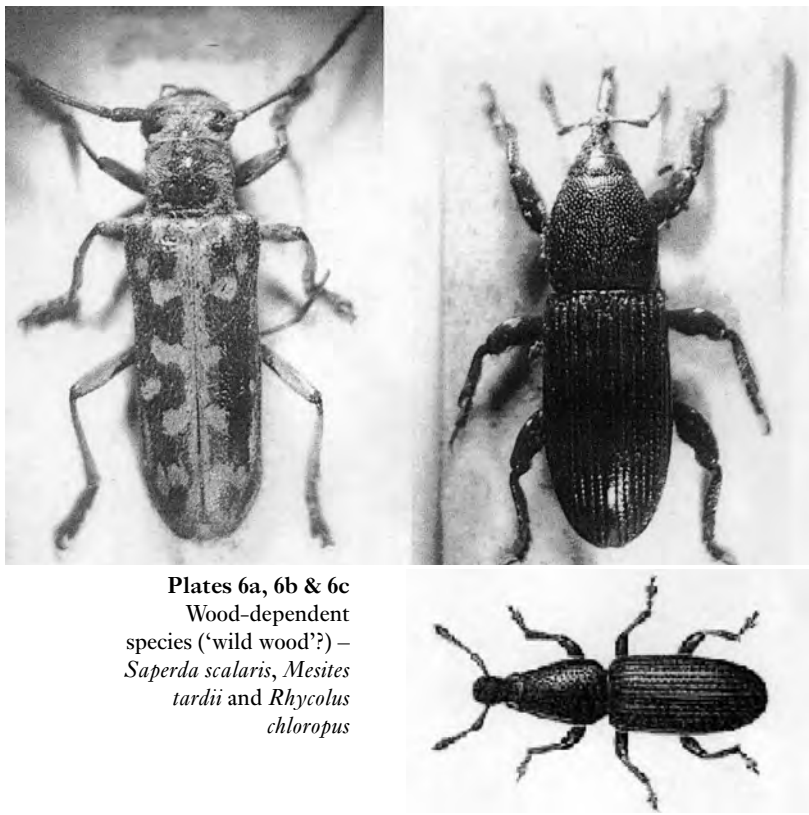
Insects recovered from house floors and structural timbers in Back Lane produced a very large numbers of wood-dependent taxa. These ranged from the structural wood pests like *Anobium punctatum* (woodworm beetle) (plate 5a) and *Lyctus linearis* (the powder-post beetle) and a surprising number of what are considered rare, threatened or, in an Irish context, possibly extinct woodland species. Structure E, for example, produced three different species of Scolytidae ('bark' beetles) – *Lepersinus orni, Scolytus mali* (plate 5b) and *Acrantus vittatus* – none of which are recorded on the current Irish list of Coleoptera (Anderson et al. 1997) and one of which, *A. vittatus*, is considered part of the 'relict woodland fauna' by researchers in this field (Girling 1985). All attack thin branches of tree species such as ash, willow, and fruit tree species, species invariably used in construction of wattle walls, mats and household implements in medieval times. Another rare beetle, *Saperda scalaris*, was recovered from this context (plate 7a). This is a long-horn beetle, the same family as *Gracilia minuta* found at Christchurch Place (Coope 1981), and is found generally in broad-leaved woodland. It is not recorded currently in Ireland (Anderson et al. 1997). From between the wall of Structure G and a

property boundary built up against it a remarkable range of wood-dependent species were recovered (plate 6), including sixty-three examples of *Anobium punctatum, Lyctus linearis, Lepersinus orni, Acrantus vittatus, Mesites tardii* (plate 7b: found in broad-leaved woodland with a pronounced coastal preference (Alexander 1994)), and *Rhyncolus chloropus* (plate 7c), usually found in dead and decaying oak or pine (Bullock 1993). Of all of the above taxa, only *M. tardii, A. punctatum* and *L. linearis* are still recorded in Ireland. These findings clearly give us important insights into the nature and extent of woodland surrounding Dublin at this time.

A discussion by O'Sullivan on the nature of woodmanship in Anglo-Norman Dublin (1998) highlighted the differentiation between types of woodland gleaned from medieval documentation: *Silva* was timber woodland used for construction; *boscus* was underwood used for fuel and wattle and *bruaria* was poor, scrubby brushwood. The small but significant assemblage of wood-dependent beetles discussed above gives us a glimpse into these different types of woodland in the hinterland of Dublin. While *A. punctatum* and *L. linearis* established themselves worldwide as pests of structural timber because of the age and condition of the wood they infest, most of the other species are either inhabitants of recently felled, thin-bore twigs or branches (the scolytid beetles primarily), or dead wood and tree stumps (*R. chloropus, S. scalaris*). These species



5 Structure G and H, early 13th century, Back Lane



Plates 6a, 6b & 6c Wood-dependent species ('wild wood'?) – *Saperda scalaris*, *Mesites tardii* and *Rhycolus chloropus*

are more likely to have been brought into the town occasionally in timber, firewood or branches cut for wattle-making then to have become established as structural timber pests themselves. With the clearance of woodland over time and generally tidier forest management practices that included clearance of dead wood from forest floors, many of these species have simply disappeared from the record. This is important information not just for the archaeologist in terms of understanding the nature and use of surrounding woodland, but is of enormous value to the entomologist and ecologist in providing a glimpse into our once richer entomo-fauna. It is a very tangible way of seeing the dramatic effects of forest clearance from medieval times onward. The true extent of the loss of wood-dependent beetle taxa is not as well studied in Ireland as it is in Britain (e.g., Whitehouse 1997), however, research is ongoing and findings from some prehistoric sites have added yet more wood-dependent species that are no longer recorded in Ireland (e.g., Caseldine et al. 2001). It is certainly an area of research worthy of greater attention.

CONCLUSIONS

This paper has attempted to illustrate some of the interesting and important environmental evidence suggested by sub-fossil insect remains. They can contribute to the overall archaeological interpretation of the use of buildings, the use of space within buildings, and the living conditions of people at this time. They give us insights into the use of hinterland resources, the nature of surrounding woodland, links with the European mainland through the presence of imported species like *Sitophilus granarius* and, occasionally, the seasonality of resource use. While rich organic preservation does not always occur in the suburban areas of medieval Dublin except in pits – for example, the sites examined in Thomas Street and Iveagh Markets – many of the same species that occur in the organic-rich deposits within the walled Anglo-Norman precincts are found in the pit-fills of these suburban areas. This at least points to similar micro-environments within structures in these areas; structures that unfortunately have not survived in the archaeological record. In particular, the 'background' fauna noted within samples from Iveagh Markets showed a strong esturine and coastal bias, and this was well reflected in findings from within the Viking and the Anglo-Norman walled town. Our understanding of the suburban areas of Dublin could benefit greatly from increased integration of environmental analysis in tandem with archaeological excavation.

Finally, it is extremely important for archaeologists to note their contribution to our present understanding of the current Irish insect fauna. All of the findings of rare, threatened and extinct Coleoptera described in this paper have come from archaeological sites. These findings have the potential to contribute positively to future conservation strategies for certain threatened ecological niches.

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