3670

THE ARTHROPOD ASSEMBLAGE FROM CUTLER'S GARDENS, LONDON

Maureen A. Girling

The following 54 taxa of insects, spiders, mites, woodlice and millipedes were identified from layers 340 and 342 of a 17th Century pit at Cutler's Gardens.

NAME	340	342	TOTAL
INSECTA			
SIPHONAPTERA			
Pulicidae			
Pulex irritans	2	1	3
Ctenocephalides felis felis (Bouché)	-	1	1
HEMIPTERA			
Cimicidae			
Cimex lectularius L. or *columbarius* Jenyns	-	1	1
PHTHIRAPTERA			
Pediculicidae			
Pediculus humanus L.	1	1	2
Phthirus pubis (L.)	1	-	1
COLEOPTERA			
Carabidae			
Clivina collaris (Herbst)	1	-	1
Trechus micros (Herbst)	1	-	1
Bembidion nitidulum (Marsh.)	2	-	2

NAME	340	342	TOTAL
Hydrophilidae			
Helophorus sp	-	1	1
Cercyon spp	5	9	14
Cryptopleurum minutum (E)	-	1	1
Anacaena bipustulata	-	1	1
Histeridae			
Hister merdarius Hoff.	2	-	2
Leiodidae			
Choleva or *Catops* sp.	1	-	1
Staphylinidae			
Omalium septentrionis Thoms.	1	-	1
Coprophilus striatulus (F.)	2	3	5
Carpelimus or *Thinobius* spp.	1	3	4
Anotylus rugosus (F.)	1	2	3
A tetracarinatus (Block) group	-	1	1
Anotylus sp.	1	1	2
Gyrohypnus punctulatus (Payk.)	1	-	1
Philonthus spp	5	7	12
Creophilus maxillosus (L.)	1	1	2
Quedius spp.	3	4	7
Aleocharinae *indet.*	2	2	4
Trogidae			
Trox scaber (L.)	4	2	6
Scarabaeidae			
Aphodius spp.	1	1	2

NAME	340	342	TOTAL
Elateridae			
Athous hirtus (Herbst)	1	-	1
Dermestidae			
Attagenus pellio (L.)	2	1	3
Anobiidae			
Stegobium paniceum (L.)	1	3	4
Anobium punctatum (Deg.)	5	3	8
Ptinidae			
Tipnus unicolor (Pill.& Mitt.)	5	7	12
Ptinus fur (L.)	3	-	3
Rhizophagidae			
Monotoma conicicollis Aubé	1	-	1
Cucujidae			
Cryptolestes sp.	-	1	1
Cryptophagidae			
Cryptophagus sp.	1	2	3
Cryptophagidae *indet.*	-	1	1
Endomychidae			
Mycetaea hirta (Marsh.)	1	2	3
Lathridiidae			
Corticaria sp.	-	1	1
Chrysomelidae			
Phyllotreta vittula Redt.	1	1	2

NAME	340	342	TOTAL
Chaetocnema concinna (Marsh.)	3	1	4
Cassida ? nobilis L.	1	-	1
Apionidae			
Apion ulicis (Forst.)	-	1	1
Curculionidae			
Sitona lineatus (L.)	1	-	1
Caulotrupodes aeneopiceus (Boh.)	2	3	5
Ceuthorhynchus sp.	1	-	1
DIPTERA			
Ephydridae			
Teichomyza fusca Macq.	72	-	72
Fam.gen.et spp.indet.	33	6	39
ARACHNIDA			
Aranaea	1	-	1
Acari	21	18	39
ISOPODA			
Porcellionidae			
Porcellio scaber Lat.	-	1	1
Armadillidiidae			
Armadillidium sp.	3	1	4
Fam.gen.et spp.indet.	2	3	5
DIPLOPODA	12	19	31

Species of importance

Pediculus humanus and Phthirus pubis. Both species of lice which attack humans and feed by sucking blood were present in the pit. P humanus is known to occur in two forms, P. h.capitis DeG, the head louse and P. h. humanus L. the body louse and these are considered to be unstable environmental sub-species (Clay 1973). Head lice attack the scalp, cementing their eggs or 'nits' to individual hairs, and they can extend to other parts of the body. The body lice have adapted to the hairless parts of the body and their eggs are laid in clothing. The morphological differences between head and body lice are slight and variable; the body louse is generally larger and of a lighter coloration then head louse. The Cutler Gardens specimens, one adult and a nymph, were preserved as partial $CaCO_3$ replacement fossils, a process which had affected the softer bodied insects, millipedes and woodlice from the pit, and which appears to be common in hard-water drainage areas (Girling 1979). Although the mineral replacement preserved fine structures and ornamentation of the lice specimens, it was not possible to assign them to sub-species. Even modern lice present difficulties as the sub-species interbreed and produce intermediate forms, and their reliable identification is often difficult. The other louse which occurred in the pit fauna is clearly referable to P. pubis, the pubic louse, also known colloquially as the crab louse (Plate I). This species infests the pubic hair but can occur in the armpits or even eye brows and lashes. There are historic records of both head or body and crab lice extending from ancient China and India, and they were known to the Greeks and Romans (Sandison 1969). More recent accounts of louse infestation include those of Thomas Beckett, and the description by Amatus Lusitanus, a 16th century Portuguese doctor of a rich nobleman attacked by Phthiriasis, the skin condition caused by body louse infestation. (Figuier 1869). The Dutch

Phthirus pubis (crab louse)

Scanning electron micrograph (X) of calcified adult

Plate 1

microscopist Leeuwenhock (1632-1723) experimented with body lice in an attempt to calculate their fecundity. Head lice and nits have been recovered from numbers of mummies of Pre-columbian Peruvians and Mexicans, Prehistoric North American Indians and Egyptions (Ewing 1924, Brothwell and Spearman 1963).

Cimex lectularius or columbarius. A calcified nymph of the bug Cimex sp. may be referable to C.lectularius, the bed bug, although the closely related pigeon bug, C.columbarius cannot be discounted. The Roman occurrence of Cimex sp. at Alcester has enabled Osborne (1971) to suggest that bed bug might be included in the growing list of insect pests introduced by the Romans.

Pulex irritans and Ctenocephalides felis felis. The two flea species present in the pit have been identified as human and cat flea. P. irritans (Plate 2) mainly effects man although it will feed on badgers, foxes, hedgehogs and pigs and severe infestations of this flea can occur in pig sties. Previous fossil records have been made for the human flea at two Viking sites in York and Dublin (Kenward et.al. 1978, Coope 1981).

C.f.felis, characterised by the ctenidium, or comb of spines on the head (Plate 3) lives mainly on cats and dogs, but will readily bite man, particularly when their primary hosts are removed from a dwelling. Unlike lice, fleas (and bed bugs) do not breed on their hosts, but only approach for blood meals.

Stegobium paniceum. This member of the family of wood-borers and timber pests, as its common name, the 'biscuit beetle' suggests, has become adapted to living in dried foods. It feeds on grain, flour and farinaceous products, spices, nuts and dry vegetables. Its present cosmopolitan

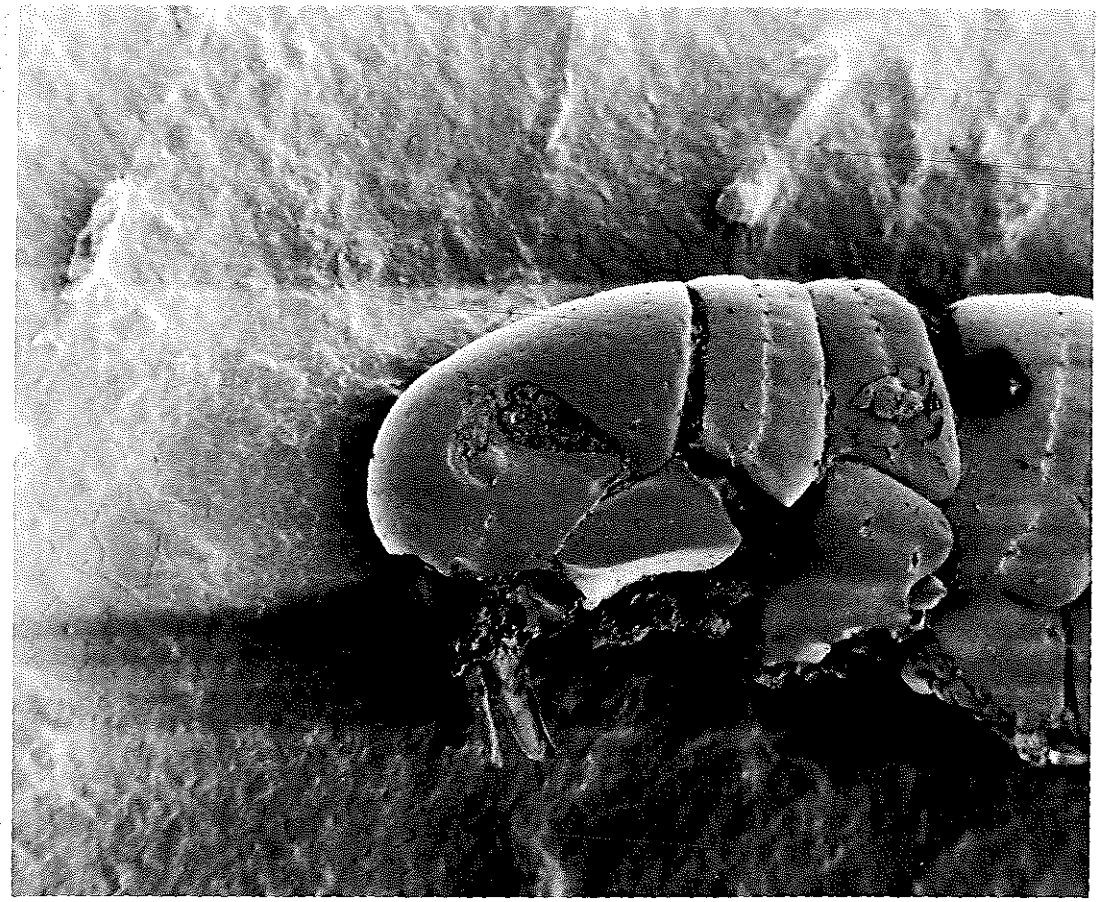
distribution has resulted from trade as its strong association with man goes back to Greece of 1345 BC (Alfieri 1931, Chadwick and Leek 1972). Its first records in Britain date from Roman times (Osborne 1971, Robinson 1975, 1979).

Caulotrupodes aeneopiceus. Elytra, or wing cases, of five individuals of this wood-boring weevil have been recovered from the pit. Both adults and larvae live in decayed wood including rotten stumps of deciduous trees, beams, posts and wine casks, and it occurs in caves and cellars. (Hoffmann 1959, Folwaczny 1973). These latter records prompt the not unreasonable suggestion that the weevil was living in rotten wood in the pit, although equally it might have been introduced by the disposal of rotten timber. Its present distribution in Britain resembles that of recent imported species; in 1890 it was known only from London and coastal ports in Devon and Cornwall (Fowler 1890). In Europe, it displays a littoral range, occurring inland only rarely.

If C.aeneopiceus is not indiginous to Britain, but an imported species carried in ships' timbers, wine casks or other transported wood, the Cutler's Gardens record could represent expansion from the nearby port of London where populations could arise from unloaded cargoes. Such suggestions must, however, remain speculative until the fossil history of this very rare species is established.

The environment of the pit.

Three components of the pit fauna can be identified; species breeding in the contents of the pit, those introduced in this infill and finally, insects whose arrival can be judged to be accidental. Whilst the in situ fauna permits a reconstruction of conditions in the pit, particularly where larval or immature arthropod stages imply a breeding population, species contained in material thrown into the pit provide important evidence of



Pulex irritans (human flea)

Scanning electron micrograph (X) of anterior part of adult

PLATE 2

Ctenocephalides felis felis (cat flea)

Scanning electron micrograph of adult head

PLATE 3

human activity in the area. Accidental arrivals provide clues about the surroundings, and indirectly, the human influences which fashioned them.

The commonest species in the fauna is the fly Teichomyza fusca and its usual habitats indicate the nature of the deposit. It breeds in cess pits and urine-soaked woodwork, often occurring in sufficient numbers to block sewage pipes, and its requirement for water with a high organic concentration can also be supplied by decaying corpses (Oldroyd 1964). Decaying plant and/or animal matter is further indicated by beetle species which might have bred in the deposit. Hister merdarius occurs in dung and carrion, habitats also favoured by Creophilus maxillosus, and dung, if present, is a suitable pabulum for Cryptopleurum minutum, Anacaena bipustulata and Coprophilus striatulus. Millipedes and woodlice adopt a cryptic mode of life well suited to a pit with an organic infill. Caulotrupodes aeneopiceus might have lived in situ, if decaying wood were present, and one other species associated with cellars, tunnels and burrows is the ground beetle Trechus micros. Its occurrence in such places makes this species a possible candidate for post-depositional contamination in any deposit but the similarity of preservation of T. micros with other Cutler's Gardens beetle remains argues for its contemporaneity with the fauna.

The suggestion from the in situ fauna that the pit was used, at least in part, for cess and other organic material, is borne out by the introduced fauna. As lice cannot survive long away from their hosts, and usually spread by direct contact, their incorporation in cess material is the most likely explanation of their occurrence in the pit. The other parasites might have gained similar entry or equally, the cat fleas could have arrived in the fur of a disposed animal corpse. The synanthropic beetles include some which are household pests; Attagenus pellio in dried meats or

hides, Stegobium paniceum, Cryptolestes sp, Ptinus fur and Tipnus unicolor in cereals and/or dry wood and Mycetaea hirta in general refuse. These would be contained in floor sweeping from houses or stores, and in any heavily infested product which was thrown away. Trox scaber lives on hides, bones and dry carrion, and it often occurs at habitations where these materials are provided by butchery or processing of animal products.

The small number of phytophagous beetles at the site hint at the plants growing nearby or at vegetation used for bedding or stalling animals. Chaetocnema concinna lives chiefly on Polygonum and various Cruciferae, including cultivated species, are the major host plants of Phyllotreta vittula. Sitona lineatus occurs on a wide range of legumes, again including cultivated plants. The only phytophage with a particular host plant is Apion ulicis which feeds on gorse bushes. One other species associated with vegetation is Athous hirtus whose larvae attack the roots of a variety of shrubs or herbs.

Any pit acts as a trap particularly for those animals which run along the surface, and the ground beetles Clivina collaris and Bembidion nitidulum might owe their presence in the pit to such accidental trapping.

Implications for health and hygeine at the site.

Infestations of fleas and bed bugs are usually associated with overcrowded housing, particularly where standards of hygeine are low,as the insects live in the host's dwelling. Their bites must have presented a continual nuisance to the occupants of an infected house, The pubic louse similarly suggests the poor standards of personal cleanliness which often accompany overcrowding. The most significant factor in terms of health is, however, the possibility that the Pediculus records represent body lice. Lousiness often confers a great deal of discomfort and skin irritation to the sufferer, although it has been noted that in a community where lice

are commonplace, certain individuals develop a tolerance to chronic infestation. The major importance of body lice is their role as vectors of the disease typhus (Buxton 1947, Busvine 1980). When lice feed upon a person suffering from typhus, the pathogenic micro-organisms, Rickettsia, are ingested in the blood meal and these infect the insect, obstructing its digestive tract and eventually causing starvation and death. In an effort to feed, the infected louse will repeatedly approach a host and the disease is thus spread. Furthermore, body lice are closely adapted to normal human body temperature, and are, or have been, important in areas of the world with temperate or cool climates where clothing is required by the inhabitants. Whilst removal of the insect from the host body heat induces torpor and eventual death, lice are equally sensitive to abnormal warmth and will abandon a host infected with typhus at the onset of the characteristic fever, this factor further promoting the spread of the disease. Zinsser (1935) has demonstrated the importance of typhus in the course of history in accounting for enormous mortality in urban and village populations. It is difficult to trace the appearance of typhus in man because of the uncertainty of descriptions of symptoms surviving in historical accounts, and it is possible that epidemics occurred in ancient Greece and China. Early accounts suggest that typhus fever affected Italy and Bohemia in the late 11th century and by the end of the 15th century it appears to have been widely spread in Europe. In London it reached epidemic proportions at the times of bubonic plague outbreaks, for instance in the 1620's and 1660's and the two diseases were frequently confused (Shrewsbury 1970). Until the 18th century, the filthy, overcrowded conditions of prisons provided reservoirs of the disease, then known as 'jayl' or 'gaol' fever, outbreaks of which occurred during trials, these 'assize epidemics' then devastating the surrounding populations. Outbreaks were commonly associated with circumstances which produced over-crowding, particularly famine, and, later, industrial depression. Of major

historic importance, however, was the prevalence of typhus during military campaigns, in overcrowded camps or ships which had limited facilities for washing and sanitation. Many wars were lost because typhus accounted for more deaths than occurred in battle. Frequently, the disease was then spread to the local populace who were living in straightened circumstances, or forced to flee, conditions which favoured further typhus outbreaks. The Culter's Gardens arthropod fauna, and its implications of low standards of hygeine in the nearby inhabitants combined with primitive sanitation must be considered in the light of the prevalence of diseases which flourished in such conditions. In 17th and 18th.century London, where typhus was endemic, the occurrence of Pediculus humanus of which the body louse subspecies is a vector, was of very major significance to a populace who were unaware of the link between the insect and the disease. In any event, the lice, fleas and ?bed bug must have posed a constant source of irritation and nuisance which today, we would find intolerable.

Acknowledgements.

I wish to thank Ann Davis who undertook the extraction and preliminary sorting of the fauna from the samples. Also, my thanks to the staff of the British Museum (Natural History) in particular K.G.V.Smith and A.Hutson who identified T.fusca and P.irritans, and P.Leigh who confirmed the identification of P.pubis and drew attention to early work on the group.

References.

Alfieri, A. 1931 Les insectes de la tombe de Toutankhamon. Bulletin Societe Royale Entomologique d'Egypte, 3/4, pp 188-189.

Brothwell, D. and Spearman, R. 1963 The hair of earlier peoples. In Science and Archaeology Ed D.Brothwell and E.Higgs, pp 426-436. London.

Busvine, J.R. 1980 Insects and Hygeine. London.

Buxton, P.A. 1947 The louse. London.

Chadwick, P.R. and Leek, F.F. 1972 Further specimens of stored products insects found in ancient Egyptian tombs. Journal of Stored Products Research, 8, pp 83-86.

Clay, T. 1973 Phthiraptera (lice). In Insects and Other Arthropods of Medical Importance, (Ed.) K.G.V.Smith, pp 395-397. London (BM, NH).

Coope, G.R. 1981. The fossil insect fauna from Christchurch Place, Dublin. In Proceedings of the 6th Viking Congress.

Ewing, H.E. 1924 Headlice from North American Indian Mummies. Science, 60, pp 389-390.

Figuier, L. 1869 The Insect World. London, Chapman and Hall.

Fowler, W.W. 1890 The Coleoptera of the British Islands, vol.5. London.

Folwaczny, B. 1977 Bestimmungstabelle der Palaärktischen Cossoninae (Col. Curc.) Entomologische Blätter, 69, pp 65-180.

Girling, M.A. 1979 Calcium carbonate-replaced arthropods from archaeological sites. Journal of Archaeological Science, 6, pp 309-320.

Hoffmann, A. 1959 Coleoptères curculionides. Faune de France, —, Paris, Lechevalier.

Kenward, H.K., Williams, D., Spencer, P.J., Greig, J.R.A., Rackham, D.J. and Brinklow, D. 1978 The environment of Anglo-Saxon York. In (ed.) R.A.Hall, Viking Age York and its Context. CBA Research Report 27, pp 58-73. London.

Oldroyd, H. 1964 The Natural History of Flies. London, Weidenfield and Nicolson.

Osborne, P.J. 1971 An insect fauna from the Roman site at Alcester, Warwickshire. Brittannia, 2, pp 156-165.

Robinson, M.A. 1975 The environment of the Roman defences at Alchester and its implications. Oxoniensia 40, pp 161-170.

Robinson, M.A. 1979 The biological evidence. In (eds.) G.Lambrick and M.Robinson, Iron Age and Roman Riverside Settlements at Farmoor, Oxfordshire, pp 77-133. CBA Research Report 32, London.

Sandison, A.T. 1979 Parasitic diseases In (eds.) D.R.Brothwell and A.T.Sandison, Diseases in Antiquity, pp 178-183, Springfield Illinois, Thomas.

Shrewsbury, J.F.D. 1970 A History of Bubonic Plague in the British Isles. Cambridge, University Press.

Zinsser, H. 1935 Rats, Lice and History. Boston, Little and Brown.