

1980. *Insects and hygiene. The biology and control of insect pests of medical and domestic importance.*, 3rd edition. London: Chapman & Hall.
- CLOUDSLEY-THOMPSON, J.L. 1976. *Insects and history*. London: Weidenfeld & Nicolson.
- DIOSCORIDES. [1968.] *The Greek Herbal of Dioscorides*. London: Hafner Publishing.
- GHAURI, M.S.K. 1973. Hemiptera (bugs), in K.G.V. Smith (ed.), *Insects and other arthropods of medical importance.*: 373–94. London: British Museum (NH).
- GIRLING, M.A. 1984. Eighteenth century records of human lice (Pthiraptera, Anoplura) and fleas (Siphonaptera, Pulicidae) in the City of London. *Entomologist's Monthly Magazine* 120: 207–10.
- HALL, A.R., H.K. KENWARD & A. ROBERTSON. 1993. *Investigation of medieval and post-medieval plant and invertebrate remains from Area X of the excavations in the Bedern (south-west), York (YAT/Yorkshire Museum sitecode 1973-81.13 X)*. London: Ancient Monuments Laboratory. Report 56/93.
- HEPPER, F.N. 1990. *Pharaoh's flowers. The botanical treasures of Tutankhamun*. London: HMSO.
- KEMP, B.J. 1984. *Amarna Reports*. I. London: Egypt Exploration Society.
- KEMP, B.J., D. SAMUEL & R. LUFF. 1994. Food for an Egyptian City: Tell el-Amarna, in R. Luff & P. Rowley-Conwy (ed.), *Whither Environmental Archaeology?*: 133–70. Oxford: Oxbow. Monograph 38.
- KENWARD, H.K. & E.P. ALLISON. 1994. Rural origins of the urban insect fauna, in A.R. Hall & H.K. Kenward (ed.), *Urban-rural connexions: perspectives from environmental archaeology*: 55–78. Oxford: Oxbow. Monograph 47.
- MATHESON, C. 1941. The distribution of *Cimex lectularius* in towns in England and Wales. *Bulletin of Entomological Research* 32: 165–71.
- MOUFET, T. 1634. *Insectorum sive minimorum animalium theatrum*. London: Thomas Cotes.
- NOBLE, E.R. & G.A. NOBLE. 1976. *Parasitology. The biology of animal parasites*. 4th edition. Philadelphia (PA): Lea & Febiger.
- OMORI, N. 1939. Experimental studies on the cohabitation of and crossing of two species of bed bug (*Cimex lectularius* L. and *C. hemipterus* F.) and on the effects of interchanging males of one species for the other, every alternate day, upon the fecundity and longevity of females of each species. *Acta Japonica medicinae tropicae* (Taihoku) 1: 127–54.
- OSBORNE, P.J. 1971. An insect fauna from the Roman site at Alcester, Warwickshire. *Britannia* 2: 156–65.
- PLINY. [1956.] *Natural History* 7. (transl. W.H.S. Jones). London: Heinemann. Loeb Text.
- [1963.] *Natural History* 8. (transl. W.H.S. Jones). London: Heinemann. Loeb Text.
- SHREWSBURY, J.F.D. 1964. *The plague of the Philistines and other medico-historical essays*. London: Victor Gollancz.
- SILVERMAN, A.L., J.A. BLOW, L.H. QU, I.M. ZITRON, E.D. WALKER & S.C. GORDON. 1998. Persistence of the hepatitis B viral genome in the common bedbug (*Cimex lectularius* L.) and evidence for viral shedding in excrement. *Hepatology* 28: 619.
- SOUTHWOOD, T.R.E. & D. LESTON. 1959. *Land and water bugs of the British Isles*. London: Warne & Sons.
- STROUHAL, E. 1995. *Life in Ancient Egypt*. Liverpool: Liverpool University Press.
- USINGER, R.L. 1996. *Monograph of Cimicidae (Hemiptera-Heteroptera)*. Baltimore (MD): Thomas Say Foundation. Baltimore Entomological Society.
- USINGER, R.L. & D. POVOLNÝ. 1966. The discovery of a possibly aboriginal population of the bedbug (*Cimex lectularius* Linnaeus, 1758). *Acta Musei Moraviae* 51: 237–42.
- VENKATACHALAM, P.S. & B. BELAVADI. 1962. Loss of haemoglobin iron due to excessive biting by bed-bugs. *Transactions of the Royal Society for Tropical Medicine and Hygiene* 56: 218–21.

Pubic lice (*Pthirus pubis* L.) were present in Roman and Medieval Britain

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As methods of retrieval become ever better, and analysis more refined, the horrid vermin of human occupation are identified and mapped. Recent analyses of deposits from Carlisle provide data on pubic lice.

Key-words: insect remains, lice, Britain, Roman, medieval, Carlisle

Studies of insect remains preserved in archaeological deposits are providing a wide range of information about past human economy, resource exploitation, diet, activity and living conditions. Recent work is exemplified by Buckland *et al.* (1994; 1996), Dobney *et al.* (1998), Hall &

Kenward (1990), Kenward & Hall (1995) and Robinson (1991). A remarkable aspect of these investigations has been the discovery of abundant remains of insect parasites of humans. There are numerous European archaeological records of the human flea (*Pulex irritans* L.)

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from the Neolithic (Buckland & Sadler 1997), Iron Age (Allison *et al.* 1990; Hakbijl 1989; D.N. Smith pers. comm.) and later (e.g. Allison *et al.* 1991; 1999; Hall & Kenward 1990; Hall *et al.* 1993; Kenward & Allison 1994; Kenward & Hall 1995). The human flea is also known from Norse Greenland (Sadler 1990). Archaeological records up to 1988 are discussed by Buckland & Sadler (1989). Human lice (*Pediculus humanus* L.) are recorded from 7th-century BC–AD 8th-century Israel (Mumcuoglu & Zias 1988; Zias & Mumcuoglu 1991) and from Egyptian mummies of early dynastic date (Fletcher 1994). In Europe they are known from the Roman period onwards (e.g. Allison *et al.* 1999; Hall & Kenward 1990; Kenward & Hall 1995; Schelvis 1994), and there are records from Iceland (Amorosi *et al.* 1992; Buckland *et al.* 1992), Greenland (e.g. Buckland *et al.* 1983; Hansen & Gulløv 1989; Sadler 1990), and North America (e.g. Cockburn & Cockburn 1980; Ewing 1924; Graham 1965; Horne 1979). By contrast, the pubic or crab louse, *Pthirus pubis* L., has only twice been found in archaeological deposits: a single fossil from 18th-century London (Girling 1984), and a group of three from post-medieval deposits, probably of the 17th century, in Iceland (Buckland *et al.* 1992). This pattern of occurrence might give rise to the suspicion that the insect was a late introduction, but new records from excavations of urban occupation layers in Carlisle, Cumbria, have now shown that the pubic louse was present in Britain in the Roman and medieval periods.

Samples of sediment from numerous archaeological layers revealed during excavations at The Lanes, Carlisle, and interpreted as having formed on surfaces and in ditches, gulleys and pits, have been analysed for insect (and other biological) remains. Many yielded abundant, often quite well preserved, insect fossils preserved by anoxic waterlogging (Kenward *et al.* 1998). Single specimens of the crab louse were recovered from two of these samples from the Keay's Lane C site. The first was from the fill of a Roman pit, dated between the late 1st and mid 2nd centuries AD (Context 1269.02). The insect assemblage indicated that the layer incorporated stable manure and possibly other waste. The second record was from a deposit of medieval date, also a pit fill, perhaps containing house-floor cleanings (Context 758). The medieval louse (FIGURE 1a) consisted of an en-

tire thorax and abdomen, together with part of the head and the bases of the legs, and was preserved by anoxic waterlogging. Much of its structure could be seen clearly, including the very characteristic arrangement of the abdominal spiracles (the anterior two pairs being well removed from the lateral margins) and the setae of the abdominal terminalia. The Roman specimen (FIGURE 1b) was partly mineralized and detail was obscured, but it could be positively identified by its general body form and such structure as could be discerned.

There are early Chinese, Greek and Roman sources which have been interpreted as referring to crab lice (Busvine 1976; Hoeppli & Ch'iang 1940), including the treatment of infestations of the eyelashes, which occasionally occur today (Burns 1987). Texts of the 15th century onwards seem, with various degrees of certainty, to deal with these creatures, and an illustration of AD 1688 clearly shows *P. pubis* (Busvine 1976). The fossil records strongly support the interpretation of the earlier literary references as relating to the crab louse.

The relative probabilities of archaeological preservation for the two genera of lice associated with humans may be very different. It is likely that most of the numerous human lice (*Pediculus humanus*) found in archaeological deposits are the form *capitis*, occurring primarily in the head hair, rather than *corporis*, mainly found on the body and in clothing, although separation of the subspecies is extremely difficult in fossil material unless it is exceptionally well preserved. (There appears, in fact, to be doubt amongst entomologists as to whether there are constant characters separating the two forms of *Pediculus*, cross-matings of which are fertile; see for example Brown 1969; Clay 1973.) Head lice are likely to have been shed in large numbers as a result of grooming, and body lice to have been shaken from clothes, and each often develops very large populations, so that both forms stood a good chance of becoming preserved in surface deposits. In contrast, pubic lice are by their nature perhaps much less likely to become incorporated into archaeological deposits. It has been pointed out that the 'sedentary nature' of *Pthirus* limits its spread (making it of little importance as a disease vector, in contrast to *Pulex* and *Pediculus*), and that it is, in a sense, a venereal disease, being mainly transmitted by sexual intercourse (Harwood &

James 1979). The insects' behaviour thus reduced the probability of pubic lice being shed into deposits where they might preserve.

Other taphonomic (preservational) problems for pubic lice arise because they are likely often to have remained *in situ* when the host died (references given by Smith 1986: 164): cremations would obviously destroy them, and interments are typically in well-drained deposits, providing poor conditions for survival. Bog bodies would provide a suitable preservational regime but are rare. Pubic lice might survive in sealed coffins where the contents remained damp, but it would be necessary to process the whole 'soup' in the bottom of the coffin, and not just a sample, if there was to be a reasonable chance of finding lice. The lice might be expected to survive in mummies, but they have yielded none, perhaps because of the high status, and thus arguably cleanliness, of the individuals likely to have received such treatment in most societies (shaving of body hair, as in ancient Egypt, may also have been a factor). In contrast, *Pediculus* has repeatedly been recovered from mummies, probably of ordinary individuals, in North America and Greenland (Cockburn & Cockburn 1980; Ewing 1924; Hansen & Gulløv 1989; Horne 1979) as well as Egypt.

A curious aspect of the fossil record of the pubic louse is that two of the three known British specimens are mineralized. There appears to be only a single record of mineralized individuals among the many hundreds of specimens of other lice from archaeological deposits in Europe (the exception being two *P. humanus* from a pit in London with a rather peculiar depositional environment, Girling 1984). While this may be a chance phenomenon, it may result from the pattern of shedding from the host. In the past, as now, head lice were picked off by family members (Busvine 1976), and there are numerous records of fine-toothed antler, horn, bone and boxwood combs, some clearly suitable as 'nit combs'. Head lice were probably typically systematically removed in houses or, to obtain better light, in the open; the distribution of lice in deposits at an Early Christian site in Northern Ireland provides evidence of both (Allison *et al.* 1999). Body lice may have been shaken or picked from clothes. The bodies of the lice were thus frequently deposited on surfaces, where there would either be 'waterlogged' preservation or the lice would quickly

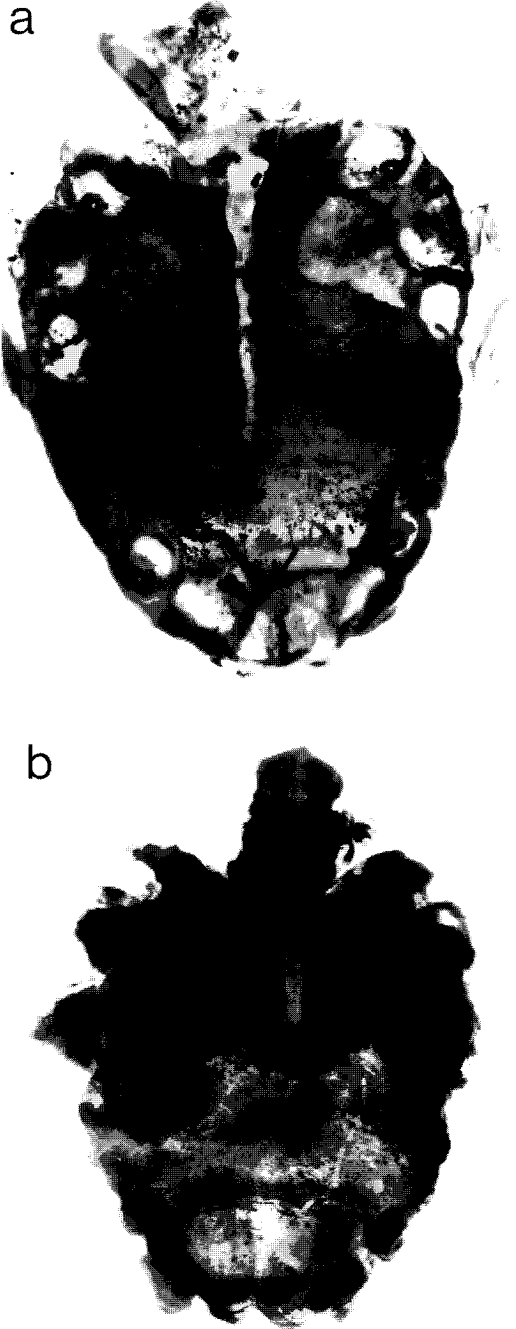


FIGURE 1. Pubic lice (*Pthirus pubis*) preserved in archaeological deposits at Carlisle, Cumbria, UK. a medieval, preserved by anoxic waterlogging (length 1.1 mm); b Roman, partly mineralized, with a hyaline appearance (length 1.0 mm). (Photographs M. Stark.)

decay completely and be lost from the fossil record. Mineralization (except of bone-rich dog faeces) is rare in archaeological deposits which formed on surfaces. In contrast, *Pthirus* would in most social groups most often be removed during thorough washing or in the privacy of the latrine, ending up in drain or cesspit fills where mineralization is fairly common. The (non-mineralized) Icelandic examples appear to have been deposited in a living room, however (Buckland *et al.* 1992).

It seems likely that the crab louse will inevitably be poorly represented in the fossil

record, limiting the likelihood of obtaining a clear picture of its origin and spread. Whatever the special circumstances leading to their survival, the specimens from Carlisle are thus of considerable interest, pushing back the confirmed presence of the pubic louse in Europe by almost 15 centuries and adding to the evidence for a long association with *Homo sapiens*.

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References

- ALLISON, E., A. HALL & H. KENWARD. 1999. *Technical report. Living conditions and resource exploitation at the Early Christian rath at Deer Park Farms, Co. Antrim, N. Ireland: evidence from plants and invertebrates 1-2*. York: Environmental Archaeology Unit. Reports 99/8, 99/10.
- ALLISON, E.P., A. HUTCHINSON, A.K.G. JONES, H.K. KENWARD & L.M. MORGAN. 1991. In M.R. McCarthy. The structural sequence and environmental remains from Castle Street, Carlisle: excavations 1981-2. *Cumberland and Westmorland Antiquarian and Archaeological Society Research Series 5* (fascicule 1): *passim*.
- ALLISON, E.P., H.K. KENWARD & P.R. TOMLINSON. 1990. Environmental analysis of samples from Area 86.53H, Peel Castle, Isle of Man. York: Environmental Archaeology Unit. Report 90/7.
- AMOROSI, T., P.C. BUCKLAND, G. ÓLAFSSON, J.P. SADLER & P. SKIDMORE. 1992. Site status and the palaeoecological record: a discussion of the results from Bessastaðir, Iceland, in Morris & Rackham (ed.): 169-92.
- BROWN, H.W. 1969. *Basic clinical parasitology*. 3rd edition. London: Butterworth.
- BUCKLAND, P.C., T. AMOROSI, L.K. BARLOW, A.J. DUGMORE, P.A. MAYEWSKI, T.H. MCGOVERN, A.E.J. OGILVIE, J.P. SADLER & P. SKIDMORE. 1996. Bioarchaeological and climatological evidence for the fate of Norse farmers in medieval Greenland. *Antiquity* 70: 88-96.
- BUCKLAND, P.C., T.H. MCGOVERN, J.P. SADLER & P. SKIDMORE. 1994. Twig layers, floors and middens. Recent palaeoecological research in the Western Settlement, Greenland, in B. Ambrosiani & H. Clarke (ed.), *The Twelfth Viking Congress: Developments around the Baltic and North Sea in the Viking Age*: 132-43. Stockholm: Birka project.
- BUCKLAND, P.C. & J.P. SADLER. 1989. A biogeography of the human flea, *Pulex irritans* L. (Siphonaptera: Pulicidae). *Journal of Biogeography* 16: 115-20.
1997. Insects, in K.J. Edwards & I.B.M. Ralston (ed.), *Scotland. Environment and archaeology 8000 BC to AD 1000*: 105-8. Chichester: Wiley.
- BUCKLAND, P.C., J.P. SADLER & G. SVEINBJARNARDÓTTIR. 1992. Palaeoecological investigations at Reykholt, Western Iceland, in Morris & Rackham (ed.): 149-68.
- BUCKLAND, P.C., G. SVEINBJARNARDÓTTIR, D. SAVORY, T.H. MCGOVERN, P. SKIDMORE & C. ANDREASEN. 1983. Norsemen at Nipáitsoq, Greenland: a palaeoecological investigation. *Norwegian Archaeological Review* 16: 86-98.
- BURNS, D.A. 1987. The treatment of *Pthirus pubis* infestation of the eyelashes. *British Journal of Dermatology* 117: 741-3.
- BUSVINE, J.R. 1976. *Insects. hygiene and history*. London: Athlone Press.
- CLAY, T. 1973. Phthiraptera (lice), in K.G.V. Smith (ed.), *Insects and other arthropods of medical importance*: 395-97. London: British Museum (Natural History).
- COCKBURN, A. & E. COCKBURN. 1980. *Mummies, disease and ancient culture*. Cambridge: University Press.
- DOHNEY, K., H. KENWARD, P. OTTAWAY, & L. DONEL. 1998. Down, but not out: biological evidence for complex economic organisation in Lincoln in the late fourth century. *Antiquity* 72: 417-24.
- EWING, H.E. 1924. Lice from human mummies. *Science* 60: 389-90.
- FLETCHER, J. 1994. A tale of hair, wigs and lice. *Egyptian Archaeology* 5: 31-3.
- GIRLING, M.A. 1984. Eighteenth century records of human lice (Phthiraptera, Anoplura) and fleas (Siphonaptera, Pulicidae) in the City of London. *Entomologist's Monthly Magazine* 120: 207-10.
- GRAHAM, S.A. 1965. Entomology: an aid in archaeological studies. *American Antiquity Memoirs* 19: 167-74.
- HALL, A.R. & H.K. KENWARD. 1990. Environmental evidence from the Colonia: General Accident and Rougier Street. *Archaeology of York* 14(6): 289-434. London: Council for British Archaeology.
- HALL, A.R., H.K. KENWARD & A. ROBERTSON. 1993. Investigation of medieval and post-medieval plant and invertebrate remains from excavations in The Bedern, York: Technical report. *Ancient Monuments Laboratory Reports* 56-58/93.
- HAKBIJL, T. 1989. Insect remains from site Q, an Early Iron Age farm of the Assendelvers Polders project. *Helinium* 29: 77-102.
- HANSEN, J.P.H. & H.C. GULLOV (ed.). 1989. The mummies from Qilakitsoq — palaeopathological aspects. *Meddelelser om Grønland, Man and Society* 12.
- HARWOOD, R.F. & M.T. JAMES. 1979. *Entomology in human and animal health*. New York (NY): Macmillan.
- HOEPLI, R. & I-H. CH'ANG. 1940. The louse, crab-louse and bed-bug in old Chinese medical literature, with special consideration on phthiriasis. *Chinese Medical Journal* 58: 338-62.
- HORNE, P. 1979. Head lice from an Aleutian mummy. *Paleopathology Newsletter* 25: 7-8.
- KENWARD, H.K. & E.P. ALLISON. 1994. A preliminary view of the insect assemblages from the early Christian rath site at Deer Park Farms, Northern Ireland, in D.J. Rackham (ed.), *Environment and economy in Anglo-Saxon England*: 89-107. London: Council for British Archaeology. Research Report 89.
- KENWARD, H.K. & A.R. HALL. 1995. Biological evidence from Anglo-Scandinavian deposits at 16-22 Coppergate. *Archaeology of York* 14(7): 435-797. York: Council for British Archaeology.

- KENWARD, H., F. LARGE & J. CARROTT. 1998. *The archaeological significance of insect and other invertebrate remains from Key's and Law's Lanes, The Lanes, Carlisle. Technical report*. York: Environmental Archaeology Unit. Report 98/32.
- MORRIS, C.D. & D.J. RACKHAM (ed.). 1992. *Norse and later settlement and subsistence in the North Atlantic*. Glasgow: Department of Archaeology, University of Glasgow.
- MUMCUOGLU, K.Y. & J. ZIAS. 1988. Head lice, *Pediculus humanus capitis* (Anoplura: Pediculidae) from hair combs excavated in Israel and dated from the first century BC to the eighth century AD. *Journal of Medical Entomology* 25: 545–7.
- ROBINSON, M. 1991. The Neolithic and Late Bronze Age insect assemblages, in S. Needham (ed.), *Excavation and salvage at Runnymede Bridge, 1978: The Late Bronze Age waterfront site: 277–327*. London: British Museum/English Heritage.
- SADLER, J.P. 1990. Records of ectoparasites on humans and sheep from Viking-Age deposits in the former Western Settlement of Greenland. *Journal of Medical Entomology* 27: 628–31.
- SCHELVIS, J. 1994. Caught between the teeth. A review of Dutch finds of archaeological remains of ectoparasites in combs. *Proceedings of the section Experimental and Applied Entomology of the Netherlands Entomological Society* 5: 131–2.
- SMITH, K.G.V. 1986. *A Manual of Forensic Entomology*. London: British Museum (Natural History).
- SVEINBJARNARDÓTTIR, G. & P.C. BUCKLAND. 1983. An uninvited guest. *Antiquity* 58: 127–30.
- ZIAS, J. & K.Y. MUMCUOGLU. 1991. Pre-pottery Neolithic head lice from Nahal Hemar Cave. *Atiqot* 20: 167–8.

The concept of affordance and GIS: a note on Llobera (1996)

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Llobera (1996) seeks to utilize the concept of affordance in his GIS study of Wessex linear ditches. Unfortunately, he does not seem fully to appreciate what is implied in the concept of affordance, nor the role that it plays within Gibson's theory of direct perception. I offer this short note as an addendum to Llobera's discussion of affordance and its uses with GIS.

Key-words: GIS, landscape, theory

Llobera's project

Marcos Llobera (1996: 612) attempts to use Geographical Information Systems (GIS) in a more 'humanistic way', to explore 'places and spaces' and to 'close the gap between theory and method'. The theory in question is that of human *practices* and relates to Gidens' concept of *structuration* and Bourdieu's concept of *habitus*. As a methodological tool, GIS offers, as Kvamme (1993: 91) notes, 'excellent display capabilities together with embedded systems of quantitative analysis [that] can provide an ideal environment for spatial investigation'.

Gidens and Bourdieu are now regular sources for archaeological theorizing, but the American psychologist, James J. Gibson is not. Gibson studied perception and developed an 'ecological psychology' based on a theory of direct perception. The concept of *affordance* is central to the theory of direct perception.

For Llobera, the concepts of *structuration*, *habitus* and *affordance* make up a trinity of key concepts that, it is hoped, will make human practices within the landscape explicable (but note; the utility of the concept of *practices* for social science has been severely questioned by Stephen Turner (1994)).

Finally, Llobera's approach to understanding 'places and spaces' in the Wessex landscape is also influenced by the anthropology of Tim Ingold, who in turn, draws on Gibson's theory of direct perception. Llobera is therefore doubly influenced by Gibson; directly by his attempt to use the concept of *affordance* and indirectly through the anthropology of Ingold. What, then, does Gibson's theory of direct perception amount to?

Gibson's theory of 'direct perception'

Although Gibson's theory of direct perception is generally applicable to the senses, most of

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