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Cover Page Footnote
The majority of this text was prepared during my Social Science and Humanities Research Council of Canada funded postdoctoral fellowship at the Fiske Center for Archaeological Research, University of Massachusetts Boston. I am grateful to· Paul Buckland for his comments on an earlier draft and to two reviewers for their helpful suggestions.

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Ectoparasites, in the form of lice, fleas, and bedbugs, are often found in archaeological samples as indicated by archaeoentomological investigations in Europe, the Near East, Greenland, Iceland, and more recently in North America. Many historical texts, some dating as far back as the Classical Period, discuss ectoparasites, providing a lively repository of folk remedies. While archaeoentomological finds of ectoparasites are relatively new to the Northeast, these irritating intimates are found when care is taken to look for them.

Des ectoparasites, sous la forme de poux, de puces, et de punaises de lit, sont souvent trouvés dans les échantillons archéologiques comme indiqué par des analyses archéoentomologiques en Europe, au Proche Orient, au Groenland, en Islande et, plus récemment, en Amérique du Nord. Beaucoup de documents historiques, certains datant de la période classique, mentionnent les ectoparasites. Ces textes représentent un riche et vivant répertoire de remèdes et de recettes folkloriques. Bien que les prélèvements archaéoentomologiques d'ectoparasites soient relativement nouveaux dans le Nord-est, on retrouve ces irritants intimes quand on se donne la peine de les chercher.

Introduction

This paper was originally presented at the 1998 Council for Northeast Historical Archaeology meetings under the title "A Treatise of Cleanliness in Meats and Drinks ...and the Benefits of Clean Sweet Beds." The title was taken from a 1682 text referring to bedbugs and their generation in "the excrements and
breathings of the body," cited in Busvine's *Insects, Hygiene and History* (1976: 98). In fact, Busvine's elegant and entertaining treatment of ectoparasites inspired this paper. Regardless of our position on them, or them on us for that matter, they are (almost) always with us.

It is simultaneously fascinating and amusing to examine peoples concerns about, and their cures for, ridding themselves of the irritating intimates that are fleas, lice, and bedbugs. Most of these ectoparasites are mildly offensive to our aesthetic senses, while posing no actual health risk. However, severe infestations may have some health implications. Many examples of these ectoparasites have been recovered from archaeological excavations abroad, while two sites in the Northeast indicate their presence in historic archaeological contexts. A brief but by no means exhaustive survey of the ectoparasites recovered from various archaeological contexts is presented, followed by a consideration of the Northeast entomological fauna.

Ectoparasites and Us

While intestinal parasites or endoparasites have been studied archaeologically in the Northeast by several researchers (Driscoll 1994, 1995; Fries et al. 1990; Horne and Tuck 1996; Reinhard 1989, 1994; Reinhard et al. 1986), the focus of this discussion is the ectoparasites, which can be defined as parasites living not in, but on their host's body (Markell et al. 1999: 7). This group generally includes the human flea, and head, body and pubic lice. For the purposes of our discussion here, we will also include bedbugs, as they too feed on human blood.

Ideally, ectoparasite analysis enhances our interpretations of past sanitary conditions. However, the presence of a single or even several lice in an archaeological assemblage does not specifically imply that the site's inhabitants were diseased or dirty, though severely lousy people are certainly more at risk to infections as a result of their louse bites, and they likely lived in what we would consider unsanitary conditions today. Osborne cautions against these assumptions, as we are imposing modern Western standards of hygiene on those that lived in the past (1983: 461). While culturally-laden perceptions of infestations, hygiene, and sanitation can be problematic as they are burdened with our currently accepted standards of extreme hygiene, their consideration is, nonetheless, interesting.

Lice

The three species found on humans are body lice (*Pediculus humanus humanus* Linnaeus), head lice (*Pediculus humanus capitis* DeGeer), and pubic or crab lice (*Pthirus pubis* Linnaeus). It has been suggested that the wearing of clothing resulted in *Pediculus humanus* evolving into the two subspecies of *humanus* and *capitis* (Kittler et al. 2003: 1415), while *Pthirus pubis* is believed to have evolved on primates (Busvine 1976: 41). However, the debate on the subspeciation of the *Pediculus* genus is still unresolved (see Kenward 1999: 912 for discussion). It is generally accepted that lice became cosmopolitan in their distribution, along with their human hosts (Buckland and Sadler 1989: 115).

Head lice, as their name suggests, infest the scalp. The females deposit their eggs or nits onto individual strands of hair and ten days later, these hatch into nymphs. Within another two weeks, they have evolved into adults 2–3 mm in length (Markell et al. 1999: 363). Both larvae and adults feed on blood (Markell et al. 1999: 363). In North America, the most commonly infested members of society are school children as their proximity to their classmates allows for easy transmission.

The pubic louse, or "crabs" in the common vernacular, is shorter and broader, about 2 mm in length, a distance seemingly dictated by evolution as it represents roughly the distance between pubic hairs (Robinson 1996: 191). They are most often found in the genital region, but may also be found elsewhere on the body (Markell et al. 1999: 364). They have a 30 to 40 day life cycle, spent entirely on their hosts, thus contact with an infected person is needed for their transmission. Other than a slight allergic reaction at the source of the bites, public lice cause no harm and are not known to transmit disease.

Body lice are slightly larger than head lice, and live on the covered parts of the body. In fact they are often found in their hosts clothing (Markell et al. 1999: 364). Like the head lice, they can be spread by direct contact or by contact with the clothing, bedding, or other fabrics such as cloth-covered seats in theatres or railway cars (Markell et al. 1999: 364). This transmission is important, as body lice can be vectors of epidemic typhus, trench fever and louse-borne relapsing fever (Cloudsley-Thompson 1976: 103; Markell et al. 1999: 385). Typhus may be carried by lice infected with the causative micro-organism *Rickettsia prowazekii*. Both the body and faeces of the lice become infected, and when people cracked them between their fingernails to kill them in the past, this action usually ensured enough contact with the skin for transmission (Robinson 1996: 178). The rubbing of dead lice and their faeces into bites, sores, and cuts may further ensure infection. Some people also suffer from localised thickening of the skin around bites, pigmentation changes and other generally unpleasant reactions (Markell et al. 1999: 365). To treat body lice, infested clothing must be removed and decontaminated. As for head and crab lice, nits can be combed out and special lotions or shampoos applied (Markell et al. 1999: 364).

As early as the 13th century it was known that "against the grieving of lice, oft washing, combing and medicinal cleansing of the hair helpeth" (FIG. 1), while a text dating from 1500 suggests washing and changing linens often (Busvine 1976: 181). These early writers were right but for the wrong reasons, as they believed that these pests were generated from miasmas, dirt, sweat, or simply appeared spontaneously. Canadian advice booklets from the late-19th century warn children's nurses that lice generate as a result of illness (Chavasse 1880: 213). Suggestions for treatment of body lice include baths and applications of mercury, sulfur, camphor, benzene or a solution of diluted tobacco (Littré 1898: 1287). Camphor was also used to remove both head lice and fleas (Chavasse 1880: 214), as was kerosene oil, followed by both soap and water rinses and a thorough soaking in vinegar (Scovil 1894: 177). The Slave Indians of Western Canada have been known to use the pygmyflower from the primrose family (*Androsace septentironalis* Linneaus) to rid themselves of hair and body lice (Marles et al. 2000: 224).

Archaeologically, head and body lice have been found in Greenland from both Norse (Sadler 1990: 628, 1991: 202–3; Sveinbjarnardóttir and Buckland 1983: 127),

Figure 1. Image of lice removal from G. van den Bossche's *Historia Medica* (1639), Brussels.

and Inuit sites (Bresciani et al. 1983). They are considered relatively frequent finds in samples from medieval (Buckland 1987: 135, 1988: 23) and post-medieval Iceland (Amorosi et al. 1994: 74). They have also been recovered on Dutch combs dating from the 11th to the 14th century (Schelvis 1994: 132), on Egyptian mummies (Fletcher 1994), and in Israeli cave deposits dating to 6900–6300 B.C. (Zias and Mumcuoglu 1991). In Wyoming they were recovered from a mummy, probably of Sioux or Crow origin, dating to the 1880s (Gill and Owsley 1985:46). The oldest archaeological evidence for head lice are from a Brazilian human louse egg dating to over 10,000 years (Araújo et al. 2000: 269). Their presumed ubiquity and removal with fine combs would allow for their more common occurrence in archaeological contexts, not likely the case for pubic lice (Kenward and Allison 1994: 69). Pubic lice have, however, been recovered from post-medieval Iceland (Sadler 1991: 204), from 18th-century London (Girling 1984: 207), and from Roman and medieval contexts from Carlisle, England (Kenward 1999: 912).

Bedbugs

Bedbugs were introduced to North America with their European hosts (Busvine 1976: 33). Two species of bedbugs attack humans, feeding on their blood, but live and breed away from their hosts (Eldridge and Edman 2000: 63). *Cimex lectularius* (Linnaeus) is a cosmopolitan or globally dispersed species, while C. *hemipterus* (Fabricius) is restricted to tropical climates, primarily in southern Asia and Africa (Eldridge and Edman 2000: 110). Most members of the genus *Cimex* are parasites of bats and it is believed that bed bugs were initially pests of bats, and came into contact with humans in cave environments (Busvine 1976: 33). They are extremely hardly, and can survive without food for up to a year in cool weather (Busvine 1976: 12).

Bedbugs often attack while their hosts are sleeping with no immediate discomfort from their bites (Eldridge and Edman 2000: 110). In fact, many people have no reaction at all (Markell et al. 1999: 375). An extreme infestation of female egg-laying bedbugs or lice, numbering around a thousand, would only draw 4 ml per week of blood, with virtually no effect on the health of their human host (Busvine 1976: 62). While dermatitis or a secondary infection may occur from their bites, bedbugs have never been proven to be vectors of disease (Burgess 1981: 50). However, they offend us as they excrete regularly where they are living, often on walls, where they leave yellowish or black spots (Busvine 1976: 64), and when disturbed they may give off an unpleasant smell (Eldridge and Edman 2000: 110).

Historical texts suggest some rather innovative ways of eliminating bedbugs. The smoke of ox dung, horsehair, arsenic, lupines, and cypress were all believed to be effective 17th-century bedbug combatants (Busvine 1976: 190). Nineteenth-century medical recipes suggest a concoction of saltpetre, soft water, shaving soap and Aqua ammonia for the elimination of bed bugs. This "Renovating Mixture" also served as a shampoo, paint remover and grease spot eliminator (Chase 1864: 277). Another author suggests that a night light and oil of turpentine sprinkled between the sheets and on the pillow will "keep the bugs at a respectful distance" (Chavasse 1879: 81).

According to the Swedish botanist Pehr Kalm, 18th-century Canada was as equally infested with bedbugs as the Old World (Rousseau and Béthune 1977: 127). He observed them during his 1749 visit to Upper New York State, and complained they disturbed him all night on a visit to Québec. To give due justice to rural living, Kalm noted they were equally abundant in the cities and in the countryside (Rousseau and Béthune 1977: 221). Kalm also noted the presence of lice and fleas (Rousseau and Béthune 1977: 408). During the first half of the 20th century, the bedbug was common in North American cities (Robinson 1996: 169), and can still be found today.

The earliest association of humans with bedbugs was found at the site of Tell el-Amarna, Egypt, dating to about 3550 years ago (Panagiotakopulu and Buckland 1999). Osborne also identified *Cimex*, likely the species *lectularius*, in samples from a Roman site in Warwickshire, England (Osborne 1971: 157–8). Bedbugs have been identified from York and Norwich in the 10th and 11th centuries (Kenward and Allison 1994), and 18th-century London (Girling 1984: 208). In comparison with other ectoparasites, Kenward and Allison have noted the rarity of finding bedbugs in Old World archaeological samples (1994: 69). They suggest that the lack of central heating in Roman stone buildings may have limited their fecundity or they were potential fodder for chickens and rodents in less sanitary settings (Kenward and Allison 1994: 69).

Fleas

Fleas, specifically the human flea, *Pulex irritans* (Linnaeus), were originally believed to be of New World origin (Buckland 1987: 135; Buckland and Sadler 1989: 119), however recent archaeological evidence indicates their existence in the Old World during the Late Neolithic (Buckland and Sadler 1997), indicating a cosmopolitan distribution. Like bedbugs, fleas are hardy and are able to survive for long periods between feedings. In fact, they may lay dormant waiting for the presence of an appropriate host and then emerge collectively, which is the reason why a flea infestation appears to be so intense (Eldridge and Edman 2000: 111).

While certain species, such as the rat flea *Xenopsylla cheopis*, played an important role in plague transmission, the human flea is not known to be a vector of any one particular disease (Burgess 1981: 62; Hubbard 1968: 57), though it has been proven to transmit bacteria (Valera and Olarte 1946: 105). Flea bites themselves are generally harmless; however excessive scratching can result in infection.

In the 15th century ladies stoles worn around the shoulders were referred to as "flea furs," and even into the 18th century flea traps were worn under clothing (Busvine 1976: 70). Traps were sometimes made of the skin of a small animal, which was worn on a chain

around the neck (Busvine 1976: 185). Fleas will abandon a host shortly after death, (Dittmar et al. 2003: 55) so this could not have been particularly effective. Another type of flea trap was composed of a cylindrical tube, which contained a small rod or tuft smeared with honey or blood to attract fleas (Busvine 1976: 186). Chavasse recommends the use of *La Poudre Insecticide* from France which he claimed to be "utterly destructive" to fleas (1879: 80).

Human fleas have been recovered from Tell el-Amarna, Egypt, dating to about 3550 years ago (Panagiotakopulu and Buckland 1999: 908). They have also been recovered in large numbers from Norse Greenland, (Buckland 1987: 135, 1988: 23; Sadler 1990: 628, 1991: 203), medieval Dublin (Sadler 1991: 203), Anglo-Scandinavian York (Hall and Kenward 1990: 398), 18th-century London (Girling 1984: 207), and Dutch sites dating between the 11th and 14th centuries (Schelvis 1994: 132). Hundreds of fleas recovered on mummified dogs from Southern Peru dating to around 900 A.D. confirm their presence in the Americas before European colonization (Dittmar et al. 2003).

Ectoparasites in the Northeast

To date, ectoparasites have been recovered from only two sites in the Northeast, both 19th-century urban privies. Bedbugs and lice were encountered when sediment samples were processed to study the preserved insect fauna, following the standard methodology used in archaeoentomological analyses (Bain 2001: 38; Elias 1994: 30–34). Samples from the Îlot Hunt site in Québec City contain lice, but identification to the species level was impossible due to the fragmentary nature of the remains. They were likely transferred to the privy on one of the many recovered combs or brushes, or in chamber pots, floor sweepings, or the folds of clothing.

Bedbugs (FIG. 2) have been identified from both Îlot Hunt (Bain 2001) (FIG. 3) and from the Abiel Smith School site, a Boston primary school (Bain 1998a: 7). As they do not depend on humans for their entire life cycle, their presence in privy samples could be the result of discarded floor sweepings, dropping out of the folds in clothing, in chamber pots contents

Figure 2. *Cimex lectularius*—the bedbug.

Figure 3. Preserved head and pronotum of *Cimex lectularius* from the Îlot Hunt site, Québec, ca. 1860.

or any other domestic trash. At the Abiel Smith School, it appears that the single bedbug recovered likely fell into the privy from the folds of clothing during privy use. At Îlot Hunt, 238 liters of sediment were processed resulting in an entomological fauna of almost 7000 individuals, only 43 of which were bedbugs. In most archaeoentomological analyses the focus is primarily on the Coleopteran or beetle remains which dominate insect faunas of historic sites in the Northeast (Bain 1997a, 1997b, 1998a, 1998b, 2001). Privies or other urban deposits that allow for the preservation of botanical remains also, as a general rule, favor the preservation of insects, due to their hardy chitinous exoskeletons. At both Abiel Smith and Îlot Hunt, the ectoparasites were less than 1% of the total insect fauna, and do not appear to indicate a marked infestation.

In general, it appears that the sanitary conditions of New World cities were little better than that of the European cities. With the exception of the bedbug, colonization of the New World simply reinforced the ectoparasitic load of North America as fleas and lice were already present. John Josselyn, the English botanist and explorer, noted that Native Americans knew about lice and their eggs and used tobacco as a cure (Gifford 1980: 271), while French explorer Samuel de Champlain, complained about being tormented by the abundant fleas in the native "cabins" he stayed in (Slafter 1882: 118). These anecdotes indicate well established ectoparasitic faunas in the New World.

According to Ruddel, the river traffic in the Northeast during the historic period ensured inhabitants' continual and repeated exposure to smallpox, cholera, typhus, syphilis, influenza, dysentery, pneumonia, diphtheria, tuberculosis, measles, dropsy and many fevers (1981: 92). The spread of typhus by the body louse led to the creation of regulatory boards and councils, however between 1800 and 1830 only five major American cities had Boards of Health (Robinson 1996: 93), though typhus was a frequent affliction at this time (Pfeiffer 1985: 100, 156).

Historical texts, though they must be read critically, leave the general impression of filthy conditions in the Northeast, though the examples discussed here focus on Québec City. In Nouvelle-France, the first by-law related to city sanitation was passed in Québec City on March 28th, 1673. It encompassed privies, latrines, garbage disposal, tenure of animals in the city, and street cleaning. It encouraged the town's citizens, which would have numbered around 1000, to throw their domestic garbage into the river (Saucier 1958: 48). Other municipal by-laws from the period between 1663 and 1690 state that town occupants without latrines, were to clean the area in front of their homes every morning (Chénier 1991: 95), leaving a vivid image of the nocturnal disposal of chamber pot contents. In theory, a weekly garbage collection service was in place by the early 1700s, but in practice citizens often did the clean up themselves (Desloges 1991: 103). It appears that little changed in the post-Conquest period (after 1759). A 1780 by-law stated that the inhabitants of each dwelling were responsible for cleaning the street in front of their homes, and at this time it was strictly forbidden to throw garbage into the streets and to let animals run freely within the city limits. It appears that these ordinances, continually re-issued in the years that followed, were virtually ignored by the growing city's inhabitants (Hare et al. 1987: 127). Late-19th-century reports issued by Québec's Provincial Hygiene Inspectors discuss appalling conditions in Québec City with its overflowing privy pits, streets filled with garbage, and polluted rivers (Beaudry 1888, 1891, 1893, 1989; Pelletier 1889).

While far from ideal conditions for their human inhabitants, ectoparasites likely thrived in the unhygienic and crowded conditions found in Northeastern cities like Québec during the historic period. The Îlot Hunt site, located in the port area of Lower Town, Québec City, fronted onto the St. Lawrence River at the peak of the city's economic boom in the early-19th century, and was owned by one of the cities most important businessman, James Hunt. The intensely occupied urban space contained a hotel, houses, warehouses, workshops, a stable, wharves and various small businesses during a period of massive immigration to Canada and regulations which required almost all ships to stop in Québec City. It is little surprise then that the rich privies of the Îlot Hunt site, in Lower Town,

Québec City yielded many bedbugs and lice fragments.

Conclusion

While environmental archaeology in the Northeast has focused primarily on the analysis of pollen, seeds, and bones, the analysis of endoparasites, ectoparasites, and other insects can shed light on many intimate aspects of daily life. Most readers will be encouraged to know that human fleas and bedbugs are becoming rare in the West. A decade ago Kenward and Allison suggest that this is becoming a potential conservation issue (1994: 71) as the multitude of cleaning products used in most homes has essentially eliminated this domestic fauna. Furthermore, the advent of synthetic fibres used in carpets, clothing and furniture today, versus natural fibres, woollen carpets and animal skins, further reduces their few remaining available ecological niches (Robinson 1996: 9). Regardless of our feelings about them, this intimate fauna has played a role in our history and merits our due consideration.

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