

Ancient Monuments Laboratory
Report 87/91

TWO ROMAN 'NIT' COMBS FROM
EXCAVATIONS AT RIBCHESTER
(RBG80 AND RB89), LANCASHIRE

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Summary

Two combs, made of boxwood, were recovered from waterlogged deposits during excavations at Ribchester in 1980 and 1989-90. During conservation, the soil residues were examined and found to contain fragments of human head lice (*Pediculus humanus capitis*). This report describes the combs, their conservation, and the lice.

Author's address :-

Vanessa Fell

Conservation Laboratory
The Manchester Museum
The University
Manchester
M13 9PL

**TWO ROMAN 'NIT' COMBS FROM EXCAVATIONS AT RIBCHESTER
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Description of the combs

Comb RB89/2635

Context 728. Lab. No. Manam 3816. (Plate I, a-c).
Length 108mm; width 52.5mm; thickness (max.) 10.0mm.

The comb is double-sided with 6 teeth per cm on one side and 13-14 teeth per cm on the other side. It is made of boxwood (*Buxus sempervirens*) - the grain running down the teeth. The teeth are cut at a slight angle (10-15°) to the length of the comb - along the direction of the rays of the wood.

On each side of the comb, along the line of the base of the teeth, there is an incised line made prior to the teeth and presumably to mark the extent of the cuts. The teeth are separated by flat-based, angled channels (Plate Ic), c. 0.2mm wide between the fine teeth, c. 0.7mm wide between the coarse teeth. Within the channels between the coarser spaced teeth there are grooves c. 0.2mm wide, and there are angled tool marks on the sides of the teeth (Plate Ic). Thus, the teeth were cut from both sides, very possibly by sawing, to a maximum depth of 21.5mm.

Comb RBG80/77

Context 104. Lab. No. Manam 458. (Plate Id).
Length 49.5mm (incomplete); width 51.5mm, thickness (max.) 10.0mm.

A fragment of a double-sided comb with 5.5 teeth per cm on one side and 14 teeth per cm on the other side, cut to c. 21mm depth (maximum). It is made of boxwood and the form is similar to comb RB89/2635. There is post-burial compression damage near the fracture, and some fungal deterioration of the wood structure.

Examination and conservation

Comb RB89/2635 was received in the unwashed, waterlogged condition. Comb RBG80/77 had been partially cleaned and stored wet with fungicide (Panacide: 0.01% w/v dichlorophen in water) since 1980.

Adhering soil was freed into a petri dish using a brush, needle and water, taking care not to mark the wood structure. A small amount of the residues between the finer spaced teeth could not be released without potentially damaging the combs. Sorting of the soil residues under a binocular microscope (x10 - x20) revealed fragmentary remains of insects. These were isolated and examined under transmitted light at magnifications up to x400. All the insect remains from comb RBG80/77 came from the finer spaced teeth (soil residues from comb RB89/2635, which were examined first, were not segregated prior to examination). No egg cases ('nits') or hairs were found.

After wood species identification, the combs were stabilised by freeze-drying following pretreatment for eight weeks in a 20% solution of polyethylene glycol 400 according to the recommendations of Watson for medium density wood in little degraded condition (Watson 1987).

The lice

The insects were identified (by Dr J.H. Kennaugh) as human head lice (*Pediculus humanus capitis* de Geer: Order Phthiraptera: Anoplura).

Comb RB89/2635 (Plate II, a-b)

Fragments of three lice, probably nymphs (juveniles), and moulted cuticles from five or more nymphs were recovered (Table 1). One fragment of nymph is shown in Plate II, a-b; a moulting claw is clearly visible indicating that this nymph died during a moult.

Comb RBG80/77 (Plate II, c-e)

Despite a smaller volume of soil residues being recovered from this comb, a far greater number of fragments of lice and cuticles were recognised (Table 1). Noticeable amongst these were fifteen larvae or first stage nymphs (Table 1, column 3), three of which were in the partly opened state (Plate IIId) and the rest in the closed state (Plate IIe). On the basis of size, other insect fragments may be from five or more adult lice.

Table 1. Minimum population of *Pediculus humanus capitis* recovered

| Comb | Nits | Nymphs | | Moulted cuticles | ?Adults | Total insects (excluding moulted cuticles) |
|-----------|------|--------|-------|------------------|---------|--|
| | | Early | Other | | | |
| RB89/2635 | 0 | 0 | 3 | 5 | 0 | 3 |
| RBG80/77 | 0 | 15 | 18 | 12 | 5 | 38 |

Discussion

The embryo of the human head louse, within its egg case (c. 0.8 x 0.3mm) attached to the base of the hair follicle, develops into the nymphal stage in about nine days (Busvine 1980, 261-2). After hatching, the nymph goes through three stages of development, growth and moulting before reaching maturity at around nine days, when its length may reach 4mm (Donaldson 1979, 59; Busvine 1980, 256-260). The size and

form of the claws, and the form of the abdominal segments, spiracles and hairs are the principal distinguishing features between the human head louse *Pediculus humanus capitis* and the human body louse *Pediculus humanus humanus* (Donaldson 1979, 58; Bresciani et al. 1983, table 1).

The fragments of *Pediculus humanus capitis* found on the two Ribchester combs seem to be principally in the juvenile stages of the life cycle. The partly opened larvae (Plate IIId) may have just hatched before being combed from the hair, or may have died naturally during hatching (J. Fletcher pers. comm.). If the former were the case, death would have occurred within an hour or two of hatching since a newly hatched insect fully expands before the sclerotin in the exocuticle cross-links and hardens. The unopened larvae (Plate IIe) were at advanced stages of development - all with clearly distinguishable claws, many with distinguishable mouthparts, spiracles and cuticular hairs, and in a few, internal organs (e.g. trachea) were visible. These were probably unhatched larvae which had been pulled from their egg cases, for example by combing (J. Kennaugh pers. comm.). It is possible that they may be unhatched larvae from which the egg cases (which contain no sclerotin) have subsequently degraded, but this seems less likely since (soft tissue) internal organs had survived in some specimens.

The lice presumably survived due to their waterlogged and anaerobic burial environment. Their fragmentary condition may be due to physical damage of the insects by combing or through post-excavation recovery and sorting of the soil residues; the moulted cuticles would be particularly fragile and vulnerable to damage. It is relevant that the only readily distinguishable features of the larval (first stage nymph) specimens at low-power reflected light microscopy were the claws; it therefore seems probable that many insects at earlier stages of development were not recognised during sorting of the soil residues. None of the insect fragments recovered was sufficiently intact and well-preserved, or mature, to enable sexing.

The apparent absence of 'nits' is probably due to failure to distinguish specimens from the soil residues though may be because they have not survived (see above). It is conceivable that the nits remained attached to the hair follicles during combing, though this seems unlikely since the spaces between the teeth of the combs are smaller than the dimensions of louse eggs. It may be significant that eggs and egg cases were recovered from combs from Israel (Mumcuoglu and Zias 1988), and those combs have similar density of teeth as the Ribchester combs.

Head lice do not thrive once removed from their source of warmth (the scalp) and food (blood), and furthermore, are host-specific (Busvine 1980). Thus, the specimens recovered are presumed to be contemporary with the combs and their contexts. Both combs are made of boxwood and are therefore of the same species as many other early combs (e.g. Mumcuoglu and Zias 1988; Hall and Kenward 1990, 344, 353, 366).

Human lice are known from classical sources (e.g. Aristotle *Hist. Animalium* V.31; Pliny *Nat. Hist.* XXVI.86) to have been prevalent during the Roman period. Human head lice and nits have been found on twelve combs from Israel dating from the first century BC to the eighth century AD (Mumcuoglu and Zias 1988), on desiccated corpses of medieval date from Greenland (Bresciani et al. 1983) and southern America (Ewing 1924), and recently on ancient Egyptian mummies and hair-pieces (J. Fletcher pers. comm.). Lice of various species have been found in soil samples, including Roman deposits, from several waterlogged sites in Britain (Hall and Kenward 1990; H. Kenward pers. comm.).

Acknowledgments

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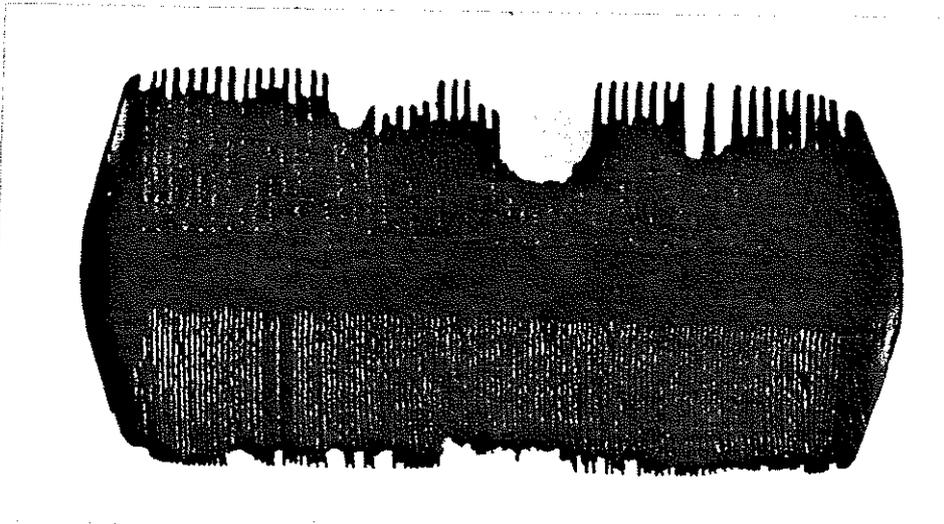
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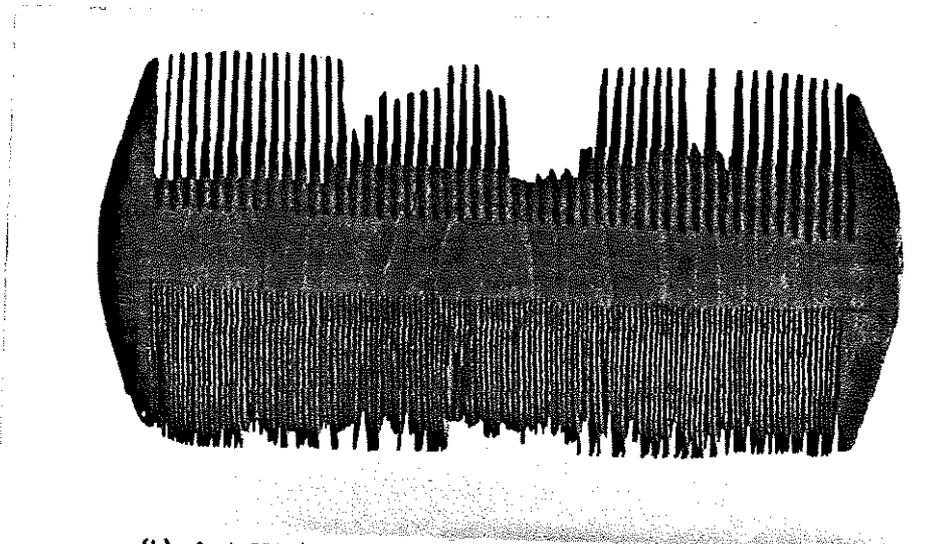
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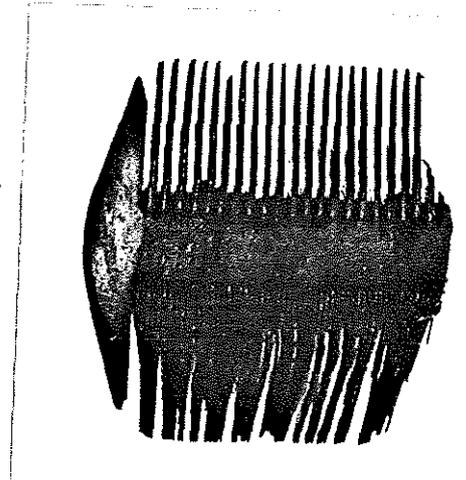
(a) Comb RB89/2635 with soil residues *in situ*. x1



(b) Comb RB89/2635 after stabilisation by freeze-drying. x1



(c) Comb RB89/2635: base of the coarser spaced teeth (T), showing angled channels (C), and angled tool marks (arrowed) on the sides of the teeth. x8



(d) Comb RBG80/77 after removal of soil residues. x1

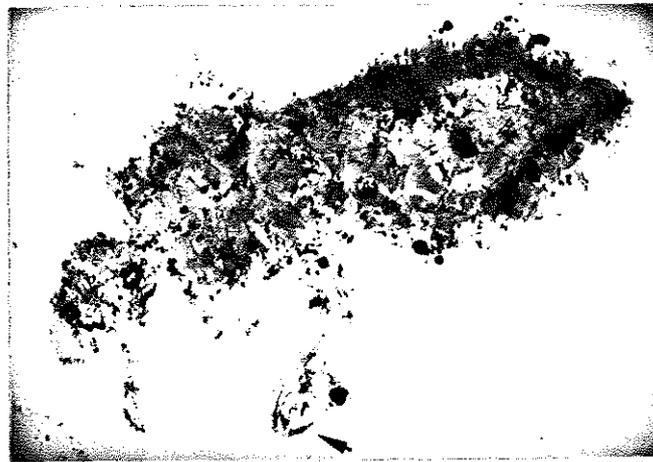
Plate I. Combs RB89/2635 and RBG80/77 from Ribchester



(a) Fragment of nymph (head, thorax, 4 legs) from comb RB89/2635. x40



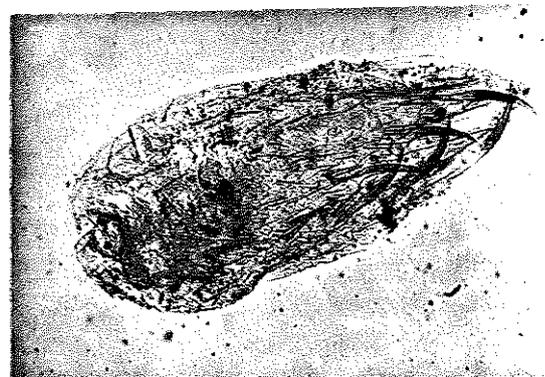
(b) Detail of leg shown top in Pl. IIa; moulting claw arrowed. xi80



(c) Fragment of nymph (head, thorax abdomen) from comb RBG80/77, moulting claw arrowed. Insect length: 2mm. (x40)



(d) First stage nymph (part opened) from comb RBG80/77. (Head and one claw missing). Length: 0.7mm. (x80)



(e) Larva from comb RBG80/77. The six claws are crossed in pairs at the right; mouthparts are visible at the left. Length: 0.8mm. (x80)

Plate II. *Pediculus humanus capitis* recovered from the Ribchester combs (transmitted light microscopy)