Chapter 10

A head louse egg, *Pediculus humanus capitis* found in a louse comb excavated in The Christmas Cave, which dates to the 1st c. B.C. and A.D.

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Abstract

During the archaeological excavation in the 1960's in the so called "Christmas Cave" in the delta of Wadi Kedron near the Dead Sea, a wooden louse comb dated from the First Century B.C. to the First Century A.D., was found. The two-sided comb had 22 large teeths on the one side, while the opposite side had 56 fine teeths.The comb was 7mm thick at its central part and 1.5 mm at its extremes. It measured 9 cm in its length and 5.7 in its width. The debris, found among the teeth of the comb was removed and examined for the presence of head lice and its eggs. The remains of a single louse egg was found, where part of the human hair, on which the egg was attached, fragments of the glue and the lower part of the egg have been preserved.

From Sumerian, Akkadian, Egyptian and Biblical sources, it is evident that the ancient inhabitants of the Middle East were well acquainted with head lice, *Pediculus humanus capitis*. Lice are mentioned in the Bible (Exod. 8:13-14) as the 3rd plague bestowed upon the Egyptians when Pharaoh denied the request of Moses to let the Israelites go.

Nine-thousand year-old louse eggs were found in hair samples from an individual who lived in Nahal Hemar Cave near the Dead Sea in Israel (Mumcuoglu & Zias 1991), while in Egypt, head lice and their eggs were found on the hair of mummies (Ruffer 1921, Hoeppli 1956, Fletcher 1994).

Head lice and their eggs were also found in combs recovered from archaeological excavations in the Judean and Negev deserts of Israel, including from Masada and Qumran. Most of the combs were two-sided, while few were also single-sided. One side was used to open hair knots, while the other one was used to remove lice and eggs. Most combs found in archaeological excavations were made out of wood, while some were made from bones and ivory, and are quite similar to modern day combs. Lice were found in 12 out of 24 combs examined from the Judean and Negev Deserts. In the comb from Wadi Farah, 4 lice and 88 eggs were found; two of them were operculated, showing that at this stage the eggs were viable with an embryo inside. In one comb from Qumran 12 lice and 27 eggs were found, ten of them operculated (Mumcuoglu & Zias 1988; Mumcuoglu, 2008).

In a recent study, 3 head lice were found in 1 out of 6 combs from an unidentified period from Nahal Zeelim. Lice and eggs were also found in 2 out of 5 combs from the Roman period excavated in Ein Rachel, while from 1 comb from an unidentified period from Ein Gedi no lice neither eggs could be isolated (Mumcuoglu, 2006).

Two wooden louse combs, most probably from the Roman period, excavated in the "Cave of the Pool", which is located at the western end of Nahal David river stream, in Ein Gedi oasis near the Dead Sea in Israel, were examined for the presence of head louse remains. In one of the combs, the head and the apical part (tarsus, tibia and femur) of one of the legs of a head louse were found (Mumcuoglu & Hadas, 2011).

In Egypt, royal combs from Pharonic times were used for delousing (Kamal 1967). Head lice were recovered from the debris found among the fine teeth of a wooden comb excavated in Antionoe, Egypt, and dated between the fifth and sixth centuries A.D. (Palma 1991). The oldest combs, which are similar to today's delousing combs, are known from 1,500 B.C. (Zias & Mumcuoglu 1988).

Remains of a body louse (*Pediculus humanus humanus*) were found in one of the rooms at the Masada fortress, known as the "Casemate of the Scrolls". Originally constructed during the last decade of King Herod's reign, the Casemate Room was converted into a dwelling unit during the first Jewish revolt against the Romans. Following the conquest of Masada, the room was used by the Roman soldiers as a dumping area. The context and the nature of the textiles associated with the louse clearly suggest a rebel origin (Mumcuoglu *et al*. 2003).

In the 1960's a louse comb was excavated in the so called "Christmas Cave" in the Kedron wadi delta. The aim of this study was to examine the debris removed between the teeth of the comb for any remains of head lice and their eggs.

The Christmas Cave is a cave that was used by various types of refugees from the Chalcolithic through Roman periods. It is located in the delta of Wadi Kedron close to the Dead Sea, 7.5km south of Qumran. The Christmas Cave is not considered a “Qumran” Cave proper. The cave has two entrances at opposite sides. The opening of the cave facing the delta is visible from the bottom of the delta and is some meters elevated (Porat et al).

The stratigraphy of the Christmas Cave is a problem, since there is no publication by the excavator. Some items have numbers but these have been added long after the excavation in the 1960s. As a result, the numbering has no significance of where and how the finds were found, except for the fact that they were found in the Christmas Cave and that they belong to the Second Temple Period.

The excavator, John Marc Allegro received permission to dig from the Ecole Biblique de Jerusalem (Prof. Roland de Vaux), as a results of which the finds were first at the Ecole and later, after having been numbered they were shipped in two large boxes to the Rockefeller Museum in Jerusalem, where we found them in 2001 and where they still are at present.

The finds were left in the Jordanian occupied part of East Jerusalem with the PAM (Palestine Archaeological Museum), presently the Rockefeller Museum, on the eve of the Six Day War (1967) and as such, the Christmas Cave contents, as also the very Dead Sea scrolls, came into Israeli hands.

The comb deposit sample is called QUM 433, corresponding to the excavation number QCC-263 a comb from the Christmas Cave.

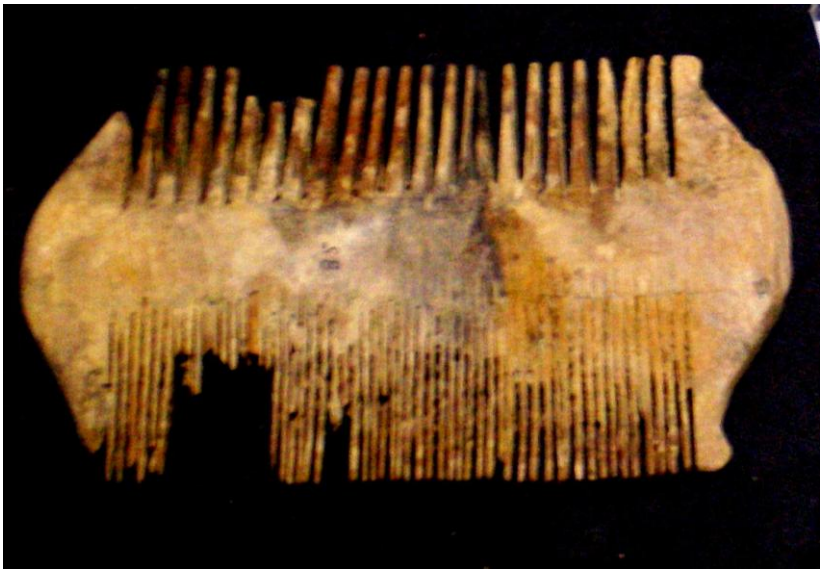

Figure 1. The louse comb excavated from the Christmas Cave was dated to the 1st c. B.C. and A.D on typological grounds and its ceramic context.

The depicted wooden comb is 7 mm thick at its central part and 1.5 mm at its extremes (Fig. 1). The length and width of the comb is 9 x 5.7 cm. In both ends of the combs a bow-like cut-out form can be seen, which is typical to many louse combs found in archaeological excavations in the region.

The comb was examined under a stereo microscope and the organic and inorganic debris that adhered between the teeth was removed with the help of a sheet of clean paper folded double. The paper was strong enough to remove any deposit until the very source of many of the teeth. The isolated material was examined under the stereo microscope (40x) and suspected louse and eggs remains were embedded in Hoyer's medium to prepare permanent slides.

The remains of a single louse egg (Figure 2) was found among the debris collected from the examined comb, i.e., part of the human hair, on which the egg was attached, fragments of the glue, which the female louse uses to attach the egg on the hair, and the lower part of the egg have been preserved.

Figure 2. An headlouse egg retrieved from the Christmas Cave hair comb

The findings show once more that louse combs were used during the history for the physical removal of lice and their eggs. In two-sided combs like the present one, the side with the lower density of teeth was used to straightening the hair, while the opposite side with a greater density of teeth served for delousing. It is assumed that the number of lice and eggs, which were originally stucked between the teeth of the comb, was higher, but reduced later by circumstances of burial and excavation.

While the debate continues as to whether Essenians from Qumran were living in only male groups or with their wives and children, [K.M.] believes that the combs, which were found in the Dead Sea area and which contained a large number of lice and eggs (Mumcuoglu

& Zias, 1988; Mumcuoglu 2006, 2008), were most probably not used by men. Then, examination and grooming to remove lice from the head of an infested individual was practically always an activity achieved by the mother, a social interaction between mother and child. In an epidemiological study conducted in Israel, it was found that in over 95% of the households, head louse diagnosis and treatment was the responsibility of the mother (Mumcuoglu et al. 1990/91).

The find of combs in the Christmas Cave accentuate once more, an argumentation, which is presented in three papers on pottery and textile in this volume, that the inhabitants/refugees of the Christmas Cave were different from those at Qumran proper (Shamir & Sukenik (Chapter 5); Balla & Gunneweg (Chapter 6); Gunneweg (Chapter 7), respectively.

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References

Fletcher I. 1994. A tale of hair, wigs and lice. *Egyptian Archaeol*. 5: 31-33.

Hoeppli R. 1956. The knowledge of parasites and parasite infections from ancient times to the 17th Century. *Exp. Parasitol*. 5: 398-412.

Humbert, J-B. and Gunneweg, J. 2003, Khirbet Qumran and 'Ain Feshkha, Volume II, Vandenhoeck, Fribourg and Goettingen

Kamal H. 1967. *A Dictionary of Pharonic Medicine*. The National Publication House, Cairo, Egypt.

Mumcuoglu, K.Y. 2006. Human parasites from Qumran and the sourrounding regions in Israel. In: *Bio- and Material Cultures at Qumran*. Gunneweg, J., C. Greenblatt & A. Adriaens (eds.), Fraunhober IRB Verlag, Stuttgart, pp. 57-61.

Mumcuoglu, K.Y. 2008. Human lice: Pediculus and Pthirus. In: Paleomicrobiology – Past Human Infections. Raoult, D. & M. Drancourt (eds). Springer, Berlin, pp. 215-222.

Mumcuoglu K.Y. and J.E. Zias. 1988. Head lice, *Pediculus humanus capitis* (Anoplura: Pediculidae), from hair combs excavated in Israel and dated from the first century B.C. to

the eighth century A.D. *J. Med. Entomol*. 25: 545-547.

Mumcuoglu K.Y. and J.E. Zias. 1991. Pre-pottery neolithic B head lice found in Nahal Hemar Cave and dated 6,900-6,300 B.C.E. (uncalibrated). *Atikot* 20: 167-168.

Mumcuoglu, K.Y. & G. Hadas. 2011. Head louse (*Pediculus humanus capitis*) remains in a louse comb from the Roman period excavated in the Dead Sea area of Israel. *Isr. Expl. J.* 61: 223-229.

Mumcuoglu K.Y., J. Zias, M. Tarshis, M. Lavi and G.D. Stiebel. 2003. Body louse remains in textiles excavated at Massada, Israel. *J. Med. Entomol*. 40: 585-587.

Palma R.L. 1991. Ancient head lice on a wooden comb from Antinoe, Egypt. *J. Aegyptian Archaeol.* 77: 194.

Porat, R., Eshel, H., Frumkin, A., 2009. The Christmas Cave in the lower part of Nahal Kidron. In: Refuge caves of the Bar Kokhba Revolt, Vol. 2. Israel Exploration Society (Hebrew), p. 31-52, 2010.

Ruffer M.A. 1921. *Studies in the Paleopathology of Egypt*. University of Chicago Press, Chicago, Illinois, pp. 372.

Zias J. and K.Y. Mumcuoglu. 1989. How the ancients de-loused themselves. *Bibl. Archaeol. Rev*. 15: 66-69.

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