

Ancient Monuments Laboratory
Report 40/87

PARASITOLOGICAL INVESTIGATIONS ON
SAMPLES OF ORGANIC MATERIAL
ASSOCIATED WITH HUMAN BURIALS AT
THE ROMAN INHUMATION CEMETERY AT
POUNDBURY, DORSET.

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(SITE CODE PC72-76).

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Summary

Five small samples of organic material collected from human inhumations within lead coffins at the Roman Cemetery of Poundbury, Dorset (PC 72-76) were examined for parasite ova. One sample contained poorly preserved ova of the genera *Trichuris* and *Ascaris*. The finds demonstrate that under special circumstances parasite ova can survive with human inhumations in sediments where organic preservation is generally poor. Moreover, it is clear that at least one member of the Romano-British population of the area was infested with intestinal parasites.

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Parasitological investigations on samples of organic
material associated with human burials at
the Roman inhumation cemetery at
Poundbury, Dorchester, Dorset
(Site code PC72-76)

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Introduction

A group of 5 samples of organic matter, collected from human inhumations at Poundbury, Dorset, was submitted to the Environmental Archaeology Unit, University of York, for parasitological examination in order to determine if traces of human faeces could be recognized.

Table 01: A description of the material submitted for examination

Site Code	Number	Description
PC72D 478	722714	4.9 g of mid to dark brown organic matter
PC75E	750643	Small amount of black organic matter preserved in alcohol
PC76E 970		7.6 g white crystalline powder
PC76E 1012		3.0 g black organic matter with some bone fragments
PC 513		0.8 g dark brown organic matter

All samples were collected from lead coffins with plaster (gypsum) packing.

The samples were examined using a technique based on the procedure outlined by the Ministry of Agriculture, Fisheries and Food (1977 p 3) for examining modern faecal samples. Weighed amounts of each sample (except PC75E/750643 which was received as a suspension) were placed in a 120 ml wide-mouthed bottle with a measured quantity of water. The bottles were allowed to stand for 24 hours and gently shaken by hand to assess if the material was thoroughly disaggregated. Once disaggregated the mixture thoroughly shaken and poured through a freshly flamed 250 micron aperture meshed sieve to remove coarse particles. Measured aliquots of the filtrate were mixed with warmed glycerine jelly, covered by a 22 X 50 mm coverslip and scanned at X 120 using a transmission microscope. Where possible eggs were measured using a eyepiece graticule calibrated to a stage micrometer. Length and width were recorded for all eggs. (None of the Trichuris ova possessed polar plugs so the length for this genus is length minus polar plugs.)

Recent experiments have shown that although parasite ova can withstand the rigours of pollen analysis, the size of the eggs can be modified by the process (Hall, Jones and Kenward, 1983). Accurate identification is therefore only possible if samples are carefully prepared using reagents which do not affect egg size.

Results

Sample PC 513, from R10 one of the mausoleums in the southern part of the main cemetery, was collected from a coffin containing the skeleton of an adult male aged about 30 years. This sample contained two kinds of ova. One, a barrel-shaped structure possessing two polar openings, was typical of whipworms - the genus Trichuris, the other kind of egg was typical of the

genus Ascaris, the large roundworm. None of the other samples yielded parasite ova, most consisted of amorphous organic matter with a few fungal spores.

Trichuris ova were present at a concentration of 5350 ova per gram deposit is sample PC 513 (mean of 10 counts). Concentrations of Trichuris trichiura ova in the region of 5000 ova per gram are common in faecal samples from patients harbouring this parasite. Whipworms are parasitic nematodes which infest the lower intestine and caecum of a many mammals throughout the world. Eggs are produced in large numbers and shed into the gut lumen and passed with faeces. Light infestations are thought to cause little harm to the host, while heavy worm burden can produce prolapse of the rectum, diarrhoea, dysentery and blood in the faeces. Recent work has suggested that chronic dysentery caused by Trichuris trichiura infections may be a major determinant of chronic malnutrition in children, and that the importance of this parasite in world public health has been grossly underestimated, Cooper, Bundy and Henry (1986).

The condition of the Trichuris ova was assessed by considering the numbers which fall into the following categories:

- 1) complete, i.e. possessing two polar plugs;
- 2) damaged, i.e. the shell is complete but the condition of either one or both plugs suggest that the ova are beginning to disintegrate;
- 3) shell complete lacking any trace of a polar plug;
- 4) shell broken or crumpled.

All of the Trichuris ova lacked polar plugs, 13 were wrinkled or crumpled and could not be measured, while 8 broken ova were present. In addition 35 ova were obscured by detritus and could not be measured.

Thus, the condition of the ova can be described as poorly preserved. Photographs of some of the Trichuris ova are given in Figure 01.

The length minus polar plugs (mean 51.1 microns, n = 103) and width (mean 26.3 microns) of the Poundbury sample Trichuris ova leave no doubt that they were from the human whipworm T. trichiura. The comparison of egg size was based on modern measurements of whipworm eggs gleaned from several sources including parasitological textbooks, data given by Beer (1976) for the whipworms of man and pig, the size of whipworm eggs from Lindow Man (Jones, 1986), and egg measurements of Trichuris ova from the coprolite from 6-8 Pavement, York (Jones, 1983). The range of egg size in the Poundbury sample is rather greater than that given by Beer (1976) and may result from minor distortion of ova during burial. Hall, Kenward and Jones (1983) have demonstrated that Trichuris ova are subject to shrinkage during pollen analysis.

Table 02

Basic statistics of the Trichuris ova from the Poundbury burial PC 513

	n	mean	maximum	minimum	SEM
Length minus polar plugs	103	51.1	59.6	42.0	0.3
Width	103	26.3	31.9	21.0	0.2

n = number of observations; SEM = Standard error of the mean

The second kind of egg present in PC 513 possessed a mammillated outer shell characteristic of the large roundworm - genus Ascaris, a common parasite of pigs and man. Ascaris can grow to 30 cm and, like the whipworm, produces large numbers of eggs which are passed with faeces. The larvae, which hatch from ingested embryonated eggs, migrate through the host tissues and can cause considerable damage. Nevertheless, many people harbouring small numbers of worms do not suffer severe symptoms. A single Ascaris ovum was present.

Unfortunately, the ova of A. lumbricoides and A. suum, the large roundworms of man and pigs respectively, produce ova of identical size. However, because they were associated with large numbers of Trichuris trichiura ova, the Ascaris ovum is assumed to be A. lumbricoides.

Most of the samples failed to yield parasite ova. With the exception of PC76E 970 and PC 513, the samples proved to consist largely of amorphous organic matter lacking any distinctive features apart from a few fungal spores.

Both Ascaris and Trichuris eggs have been widely reported from archaeological deposits in Britain and mainland Europe including the Danish bog burials (Jones, 1982) and Lindow Man (Jones, 1986). The results from this sample at Poundbury compare closely with those obtained from Lindow Man (Jones, 1986). There is no doubt that the material associated with PC 513 was primarily preserved human gut contents or faeces.

This find has important implications for the study of ancient human inhumations. Previously it has been assumed that parasite ova are unlikely to survive in graves unless the fills have remained waterlogged. This investigation shows that organic residues associated with human burials may contain parasite ova.

Acknowledgements

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Caption for Figure 1

Photomicrographs of selected ova from Poundbury sample PC 513.

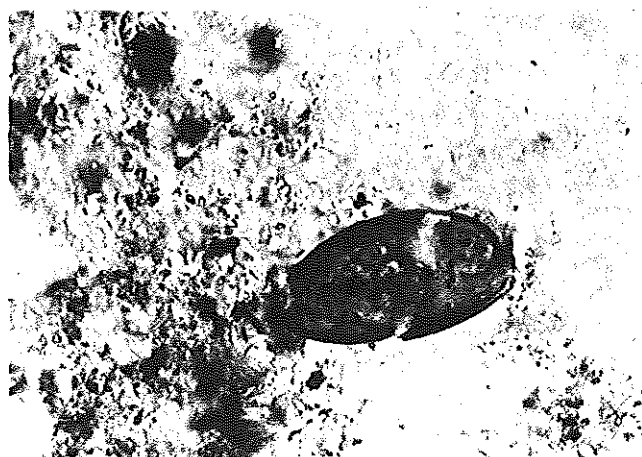
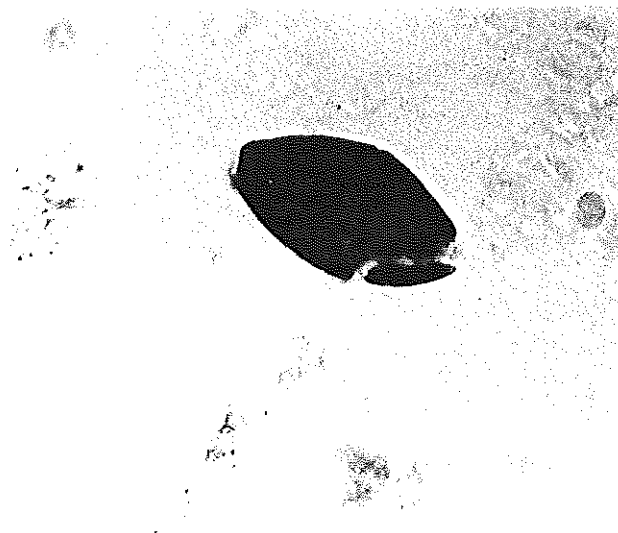
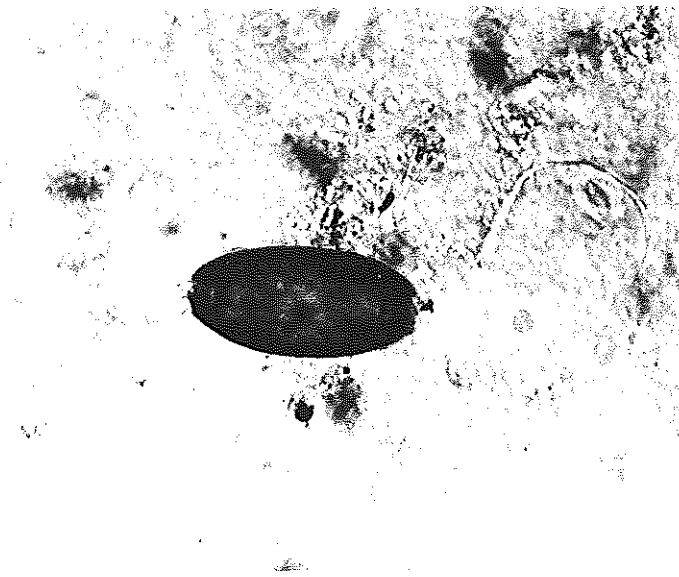
A. A typical Trichuris ovum lacking polar plugs. Note irregularities in the thickness of the shell wall.

B. A relatively well-preserved Trichuris ovum showing a fracture in the shell wall.

C. A poorly-preserved ?Trichuris ovum showing fractures and irregularities on shell wall thickness.

Scale bar 50 microns

FIGURE 1



 = 50 microns