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Bearsden

A Roman Fort on the Antonine Wall

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Chapter 18

PARASITOLOGICAL INVESTIGATIONS OF THE EAST ANNEXE DITCH

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18.1 INTRODUCTION

Several pollen samples taken from a central column of the outer east annexe ditch Bearsden contained ova which represented those of the intestinal parasite *Trichuris*, the whipworm. In order to determine the species of the eggs, a group of ten samples, also collected from the central column, was submitted to the Environmental Archaeology Unit, University of York, for a detailed parasitological examination.

Following a procedure outlined by the Ministry of Agriculture, Fisheries and Food (1977: 3) for examining modern faecal samples, a 3g sub-sample of each sample was placed in a 500ml conical flask with approximately 20 1–2mm diameter ballotini and 42ml water. The flasks were shaken for 2–4 days until the soil was thoroughly disaggregated. The resulting suspension was poured through a freshly flamed 250 micron sieve to remove coarse particles, and 0.15ml aliquots of the filtrate mounted in glycerine jelly using 22mm × 50mm coverslips. Slides were scanned at × 120 using a transmission microscope and all the ova counted. Two counts were made for each sample. Where possible ova were measured using a eyepiece graticule and stage micrometer. Recent experiments have shown that although parasite ova can withstand the vigours of pollen analysis, the size of the eggs can be modified by the process (Hall et al 1983). Accurate identification is therefore only possible if samples are carefully prepared using reagents which do not affect eggs size.

18.2 ANALYSIS

Throughout the deposits two kinds of ova were observed. One, a barrel-shaped structure sometimes possessing two polar plugs, was typical of the genus *Trichuris*. Whipworms are parasitic nematodes which infest the lower intestine and caecum of many mammals throughout the world. Eggs are produced in large numbers and shed into the gut lumen and passed with faeces. Light infestations usually cause little harm to the host, while heavy worm burden can cause prolapse of the rectum, diarrhoea and blood in the faeces.

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

1. complete, ie possessing two polar plugs;
2. damaged, ie 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 polar plug;
4. shell broken or crumpled.

The other kind of egg possessed a mamillated outer shell characteristic of the genus *Ascaris*, roundworm. This nematode can grow to 300mm 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

Table 18.1
Dimensions of *Trichuris* ova from samples 116–18 and 174–76cm in the east annexe ditch

Sample 116–18	*Width*	*Total length*	*Length minus polar plugs*
Maximum	28.64	56.0	54.8
Minimum	24.9	–	47.3
Mean	27.0	–	51.5
SEM	0.5	–	1.0
N	6	1	6
Sample 174–6			
Maximum	29.9	61.0	56.0
Minimum	23.7	52.3	44.8
Mean	27.0	56.0	50.3
SEM	0.2	1.1	0.4
N	42	7	42

All measurements in microns. SEM = Standard error of the mean.
n = number of observations.

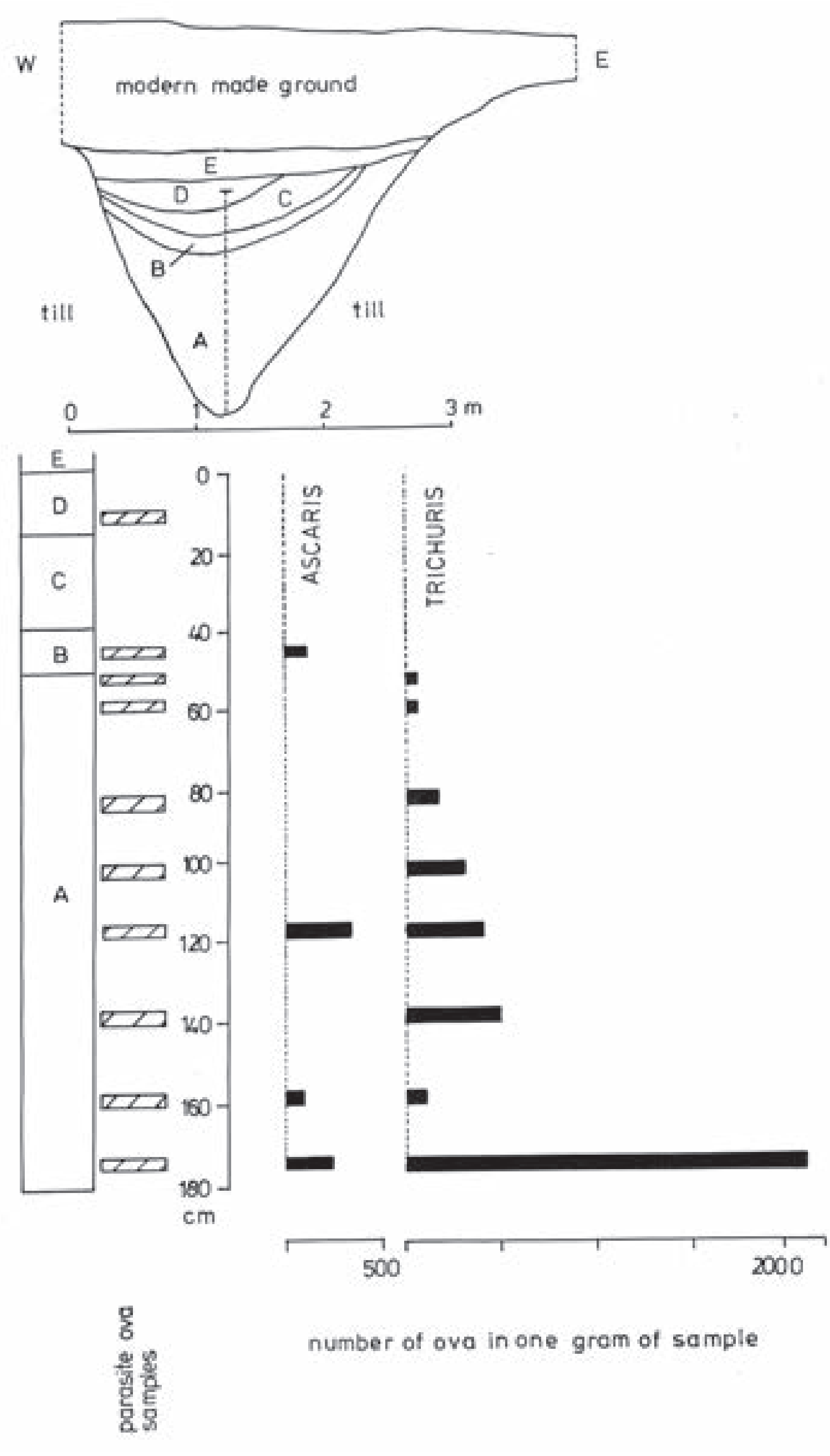

Illustration 18.1
The distribution of *ascaris* and *trichuris* in the east annexe ditch.

symptoms. *Ascaris* ova were classified as either complete or broken. No other parasitic ova were recognised.

Illus 18.1 shows that *Trichuris* ova were more abundant in the deposits than the *Ascaris* eggs. Furthermore, the eggs were not evenly distributed through the samples. The upper five samples contained less than 200 ova per gram of deposit, while the lower samples showed a gradual increase in egg concentration with depth to a maximum of 2,350 ova per gram. Sample 158–60, however, did not reflect this trend giving a modest egg count of 200 ova per gram.

Both *Ascaris* and *Trichuris* eggs have been widely reported from archaeological deposits in Britain and mainland Europe, including the Danish bog burials (Jones, A K G 1982). Most published records assume the ova to have been passed by man or argue that the *Trichuris* ova are from the human whipworm *Trichuris trichiura* either because the number of *Trichuris* ova exceeds those of *Ascaris* or because the dimensions of the eggs of the ancient material compare closely with modern specimens of the species. Unfortunately, the ova of *A. lumbricoides* and *A. suum*, the large roundworms of man and pigs respectively, produce ova of identical size. There are only two hosts indigenous to north-west Europe which can harbour *Trichuris* and *Ascaris*, man and pig.

Some of the lower samples gave sufficient numbers of eggs to allow identification of species. A total of 48 *Trichuris* ova were measured from the two samples (116–18 and 174–6). Only seven ova possessed both polar plugs and gave a mean total length of 56.0 microns, length minus polar plugs of 50.3 microns (n = 42) and mean width of 27.0 microns. A comparison of the ranges and mean dimensions of the Bearsden ova (table 18.1) with similar data for modern human and pig whipworms (Beer 1976) showed the archaeological material to be almost identical to *T. trichiura*, the human whipworm.

The upper five samples produced mainly broken and crumpled ova suggesting that either the soil conditions in the upper metre of the ditch fills were not conducive to the survival of the parasite ova, or that the ova were considerably abraded before they became incorporated into the ditch. By contrast, the eggs from all but one of the lower samples were moderately well preserved. Comparing the condition of the ova with other archaeological samples from York and Oslo (Jones, A K G 1984; Jones, A K G forthcoming) the material can be classified as moderately to well preserved.

18.3 DISCUSSION

There can be little doubt that the lower fills of the ditch contained faeces and that the kinds of egg indicate that they were passed by people rather than pigs. No evidence of domestic animal faeces was recovered.

The condition and numbers of ova in the samples from the upper fills of the ditch suggest that the layers between 440mm and 1.2m contained only a small faecal component. Evidence from the excavations at 16–22 Coppergate, York (Jones, A K G 1984) have shown that a large percentage of deposits dated to the late ninth century and tenth century contain small numbers 950–800 ova per gram. Deposits which are primarily faecal in origin contain 1,000–60,000 ova per gram. Thus it seems that a large number of ova were scattered upon land surfaces and gradually decayed as they became incorporated into archaeological deposits.

The presence of small numbers of parasitic ova, even if their size suggests they were passed by people, does not necessarily mean that the whole context was largely faecal. There is increasing evidence that whipworm and *Ascaris* infections were widespread in Britain during the Roman and medieval periods. It seems likely, therefore, that the parasite eggs may have been distributed around and within the Roman fort in a similar way to those at Coppergate. Thus the small numbers of parasite ova found in the upper ditch fills may not indicate the presence of large quantities of human faeces deliberately dumped in the feature, but simply the gradual accumulation of dirt and dust from the fort.

It would be tempting to suggest that the distribution of parasite ova in the column reflects changes in the worm burden of the human population during the period the ditch silted up. However, there are many factors which suggest that such a conclusion is almost certainly unjustified. Firstly, there is no evidence that the fills of the ditch were laid down at a constant rate. The lower fills are likely to have been laid down in a shorter period than the upper fills. The results from samples 158–60 may be interpreted to indicate that the lower fills did not all accumulate gradually, but sporadic dumping or slumpage occurred. Secondly, it is possible that changes in the numbers and condition of the ova are caused by differential preservation. Finally, there is little evidence to suggest that the ditch was receiving the same kind of refuse throughout its functional life. Whether the ova in the upper fills were eggs washed in with other soil particles, or if they were from deliberately deposited faeces will probably always remain in doubt.