Parasitological investigations on the Ambleside Roman pit

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Summary

A soil sample taken from a Roman pit at Ambleside was examined for evidence of intestinal parasite ova in order to test the hypothesis that the pit was used to dispose of excrement. Ova of Trichuris, the whipworm and Ascaris, the maw worm, were present suggesting that human excrement was present in the feature.

Methods and materials

Following a procedure outlined by the Ministry of Agriculture, Fisheries and Food (1977 p 3) for examining modern faecal samples, a 3 g subsample was placed in a 500 ml conical flask with approximately 20 1-2 mm diameter ballotini and 42 ml water. The flask was shaken gently for 3 days until the soil was thoroughly disaggregated. The resulting suspension was poured through a freshly flamed 250 micron sieve to remove coarse particles, and 0.15 ml aliquots of the filtrate mounted in glycerine jelly using 22 x 50 mm coverslips. Slides were scanned at X 120 using a transmission microscope and all ova counted. Two counts were made. Where possible ova were measured using a eyepiece graticule and stage micrometer.

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, 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 but polar plugs absent;

4) shell broken or crumpled.

The other kind of egg possessed a mamillated outer shell characteristic of the genus Ascaris. This nematode can grow to 30 cm and also 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. Ascaris ova were classified as either complete or broken. No other parasite ova were recognized.

Most of the Trichuris ova bore some evidence of disintegration. All but one had lost both polar plugs. One ovum possessed abraded plugs and one broken ovum was noted. Comparing the condition of the ova with other archaeological samples from York and Oslo (Jones, 1984 & forthcoming) the material was classified as poorly preserved.

The two counts gave 1000 and 1100 Trichuris ova per gram. No Ascaris ova were present in the first count but two were noted in the second. A total of 12 Trichuris ova were measured from the two samples. Mean length minus polar plugs was 45.5 microns and mean width was 25.7 microns (more details of egg measurements are presented in table 01). Eggs of this size are most likely to have been produced by the human whipworm Trichuris trichiura. A comparison of the ranges and mean dimensions of the Ambleside ova with modern ova of human and pig whipworms (data from Beer, 1976) showed the archaeological material to be only 0.2 microns larger in width and 4 microns smaller in length than the means quoted for modern Trichuris trichiura ova. The egg measurements are too small for T. suis, T. muris, T. vulpis, or T. ovis, the whipworms of pigs, mice and rats, dogs, cattle and sheep.

The evidence from the width of the ova strongly suggests that the Trichuris ova are T. trichiura, the human whipworm.

Discussion

Both Ascaris and Trichuris eggs have been widely reported from archaeological deposits in Britain and mainland Europe including the Danish bog burials (Jones, 1982). Some published records simply assume the ova were passed by man presenting little data. Others argue that the Trichuris ova are from the human whipworm Trichuris trichiura because the number of Trichuris ova exceeds those of Ascaris. A small number of reports give egg dimensions showing ancient material is very similar in size to modern specimens of the species.

On grounds of both relative abundance and egg dimensions there can be little doubt that the pit contained human excrement. No evidence of domestic animal faeces was recovered.

The numbers of ova in the sample suggest that the pit examined probably contained a substantial faecal component, although it is possible that a small amount of excrement containing high concentrations of parasite ova was thinly distributed within the pit. Evidence from the excavations at 16-22 Coppergate, York, (Jones, 1984) has shown that a large percentage of deposits dated to the late 9th and 10th century contain small numbers (50-800 ova per gram) of ova. Deposits which are primarily faecal in origin contain 1,000-60,000 ova per gram. The Ambleside pit sample falls at the lower end of this range.

This find must be seen as increasing evidence that whipworm and Ascaris infections were widespread in the human population of Britain during the Roman period.

References

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Table 01: Dimensions of the Trichuris ova from Ambleside

	Width	Length minus polar plugs
Maximum	26.6	56.9
Minimum	22.7	41.7
Mean	25.7	45.5
n	12	12

All measurements in microns

n = number of observations