



CHAPTER 17

THE POLLEN AND TRICHURID OVA FROM PIT 5251

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INTRODUCTION

Pollen analysis was undertaken on waterlogged deposits in the southern half of Period 2 pit 5251, identified as a cess-pit which was filled by *c.* A.D. 125 (see Preface, p. xix). The pit lay immediately next to the east-west street and was beside, and contemporary with, ERTB 1 (FIG. 132). The samples were from the lower cess (Sample 800.6), middle calcium phosphate 'crust' (Sample 800.5) and upper cess (Sample 800.4) from the sewage layer (5276). In addition to abundant pollen grains, the samples were found to contain small numbers of whipworm eggs, which were measured to allow specific identification. The same layers were sampled by Robinson (above, Ch. 16) for macroscopic plant remains from the southern half of the pit, providing the opportunity to compare the different types of botanical evidence.

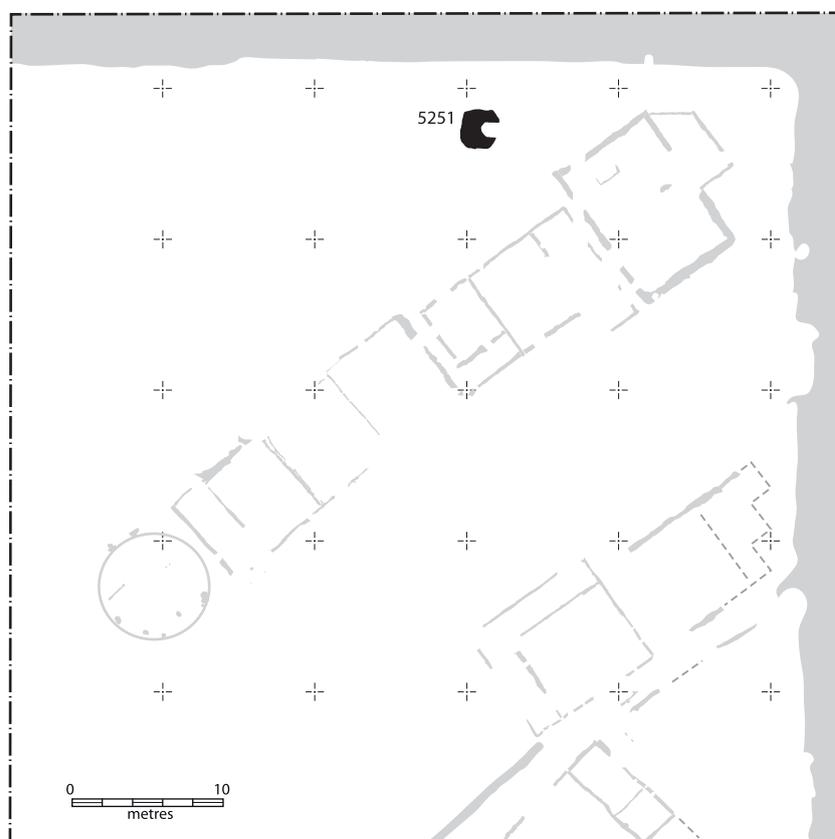


FIG. 132. Location of pit 5251 (Period 2).

METHODS

POLLEN ANALYSIS

Samples were collected during hand excavation of the pit, and sub-samples 1 cm³ in volume were prepared for pollen analysis following standard procedures (Berglund and Ralska-Jasiewiczowa 1986). Pollen was counted using a Leica DMLB microscope at a magnification of 400x, with a magnification of 1000x for critical determinations. A minimum of 300 identifiable pollen grains and Pteridophyte (fern) spores was counted for all samples. Pollen and spores were identified using the key of Moore *et al.* (1991) and by comparison with the reference collection in the Department of Archaeology, University of Reading. Vascular plant nomenclature follows Stace (1991) and pollen and spore nomenclature follows Bennett *et al.* (1994). The criteria of Andersen (1979) were used in identification of cereal pollen. Unidentifiable deteriorated pollen grains and spores were classified according to the categories of Cushing (1967).

Pollen percentage calculations are based on a sum including all identifiable pollen grains and Pteridophyte spores (no pollen of obligate aquatics was present). Calculations for the different categories of unidentifiable pollen grains are based on the main sum plus the sum of unidentifiable grains.

TRICHURID OVA

Eggs of the genus *Trichuris* were counted from the same samples used for pollen analysis. Their numbers are expressed in relation to the main pollen sum plus sum of *Trichuris* eggs. The length and width of all eggs were determined as whipworms of different hosts are distinguishable by their size.

RESULTS

POLLEN ANALYSIS

Pollen percentages for all taxa are shown in FIG. 133. The samples contained abundant pollen, but preservation was variable and a high proportion of corroded and/or crumpled grains occurred in all samples. Most pollen grains remained identifiable, however, with total indeterminable pollen never exceeding 10 per cent, so there is no reason to believe that the assemblages have been significantly biased by poor preservation. It is likely that the pollen deterioration reflects fluctuations in the degree of waterlogging in the pit.

The composition of the pollen assemblages from all three samples is very similar. Tree pollen is sparse, reaching a maximum value of just 6 per cent of the pollen sum in the upper cess, and all samples are dominated by pollen of the Brassicaceae (cabbage) family (peaking at 52 per cent in the lower cess). This family includes many familiar native plants of cultivated and other open ground, such as garlic mustard (*Alliaria petiolata*) and shepherd's purse (*Capsella bursa-pastoris*), but also crops such as cabbage (*Brassica oleracea*) and mustard (*Sinapis alba*). The pollen grains of most members of the family are too similar to allow separate identification, so unfortunately it is uncertain whether any of the pollen represents crops. Robinson (Ch. 16) identified two seeds of *Brassica* or *Sinapis* sp. in the same deposit.

The other main taxa present are Apiaceae (carrot family) (maximum 16 per cent) and Poaceae (grasses) (maximum 18 per cent). Again, most members of these large families have pollen grains too similar to allow identification to genus or species level (although fortunately cereal pollen is an exception). The Apiaceae includes a wide range of both wild (e.g. cow parsley, *Anthriscus sylvestris*, and hogweed, *Heracleum sphondylium*) and cultivated plants occupying a variety of habitats. It includes several culinary herbs, such as coriander (*Coriandrum sativum*), dill (*Anethum graveolens*) and celery (*Apium graveolens*), all of which were represented by seeds in the same deposit (Robinson, Ch. 16). The assemblages of macroscopic plant remains were dominated by seeds classed as Apiaceae undiff., most of which resembled *Anethum graveolens*.

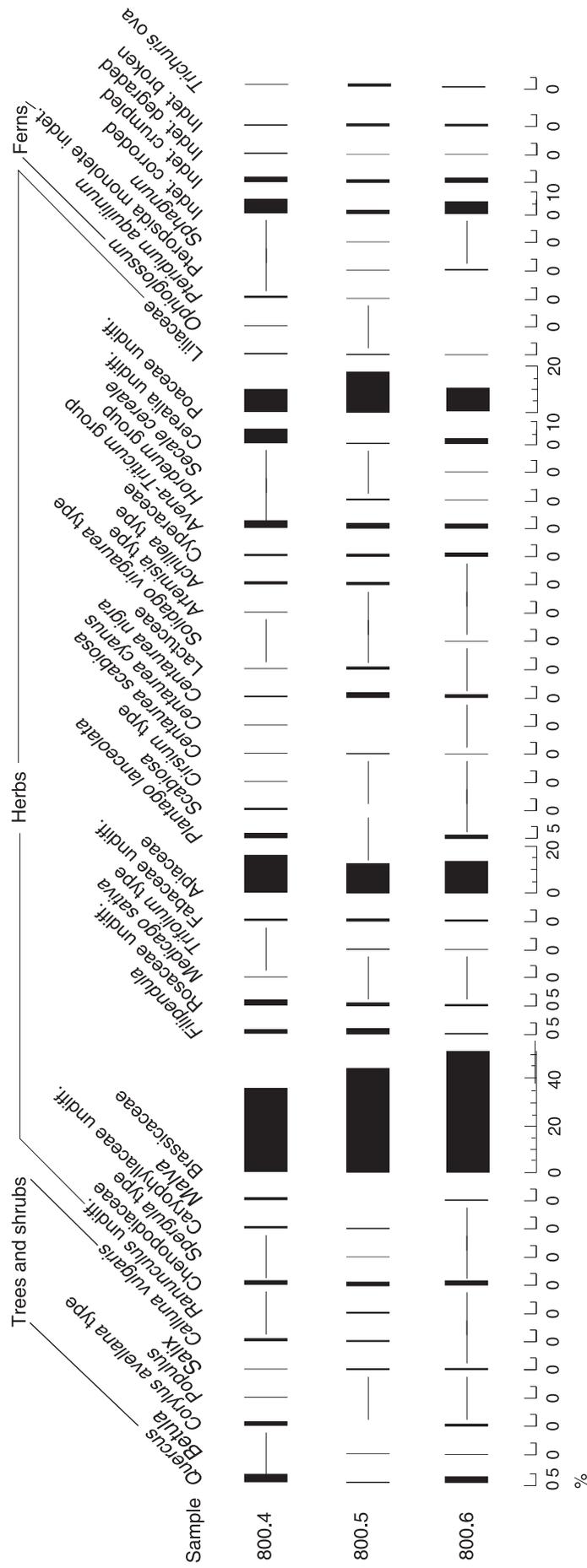


FIG. 133. Pollen percentage diagram from context 5276, pit 5251. For pollen sums see text. Presence of Trichurid ova is also indicated.

The undifferentiated Poaceae pollen could derive from plants of a wide range of mainly open habitats, but there is also a substantial presence of cereal pollen in the deposits (peaking at almost 10 per cent of the pollen sum in the upper cess). Pollen of *Avena-Triticum* group (which includes *Avena* (oat) species and *Triticum* (wheat) species apart from *T. monococcum*) is most abundant, but *Hordeum* group (which includes *Hordeum vulgare* (barley), *T. monococcum* and a few native grasses) is also present, as well as a single pollen grain of *Secale cereale* (rye) in the lower cess. Mineralised cereal remains were abundant in the lower part of the sewage deposit, including both spelt wheat (*Triticum spelta*) and hulled six-row barley (*Hordeum vulgare*) (Robinson, Ch. 16). Robinson reports that remains of *Triticum* were more abundant than those of *Hordeum*, and this applies to the pollen also.

Pollen of several characteristic arable weeds is present, some of which are thought to have been introduced in the late Iron Age but are seldom recorded before the Roman period (e.g. cornflower (*Centaurea cyanus*)). Common knapweed (*Centaurea nigra*) is characteristic of hay meadows, although it also occurs in other grassy places and on rough ground, where other plants represented in the pollen assemblages, including *Malva* (mallow), *Medicago sativa* (medick), *Scabiosa* (scabious) and *Centaurea scabiosa* (greater knapweed), may also be found.

TRICHURID OVA

Trichuris eggs were present in small numbers in all three samples (reaching a maximum of 1.4 per cent of the pollen sum in the middle cess) (FIG. 133). Preservation was generally good, but all eggs lacked their polar plugs (FIG. 134). The eggs range from 41–49 μm in length and 24–31 μm in width.

Given the context of the eggs, attribution to the human whipworm, *T. trichiura*, seems a virtual certainty, but there are several species of whipworm that infect other mammals, and it is possible

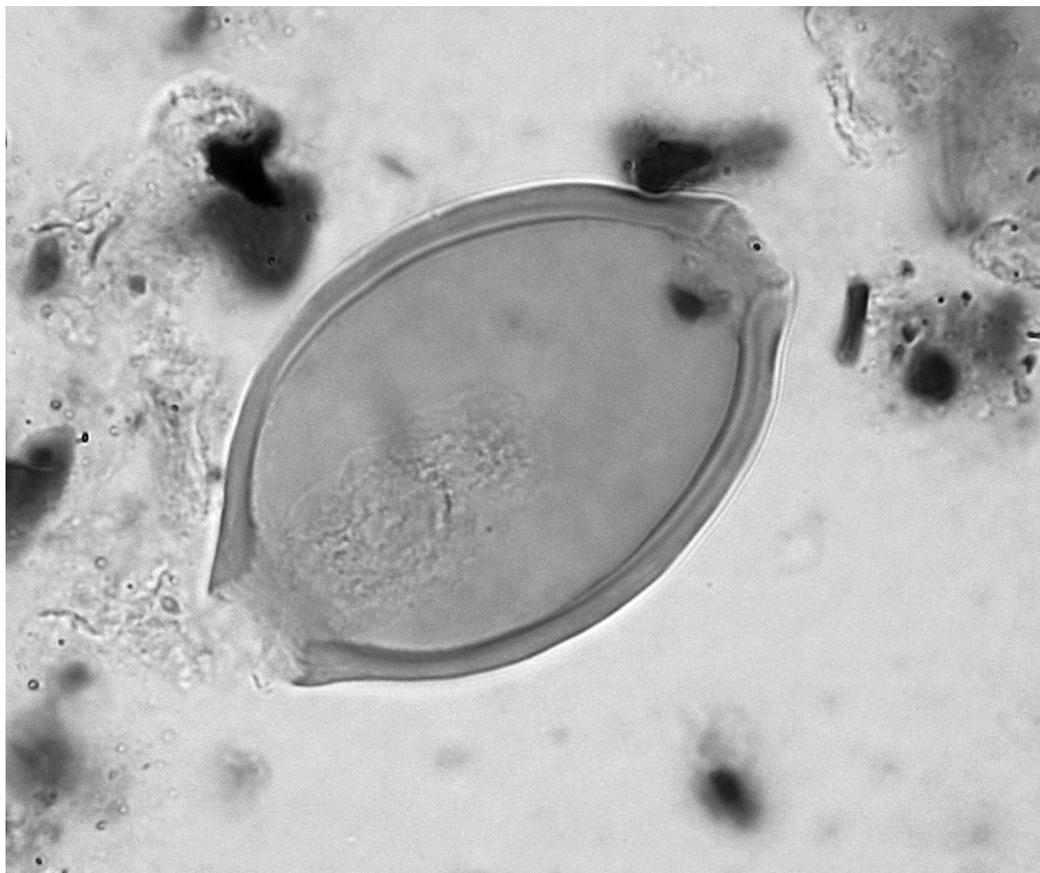


FIG. 134. Egg of human whipworm (*Trichuris trichiura*) from context 5276.

that dung of domestic animals may have been deposited in the pit as well as human waste. These include dogs (infected by *T. vulpis*), cattle (*T. ovis* and *T. globulosa*), sheep (*T. ovis*), and pigs (*T. suis*). Eggs of the different species of *Trichuris* are morphologically similar but differ to varying degrees in size. Beer (1976) provides detailed measurements for modern eggs of *T. trichiura* and *T. suis*. *T. trichiura* eggs have a mean length without polar plugs of 49.8 μm (range 45.3–56.0 μm), and width of 25.5 μm (range 23.1–28.7 μm), while *T. suis* eggs have a mean length of 51.5 μm (range 35.1–62.8 μm) and width of 30.1 μm (range 26.8–34.5 μm). Thus *T. trichiura* eggs are, on average, slightly smaller than those of *T. suis*, but the size ranges overlap. The eggs of *Trichuris* species of other domesticated and wild mammals are generally larger than those of *T. trichiura* and *T. suis*. For example, Thienpoint *et al.* (1979) give size ranges of 70–80 μm length (with polar plugs) and 30–42 μm width for *T. ovis*, and 70–90 μm length and 32–41 μm width for *T. vulpis*.

Consideration of the size of the eggs from Silchester must take account of the fact that they were from samples subjected to the chemical treatments used for pollen preparation, and mounted in glycerine jelly. These procedures are known to cause some shrinkage of *Trichuris* eggs. Working on samples from Viking Age York, Hall *et al.* (1983) found that *T. trichiura* eggs untreated and mounted in water had a mean length without polar plugs of 55.3 μm (range 48.1–61.6 μm) and width of 26.6 μm (range 23.1–30.8 μm), while those subjected to chemical pollen preparation procedures and mounted in glycerine jelly had a mean length of 41.2 μm (range 34.7–47.0 μm) and width of 22.1 μm (range 17.7–30.0 μm). The Silchester eggs are thus similar in size to the treated *T. trichiura* eggs and, even allowing for shrinkage, would seem to be too small to derive from whipworms of dogs or ruminants. Given their size, the eggs are almost certainly all from whipworm of humans.

INTERPRETATION

The key factor in interpreting the pollen assemblages is consideration of the sources of pollen to the deposits. The main possibilities are:

1. Pollen that has passed through the digestive tract after ingestion with food. Greig (1994) notes that significant amounts of pollen may persist in many plant materials after the flowers have disappeared, including various fruits, legumes and dried herbs.
2. Pollen from plants brought to the town for various purposes, e.g. cereals and other plant foods, hay for animal fodder or bedding, straw for thatch, and deposited in the pit through various routes.
3. Pollen from plants growing on disturbed ground or garden/horticultural plots within the town.
4. Pollen from plants growing at varying distances outside the town.

Previous pollen assemblages from latrine fills (most examples of which have been medieval or later in date) have often been found to be dominated by cereal pollen, accompanied by macroscopic remains of cereals, suggesting that much of their pollen content may be from food (Greig 1994). Food is the most likely source of much of the pollen in the Silchester pit also, although cereal pollen was not the most abundant pollen type here. Other possible sources for the cereal pollen include pollen dispersed by threshing (Robinson and Hubbard 1977), pollen present in straw or animal dung which might have been dumped in the latrine, or even pollen derived from runoff from thatch on adjacent buildings. With regard to the first of these possibilities, Robinson (Ch. 16) suggests, on the basis of the macroscopic plant remains, that cereal grain was being processed elsewhere. The use of hay and straw in the town might account for the pollen of hay meadow plants and arable weeds.

As noted above, the abundant Apiaceae pollen is mirrored by the dominance of the assemblages of macroscopic plant remains by seeds closely resembling those of dill, suggesting that this was a popular culinary herb. The Brassicaceae pollen can probably also be attributed to culinary use of plants of this family, such as cabbage and mustard. Other pollen types that may derive largely from food are Rosaceae undiff. and Fabaceae undiff. The former may relate to the large number

of blackberry (*Rubus fruticosus* agg.) seeds and plum (*Prunus* spp.) stones in the deposits, and the latter to the peas (*Pisum sativum*). While pollen of all of these potential food plants is perhaps most likely to have reached the pit in sewage, another possibility is that kitchen waste from food preparation was deposited in the pit.

The records of pollen of *Malva* (mallow) are interesting, as this plant is rarely represented in off-site pollen sequences. *Malva* pollen was also recorded in sewage deposits from the Roman fort at Bearsden, Scotland (Knights *et al.* 1983), and Dickson and Dickson (2000) suggest that its presence there may reflect a medicinal use.

The very low tree pollen frequencies from the Silchester cess-pit need not be indicative of limited woodland around the town, as the pollen assemblages probably contain very little pollen deposited aurally from outside its walls. Apart from pollen derived from plant foods, most of the herbaceous pollen types in the assemblages, including Chenopodiaceae (goosefoot family) and *Plantago lanceolata* (ribwort plantain), probably represent plants growing on patches of disturbed ground within the town.

Assuming that much of the pollen in the sewage deposit is indeed from food, it is tempting to consider whether the minor differences between samples (such as the apparent decline in abundance of Brassicaceae, and increase of Rosaceae, towards the top of the layer) may represent changes in food consumption over time. However, it is likely that the pit was periodically cleared out (M.G. Fulford, pers. comm.), so the sewage layer analysed may have accumulated over a very short period of time. Furthermore, many factors other than diet might be responsible for variability between samples, such as use of the pit by different households, and variation in the relative abundance of different types of materials (e.g. waste from food processing, floor sweepings etc.) deposited in the pit.

Differences between the pollen assemblages from different parts of context 5276 might be expected due to variation in the nature of the sediment and degree of waterlogging within the layer. Robinson (Ch. 16) found considerable variation in the preservation of macroscopic plant remains, with the best preservation in the basal part of the context, but the pollen preservation is less variable and unlikely to have caused significant differences in assemblage composition.

DISCUSSION AND CONCLUSIONS

The availability of both pollen and macroscopic plant remains from the same contexts at Silchester has provided an interesting (and unusual) opportunity to compare the two types of evidence. They are complementary because of differences in source areas, potential for preservation, and level of identification possible. While pollen grains are, in many cases, less closely identifiable than seeds, where pollen can be identified to species level it has the potential to indicate the presence of plant taxa missing from the macroscopic assemblages. An example of this at Silchester is rye (*Secale cereale*), which is absent from the assemblages of macroscopic plant remains from the pit, but which is represented by a single pollen grain from the lower cess. Similarly, pollen grains, but not seeds, of cornflower (*Centaurea cyanus*) and greater knapweed (*C. scabiosa*) were present.

As much of the pollen from the pit is likely to derive from food, or from the immediate area around the pit, the assemblages shed little light on the broader environment of the town in the mid-Roman period. The basal part of the pollen sequence analysed by Keith-Lucas (1984) from waterlogged deposits below the town rampart may be contemporary with the deposits analysed here. There the assemblages were dominated by grass pollen, indicating substantially open conditions, but pollen of oak (*Quercus*), hazel (*Corylus avellana*) and alder (*Alnus glutinosa*) together comprised over 25 per cent of the pollen sum in one sample, suggesting the presence of some local woodland (Keith-Lucas 1984). Interestingly, the pollen type dominant in the cess-pit samples, Brassicaceae, was absent from the basal part of the rampart sequence, and pollen of Apiaceae did not exceed 2 per cent of the pollen sum. This supports the suggestion that much of the pollen of these groups in the sewage deposit is derived from food.

The abundant pollen of Brassicaceae and Apiaceae suggests that both plant groups made a significant contribution to the diet at Silchester, and in the case of the Apiaceae the evidence from the macroscopic plant remains makes it possible to suggest that much of the pollen may derive

from dill. Macroscopic remains of dill have been found quite frequently on Roman-period sites in Britain, including Colchester (Murphy 1984), York (Hall and Kenward 1990), and Bearsden (Dickson and Dickson 2000), and it was evidently a popular and widely used culinary herb. The plant could have been grown locally at Silchester, perhaps even within the town.

The origin of the Brassicaceae pollen is less certain, as few seeds of this family were present. Mustard and cabbage are both possible, providing flavouring and leafy vegetables respectively, and could also have been grown locally. The great abundance of Brassicaceae pollen may indicate that shoots either close to or actually flowering were consumed. Flowering shoots of several native members of the family are edible, including watercress (*Rorippa nasturtium-aquaticum*) and charlock (*Sinapis arvensis*), but it is also possible that a vegetable similar to broccoli was available (Robinson, pers. comm.).

The presence of whipworm eggs in the deposits at Silchester adds strength to the interpretation of the pit as a cess-pit, although this was hardly in doubt in view of the character of the deposit and presence of calcium phosphate mineralised plant remains. Whipworm infection was probably commonplace in the human population of the Roman period. The eggs have been quite widely recorded in prehistoric and later sites where coprolites and/or cess deposits are preserved: other examples from Roman Britain include the forts at Bearsden (Knights *et al.* 1983) and Carlisle (Jones and Hutchinson 1991) and the *colonia* at York (Hall and Kenward 1990).