ANCIENT MONUMENTS LABORATORY

REPORT

2543

SERIES/No	CONTRACTOR
AUTHOR	James Greig June 1978
TITLE	The seed and pollen remains from the Roman sewer at Church Street, York

ANL Report 2543

BIRMINGHAM ARCHAEOLOGICAL LABORATORY,
DEPARTMENT OF PLANT BIOLOGY,
UNIVERSITY OF BIRMINGHAM,
P.O. BOX 363,
BIRMINGHAM, B15 2TT

The Seed and Pollen Remains from the Roman Sewer at Church Street, York.

By: James R.A. Greig.

Published in: Buckland, P.C.
The Environmental Evidence from the Church
Street Roman Sewer System. The Archaeology
of York 14 (1).

Table 2. Seed Remains from the Sewer

Name	Vernacular name	Sample S1	S2	S3	S6	S7	S8	S9	S10
Anthemis cotula L.	stinking mayweed	6	-	-	-	-	-	-	-
cf. Apium graveolens L.	celery	1	-	-	-	-	-	-	-
Atropa belladonna L.	deadly nightshade	4	7	-	-	-	2	11	-
cf. Brassica nigra (L.) Koch	black mustard	=2	-	-	-	-	-	-	-
cf. Brassica oleracea L.	cabbage	=2	-	2	-	-	-	-	-
cf. Brassica rapa L.	turnip	=1	-	-	-	-	-	-	-
Carex sp.	sedge	2	-	-	-	-	-	-	-
Carex cf. aquatilis Wahlenb.	northern sedge	3	-	-	-	-	-	-	-
Chenopodium album L.	fat hen	9	4	-	-	-	-	-	-
Chenopodium rubrum L.	red goosefoot	1	-	-	-	-	-	-	-
Cirsium sp	thistle	1	-	-	-	-	-	-	-
Conium maculatum L.	hemlock	-	-	-	-	-	+	3	-
Fragaria vesca L.	strawberry	97	-	34	-	-	-	15	-
Hordeum vulgare L.	barley	-	-	-	1	-	-	-	-
Hyoscyamus niger L.	henbane	9	-	-	-	-	-	-	-
Hypericum elodes L.	marsh St. Johns wort	1	2	7	-	-	-	1	-
Juncus sp.	rush	14	-	∞	-	3	∞	90	40
Lycopus europaeus L.	gipsy-wort	1	-	-	-	-	-	-	-
Papaver cf. rhoeas L.	field poppy	-	-	-	-	-	-	1	-
Papaver cf. somniferum L.	opium poppy	-	-	10	-	-	-	9	9
Ranunculus lingua L.	great spearwort	1	-	-	-	-	-	-	-
Ranunculus sardous Crantz	hairy buttercup	1	-	-	-	-	-	-	-
Ranunculus sceleratus L.	celery leaved crowfoot	39	-	-	-	-	-	-	-
Rubus fruticosus agg.	blackberry	23	1	115	-	-	+	8	+
Rubus idaeus L.	raspberry	55	2	24	-	-	-	1	-
Rubus indeterminate	-	9	-	18	-	-	-	-	-
ambucus nigra L.	elderberry	8	=7	=12	2	1	14	7	-
ilene dioica (L.) Clairv.	red campion	-	-	-	-	-	-	=1	-
f. Solanum nigrum L.	black nightshade	1	-	-	-	-	-	-	-
pergula arvensis L.	corn spurrey	1	-	-	-	-	-	-	-
riticum aestivo-compactum Schiem.	compact wheat	-	=1	-	-	-	-	-	-
rtica dioica L.	stinging nettle	1	-	1	-	-	-	-	-
rtica urens L.	lesser nettle	9	-	-	-	-	-	-	-
itis vinifera Gmel.	grape	-	1	-	-	-	-	-	-
Oogonia									
hara	brittlewort	-	2	10	-	-	-	-	-

ote: = denotes fragments
∞ denotes more than 100

The Plant Remains

By J. R. A. Greig

The Seeds

General remarks

The seeds were extracted from the same 'floats' that provided the beetle remains, the method being equally good for both types of remains. Identifications were made with reference to the standard works on seeds such as Bertsch (1941), Beijerinck (1947) and Renfrew (1973) as well as the Novaesium report (Knörzer, 1970). In each case seeds were compared with reference material of known identification, usually treated so as to simulate the decayed condition of the sub-fossil seeds from the sewer. Many of the seeds were in a poor state of preservation, or present only as fragments, and this in a few cases caused some difficulty in identification. Some fragments could not certainly be ascribed to one species as, for example, the seed fragment which was matched most closely by Conium maculatum L. (hemlock); this was too decayed for a definite identification and must be left as cf. C. maculatum. Some other seeds proved probematic because of their very small size, as did Juncus (rush), and identification to species will have to await the completion of a scanning electron microscope study of the micro-anatomy of recent reference seeds.

The seed flora from the sewer can be divided into three fairly clear groups according to the habitats they represent, although some species occur in more than one group. The first group contains weeds of waste places and arable land in present-day habitats; the second consists of aquatic plants of river banks and streamsides; and the third, plants which could well owe their presence here to the fact that they can be used as food, or medicine or for some other purpose.

The Weed Plants

Anthemis cotula L.	stinking mayweed	*Ranunculus sardous* Crantz	hairy buttercup
Atropa bella donna L.	deadly nightshade	*Rubus fruticosus* L., aggr.	blackberry
Chenopodium album L.	fat hen	*Sambucus nigra* L.	
		Silene dioica	red campion
C. rubrum L.	red goosefoot	*Urtica dioica* L.	stinging nettle
Papaver somniferum L.	opium poppy	*U. urens* L.	lesser nettle

Most of these weeds are found wherever there is disturbed ground, preferably nitrogen-rich, and would be expected to occur in York today on building sites, spoil tips and allotments. The presence of their seeds in the sewer would be unremarkable owing to the wide dispersal of such seeds by wind and other means. Any accumulating sediment with some means of access from the outside like the deposits in a sewer, would be expected to contain a proportion of the seeds being dispersed at the time. However, the weed list does include *Ranunculus sardous* the hairy buttercup, a local but widely distributed weed of damp places, which is known at the present day from only a few localities in the York area (Perring and Walters, 1962). *Silene dioica*, the red campion, is mainly a woodland plant rather than a weed and is therefore worthy of note.

The Aquatic Plants

Carex sp.	sedge
cf. *Conium maculatum* L.	hemlock
Hypericum elodes L.	marsh St. Johns wort
Juncus spp.	rush
Lycopus europaeus L.	gypsy-wort

Ranunculus lingua L.	great spearwort
R. sceleratus L.	celery leaved crowfoot
Chara sp.	brittlewort

The aquatic plants represented here are mostly fairly common in riverside and marsh vegetation and it would appear either that the seeds were deposited in the sewer sediments from the water supply leading into the city and flowing as waste through the sewer, or that they floated up the sewer from the river during backing up in times of flood. The latter suggestion would appear to be the most likely in view of the riverine elements in the fauna.

Plants useful to man

		suggested use
Apium graveolens L.	celery	food or spice
Atropa bella donna L.	deadly nightshade	medicine
Brassica nigra L.	black mustard	spice
B. oleracea L.	cabbage	food
Conium maculatum L.	hemlock	medicine
Fragaria vesca L.	strawberry	food
Papaver somniferum L.	opium poppy	spice or medicine
Rubus fruticosus L. (aggr.)	blackberry	food
R. idaeus L.	raspberry	food
Sambucus nigra L.	elderberry	food
Vitis vinifera Gmel.	grape	food
Triticum aestivo-compactum Schiem.	compact wheat	food
Hordeum vulgare L.	barley	food

These useful plants include certain cultivars, like wheat, and those which probably grew wild and could be gathered from the countryside. Few of these plants would be expected to be found growing within the settlement with the exception of elderberries and blackberries. These two could easily have been introduced into the sewer as part of the weed seed scatter, or like the raspberry and strawberry, which would not be expected in the fortress itself, introduced perhaps in birds' faeces. There is, however, some evidence to suggest that most of these seeds arrived in the sewer because of human action, probably in human excreta. Many of the raspberry, blackberry and elder seeds were fragmentary; the grape pip was derived from a cultivar unlikely to be available as food to other than humans, and it might have been passed through a gut, or spat out without being swallowed.

The presence of grapes so far north is interesting as other records from this period, such as those from Silchester (Reid, 1901, Codwin, 1975) are from southern Britain where grapes could well have been grown if the climate was similar to that of the present day. At York Roman viticulture seems unlikely in the light of present evidence, and it would appear that the grape pip originated from a raisin rather than a fresh grape, the former being preferable for ease of transport and storage. Raisins could have been imported from southern Europe where the summer is long and hot enough for their production.

Grains of wheat and barley are quite commonly preserved on Roman sites. The reason seems to be that grains were accidentally carbonized during drying, or during heating to drive out insect pests. In both cases the roasting process seems to have been haphazard, resulting in overheating and subsequent carbonization. The association of carbonized grain with insect pests has been found at Droitwich, Worcs. (Osborne, in press), Malton, Yorks. (Buckland, in prep.) and

York (Kenward & Hall, 1976), suggesting destruction of grain too infested to be of use. Grain pests were found in the sewer microfauna suggesting that there were grain storage or processing facilities in the vicinity.

The other "useful" plants include mustard, cabbage and celery, and in all cases there are wild varieties of these growing in Britain. The fact that they are mainly coastal and estuarine plants suggests that the seeds from York might be those of the cultivated varieties.

The rest of the plant list consists of species which mainly occur as weeds, but are known to have been used medicinally in the past. Seeds of deadly nightshade and opium poppy were found at both Silchester (Reid, 1901 and 1902; Godwin, 1975) and Novaesium (Knörzer, 1970) and their presence at these sites could hardly represent a chance similarity of weed communities, especially as deadly nightshade grows mainly in woods on limestone and henbane is an unusual plant in this part of England. Although very poisonous these plants can be therapeutic in small doses; for example, a derivative of hyoscine, which is found in henbane, is used as a sedative in travel sickness remedies. The opium poppy seeds could have been used medicinally or perhaps as a garnish on bread, as suggested by Reid (1905).

THE POLLEN RESULTS

		Sample 8 Alignment 2b	Sample 9 Roman manhole	Sample 11 Alignment 1a	
Pinus	(pine)	8	–	12	% total pollen
Quercus	(oak)	20	40	12	
Ulmus	(elm)	4	4	3	
Tilia	(lime)	4	2	2	
Alnus	(alder)	15	10	17	
Corylus	(hazel)	12	15	11	
Betula	(birch)	13	15	7	
Salix	(willow)	+	2	–	
Gramineae (grasses)		10	7	12	
Cerealia (cereals)		–	–	+	
Chenopodiaceae (goosefoot)		+	–	1	
Artemisia (mugwort)		+	–	–	
Ericales (heathers)		10	3	19	
Compositae (dandelions)		1	2	–	
Cruciferae (crucifers)		+	–	1	
Rumex	(sorrel)	–	–	+	
Umbelliferae (umbellifers)		+	–	–	
Cyperaceae (sedges)		+	+	2	
Pollen sums:		273 grains	124 grains	204 grains	

The samples taken for pollen analysis were collected in December 1972 from the most promising looking sediment exposed in alignment 2a, the Baths Channel, and consisted of fine humic matter, sand silt and twig charcoal with little sign of sorting. The samples from F28 were taken from the 1974 excavations and had a similar appearance to those already taken. Preparation was carried out in a special manner developed for samples with a low pollen content, and sufficient pollen counted to give a good idea of pollen content.

All three samples gave rather similar pollen spectra with large amounts of tree pollen and rather less from herbs, of which grasses and heathers were dominant. The samples had very large amounts of trilete spores from unidentified pteridophyta (ferns).

The interpretation of the results given above is problematic, for pollen analysis is generally carried out on material from natural deposits such as soils and sediments. Material like the sewer fill is apt to be largely unknown as to origin and mode of deposition, and the pollen could have come from a variety of sources.

This pollen analysis work was carried out in order to attempt to obtain archaeologically useful information from rather intractable sediments , and to investigate the origins of some archaeological deposits.

A further problem was encountered - poor pollen preservation which made the identification of the pollen difficult in some cases. More serious is the possibility that some of the more fragile kinds of pollen grains may have been originally present in the sewer sediments, subsequently decaying away. The effect this has on the results is to make the pollen spectra correspondingly richer in more robust pollen types and deficient in fragile pollen.

Fortunately the results obtained are sufficiently detailed and reliable, even taking the differential preservation factor into consideration, for some tentative interpretation to be made. As in the case of the seeds already discussed, the pollen flora can be divided up into different vegetation types; the large amounts of oak, lime and elm pollen suggest a mixed deciduous woodland, while the birch and hazel suggest thinner, more degraded wood, while the pine and heather seem to indicate some moorland. This [illegible] concentration of tree pollen types is unusual in Roman York, for other pollen spectra obtained from the Ebor brewery site on Aldwark contain very little tree pollen, about 10% pollen sum, demonstrating that the city itself had a mainly weedy vegetation, as would be expected, and that there was probably little tree forest in the neighbourhood of the city. Other pollen spectra from this period confirm this picture, for the Breckland was largely deforested by Roman times (Godwin 1975), although Yorkshire itself may not have been quite so heavily farmed (see however Buckland 1973). Since the pollen record from the sewer seems to be unrepresentative of what would be expected of Roman York and also of what has been partly demonstrated to be so, it appears that the pollen [illegible] in the sewer came from somewhere else. A reasonable explanation is that pollen was brought in with the city water supply, and was deposited in the sewer via the waste water, and that little if any came from within the city as in, for example, street drains. The Roman colonia at Lincoln was supplied by an aquedust from a considerable distance [illegible] and this may well have been the case at York also, with an aqueduct collecting water, containing pollen grains, from a well wooded area with perhaps some moorland on high slopes, a place such as the Howardian hills. The ease with which large amounts of pollen are transported by streams has been demonstrated by test-sampling (Peck1973) and many of the commoner pollen types from the sewer are known to travel a long distance in this way, for example Ericales pollen and Pteridium spores in the early winter floods, and tree pollen in the spring.

It is easy to visualise the transport of large amounts of tree and heather pollen from the area round the water source for York into the city and thence into the sewer which would swamp the smaller amounts of pollen from local weeds in the city as far as the pollen record goes.

If any plants with flowers had been deposited in the sewer, they might be expected to give a strong pollen record even if usually insect pollinated and therefore producing rather small amounts of pollen. Such a "derived" pollen signature might be expected if straw had been put in to the sewer, with the remains of the flowering spikelets which would result in pollen counts that were rich in cerealia type pollen. There is, however, no evidence that this kind of pollen deposition took place in this case.

References

Beijerinck, W. (1947). Zaadenatlas der Nederlandsche Flora. Wageningen.

Bertsch, K. (1941). Handbucher der praktischen Vorgeschichtsforschung, Band 1 Früchte und Samen. Verlag Ferdinand Enke, Stuttgart.

Buckland, P.C. (1973). Archaeology and environment on the Vale of York. S.Yorks Studies in Archaeology and Natural History 1, p. 6-18.

Godwin, Sir H. (1975). The History of the British Flora, 2nd Edn. Cambridge

Kenward, H.K. & Hall, R.A. (1976). Biological evidence for the usage of Roman riverside warehouses at York. Britannia 7

Knörzer, K-H. (1970). Römerzeitliche Pflanzenfunde aus Neuss. Band 10, Limesforschungen: Novaesium lV. Verlag Gebr. Mann, Berlin.

Peck, R.M. (1973) Pollen budget studies in a small Yorkshire catchment. Quaternary Plant Ecology, 14th Symposium of the British Ecological Society, Blackwell, Oxford.

Perring, F.H. & Walters, S.M. (eds) (1962) Atlas of the British Flora, London

Reid, C. (1901) In: W.H. St John Hope Taylor, Excavations on the site of the Roman city at Silchester, Hants, in 1900. Archaeologia 57 (2) p. 252-256

Reid, C. (1902) In: W.H. St John Hope Taylor, Excavations on the site of the Roman city at Silchester, Hants, in 1901. Archaeologia 58 (1) p. 34-26.

Reid, C. (1905) In: W.H. St John Hope Taylor, Excavations on the site of the Roman city at Silchester, Hants, in 1903 and 1904. Archaeologia 59 (2) p. 367-370.

Renfrew, J.M. (1973) Palaeoethnobotany Meth London.