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A possible hedgerow flora of Iron Age date from Alcester, Warwickshire

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Summary

An ditch fill contained a flora rich in seeds of Crataegus *sp. (hawthorn),* Prunus spinosa *(sloe),* Acer campestre *(field maple) and* Rhamnus catharticus *(purging buckthorn) as well as other plants typical of hedges. The remains could possibly be interpreted as evidence of a hedged and ditched boundary, and the radiocarbon date showed that it was of Iron Age date.*

Introduction

Alcester is a small town in south Warwickshire, near Stratford-upon-Avon (Fig. 1). There was a Roman town on the site of the present town, the history of which has been revealed by excavations over the years (Booth 1989). The site at Gas House Lane in Alcester (AL23; map reference SP 093575) was excavated in 1989 by Steve Cracknell for Warwickshire County Council, in advance of redevelopment of a former factory site. The excavations uncovered evidence of the Roman town defences, town houses and some late medieval features. There was also a pre-Roman watercourse, which was either a dug ditch or a natural stream, whose fill contained woody organic material and mollusc shells. The excavator sampled the sediment without calling in archaeobotanists to see the site, because the material was thought to be similar to other organic deposits which had been found in Alcester.

Laboratory processing

There were seven samples, all thought to be similar in content, of which four were examined. For three selected for examination of macrofossils, a litre of material was broken down in water and sieved on a mesh of 0.3 mm to remove fine debris and then sieved into size fractions of 4, 2, 1 and 0.3 mm for easier sorting. Not all of each of the finer fractions were sorted. A fourth sample was analysed for pollen, using the normal preparation methods followed by a small count and a scan of the rest of the slide. Pieces of wood for radiocarbon dating were also collected.

Chronology

The radiocarbon assay was carried out on twigs which were selected from the organic matrix. The determination gave a date of 2150± 50 bp (GU-5137) with a 1 sigma range between 354 and 116 BC (cal.). Since twigs were dated, one can be quite confident that this age probably represents the time during which the deposit formed.

Results

The species list (Table 1) shows the plant remains, mainly seeds (this term is used here in the widest sense), and pollen recorded. There were also snails and a range of beetle remains that have not been identified. The floras from the three macrofossil samples were almost identical, so they (and the pollen spectrum) are treated as essentially one context. Various plant communities can be recognised in this flora:

1. Aquatic. The most characteristic water plants are *Ranunculus* subg. *Batrachium* (water crowfoot), *Ceratophyllum* sp. (hornwort), cf. *Rorippa nasturtium-aquaticum* (?watercress), *Lemna* sp. (duckweed) and *Zannichellia palustris* (horned pondweed). This seems to represent the aquatic vegetation growing in the ditch itself.

2. Marsh and bankside. There were also plants of damp streamsides and marshes, such as *Ranunculus sceleratus* (celery-leaved buttercup), *R. flammula* (lesser spearwort), *Filipendula ulmaria* (meadowsweet), *Apium nodiflorum* (fool's watercress), *Hydrocotyle vulgaris* (marsh pennywort), *Berula erecta* (water-parsnip),

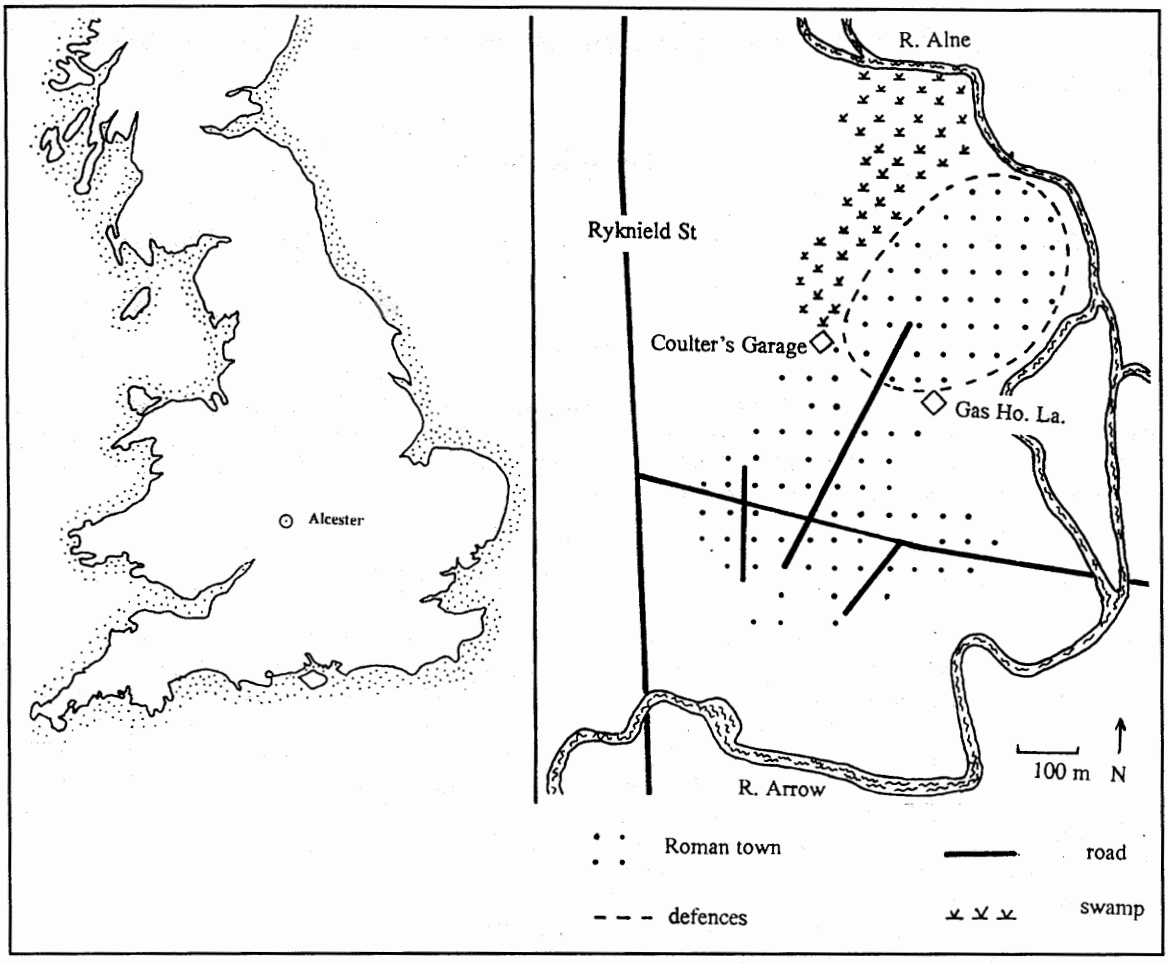

Figure 1. Alcester: location of modern and Roman towns.

Alisma sp. (water-plantain) and probably some of the *Carex* spp. (sedges). *Montia fontana* (blinks) grows on damp stony ground.

3. Spring-germinating (garden) weeds. These provide some evidence of more open, cultivated land, although they are very widespread today. *Stellaria media* (chickweed), *Chenopodium album* (fat-hen), *Atriplex* (orache), *Polygonum aviculare* (knotgrass) and *Sonchus asper* (sow-thistle) are weeds that probably grew near the ditch, although they can be found in most places where human occupation has provided disturbed soil. *Ranunculus* subgenus *Ranunculus* (buttercup) probably also belongs in this category since there were no achenes which could be identified specifically as meadow buttercup (*R. acris*).

Ranunculus parviflorus (small-flowered buttercup) is more interesting; it was 'not uncommon' in the surrounding region, parts of Warwickshire and Worcestershire, a century or so ago according to the county floras (Cadbury *et al.* 1971; Amphlett and Rea 1909) but is practically unknown there today. It has or had a scattered distribution in southern and central England, and in France (Fitter 1978). There are a number of archaeobotanical finds of achenes, suggesting that *R. parviflorus* was quite common in the further past. The main habitat of dry sunny banks might suggest that there was a bank associated with the ditch.

4. Crop weeds, crops. *Raphanus raphanistrum* (wild radish), *Aphanes arvensis* (parsley-piert), *Fallopia convolvulus* (black-bindweed) and *Valerianella* sp. (cornsalad) are more characteristic of traditional autumn-sown cornfields than gardens or spring-sown crops. There were only traces of crop plants: a charred *Triticum* sp. spikelet fork and a piece of glume (wheat chaff), and some cereal pollen. Other evidence for human activity included black soot particles in the pollen preparation showing that there were fires nearby.

Sample	/1	/7	/8	/4
CERATOPHYLLACEAE				
Ceratophyllum demersum L. (hornwort)	+	+	+	-
RANUNCULACEAE				
Ranunculus subg. *Ranunculus* (buttercup)	-	+	+	-
Ranunculus parviflorus L. (small- flowered buttercup)	-	-	+	-
Ranunculus sceleratus L. (celery-leaved buttercup)	+	-	+	-
Ranunculus flammula L. (lesser spearwort)	-	+	+	-
Ranunculus subgenus *Batrachium* (DC.) A. Gray (water crowfoot)	+	+	+	-
RANUNCULUS type (buttercups)	-	-	-	1
FUMARIACEAE				
Fumaria sp. (fumitory)	-	-	+	-
ULMACEAE				
ULMUS (elm)	-	-	-	7
URTICACEAE				
Urtica dioica L. (common nettle)	+	+	+	-
Urtica urens L. (small nettle)	+	+	+	-
FAGACEAE				
QUERCUS (oak)	-	-	-	1
BETULACEAE				
BETULA (birch)	-	-	-	+
Alnus glutinosa (L.) Gaertner (alder)	++	+	++	33
CORYLUS (hazel)	-	-	-	1
CHENOPODIACEAE				
Chenopodium album L.(fat-hen)	+	-	+	-
Atriplex sp.(orache)	+	+	+	-
PORTULACACEAE				
Montia fontana ssp. *minor* Hayw. (blinks)	+	-	+	-
CARYOPHYLLACEAE				
Moehringia trinervia (L.) Clairv. (3-nerved sandwort)	-	-	+	-
Stellaria media (L.) Vill. (common chickweed)	+	+	+	-
Stellaria palustris Retz/*S. graminea* L. (marsh or lesser stitchwort)	-	-	+	-
?*Myosoton aquaticum* L.(Moench) (?water chickweed)	-	-	+	-
Lychnis flos-cuculi L. (ragged-robin)	+	+	+	-
Silene sp. (campion)	+	+	+	-
CARYOPHYLLACEAE	-	-	-	+
POLYGONACEAE				
Persicaria maculosa Gray (redshank)	-	-	+	-
Persicaria lapathifolia (L.) Gray (pale persicaria)	+	-	+	-
Polygonum aviculare L. (knotgrass)	+	-	+	-
Fallopia convolvulus (L.) A. Löve (black-bindweed)	+	-	+	-
Rumex acetosella agg. (sheep'' sorrel)	+	-	+	-
Rumex spp. (docks)	+	+	+	1
MALVACEAE				
Malva sp. (mallow)	-	+	-	-
VIOLACEAE				
Viola sp. (violet, pansy)	+	+	+	-
CUCURBITACEAE				
Bryonia dioica Jacq. (white bryony)	+	-	-	-
BRASSICACEAE				
cf. *Rorippa nasturtium- aquaticum* (L.) Hayek (water-cress)	+	-	+	-
Raphanus raphanistrum L. (wild radish)	+	-	-	-

Table 1 (above and overleaf). Plant species list from ditch fills at Alcester, Gas House Lane (site AL23). For samples 336/0/1, 346/0/7, 346/0/8 macrofossils are recorded as present (+) or abundant (++), and for 346/0/4 pollen is given as numbers of grains or presence; taxa recorded only as pollen 'types' are shown in small capitals. Order and names from Stace (1991); pollen types after Fægri and Iversen 1989).

ERICACEAE				
ERICACEAE (heathers, etc.)	-	-	-	+
ROSACEAE				
Filipendula ulmaria (L.) Maxim. (meadowsweet)	+	+	+	-
Rubus subgenus *Rubus* (bramble).	+	+	+	-
Potentilla anserina L. (silverweed)	+	+	+	-
Potentilla sp. (cinquefoil)	-	-	+	1
Aphanes sp. (parsley-piert)	+	-	+	-
Rosa sp. (rose)	+	+	+	-
Prunus spinosa L. (blackthorn)	+	-	+	+
Crataegus monogyna Jacq (hawthorn)	+	-	+	1
Prunus/Crataegus (blackthorn/hawthorn) thorns	+	+	+	-
FABACEAE				
Trifolium sp. (clover) corolla	+	-	+	-
ONAGRACEAE				
Epilobium sp. (willowherb)	+	-	+	-
CELASTRACEAE				
Euonymus europaeus L. (spindle)	-	-	-	3
RHAMNACEAE				
Rhamnus cathartica L. (buckthorn)	+	-	+	38
ACERACEAE				
Acer campestre L. (field maple)	+	-	++	-
GERANIACEAE				
Geranium sp. (crane's-bill)	-	-	+	-
ARALIACEAE				
Hedera helix (ivy)	-	-	-	1
APIACEAE				
Hydrocotyle vulgaris L. (marsh pennywort)	-	-	+	-
Berula erecta (Hudson) Cov. (lesser water-parsnip)	-	+	-	-
Aethusa cynapium L. (fool's parsley)	+	-	+	-
Conium maculatum L. (hemlock)	+	+	+	-
Apium nodiflorum (L.) Lag. (fool's water-cress)	+	-	+	-
Heracleum sphondylium L. (hogweed)	-	-	+	-
APIACEAE	-	-	-	1
SOLANACEAE				
Solanum nigrum L. (black nightshade)	+	+	+	-
LAMIACEAE				
?*Ballota nigra* L. (?black horehound)	+	-	-	-
Galeopsis sp. (hemp-nettle)	-	+	-	-
Prunella vulgaris L. (selfheal)	+	+	+	-
Lycopus europaeus L. (gypsywort)	+	+	+	-
Mentha sp. (mint)	-	-	+	-
PLANTAGINACEAE				
Plantago media L. (hoary plantain)	+	-	+	-
Plantago lanceolata L. (ribwort plantain)	-	-	-	4
OLEACEAE				
FRAXINUS (ash)	-	-	-	2
SCROPHULARIACEAE				
Linaria vulgaris Miller (common toadflax)	+	-	-	-
Rhinanthus sp. (yellow-rattle)	+	-	+	-
RUBIACEAE				
Galium sp. (bedstraw)	-	-	+	-
GALIUM type	-	-	-	1
CAPRIFOLIACEAE				
Sambucus nigra L. (elder)	+	+	+	4
VALERIANACEAE				
Valerianella sp. (cornsalad)	+	+	+	-
ASTERACEAE				
Arctium sp. (burdock)	+	-	-	-
Carduus sp. (thistle)	+	+	+	-

Cirsium sp. (thistle)	+	+	+	-
CARDUUS/CIRSIUM type. (thistle)	-	-	-	+
Lapsana communis L. (nipplewort)	+	+	+	-
Sonchus oleraceus L. (smooth sow-thistle)	+	-	-	-
Sonchus asper (L.) Hill (prickly sow-thistle)	+	+	+	-
Taraxacum sp. (dandelion)	-	+	-	-
CICHORIAE (LIGULIFLORAE)	-	-	-	5
? *Senecio* sp. (ragwort)	-	-	+	-
ALISMATACEAE				
Alisma sp. (water-plantain)	+	+	+	-
POTAMOGETONACEAE				
POTAMOGETON type (pond-weed)	-	-	-	1
ZANNICHELLIACEAE				
Zannichellia palustris L. (horned pondweed)	+	+	+	-
LEMNACEAE				
Lemna sp. (duckweed)	+	-	-	-
SPARGANIACEAE				
Sparganium sp. (bur-reed)	+	-	-	-
SPARGANIUM/TYPHA ANGUSTIFOLIA type	-	-	-	3
CYPERACEAE				
Eleocharis sp. (spike-rush)	+	+	+	-
Scirpus/Schoenoplectus (club-rush)	+	+	+	-
Carex spp. (sedge)	+	+	+	-
Cyperaceae	-	-	-	6
POACEAE				
Gramineae <40 µm	-	-	-	20
Triticum sp. (wheat) charred rachis	+	-	-	-
Triticum sp. (wheat) charred grain	+	-	-	-
CEREALIA type, >40 µm (cereal pollen)	-	-	-	6

5. Grasslands. A few grassland plants were found such as seeds of the *Rhinanthus* sp. (yellow-rattle), characteristic of old meadows, and some *Plantago lanceolata* (ribwort plantain) pollen. The Gramineae pollen record could represent grasses in a range of different habitats (including marshland plants and weeds in the habitats already mentioned). The evidence of grassland could either have come from local vegetation or have been deposited in material such as hay or dung.

6. Scrub plants were unusually abundant; there were many 'eeds' of woody plants including *Crataegus monogyn*a (hawthorn; Fig. 6), *Prunus spinosa* (blackthorn; Fig. 6), *Acer campestre* (field-maple; Figs. 2 and 5), *Alnus glutinosa* (alder), *Rhamnus cathartica* (purging buckthorn; Figs. 2 and 3), and *Rosa* sp. (wild rose). Abundant maple and buckthorn remains are unusual finds in archaeobotanical material. There were also twigs, buds and thorns of hawthorn or blackthorn. The pollen record confirms the macrofossil findings with abundant *Alnus* and *Rhamnus* and traces of *Prunus* and *Crataegus*. It also adds *Ulmus* (elm), *Fraxinus* (ash), *Hedera* (ivy) and *Euonymus* (spindle, Fig. 4) to the list. Some woodland and hedgerow herbs, such as *Moehringia trinervia* (three-nerved sandwort), were found and *Geranium* sp. (crane's-bill), together with *Silene* sp. (campion), may also represent such a habitat. Although maple seeds do have a wind dispersal mechanism, casual observation suggests that most maple fruits fall close to the parent, especially from maples in hedges which are too short for the fruits to gain much advantage from wind dispersal. The presence in the samples of heavier seeds and twigs which are unlikely to have been transported over long distances shows that the flora probably represents vegetation growing very close to the watercourse, if not right beside it.

Discussion

At the time of excavation, this organic material was thought to be yet another exposure of the organic deposits from a large swamp which lay around the western edge of the town (Fig. 1). Several exposures of this swamp deposit have been investigated, such as the one at the Coulter's Garage site (Booth 1989) and the Gateway supermarket site

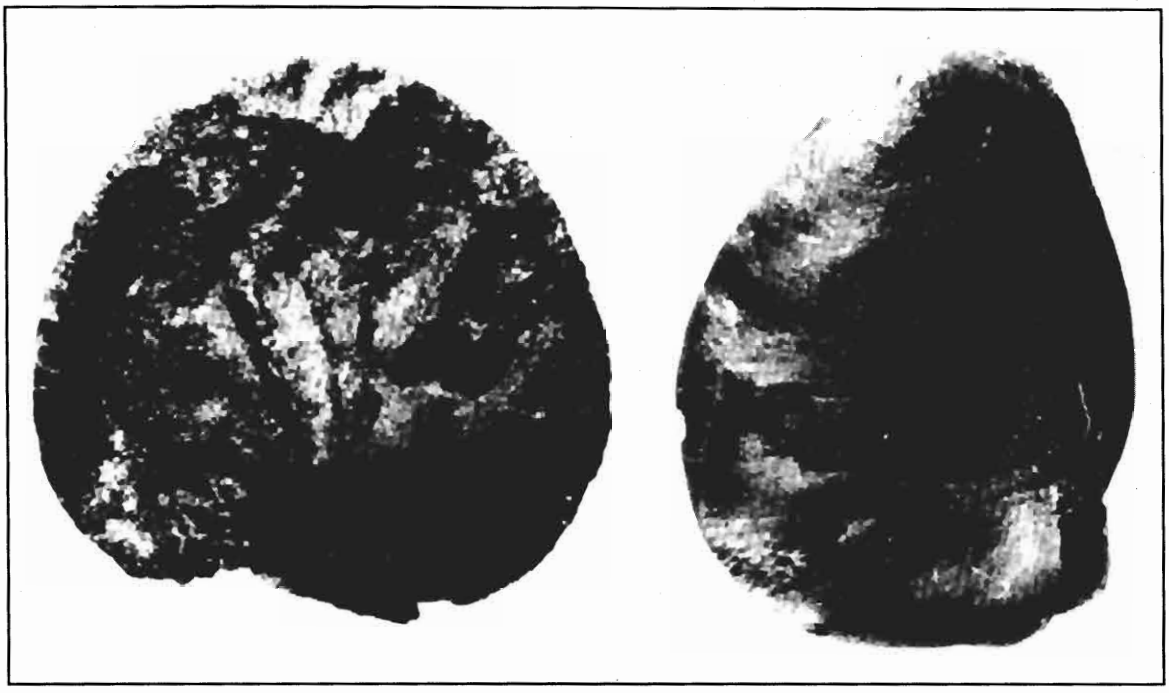

Figure 2 (left) Acer campestre *seed, x15; (right)* Rhamnus catharticus *seed, x15.*

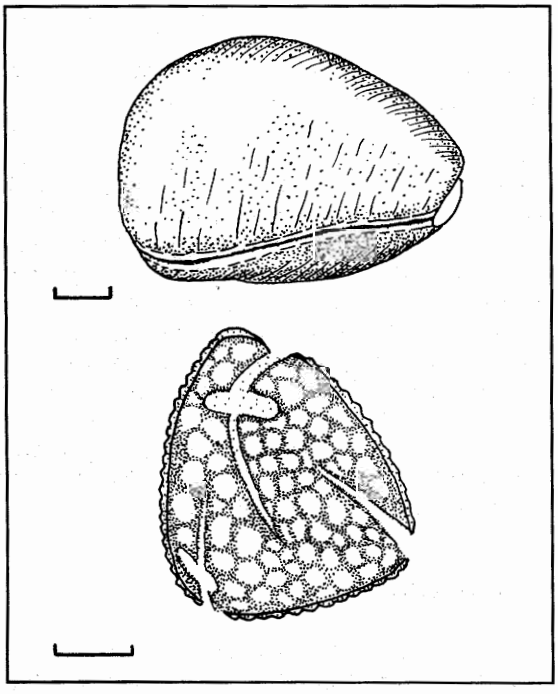

Figure 3. Rhamnus catharticus, *(above) seed, (below) pollen. Scale: 1mm for the seed, 5 µm for the pollen.*

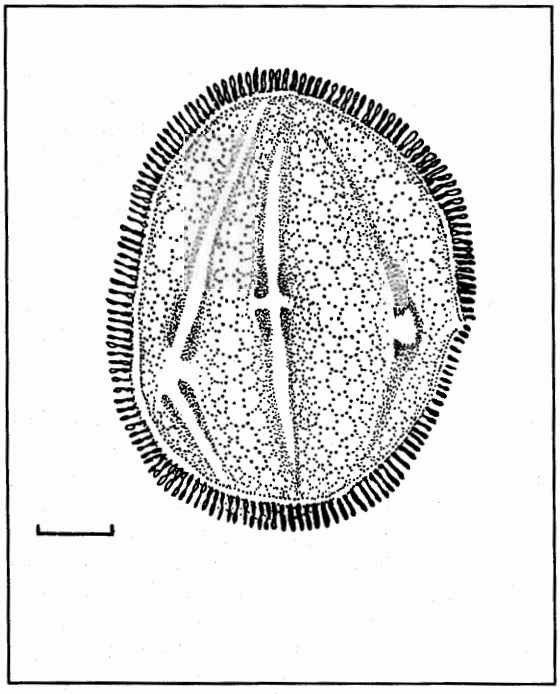

Figure 4. Euonymus europaeus *pollen. Scale: 5 µm.*

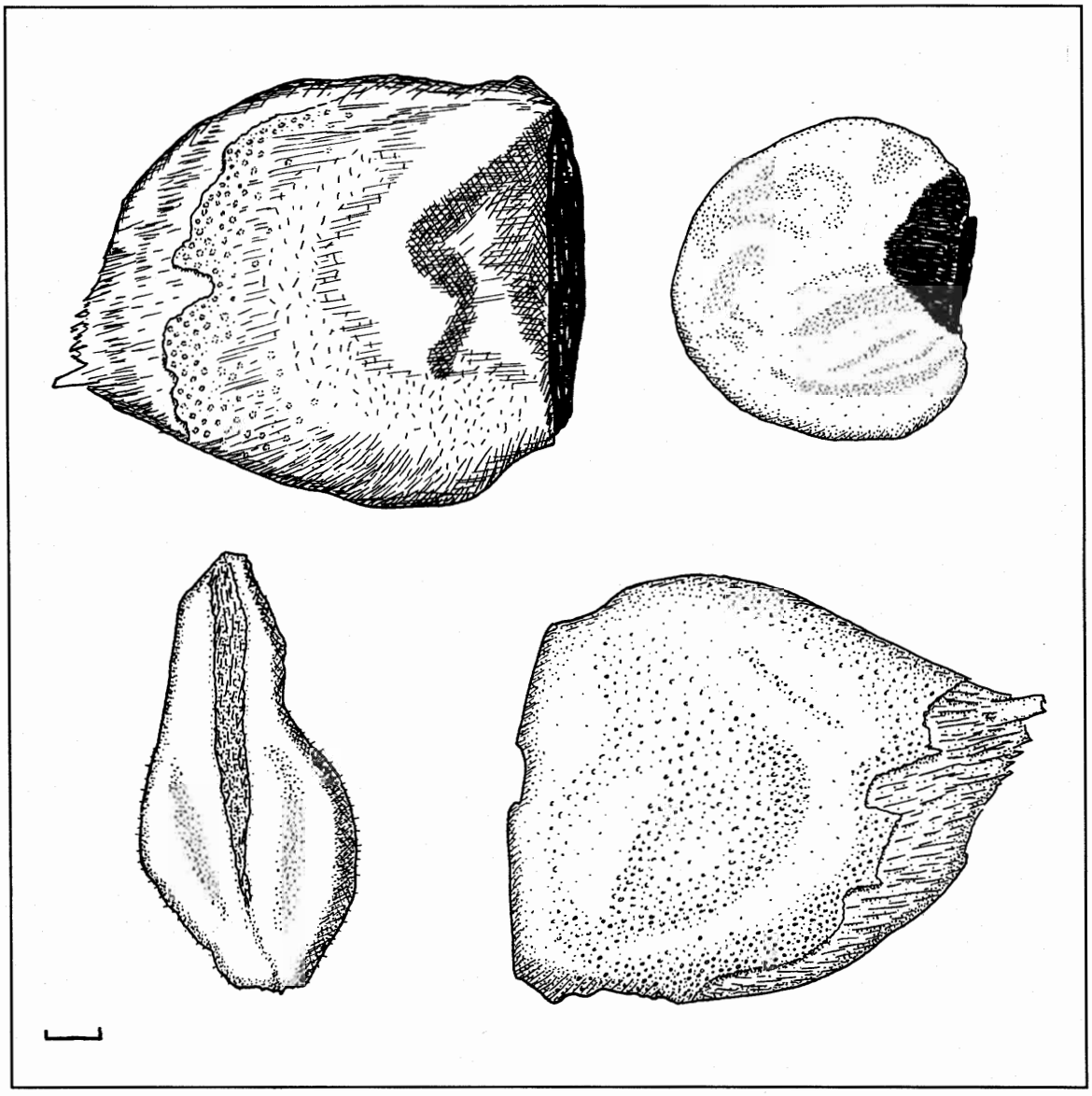

Figure 5. Acer campestre *(top left, bottom row) fruit, most layers complete but wing missing; (top right) seed. Scale: 1 mm.*

(Greig 1988). The former was slightly older than the Gas House Lane sediment, starting at the level dated 2410 ± 110 bp, (HAR 4905) and ending probably in the medieval period. There was scarcely any trace of distinctive hedgerow plants at those sites although the aquatic, wetland, weed and grassland parts of the floras were generally similar to the one from Gas House Lane discussed here. This suggests that the hedgerow flora was something different in character from the general vegetation around Alcester during the Iron Age and Roman period.

Does this represent a hedge in Alcester?

The suite of 'scrub' plants found in the Gas House Lane material is very similar to the flora of modern hedgerows: the most common plants in the (admittedly often artificial) hedgerows in Warwickshire are hawthorn, elder (*Sambucus nigra*) and blackthorn, with field maple at seventh place; buckthorn and spindle are also found in hedgerows and scrub, especially on calcareous soils (Cadbury *et al.* 1971). Historical records show that

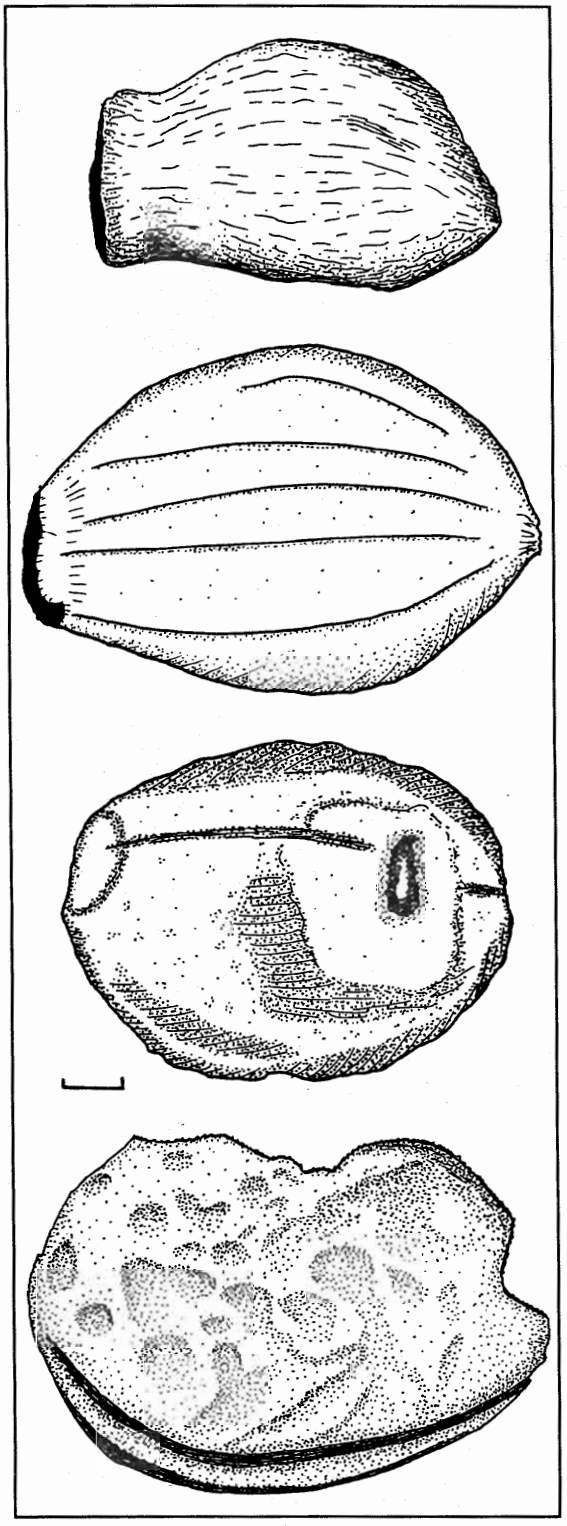

Figure 6. Crataegus monogyna: *(top) whole fruit (small), (upper middle) fruit with outer layer gone, (lower middle) inner fruitstone. Scale: 1mm.* Prunus spinosa: *(bottom) fruitstone fragment. Scale: 1mm.*

ancient hedges also contained such taxa (Rackham 1986). This seems to suggest that the ditch might have been bordered by a hedge. However this is hard to prove, for all of the taxa occur in various kinds of natural vegetation as well as hedges.

What is a hedge?

Botanically speaking, hedgerow vegetation contains a range of trees (mainly small), shrubs, climbers and herbs, which is very similar to that of wood clearings, edges and scrub. Indeed, some hedgerows can be shown to be elongated relics of former woodlands, while others have arisen naturally along boundaries when protected from grazing. Yet others have, of course, been planted (Rackham 1986). So, hedges are really a linear form of scrub. Hedgerow vegetation naturally favours plants which can easily reproduce and spread well there, which includes many bird-sown and suckering plants.

The vegetation of hedgerows is moulded by strong ecological factors, particularly damage from both grazing animals and from cutting and laying—the traditional craft of hedge-laying involving part-cutting of stems and laying them horizontally to form a stock-proof barrier. Thorny scrub plants are favoured by their self-protection and also perhaps through being selected for being more stock-proof. This can be contrasted with managed woodland which is traditionally protected against grazing animals. Availability of light is not such a limiting factor to plant growth in hedges as it is in the case of woodland.

The history of hedgerows has been studied, mainly within the historical period, (Pollard *et al.* 1974; Rackham 1986) and the correlation between richness of species and age of the hedge established.

The archaeobotany of hedges

Hedgerow plants (in the broadest sense, which includes wood glade, wood edge and scrub vegetation) have a long history associated with human settlement. Bandkeramik (earliest Neolithic) charcoal finds in Germany show that many of these plants were used as fuel (Kreuz 1988). Neolithic records of typical hedgerow shrubs such as *Prunus spinosa* have been discussed by Groenman-van Waateringe (1978). Occasional seeds of typical hedgerow

plants such as buckthorn, hawthorn and blackthorn and also pollen of maple have been found in Neolithic as well as Bronze Age levels at Runnymede, Berkshire (Greig 1991), and wood from the Late Bronze Age there included maple and buckthorn (Gale 1991). One other site where *Rhamnus catharticus* pollen was found was also dated to the Iron Age: Fiskerton near Lincoln (Greig 1986), and evidence for Roman hedges has long been suspected on the basis of finds of hawthorn and sloe at Farmoor, Oxfordshire (Robinson 1978). But these are rather scattered records and it would be hard to distinguish hedgerow from scrub and woodland edge vegetation. Almost certain proof of a hedge has been found, in the form of characteristically crooked hawthorn branches that appeared to have been laid, in Roman Iron Age remains in Scotland (Boyd 1984). Although such conclusive evidence has not been found at Alcester, the concentration of typical hedgerow taxa at a boundary of some kind seems to show that there might have been a hedge there.

Representation

Representation of remains (an aspect of taphonomy) is a very problematic area when trying to interpret such material as this. The hedgerow plants have been discussed here purely on the basis of presence (other taxa may well have been there, but have not been found). It would be desirable to study modern deposits from ditches bordered by hedges to compare the representation of seeds, pollen, and buds, etc. compared with surrounding vegetation so as to be able to make some kind of estimate of relative abundance of plants in past landscapes such as at this Alcester site.

Identification notes

Acer campestre fruits are distinctive, growing in pairs, each half with a wing. The subfossil specimens were single and did not have the wing, just the signs of where it had been attached (Fig. 5, top left and bottom right). The better preserved ones were complete with their outer layers (Fig. 5). The fruits were flat, 5-6 mm from attachment scar to wing remains and the same across, and 2 mm thick with a straight edge where the pairs had been joined together (Fig. 5, top left and bottom row), and often with a prominent lump, making the fruit about 3 mm thick there (Fig. 5, bottom left). The outermost surface was mid to dark brown, smooth and undulating, with hairs still present in some cases, shown in the side view (Fig. 5, bottom left). However this particular layer detached easily and many specimens had lost it. The layer underneath was pale brown, with a pattern of veins. Some of the fruits had split into two, so there were half-fruit walls present. There were also the shiny dark red- brown inner parts, the seeds, about 4.5 x 3.5 x 1.5 mm, with an elongated cell pattern radiating from the hilum (Fig. 5, top right and Fig. 2), faintly reminiscent of *Rhinanthus*, although twice the size.

Compared with those of *A. campestre*, the fruits of *Acer pseudoplatanus* are much less flat, and the attachment point is not directly opposite the wing, but rather at a slight angle, so this identification is quite clear. *A. pseudoplatanus* is recorded as an introduction to Britain in the 15th or 16th century, so it would not be expected in Iron Age deposits.

Crataegus monogyna fruits were occasionally preserved more or less whole, dark coloured, a with a calyx base (to which the flower was attached) and attachment point to stalk; they measured approximately 5.5 x 3.5 x 3.5 mm (Fig. 6, top). Others had lost these outer layers and exposed the pale tissue underneath, with irregular ridges like those found in *Sparganium* fruits; these were about 4.8 x 3.2 x 3.2 mm (Fig. 6, upper middle). Still further decay had caused erosion down to the fruitstone itself, exposing rather spongy material with an undulating surface and a prominent hilum, roughly 4 x 3 x 3 mm (Fig. 6, lower middle). *Crataegus* 'seeds' can have three quite different appearances, according to which layer happens to be exposed.

The *Rhamnus catharticus* seeds were shaped like an orange segment with two flat sides at an angle, and a rounded side and were about 3.2 x 2 x 2 mm (Fig. 2, 3). The thin seed-coat was often misshapen. There was a hilum at the apex (the 'sharp' end), and a furrow or groove running round the ventral surface. The seed surface was pale in colour, and the cell pattern on it with had cell rows running at right-angles to the furrow. They corresponded with modern reference material quite well. The other British member of the Rhamnaceae, *Frangula alnus* (alder buckthorn), has rather differently-shaped seeds.

The pollen of *R. catharticus* (Fig. 3) was subangular (between triangular and circular) in polar view, and tricolporate (having three pores each in a furrow), with distinct pores

that were elongated equatorially. The surface pattern was a soft reticulum in which separate columellae could not be seen, even when using phase-contrast. Their diameter was typically was 22 µm in glycerin jelly. This pollen, when lying in certain positions, could easily be confused with that of some Fabaceae.

The *Prunus spinosa* fruitstone (Fig. 6, bottom) was elongate/rounded and approximately 5 mm in length, which suggests that it represents *P. spinosa* var. *microcarpa*, the completely wild sloe, rather than one of the hybrids with *P. cerasifera* (the bullaces and primitive plums).

The *Euonymus europaeus* pollen grain (Fig. 4) was tricolporate and with fairly coarse columellae forming a reticulate (network) pattern. It measured 29 µm in diameter. The sculpture and other features of the single grain were compared with the reference material on two quite separate occasions, and were a fairly good match with *E. europaeus*, the alternatives in the key, such as *Viburnum*, seeming clearly different. The columellae did not seem to be in double rows as noted in the key of Fægri and Iversen (1989), but rather in somewhat scattered rows. It would obviously have been better to have found some more subfossil grains, but a scan of the rest of the slide failed to reveal any more.

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