

# *Circaea*



The Journal of the Association for Environmental Archaeology

## Circaea

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*Circaea* is the Journal (formerly Bulletin) of the Association for Environmental Archaeology (AEA) and—as from Volume 4—it is published twice a year. It contains short articles and reviews as well as more substantial papers and notices of forthcoming publications.

The *Newsletter* of the Association, produced four times a year, carries news about conferences and the business of the Association. It is edited by Vanessa Straker, to whom copy should be sent (c/o Department of Geography, University of Bristol, Bristol BS8 1SS).

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**Editors' note:** This issue has been delayed while sufficient contributions were accumulated. The means of publication and format of *Circaea* are currently under review by Managing Committee of the Association for Environmental Archaeology.

*Front cover: The hypostome (piercing mouthparts) of a sheep tick, Ixodes ricinus, from early Christian deposits at Deer Park Farms, Co. Antrim, N. Ireland. Reprocessed image derived from Kenward, H. K. and Allison, E. P. (1994). A preliminary view of the insect assemblages from the early Christian rath site at Deer Park Farms, Northern Ireland, pp. 89-107 in Rackham, D. J. (ed.), Environment and economy in Anglo-Saxon England. Council for British Archaeology Research Report 89.*

# A proposed scheme for evaluating plant macrofossil preservation in some archaeological deposits

Peter L. Murphy<sup>1</sup> and Patricia E. J. Wiltshire<sup>2</sup>

<sup>1</sup> Centre of East Anglian Studies, University of East Anglia, Norwich NR4 7TJ, U.K.

<sup>2</sup> Institute of Archaeology, University College London, 31-4 Gordon Square, London WC1H 0PY, U.K.

## Summary

*A scheme for the objective assessment of plant macrofossil preservation in archaeological deposits is proposed. It may be of value both in studies relating preservation to the depositional environment and also in routine assessment work. Comments and criticisms are invited.*

## Introduction

In this paper a scheme for evaluating the preservation of *uncharred* plant macrofossils in archaeological deposits will be presented. It is explicitly intended for use with archaeological deposits, such as the fills of pits, wells and ditches, rather than natural or semi-natural sediments. It cannot be stressed too strongly that the suggestions made here are preliminary, and are intended to stimulate discussion and further work in this area.

The state of preservation of plant macrofossils is extremely variable even in a single feature. Commonly, investigators report macrofossil assemblages as 'well' or 'poorly' preserved but rarely is such evaluation supported by any description of objective criteria. Some observations on preservation states, processes of decay and replacement have been published: Körber-Grohne (1964) has described progressive degradation of *Juncus* seed testas and grass fruit pericarps by the loss of cell layers; wood decay in archaeological contexts has been described and illustrated by Schweingruber (1982, 191-206); and Green (1979) has discussed phosphatic replacement of macrofossils, common in contexts such as latrine pit fills with high levels of biogenic phosphate.

Moreover, it is widely appreciated that some categories of macrofossils appear to be very susceptible to degradation and rarely preserve, whilst others are extremely durable. In our experience, *Allium* leaf epidermis and *Avena* pericarp, for example, seem to survive only in

deposits of very low redox potential where mineralisation of organic compounds is slow. [The term 'mineralisation' is used here in a strict microbiological sense; see further below.] At the other extreme, some categories of macrofossils (e.g. *Lemna* seeds) remain recognisable even in incompletely or intermittently waterlogged clastic sediments. A few types (e.g. seeds of *Sambucus nigra*) may even survive for long periods in deposits which are devoid of any other kinds of macrofossil, where oxygen has probably not been limiting to decomposition.

Nevertheless, there is, at present, no generally accepted scheme for describing macrofossil preservation, comparable to that devised by Cushing (1967) for pollen. This is understandable, for macroscopic plant remains differ very widely in gross structure, cellular structure, their degree of lignification, silicification and calcification and in their content of polyphenolic compounds, (such as tannins), and other modifiers (Swift *et al.* 1979, 148). As a result, distinct elements of various taxa survive differentially and objective assessment of preservation is difficult.

The need for a method of evaluation has arisen from a research programme, initiated by the writers, to investigate the relationship between the physico-chemical characteristics of archaeological deposits and the states of preservation of plant micro- and macrofossils. The scheme proposed may, however, have more immediate applicability in archaeobotanical practice. Nowadays, archaeobotanists are often involved in the assessment of the potential for

analysis of plant macrofossil assemblages, following the procedures laid down in *The Management of Archaeological Projects* (Andrews 1991). One factor influencing the decision on whether to proceed with analysis is the preservation of the material, though obviously many other factors would be taken into account, particularly the interpretative value of the assemblage. Poor preservation and/or fragmentation need not necessarily preclude full analysis if the investigator feels the material contains useful archaeological information. However, as a first step, assessment of preservation should be as objective as possible, to avoid idiosyncratic bias on the part of individual workers. A scheme of the type proposed here may help to ensure objectivity.

Ideally, all elements of an assemblage should be considered in evaluation, but in practice this may not be possible. To evaluate preservation of all categories of macrofossil (e.g. leaves, buds, stems, wood, rhizomes, roots, fruits, seeds) for all taxa present in a sample would clearly be excessively time-consuming and would negate the aim of producing a rapidly and easily-used scheme.

Other problems are related to taphonomy:

(a) It is possible that at least some macrofossils found in archaeological features are secondarily derived. They might have been subjected to some degree of decomposition in their initial place of deposition, and there is little hope of differentiating this secondary component from the primary assemblage.

(b) Comparing preservation between, for example, a latrine pit fill and a wet ditch fill presents problems given that the assemblages from such different context-types would have come from different sources and may show few resemblances in species composition. The former may consist largely of dietary residues from human faeces, whilst the latter may be composed mainly of seeds from the local aquatic and weed vegetation. Absence of a particular taxon or plant element may indicate lack of preservation or, alternatively, that it was never present. For these reasons, the scheme proposed here is mainly confined to a restricted range of plant elements and families which the authors have frequently encountered in a wide variety of archaeological deposits; but also included are some categories of material which are more specific to particular context-types.

The items selected for assessment may be open to debate, and the authors would welcome

comment and criticism of the scheme. Furthermore, it is hoped that workers in related sub-disciplines of environmental archaeology might develop similar approaches.

## Evaluating preservation

The simplest way to ensure comparability of evaluation between samples seems to be to use a standard recording sheet, an example of which is attached. Six categories of macrofossils are considered, with an arbitrary 'score' for various states of fragmentation and preservation. This permits assessment both of comminution by the soil fauna and microbial degradation. Macrofossils of taxa which are likely to have been exposed to comminuting agents other than soil animals have been omitted from the scheme. These macrofossils include fruits and seeds of segetal species which may have been fragmented during grain milling or chewing by humans.

Clearly if a category is absent, the 'score' is 0. By totalling 'scores' for each section, a measure of the state of preservation of the assemblage would be obtained, based on objective, albeit selected, criteria. In a final section an assessment of the degree of replacement may be made. A few notes on the material considered may be helpful.

1. *Seeds/fruits*: The taxa selected for consideration here are almost all exceedingly common in archaeological deposits. The features selected for consideration are mostly self-explanatory.

The frequency of *Sambucus nigra* seeds is here taken as a measure of overall preservation state for the assemblage: very degraded assemblages may consist of *S. nigra* but little else. Of course, there will be occasional assemblages in which *S. nigra* originally formed the predominant component; an example comes from Brandon, Suffolk, where lenses of almost pure *S. nigra* seeds in peat were thought to be related to dyeing (Murphy, unpublished); but such exceptional assemblages should be readily distinguishable.

2. *Mosses*: Moss identifications from archaeological sites were reviewed by Seaward and Williams (1976); more recently remains of mosses have been widely reported from urban deposits (eg Stevenson 1986). Replacement (see below) has apparently not been reported. In section 2 assessment of fragmentation and survival of gametophyte leaves may be made.

3. *Buds/bud-scales*: An identification key is provided by Tomlinson (1985). Buds occur widely in waterlogged deposits, and occasionally are replaced. Again, in this section fragmentation through degradation of the axillary tissue may be estimated, as well as the degree of survival of bud-scale margins.

4. *Deciduous leaves*: Although sclerophyllous leaves (e.g. *Ilex*, *Calluna*, *Buxus*, *Pteridium*) tend to survive preferentially, deciduous leaves, particularly those with a high tannin content (e.g. *Quercus*), are found in waterlogged deposits. An assessment of fragmentation may be entered in section a. Unsurprisingly, the more lignified vascular and fibrous tissue of the leaves survives better than the epidermis and parenchymatous mesophyll tissue.

5. *Wood/twigs*: Degradation of wood in archaeological deposits is fully discussed by Schweingruber (1982). Just two characteristics are considered here. The first—the state of preservation of scalariform vessel perforation plates of common taxa such as *Corylus* and *Alnus*—gives an indication of the initial stages of degradation of fine structures. The second—gross deformation of wood structure with the development of radial fissures and sinuous medullary rays—measures later stages of decay.

6. *'Epidermal' tissues*: In this section some of the more commonly encountered 'epidermal' tissues are considered (see, for example, Greig 1988). Of these, *Allium* leaf epidermis seems to be the most readily degraded, *Triticum* and *Secale* fruit pericarp the least.

7. *Pseudomorphic replacement*: In this section an estimate of the degree of replacement of seeds by calcium phosphate (or, less frequently, other compounds) may be made. [The term 'mineralisation' has been used to describe this form of preservation (Green 1979) but 'replacement' will be used here to avoid confusion with the microbiological usage of 'mineralisation', as mentioned above, meaning release of inorganic ions by microbial activity from organic compounds]. Other characteristics include the presence/absence of faecal concretions (often including cereal pericarp fragments, scraps of *Agrostemma githago* testa, fly puparia and eggs of intestinal parasitic worms) and the presence/absence of sub-spherical, often hollow, 'globules' (see note by Carruthers, 1989). Stem fragments and wood may also be replaced.

## Acknowledgements

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**Sample record sheets (preservation and replacement)**

**1. Seeds/fruits**

- a. *Ranunculus sceleratus*
  - >50% of achenes intact ... 2 .....
  - 50-25% of achenes intact ... 1.5 .....
  - >75% of achenes split, sometimes degradation of central tissue ... 1 .....
- b. Caryophyllaceae (isolated seeds)
  - >50% of seed testas uniformly well-preserved ... 2 .....
  - 50-25% with testas uniformly well-preserved ... 1.5 .....
  - >75% show degradation of tissue between tubercles, some fragmentation ... 1 .....
- c. Chenopodiaceae (isolated seeds)
  - >50% with intact testas ... 2 .....
  - 50-25% with intact testas ... 1.5 .....
  - >75% with fragmented testas, though internal tissues may be intact ... 1 .....
- d. *Rubus fruticosus*
  - >50% of fruitstones with endocarp intact ... 2 .....
  - 50-25% with endocarp intact ... 1.5 .....
  - >75% with endocarp degraded, only internal tissues survive ... 1 .....
- e. *Urtica dioica*
  - >50% of nutlets intact ... 2 .....
  - 50-25% of nutlets intact ... 1.5 .....
  - >75% of nutlets split, some fragments becoming translucent...1 .....
- f. *Sambucus nigra*
  - <25% of assemblage ... 2 .....
  - 25-50% of assemblage ... 1.5 .....
  - >50% of assemblage ... 1 .....
- g. Polygonaceae
  - >50% with perianths ... 2 .....
  - 50-25% with perianths ... 1.5 .....
  - <25% with perianths ... 1 .....
- h. Alismataceae
  - >50% of achenes as intact carpels ... 2 .....
  - 50-25% as intact carpels ... 1.5 .....
  - <25% as intact carpels, most specimens 'embryos' ... 1 .....
- i. *Juncus* spp
  - >50% with outer scalariform cell layers preserved ... 2 .....
  - 50-25% with outer scalariform cell layers preserved ... 1.5 .....
  - <25% with outer scalariform cell layers preserved, mostly endosperm tissue visible ... 1 .....
- k. Gramineae
  - >50% of caryopses with pericarp cell pattern clear ... 2 .....
  - 50-25% with cell pattern clear ... 1.5 .....
  - >75% with cells degraded or obscured by dark pigments ... 1 .....

**Total 'score' for seed/fruit preservation** (maximum possible score = 20) \_\_\_\_\_

**2. Mosses**

- a. >75% of fragments >10 mm ... 2 .....  
 75-25% of fragments >10 mm ... 1.5 .....  
 <25% of fragments >10 mm ... 1 .....
- b. >75% of stem fragments with leaves ... 2 .....  
 75-25% of stem fragments with leaves ... 1.5 .....  
 >25% of stem fragments devoid of leaves ... 1 .....

**3. Buds/bud-scales**

- a. >50% of buds intact ... 2 .....  
 50-25% of buds intact ... 1.5 .....  
 <25% of buds intact; bud-scales mostly isolated ... 1 .....
- b. >50% of bud-scale margins preserved ... 2 .....  
 50-25% of scales with intact margins ... 1.5 .....  
 <25% with intact margins ... 1 .....

**4. Deciduous leaves**

- a. >50% of fragments > 10 mm ... 2 .....  
 50-25% of fragments >10 mm ... 1.5 .....  
 <25% of fragments > 10 mm ... 1 .....
- b. >50% of fragments with epidermis and mesophyll ... 2 .....  
 50-25% with epidermis and mesophyll ... 1.5 .....  
 <25% with epidermis and mesophyll;  
 most fragments 'skeletons' of vascular tissue ... 1 .....

**5. Wood/twigs**

- a. >50% of scalariform perforation plates with all bars intact ... 2 .....  
 50-25% with all bars intact ... 1.5 .....  
 < 25% with all bars intact ... 1 .....
- b. >50% of twigs with medullary rays undeformed; no radial fissures ... 2 .....  
 50-25% with undeformed rays, no fissures ... 1.5 .....  
 <25% with undeformed rays, no fissures ... 1 .....

**6. 'Epidermal' tissues**

- a. *Allium* leaf epidermis present ...1 .....
- b. *Avena* pericarp present ... 1 .....
- c. *Triticum/Secale* pericarp present ... 1 .....
- d. Other epidermal tissues ... 1 .....

**Total 'score' for preservation of vegetative plant material, etc. (maximum possible 20)** \_\_\_\_\_

**7. Pseudomorphic replacement**

- a. >50% of seeds replaced ... 2 .....  
 50-25% replaced ... 1.5 .....  
 <25% replaced ... 1 .....
- b. 'Faecal concretions' present ... 1 .....
- c. Sub-spherical 'globules' present ... 1 .....
- d. Replaced stems present ... 1 .....
- e. Replaced wood present ... 1 .....

**Total score for replacement (maximum possible score 6)** \_\_\_\_\_

## SHORT CONTRIBUTION

### *Useful small dogs*

**Peta Sadler**, 6, Fairacres, Prestwood, Great Missenden, Buckinghamshire HP16 0LD, U.K.

Few of us these days have contact with working dogs, most of which are large, and it is easy to forget that small dogs also have their uses.

The *Animals' home doctor—Encyclopedia of Domestic Pets*, published in 1934 in 27 weekly parts (at 7d per week), contains articles on a variety of animals and their diseases. Perusal of the entries on dogs provides interesting information on the characteristics of some of the small breeds kept as pets, but also of those used for hunting and herding. The following are some of the notes I made from the encyclopedia.

*Cairn terrier*: small dog used to hunt otter, well-equipped with sporting proclivities.

*Dachshund*: kept largely by the landed gentry in Germany for sporting. (*Dachs* = badger). Have good noses and are used, not only for badger hunting, but also to track wounded game and for worrying wild boar in the forests. They keep the boar from bolting so that the sportsman can get a shot in. For this work, they are better adapted than larger dogs as, being so low to the ground, they can get about in undergrowth more easily when escaping the charges of the formidable antagonist.

*Dandie dinmot*: used for fox hunting and will fight to the death when provoked. 8-11" at shoulder, weight 14-24 lbs.

*Blenheim spaniel*: classed as a toy, but is a lively, diligent fellow in a light covert and is excited to great perseverance by a most enthusiastic enjoyment of the scent.

*Sealyham*: 'made' about 1860 as a sporting dog. The pluck to tackle a polecat was the test and any that failed were put under. Dog's weight not to exceed 20 lbs, bitches 18 lbs Height not to exceed 12" at the shoulder.

*Welsh corgi*: his duty in Wales is to drive the cattle and guard the homestead. His short legs enable him to nip the heels of the cattle and so to skulk that the retaliatory kick misses him. Height at shoulder 12-14". Dog 18-30 lbs, bitch 16-24 lbs.

*West Highland terrier*: kept for the destruction of vermin such as foxes (which kill small lambs), otters (because they prey on salmon and sea trout) and badgers. In 1901 as many as 150 foxes were killed by them in one year on the estate of Colonel Malcolm of Poltalloch in Argyllshire and that of his brother. Weight of dogs 14-18 lbs, bitches 12-16 lbs and height at shoulder 8-12".

It is, of course, not suggested that these specific breeds existed in the past, but that dogs with similar characteristics may have been employed in carrying out similar tasks. As O'Connor (1992, 110) points out, the variability in size and morphology of dog bones from Roman town sites in Britain implies that some deliberate selection of traits was already being practised. It is possible that some of the advantages of small size were being bred for, to produce animals suitable for certain hunting and herding activities, and we should at least consider these uses when interpreting the remains of small dogs.

### Reference

O'Connor, T. P. (1992). Pets and pests in Roman and medieval Britain. *Mammal Review* 22, 107-13.



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

James Greig

Department of Ancient History and Archaeology, Birmingham University, Edgbaston, Birmingham B15 2TT, U.K.

## 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  $2150 \pm 50$  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),

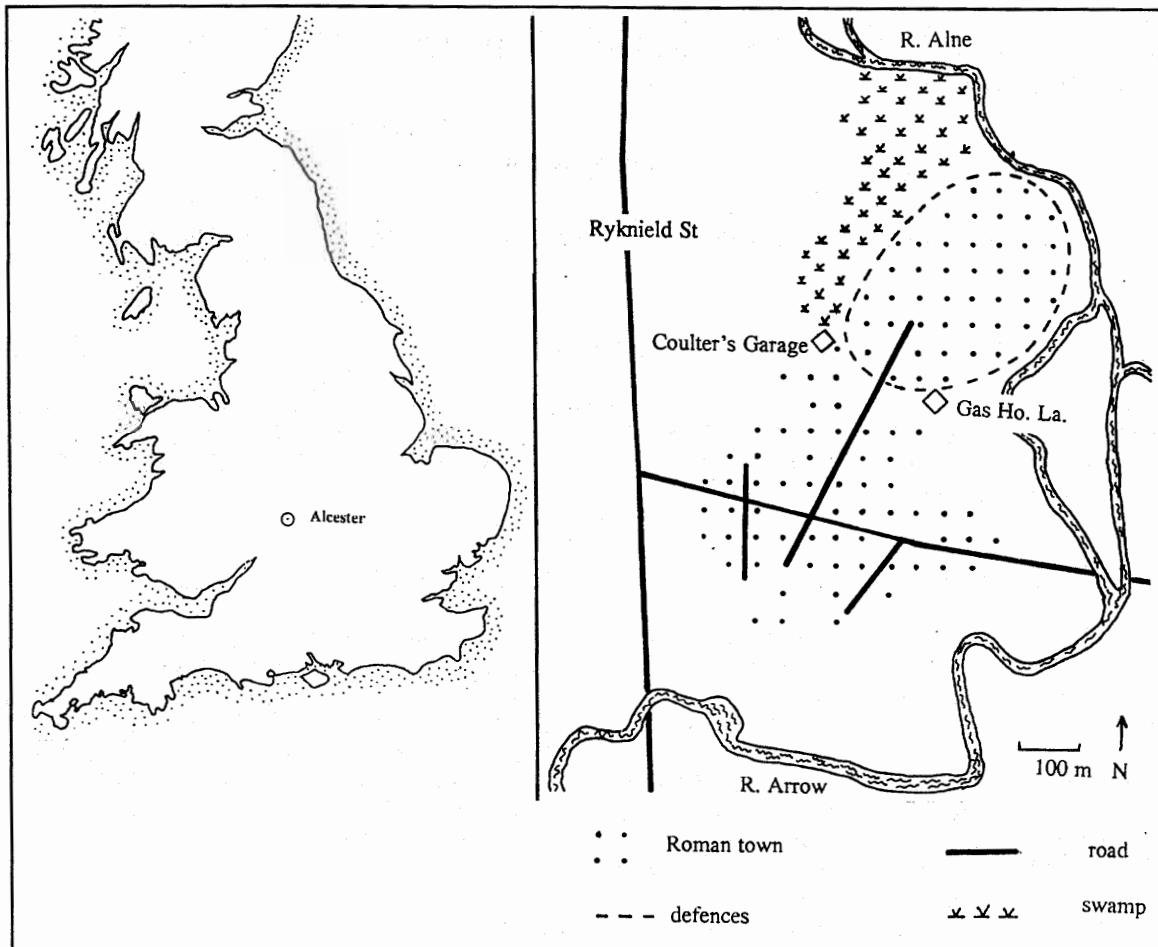


Figure 1. Alcester: location of modern and Roman towns.

*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
<b>CERATOPHYLLACEAE</b>				
<i>Ceratophyllum demersum</i> L. (hornwort)	+	+	+	-
<b>RANUNCULACEAE</b>				
<i>Ranunculus</i> subg. <i>Ranunculus</i> (buttercup)	-	+	+	-
<i>Ranunculus parviflorus</i> L. (small-flowered buttercup)	-	-	+	-
<i>Ranunculus sceleratus</i> L. (celery-leaved buttercup)	+	-	+	-
<i>Ranunculus flammula</i> L. (lesser spearwort)	-	+	+	-
<i>Ranunculus</i> subgenus <i>Batrachium</i> (DC.) A. Gray (water crowfoot)	+	+	+	-
RANUNCULUS type (buttercups)	-	-	-	1
<b>FUMARIACEAE</b>				
<i>Fumaria</i> sp. (fumitory)	-	-	+	-
<b>ULMACEAE</b>				
<i>Ulmus</i> (elm)	-	-	-	7
<b>URTICACEAE</b>				
<i>Urtica dioica</i> L. (common nettle)	+	+	+	-
<i>Urtica urens</i> L. (small nettle)	+	+	+	-
<b>FAGACEAE</b>				
<i>Quercus</i> (oak)	-	-	-	1
<b>BETULACEAE</b>				
<i>Betula</i> (birch)	-	-	-	+
<i>Alnus glutinosa</i> (L.) Gaertner (alder)	++	+	++	33
<i>Corylus</i> (hazel)	-	-	-	1
<b>CHENOPODIACEAE</b>				
<i>Chenopodium album</i> L. (fat-hen)	+	-	+	-
<i>Atriplex</i> sp. (orache)	+	+	+	-
<b>PORTULACACEAE</b>				
<i>Montia fontana</i> ssp. <i>minor</i> Hayw. (blinks)	+	-	+	-
<b>CARYOPHYLLACEAE</b>				
<i>Moehringia trinervia</i> (L.) Clairv. (3-nerved sandwort)	-	-	+	-
<i>Stellaria media</i> (L.) Vill. (common chickweed)	+	+	+	-
<i>Stellaria palustris</i> Retz/S. <i>graminea</i> L. (marsh or lesser stitchwort)	-	-	+	-
? <i>Myosoton aquaticum</i> L. (Moench) (?water chickweed)	-	-	+	-
<i>Lychnis flos-cuculi</i> L. (ragged-robin)	+	+	+	-
<i>Silene</i> sp. (campion)	+	+	+	-
<b>CARYOPHYLLACEAE</b>				
<b>POLYGONACEAE</b>				
<i>Persicaria maculosa</i> Gray (redshank)	-	-	+	-
<i>Persicaria lapathifolia</i> (L.) Gray (pale persicaria)	+	-	+	-
<i>Polygonum aviculare</i> L. (knotgrass)	+	-	+	-
<i>Fallopia convolvulus</i> (L.) A. Löve (black-bindweed)	+	-	+	-
<i>Rumex acetosella</i> agg. (sheep's sorrel)	+	-	+	-
<i>Rumex</i> spp. (docks)	+	+	+	1
<b>MALVACEAE</b>				
<i>Malva</i> sp. (mallow)	-	+	-	-
<b>VIOLACEAE</b>				
<i>Viola</i> sp. (violet, pansy)	+	+	+	-
<b>CUCURBITACEAE</b>				
<i>Bryonia dioica</i> Jacq. (white bryony)	+	-	-	-
<b>BRASSICACEAE</b>				
cf. <i>Rorippa nasturtium-aquaticum</i> (L.) Hayek (water-cress)	+	-	+	-
<i>Raphanus raphanistrum</i> 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				
<i>Filipendula ulmaria</i> (L.) Maxim. (meadowsweet)	+	+	+	-
<i>Rubus</i> subgenus <i>Rubus</i> (bramble).	+	+	+	-
<i>Potentilla anserina</i> L. (silverweed)	+	+	+	-
<i>Potentilla</i> sp. (cinquefoil)	-	-	+	1
<i>Aphanes</i> sp. (parsley-piert)	+	-	+	-
<i>Rosa</i> sp. (rose)	+	+	+	-
<i>Prunus spinosa</i> L. (blackthorn)	+	-	+	+
<i>Crataegus monogyna</i> Jacq (hawthorn)	+	-	+	1
<i>Prunus/Crataegus</i> (blackthorn/hawthorn) thorns	+	+	+	-
FABACEAE				
<i>Trifolium</i> sp. (clover) corolla	+	-	+	-
ONAGRACEAE				
<i>Epilobium</i> sp. (willowherb)	+	-	+	-
CELASTRACEAE				
<i>Euonymus europaeus</i> L. (spindle)	-	-	-	3
RHAMNACEAE				
<i>Rhamnus cathartica</i> L. (buckthorn)	+	-	+	38
ACERACEAE				
<i>Acer campestre</i> L. (field maple)	+	-	++	-
GERANIACEAE				
<i>Geranium</i> sp. (crane's-bill)	-	-	+	-
ARALIACEAE				
<i>Hedera helix</i> (ivy)	-	-	-	1
APIACEAE				
<i>Hydrocotyle vulgaris</i> L. (marsh pennywort)	-	-	+	-
<i>Berula erecta</i> (Hudson) Cov. (lesser water-parsnip)	-	+	-	-
<i>Aethusa cynapium</i> L. (fool's parsley)	+	-	+	-
<i>Conium maculatum</i> L. (hemlock)	+	+	+	-
<i>Apium nodiflorum</i> (L.) Lag. (fool's water-cress)	+	-	+	-
<i>Heracleum sphondylium</i> L. (hogweed)	-	-	+	-
APIACEAE	-	-	-	1
SOLANACEAE				
<i>Solanum nigrum</i> L. (black nightshade)	+	+	+	-
LAMIACEAE				
? <i>Ballota nigra</i> L. (?black horehound)	+	-	-	-
<i>Galeopsis</i> sp. (hemp-nettle)	-	+	-	-
<i>Prunella vulgaris</i> L. (selfheal)	+	+	+	-
<i>Lycopus europaeus</i> L. (gypsywort)	+	+	+	-
<i>Mentha</i> sp. (mint)	-	-	+	-
PLANTAGINACEAE				
<i>Plantago media</i> L. (hoary plantain)	+	-	+	-
<i>Plantago lanceolata</i> L. (ribwort plantain)	-	-	-	4
OLEACEAE				
FRAXINUS (ash)	-	-	-	2
SCROPHULARIACEAE				
<i>Linaria vulgaris</i> Miller (common toadflax)	+	-	-	-
<i>Rhinanthus</i> sp. (yellow-rattle)	+	-	+	-
RUBIACEAE				
<i>Galium</i> sp. (bedstraw)	-	-	+	-
GALIUM type	-	-	-	1
CAPRIFOLIACEAE				
<i>Sambucus nigra</i> L. (elder)	+	+	+	4
VALERIANACEAE				
<i>Valerianella</i> sp. (cornsalad)	+	+	+	-
ASTERACEAE				
<i>Arctium</i> sp. (burdock)	+	-	-	-
<i>Carduus</i> sp. (thistle)	+	+	+	-

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

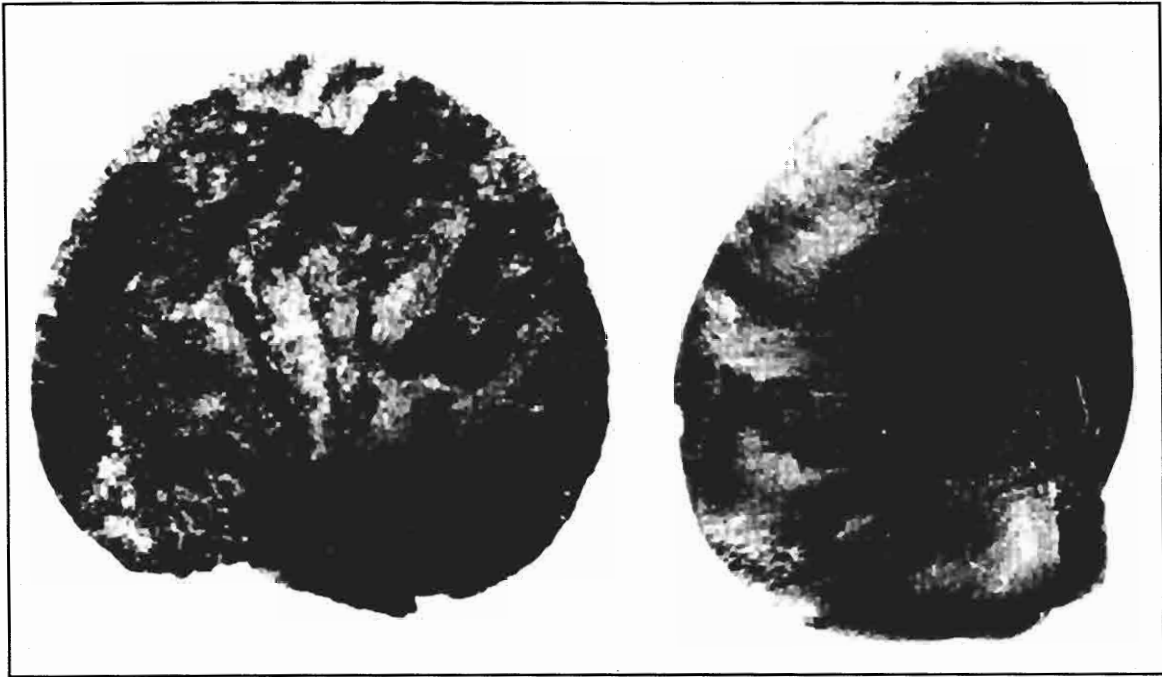


Figure 2 (left) *Acer campestre* seed, x15; (right) *Rhamnus catharticus* seed, x15.

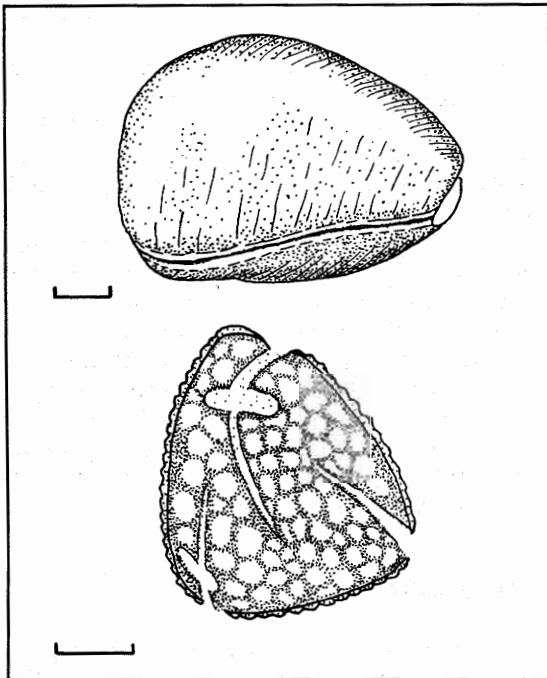


Figure 3. *Rhamnus catharticus*, (above) seed, (below) pollen. Scale: 1mm for the seed, 5  $\mu$ m for the pollen.

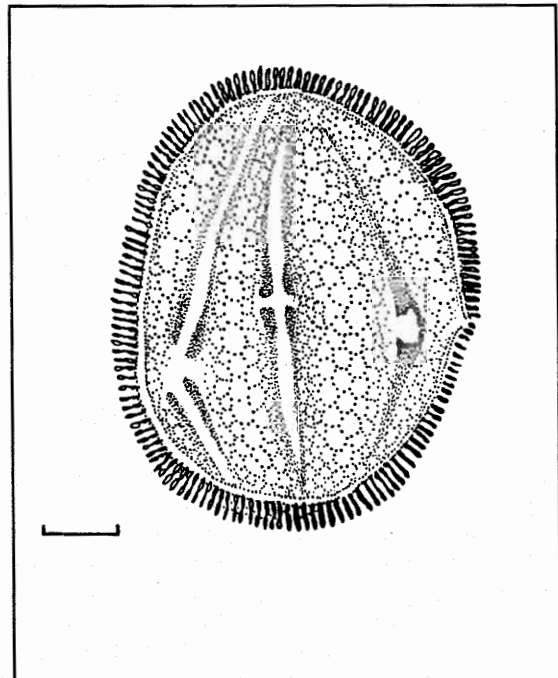


Figure 4. *Euonymus europaeus* pollen. Scale: 5  $\mu$ m.

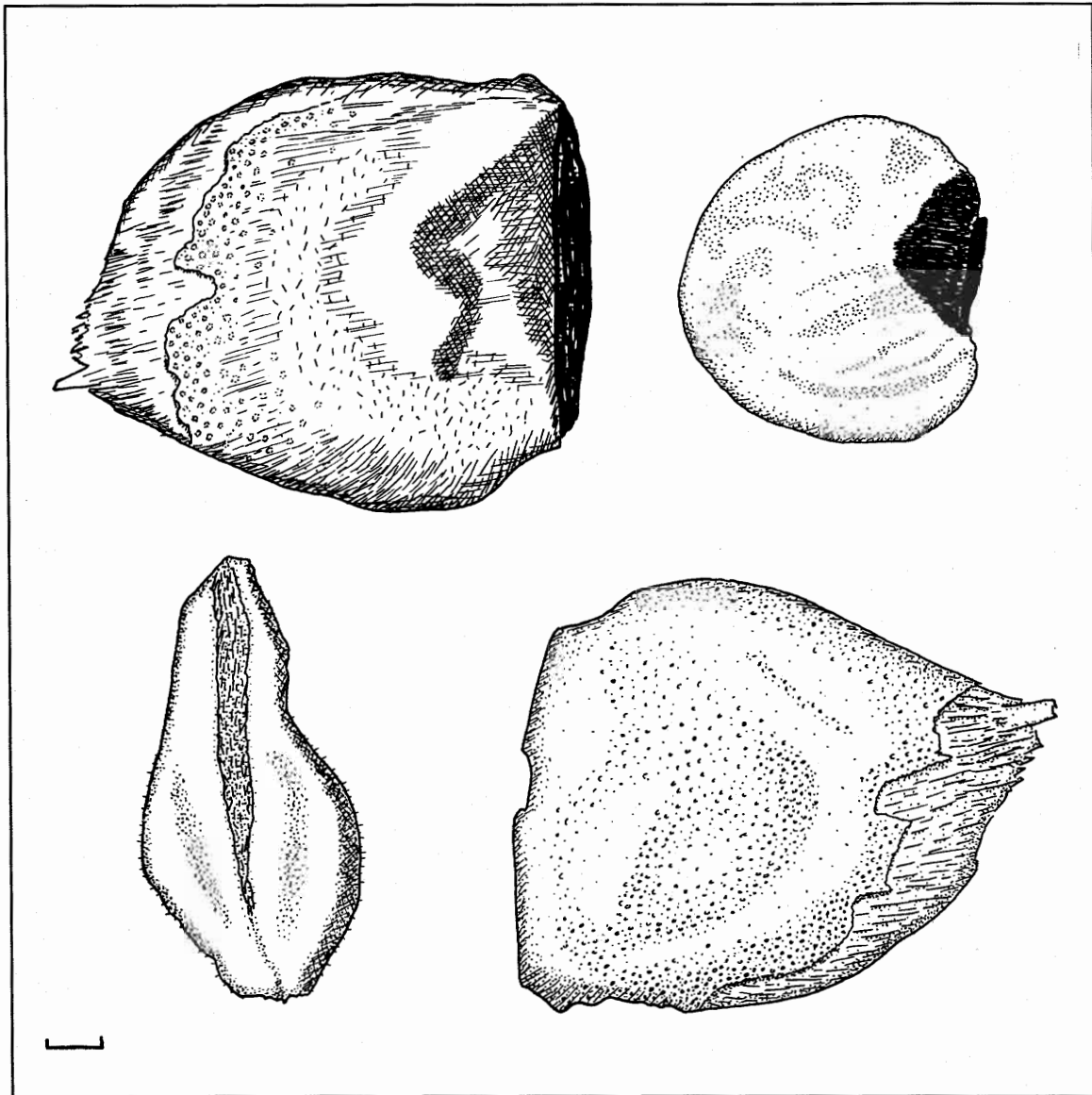


Figure 5. *Acer campestre* (top left, bottom row) fruit, most layers complete but wing missing; (top right) seed. Scale: 1 mm.

(Greig 1988). The former was slightly older than the Gas House Lane sediment, starting at the level dated  $2410 \pm 110$  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

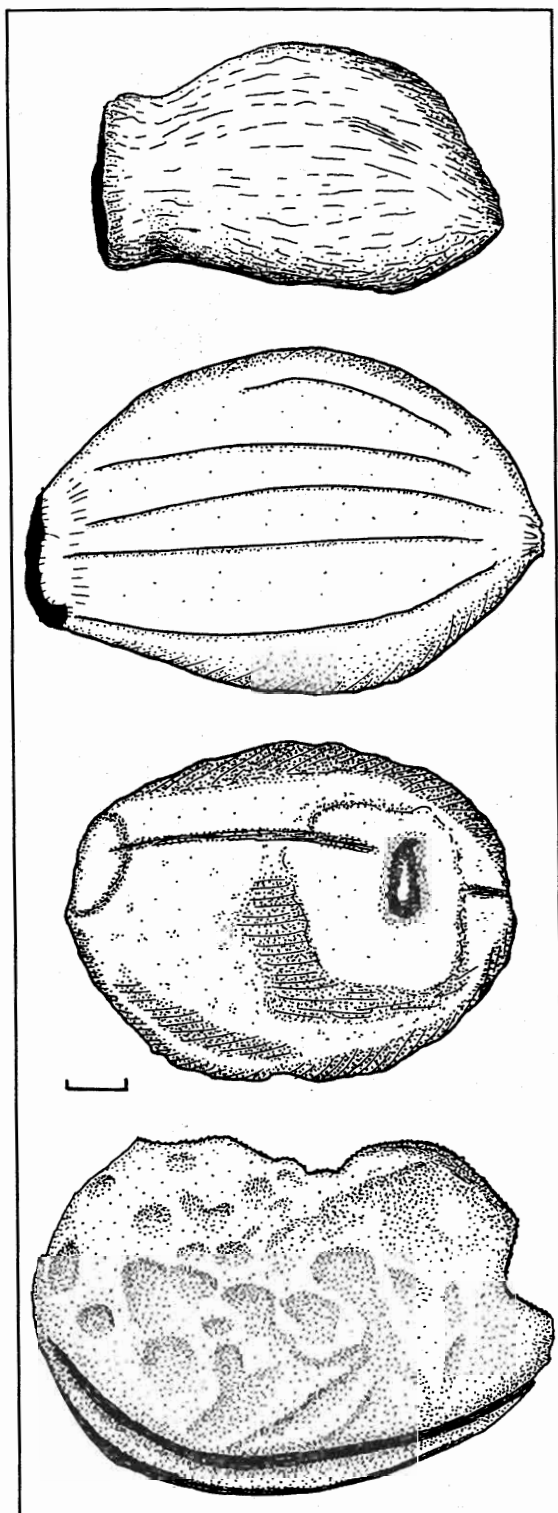


Figure 6. *Crataegus monogyna*: (top) whole fruit (small), (upper middle) fruit with outer layer gone, (lower middle) inner fruitstone. Scale: 1mm. *Prunus spinosa*: (bottom) fruitstone fragment. Scale: 1mm.

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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# Tephra-linked studies and environmental archaeology, with special reference to Ireland

Valerie A. Hall<sup>1</sup>, Jonathan R. Pilcher<sup>2</sup> and S. Joanne McVicker<sup>2</sup>

<sup>1</sup> Institute of Irish Studies, Queen's University, Belfast BT9 6AW, U.K.

<sup>2</sup> Palaeoecology Centre, School of Geosciences, Queen's University, Belfast BT7 1NN, U.K.

## Summary

*Recent advances in tephra studies on deposits from sites widespread throughout Ireland are described. Suggested improvements in tephra preparation techniques for optical microscopy, electron microscopy and electron microprobe analysis are given.*

## Introduction

The purpose of this short paper is to inform the increasing numbers of environmental archaeologists interested in this new field of research about recent advances in tephra-linked palaeoenvironmental studies in the Ireland (for an introduction to the subject, see Sheets and Grayson 1979).

Tephra is volcanic ash. It is the product of a volcanic event and marks an isochrone or plane of equal age in any deposit in which it is found. Tephrastratigraphies and tephrochronologies are used by Quaternary scientists, including archaeologists, but mostly in areas where tephra layers are visible to the naked eye. It is only relatively recently that consideration has been given to using layers of micro-tephra as isochrone markers (Persson 1971; Buckland *et al.* 1981). There has been aversion to committing time and effort to this necessarily detailed study. Indeed Hammer (1984) states the following: 'How much fine grained tephra is actually produced in eruptions? Very little is known about it, as this fine tephra is almost by definition so fine, that it cannot be traced in peat bogs etc. (at least not without laborious work and much difficulty)'.

It is only within the last five years that the value of studying deposits in the British Isles where micro-tephra layers are present has been demonstrated. Refinements in electron microprobe analytical techniques which can establish the geochemistry of single shards of volcanic glass open the way for past environmental studies using micro-tephra to

be carried out in areas such as the British Isles where tephra layers are composed of low concentrations of small shards.

The first finds of Icelandic volcanic ash in the British Isles were in peats from Caithness in northern Scotland (Dugmore 1989). The geochemistry of the ash proved it to be from an eruption of the volcano Hekla known as Hekla 4. This evidence that Icelandic volcanic glasses could be found in organic deposits prompted similar investigations throughout the northern British Isles. We now know that tephra is present in Holocene peats and lake deposits in Scotland, Shetland, the north of England and Ireland (Blackford *et al.* 1992; Bennett *et al.* 1992; Pilcher and Hall 1992; McVicker 1993; Hanna 1993; Hall *et al.* 1993; 1994). This paper is based on Holocene tephra studies in Ireland; sites where tephra layers have been found are shown in Figure 1.

There is a growing interest in finding tephra in deposits throughout the British Isles, including areas well to the south of those where tephra layers have been found to date. We would encourage such investigations and hope that our experience in handling a range of deposits containing various tephra types will reduce the pit-falls and frustrations of which we have extensive experience!

## Tephra preparation techniques for optical and electron microscopy

The basic technique for preparing tephra samples for optical and electron microscopy is given by Pilcher and Hall (1992) with the

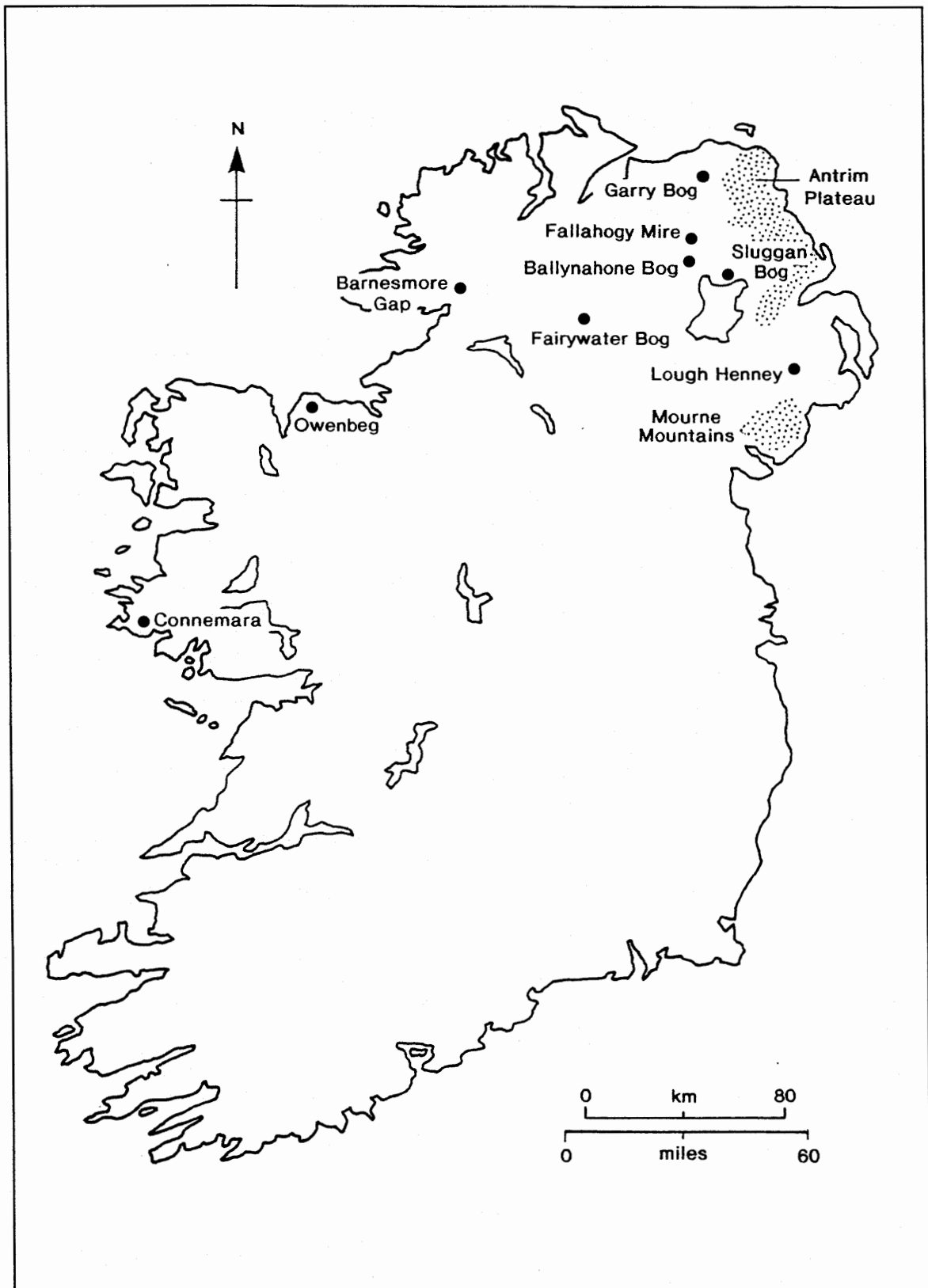


Figure 1. Sites in Ireland at which tephra layers have been found

Ash from the eruptions of Hekla in AD 1104 and of Oraefajokull in AD 1362 are now known to be present in lowland peats from Sluggan bog through geochemical linkage to historically dated Icelandic type material. The written record for volcanic activity on Iceland spans about the last one thousand years. The dates of eruptions occurring before that time are best established by high precision radiocarbon techniques. For example, a layer of tephra in peats from Sluggan bog which has been characterised geochemically, but not linked to any known Icelandic eruption, has been dated to AD 866  $\pm$  20 by high-precision multi-sample radiocarbon dating. Details of the geochemistry and dating techniques employed are given by Pilcher *et al.* (1994). These layers form the basis for a tephrochronology of the last millennium and offer an alternative dating technique to radiocarbon dating where calibrated dates are virtually useless (Pearson *et al.* 1986).

One of the most geographically widespread tephra layers in Scottish and Irish deposits is that from the eruption of the Icelandic volcano Hekla, known as Hekla 4. This tephra forms an isochrone over a wide geographical area (Buckland *et al.* 1981) and has now been identified from sites as far apart as the Shetland Islands (Bennett *et al.* 1992) and Slieve Meelbeg in the Mourne Mountains (McVicker 1993; Hall *et al.* in press), as well as from peats from the Faroe Islands and Scandinavia (Persson 1971). High-precision multi-sample radiocarbon dating of Irish lowland raised bog peats containing Hekla 4 tephra has provided the tight calendar date range of 2310  $\pm$  20 BC for this event (Pilcher *et al.* 1994). Hekla 4 tephra now forms a well-dated marker in Holocene deposits throughout the north-east Atlantic seaboard.

The occurrence of geochemically characterised and dated tephra layers has been of great value in recent palynological studies of a range of deposits throughout the northern British Isles. For example, recently published papers on the palynology of deposits in which Hekla 4 tephra has been detected have examined the possible impact of the eruption products on local vegetation (Bennett *et al.* 1992; Blackford *et al.* 1992; Hall *et al.* 1994; McVicker 1993; Hanna 1993; Hall *et al.* in press). This is an area of research of growing interest as palynologists investigate the influence of distant past volcanic activity on vegetation.

The calibrated radiocarbon date of 2310  $\pm$  20 BC for Hekla 4 allowed the vegetation history

of two of the north Irish lowland raised bog sites to be compared with the climatic signal in the sub-fossil oak tree-ring chronology (Hall *et al.* 1994). A similar approach was used to compare the palynology of more recent evidence for woodland clearance and the development of regional agriculture with the dendrochronological record (Hall *et al.* 1993). This is a most exciting advance in interdisciplinary palaeoenvironmental studies which have been bedeviled by the problem of the lack of comparative dating strategies.

The microtephra layers present in the Mourne Mountain upland peats have proved to be valuable isochrones (Buckland *et al.* 1981, McVicker 1993). In addition, comparative tephra-linked palynological investigations of a lowland raised bog peat (Sluggan bog), an upland blanket peat (Slieve Meelbeg) and a lowland lake deposit (Lough Henney) have been carried out as Hekla 4 tephra occurs in all three deposits (Hall *et al.* in press).

Micro-tephra layers are present in a number of terrestrial, lacustrine and marine deposits and are now being detected in the annual laminations of the Greenland ice-cores (Palais *et al.* 1992). Palaeoenvironmental studies will continue to benefit from refined chronological constraints as further correlations are established between ice-cores, organic deposits and proxy records for climatic change, such as tree-ring studies. The work of the archaeologist is vital in these investigations. In his 1992 paper, Keith Bennett emphasises the difficulties of separating any climatic response to volcanic activity from local human impact.

There is an increasingly large and well-illustrated literature on Holocene tephra studies in the British Isles. Papers include recent investigations on the stability and geochemistry of tephra (Dugmore and Newton 1992; Dugmore *et al.* 1992) and its environmental impact (Edwards *et al.* in press). Tephra-linked palaeoenvironmental studies are published in such journals as *The Holocene*, *Nature* and *Journal of Quaternary Science*.

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## Fascinating *Fullonum*

Michael L. Ryder

4 Osprey Close, Lord's Wood, Southampton SO16 8EX, U.K.

### Summary

A review is given of aspects of the origins, cultivation and use in textile working of fullers' teasel (*Dipsacus sativus* (L.) Honckeny).

### Introduction

Congratulations to Allan Hall (1992) for describing the first archaeological remains of the fullers' teasel, a cultivated plant that has been of immense importance during the history of textile manufacture in the raising of a 'nap' or pile on wool cloth. As indicated by him, no artificial substitute has been found for its gentle action on the finest cloths. Despite its importance it is a neglected plant and the aspects that have long interested me are (a) botanical—its cultivation (domestication) and the extent to which selective breeding might have taken place; (b) agricultural—the way in which teasels were grown as a crop; and (c) textile-historical—the way in which it was used historically during the hand processing of wool (Ryder 1969).

### Botanical aspects

The teasel (sometimes spelt *teasle*, *teazel* or *teazle*) is a tall, prickly plant belonging to the family Dipsacaceae and native to Europe and western Asia. It is a biennial, which means that the flower heads, the part used, do not form until the second year. The small, tubular, purplish flowers are separated by stiff bracts, which provide a censer mechanism for seed dispersal, and in cloth finishing it is the bracts that tease fibre ends from the cloth (hence the name) to raise a nap. The use of the teasel in this way therefore depends on the persistence of the bracts in the dead, dry heads. A key feature of the teasel is the existence of wild and cultivated forms, the important difference being that the bracts in the cultivated plant are spiny, stiff and downward-curving (often referred to in the literature as 'hooked'). It is the elasticity of the bracts, and in particular of the points, which makes them superior to

substitutes such as wire brushes. The distinction is shown quite clearly in figure 8 of Hall (1992) (although—as pointed out by the Editors in their Editorial on p. 49 of *Circaea*, vol. 9—the captions have been inadvertently transposed) and it is this difference that I wish to pursue—was what we now regard as the cultivated form always a different species or does this imply 'domestication' and selective breeding for downward-curved bracts? In my 1969 note I regarded the curved bracts as indicating selective breeding, which I thought implied that the plant had been cultivated for a long time. Grieve (1932) suggested that the curve is maintained by cultivation and that the bracts revert to the wild form through neglect. There appears to be no evidence supporting such a reversion.

Gerard (1597) distinguished the garden 'teasell' (*Dipsacus sativus*) from the 'wilde teasell' (*D. sylvestris*). He wrote that 'the tame teasell is grown in gardens to serve the use of fullers and clothworkers' and said that the tame variety had hooked spines and the wilde variety straight spines, which were of no use in dressing cloth. His illustrations clearly show the difference in the bracts. Culpepper (1653) stated that the fullers' teasel (the 'manured' form, as he quaintly put it), for which he gave the Latin name *Dipsacus fullonum*, had 'prickly hooks', while the larger, wild teasel (*D. Silvestris* [sic]) had erect prickles, that were not hooked. The very knowledgeable wool stapler Luccock (1805) regarded the fullers' teasel as the cultivated variety of *D. sylvestris*, 'which does not have hooked spines'. Loudon (1844, 198), however, was not convinced that the cultivated variety was different.

Confusion has been caused by the recent changes in nomenclature in which the name for the wild plant became *D. fullonum* L. (the name formerly used for the cultivated form by





Figure 8. Eighteenth-century Yorkshire teasel field.

Miller, but not Linnaeus) and the new name for the cultivated form *D. fullonum* ssp. *sativus*, with a further revision to *D. fullonum* L. and *D. sativus* (L.) Honckeny and fully distinct species in *Flora Europaea* (Tutin *et al.* 1976, 59). Keble-Martin (1974) uses the old names for the two forms, but gives no distinction or use. Although concerned with wild rather than cultivated plants, some authors (e.g. Moore 1983) give only *D. fullonum* and make no mention of *D. sativus*. Moore, (1978), however, illustrates *D. fullonum*, and lists *D. sativus*, which he states is used on a limited scale to raise the nap on cloth (without saying why or how). Others state, after describing the wild form, that the 'hooked bracts' of the cultivated 'fullers' teasel' were once used to raise a nap on cloth, not realising that the teasel is still so used.

Blamey and Blamey (1984), and Blamey and Grey-Wilson, (1989) regard the wild form as 'naturalized' in Britain i.e. introduced, but say that the origin of the cultivated form is

unknown. They mention the continued cultivation in Somerset, and state that occasional escapes are found in the South. It is interesting that escapes are not more common. There is no mention of the teasel in three books I have on cultivated plants: Hvass (1960), Simmonds, (1976) and de Rougemont (1989).

Peter Mason, Director of the Petersfield (Hampshire, U.K.) Physic Garden, where the teasel is grown, suggested to me that the wild form was native to Britain and that the cultivated form was introduced. This would mean either that the cultivated form was a different species (with curved bracts), or that any selective breeding for curved bracts had already taken place before introduction, which might not accord with the new designation of the cultivated form as a species. The apparent lack of hybridisation of escapes with the wild form supports the conclusion that the two forms are distinct species.



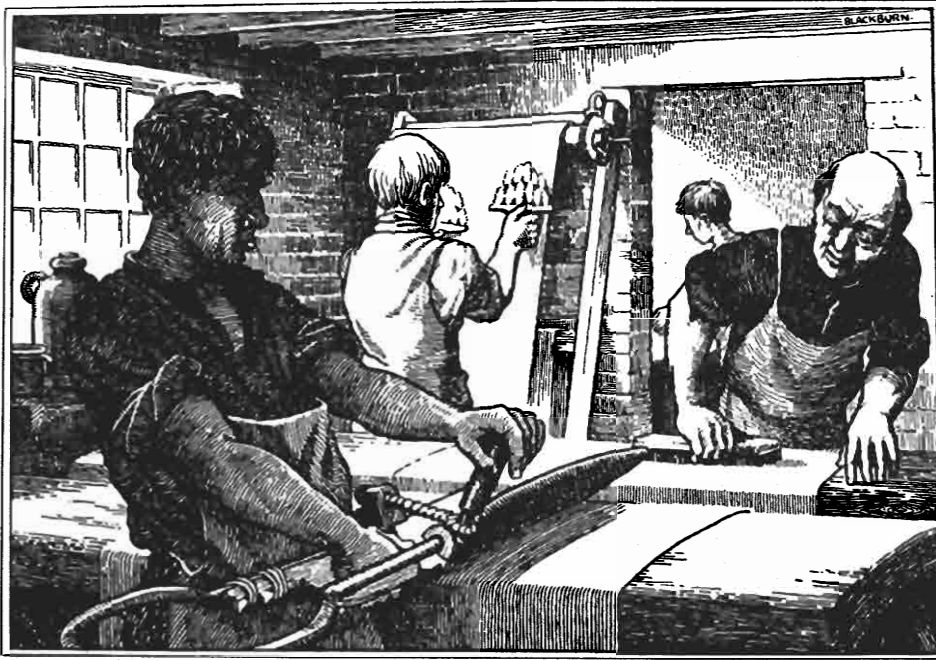


Figure 9. Using teasels to raise a nap on cloth (back); cropping the nap to a constant height with hand shears (front) (from Ryder 1983 after Bentley 1947).

The curved bracts almost certainly pre-date the Middle Ages, and their antiquity is further supported by the cultivation of the teasel also on the continent of Europe. The port books of Southampton record the import of teasels from France and Spain during the fifteenth century. According to the *Encyclopaedia Britannica* (15th ed., 1991) the teasel is (or was) also grown in North America (as the 'clothiers thistle'), but no evidence is given to support the statement that its use in Europe goes back to Roman times (see below). It will be only through archaeological work like that of Hall (1992) that answers will emerge to the questions: where and when was the teasel first cultivated and how was it selectively bred, if at all?

### Agricultural aspects

The significance of the present restriction of teasel growing to a small area of Somerset south and east of Taunton lies in the importance of raised cloths in the West of England woollen industry (Ponting 1967). According to Humphreys (1972) teasel growing in Somerset goes back at least as far as the sixteenth century. By the 1960s only about 250 acres were planted on no more than 50 farms around the villages of North Curry, Curry Rivel and Fivehead (Jones 1964). Teasels

are traditionally associated with particular farms and form part of a crop rotation, being followed by wheat. They used also to be grown around Blagdon in the Mendip country and John Billingsley writing on Somerset agriculture in 1795 stated that 'teasels are much cultivated' in that county (Mullins 1952).

But they were formerly grown also in Gloucester and Wiltshire, and Arthur Young (1794) wrote of teasels being grown in Essex in rotation with medicinal herbs. According to Loudon (1844) the two main centres were the West of England and Essex. Before World War I, teasels were grown around Sherburn-in-Elmet, east of Leeds i.e. not far from the woollen (as opposed to worsted) area of the West Riding wool textile industry, which extended south and west of Leeds to Wakefield and Huddersfield. The Yorkshire expression 'a crowd like bees round a teasel field' indicates that their growth was once more widespread (and incidentally recognises the attraction of the flowers to bees).

The method of cultivation was summarised by Ryder (1969). The following account gives more detail. The 'seeds' (they are actually fruits) are sown in March or April, and the statement of Mullins (1952) that only seed saved from the 'better' heads are used

indicates the way in which selective breeding could have been carried out. As indicated by Hall (1992) the last merchant now controls the seed and therefore any selection. According to Hanley (c.1905), who wrote that teasel cultivation had declined considerably, the seeds were sown broadcast and the seedlings were thinned to give plants 1 ft (30 cm) apart. This process was known as 'slinging' (possibly a corruption of 'singling') and was carried out using a special spade having a narrow blade 18 in (46 cm) long and 4 to 5 in (11 cm) wide with a handle curved to be clear of the plants when in use.

Hanley stated that the plants flowered in May or June (of the second year) and that the heads were harvested in September. More recent accounts give the flowering month as July and the harvesting month as August, although Mullins (1952) states that the 'burrs' are harvested 'when sufficiently mature' i.e. when the seeds have dispersed [Editor's note: fullers' teasels observed by ARH in Somerset in 1992 were ready for harvest in early July]. By that time each plant is 5 to 6 ft (1.65 m) high and has 8 to 12 heads (Humphreys 1972). Each head is cut separately 8 in (20 cm) from the top with a short curved knife, which Hanley (c.1905) described as having 'a blade 2 to 3 in (6 cm) long, slightly tapering and somewhat turned up at the point' and to have been looped to the cutters wrist. Jones (1964) said that the knife was made from the blade of an old scythe.

Leather protective gloves are worn because of the prickly stalks, and Hanley described the wearing of a waterproof smock to guard clothing from the sap that exudes from the cut stalks and from the water that collects at the base of the leaves. As much as a pint (0.57 l) of water can collect in this cup, and it was often drunk by the cutters, being thought to have medicinal properties. Hanley stated that an experienced worker could cut 20,000 heads of 'tazze' in a day, which is the same as Mullins' (1952) ten days to cut 200,000, 'the average crop to the acre' (0.4 ha).

Hanley named the largest heads from the top of the plant 'kings', medium sized ones 'maidens', and the smallest ones 'buttons'. Any heads still flowering at the time of cutting were named 'widows' and these were left to be cut down with the stubble, which was burnt. Large heads were bundled into batches of forty and smaller ones into batches of fifty. The bundles were first hung to dry for two or three days on old plant stems. Mullins

(1952), as well as Hanley, described the main drying, which takes several weeks to complete, as being carried out on long poles, to each of which was attached about 20 bundles. Mullins said that these were stacked in the open, whereas Hanley said that the drying was formerly carried out in open sheds known as 'helms'. These were built from teasel stalks tied in 'faggots' and according to Hanley could still be seen about the country.

Woods (1963) included 'teasel towers' among miscellaneous structures to look out for, without giving any details. Hanley stated that the teasels were fastened round staves about three feet (90 cm) long with willow saplings for dispatch to the mills, and Mullins stated that they were dispatched in packs of 20,000, with a protective sheet. Although the caption of the eighteenth-century print in Figure 8 states that the teasels are being fitted into rollers for use, from the accounts in the text above and below it would appear more likely that they are being prepared for drying.

More recent accounts, starting with that of Mullins (1952), agree on a slightly different procedure: the seeds are sown in drills, the plants are hand-hoed as with a root crop, and subsequently 'singled' to 4 in (10 cm) apart. The plants are transplanted in October, but since the parsnip-like tap-roots make the plants difficult to lift, only the upper part or 'knot' is removed. This is taken with a short chisel-like tool known as a 'teasel-splitter'. The transplanted knots are 'dibbed' 24 in (61 cm) apart into rows 30 in (76 cm) apart at a rate of 12,000 to 14,000 plants to the acre (0.4 ha). The plants have become established by the following spring (Jones 1964).

### *Marketing and preparation*

Just as wool is handled by merchants who buy it from the farmer and sell it to textile manufacturers, so teasels are prepared by cutting off the calyx and sorting for size and quality by merchants before being sold for textile use. The last teasel merchant in Britain, Edmund Taylor, visited by Hall (1992), used to have a regular advertisement in textile magazines indicating that the firm was established in 1849. In 1973, Mr Cyril George, the managing director, appealed in the *Farmers Weekly* (14th December, p. 85) for more British farmers to grow teasels. By then, the number of British growers had declined to about six (compared with 25 in 1949) and Mr George said that he could use one million more

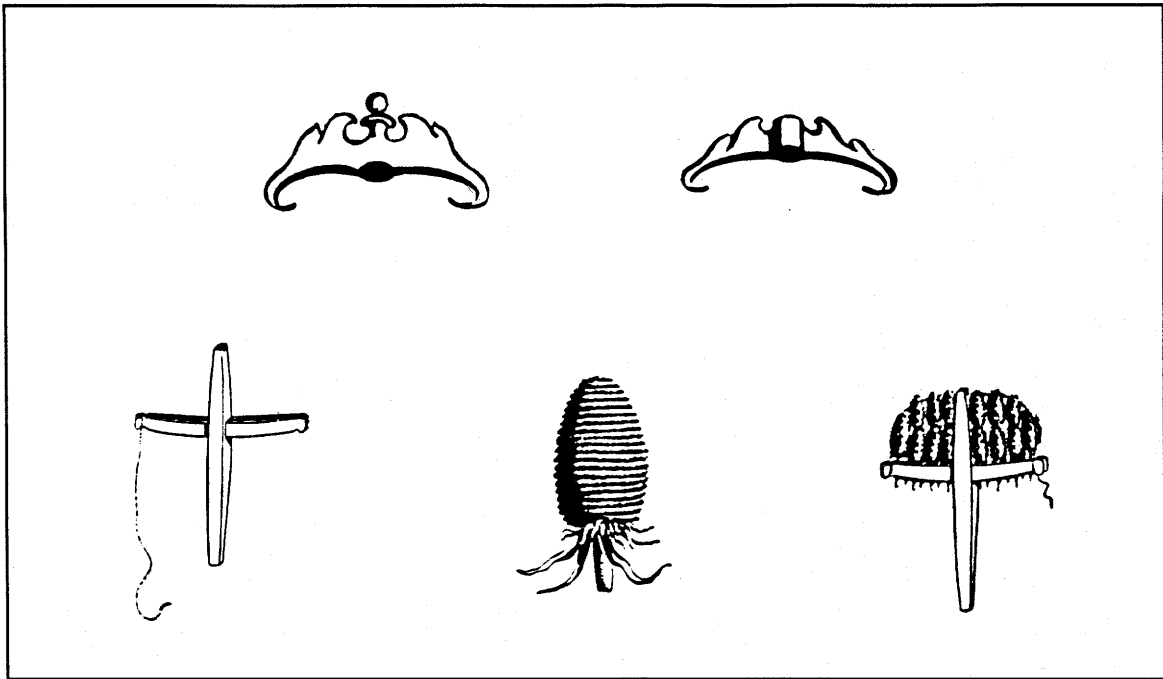


Figure 10. Habicks used to tighten the cloth over the shearing board for cropping (top); a teasel head flanked by an empty hand frame (lower left) and a frame containing teasels (lower right) (Clothworkers' Company).

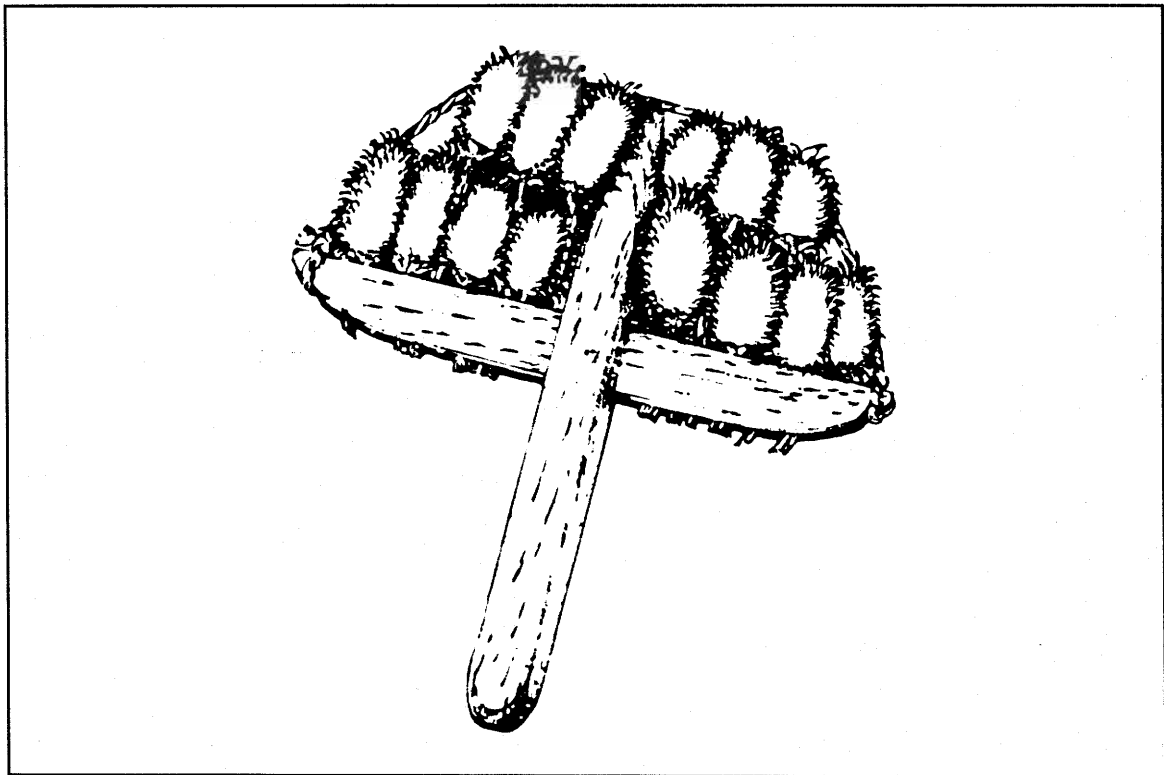


Figure 11. Teasels in a hand frame showing the stalks protruding through the cross-piece and the string around the edge to keep them in place (from Satchell 1984).

British teasels a year. According to Humphreys (1972) the annual British production was then only one million teasels compared with ten million in about 1920. Teasels could be grown more cheaply abroad and the production from Spain and southern France was then 500 times the Somerset production. Whereas larger teasels came from Provence, smaller and better-quality heads were grown in England. In 1980 Mr George reported in the *Yorkshire Evening Post* (Diary of a Yorkshireman, 16th October) that he had received a new order for 5000 teasels from Iceland, but of the six million handled by the firm annually for 200 customers, 95% came from abroad. This compared with only 5% from abroad in about 1950. In articles in *Farmers Weekly* of 17th December 1982 and *The Sunday Times* of 6th February 1983, more farmers were still being exhorted to grow teasels, although the number of growers in Somerset had decreased to four, the supply from France having begun to decrease. A report in *The Times* of 5th August 1986 stated that 80% of the Somerset crop had been destroyed by eelworm, but on 9th September 1988 yet another article appeared in *Farmers Weekly* describing a named farmer as growing teasels as a novelty crop in Somerset.

A report in *Wool Record* (October 1993, p. 5), when this contribution was revised, stated that Edmund Taylor, the last teasel supplier, faced closure because more and more textile manufacturers were raising cloth with a wire brush.

## Textile history

Hall described the way in which at the mill the teasels are fitted into long, narrow frames known as rods, which are as wide as the length of the teasels. The frames are then clamped into the cylindrical drums of the 'teasel gig' machine. The gig 'mill' revolves in one direction at 120 r.p.m. and the cloth in contact with the teasels revolves more slowly in the opposite direction. The teasel bracts pull out fibres from the (woollen, not worsted) cloth and so raise a nap. It is possible to vary the process by having the cloth either wet or dry (when the teasel gig is replaced by a 'moser'). The raising and cropping are often repeated several times. The teasels are replaced in the frame at random in order to make the effects of the change on the cloth less severe.

In the Lakeland Museum, Kendal (Cumbria, U.K.) is a simple raising machine in which the

teasels are apparently threaded on rods, which form the surface of a drum about one metre long. This was rotated by belting linked to a mechanical power source, but could earlier have been rotated by hand. One wonders whether this threading of the teasels is shown in error, because such an orientation would mean that the teasel bracts would touch the cloth laterally to the hooks and so be less effective.

The nap raised by teasels is subsequently trimmed to a constant height to give the cloth a velvety surface. This is done with a cropping/shearing machine, which resembles a spiral-bladed lawn mower, and indeed the design of the lawnmower was based on that of the cropping machine. The first crude 'cropping frame' that replaced hand shearing was the cause of the Luddite riots against such mechanisation in 1812 (Lipson 1952). Attempts to mechanise raising as well as shearing go back to the Middle Ages (Lipson *op. cit.*), but are out of the scope of the present account.

How long have teasels been used in raising (another name for which was rowing)? The process was certainly well-established by the Middle Ages. Raising was associated with fulling, the process of shrinking and thickening the cloth after weaving, and it was the fullers who raised a nap by brushing the surface with teasels. In *Piers the Plowman*, Langland (1377) quoted by Davies-Shiel (1975) wrote that 'Cloth that cometh from the weaving is nought comely to wear till it is fulled . . . and with teasels scratched' (spelling modernised). The cloth was hung over a support to give vertical orientation during the process and then passed to the shearmen who cropped the surface with heavy shears to give an even nap (Fig. 9). A fifteenth century illustration given by Davies-Shiel (1975) shows that the nineteenth century process depicted in Figure 9 had changed little since the Middle Ages. Note in Figure 9 that between the teaseling and cropping processes a man is shown working on the cloth with a scrubbing brush. The same brush is shown in use in a fifteenth-century carving on a wooden bench-end in Spraxton church, Somerset, reproduced by Aspin (1982), which also shows a hand teasel frame and cropping shears. Aspin also reproduces several nineteenth-century prints of the process.

Although each guild was much older, the Fullers' Guild was given a charter in 1480 and the Shearmen received one in 1507. The two

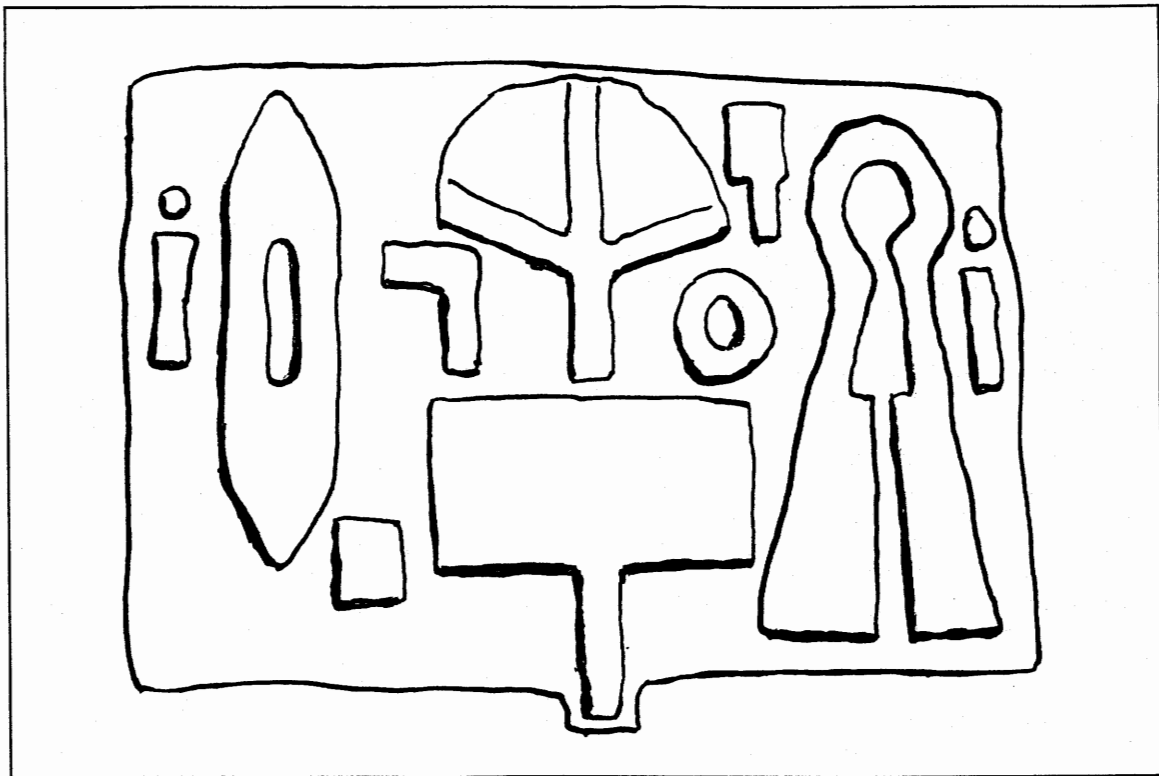


Figure 12. French stone dated 1701 with hand textile implements in relief: hand teasel-frame (top), hand card (bottom) and cropping shears (right) (from Ryder 1983).

amalgamated to form a cloth-finishers guild known as the 'Cloth-Workers' in 1528, but by the end of the sixteenth century 'teaseler' was a distinct occupation. Teasels and 'habicks', the claws used to stretch cloth over the curved board for cropping, appear in the arms of the Clothworkers Company (Fig. 10). Medieval examples of these hooks were excavated in Winchester (Ian Goodall, pers. comm.). Teasels also appear on the coat of arms of Kendal, which can be traced back to the early seventeenth century (Satchell 1984). I am indebted to Heinz Edgar Kiewe of Art Needlework Industries, Oxford, for drawing my attention to what appears to be a teasel on a relief in the Norman, St Peter's Church, Northampton, another medieval cloth town.

When raising was done by hand, the teasels were held in a small wooden hand frame in the shape of a cross, the long arm of which provided the handle (Fig. 10). The teasels were set by their stalks through holes in the cross-piece, and by making the stalks alternately long and short it was possible to obtain two rows, which were then held in place by a string around the edge (Figs. 10 and 4). Such hand teasel frames are depicted

as being of different shape from hand cards (Fig. 12). Other names for the hand frame are teasel-bat and friezing-bat, 'frieze' being the name of a raised cloth first made in the Netherlands in the thirteenth century.

One is impressed by the similarity between raising and carding, which is the teasing out of the fibres in raw wool in preparation for woollen (as opposed to worsted) spinning. The verb *to card* is apparently derived from the Latin *carduus* (a thistle) because thistle heads were used in the first hand

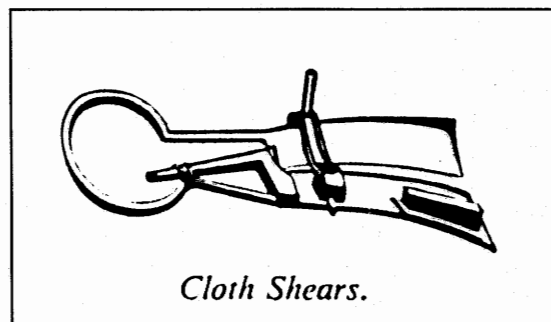


Figure 13. Hand cropping shears (Clothworkers' Company).

cards (which were later set with wires). In Iceland, however, the word for teasel is used for card. But hand cards were a medieval invention, and Wild (1970) considers that the Roman term *carminare* for the teasing-out of wool cannot refer to the process we know as 'carding'.

On the other hand there are references to 'shearers' in Roman Egypt which Wild (*op. cit.*) thinks must refer to cloth- and not to sheep-shearers. This is confirmed by the huge pair of Roman cropping shears found at Great Chesterford, near Cambridge, which are now in the Archaeology Museum, Cambridge. These Roman cropping shears are flat, but the upper blade was later set at an angle, which was gradually increased over the centuries to a maximum of 85 degrees. Cropping shears can therefore be dated from the angle of the upper blade. They weigh up to 40 lb (18 kg) and have blades up to 6 ft (nearly 2 m) long (Fig. 13).

The cropping/shearing of cloth implies the prior raising of a nap—the problem is how was this done? In my first note (Ryder 1969) I suggested the possibility that carding and raising had a common origin because the instruments used were so similar. I gained support for this suggestion from the fact that the teasel is referred to as the 'fullers thistle' and that the French name is *Chardon à foulon* and the German name *Kardendistel*.

Further support was gained from the description by Lucas (1968) of the hand raising of cloth in Ireland using the standard wire-toothed hand cards. Blanket cloth is a good example of a modern woollen that is raised by the wires of a carding machine and then not cropped. According to Wild (1968; 1970) the Romans raised cloth with an *aena fullonia*, which is mentioned by Pliny (*Natural History* XXIV, 111; XXVII, 92) and illustrated on wall paintings at Pompeii. This was a board about 20 cm (8 in) square covered with thorns or thistle heads. Wild (1968) gave the ancient Greek term used for both the raising tool and the plant providing the spines (see below). He stated (Wild 1970, 83) That the teasel was not used until late antiquity, the plant being absent from Godwin's (1975) list of Romano-British plants. I summarised the above (Ryder 1983, 754) by saying that raising was originally carried out with thistle heads fixed to a board and that the thistle heads were later replaced by teasels fixed in a frame to give an instrument similar to a hand card.

Pickering (1879) considered that the English word 'teasel' derives from the Saxon word *taesan*, to tease, which implies raising with the cultivated variety. He regarded the mention by the Roman writer Serenus Sammonicus of the *carduus nondum fullonibus, aptus* as indicating the cultivated teasel. More recently in a very detailed coverage of prehistoric textiles Barber (1991) gives only two references to raising. One (p. 274) refers to the teasing of cloth surface in ancient Greece to raise a nap, with no indication of how it was done. Pickering (1879), however, saw evidence of the cultivation of the teasel to raise cloth in various Greek references to an instrument used for the purpose (e.g. Herodotus i, 92). The other reference of Barber (1991, 287) was an Assyrian instruction of the second millennium BC stating that one side of a cloth should be combed, but not shorn. This makes shearing as well as raising very ancient, but unfortunately there is no association with teasels. Instead, a new instrument, the comb, appears. Could raising a nap be another possible use of the European Iron Age bone 'weaving combs', the true function of which has long been debated (Ryder 1991)? But that topic is out of the scope of the present account.

## Summary and conclusions

The curved bracts of the cultivated teasel have long been important in the raising of a nap on wool cloth as part of a textile finishing process. Botanical evidence suggests that the plant has been cultivated for this purpose for a long time. Agricultural evidence from the recent past indicates a well-organised and widespread system of cultivation, but no indication of its antiquity. The most detailed evidence comes from textile-historical sources, which show well-established usage during the Middle Ages. There are indications that during the Roman period cloth was shorn after being raised with thistles. Despite vague hints of even earlier usage of teasels there is no conclusive evidence of when teasels were first used. Further archaeological remains need to be sought.

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## BOOK REVIEWS

D. Fielding and R. A. Pearson (eds.) (1991). *Donkeys, mules and horses in tropical agricultural development*. Edinburgh: Centre for Tropical Medicine. ISBN 0907146066.

This is the proceedings of a symposium held in Edinburgh in 1990 on tropical veterinary medicine. Although equines are outnumbered by cattle in the tropics, there are some 50 million equines in this zone and they perform nearly all the pack work and passenger transportation.

Most contributions to the symposium were from veterinarians and government agriculturists from South America, Morocco, Asia and Malawi. The few contributions from India came from animal welfare organisations (which seem to fund most of the research carried out on donkeys), and private individuals (some of whom proved to be experts contributing invited papers).

The first part of the symposium proceedings described equine populations and their functions. In general, donkeys outnumber horses and are the least expensive to acquire. They are subjected to uniform ill treatment and malnutrition and, as a result, the average lifespan of an Ethiopian donkey (based on a very large population) is five years, in contrast to the British figure of over 30 years. Breeding is, in consequence, difficult, with foaling at a rate of only 30% females mated productively. Campaigns to improve the design of harness, often inefficient and injurious (although a tolerable donkey collar may be constructed from a bicycle tyre), may depend on the recruitment of women's organisations, as increased use of donkeys is encouraged by several African states in order to reduce women's overwork in agriculture. In Malawi, for example, the donkey was not used prior to government importation of a breeding herd of 500 animals in 1957.

The second part of this symposium publication discusses the nutrition and environmental physiology of donkeys compared with ponies. The traditional hardiness and economy of feeding is not known to depend on any superior digestive powers in the donkey. However, it can manage to work at higher temperatures than the horse, and if the donkey is dehydrated it can recover much more swiftly than does the horse. The donkey is capable of carrying two-thirds of its body weight, and of pulling 200%

(which is much more than a horse). It is estimated that in Ethiopia the donkey supports 2000 drivers who operate for hire, and their families. In Khartoum, Sudan, at one time, such drivers were licensed and their beasts inspected weekly for good nutrition and the absence of harness sores, etc.

The third part of the publication covers campaigns undertaken to improve donkey husbandry and the public image of donkeys. It is likely that the livestock of early Europe were treated just as badly as those of the present day animals in the developing world. Villeins driving monastic pack trains as part of their labour services were not likely to have been particularly considerate. Donkeys today would fare better in Africa if they were treated as food suitable for anything other than lions.

**Barbara Noddle**, *School of Molecular and Biomedical Sciences, University of Wales College of Cardiff, P.O. Box 911, Cardiff, CF1 3US, U.K.*

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James Flewitt Mullock (1993). *Art and society in Newport*. Available at Newport Museum Shop, and at W.H. Smith's, Newport, Gwent, U.K. in paperback (limited number) £9.60 (telephone orders accepted) and in limited numbers in paperback at £14.95 plus postage and packing.

The city of Newport, Gwent, S. Wales, underwent extensive development during the second half of the 19th century. Many of these changes have been illustrated by the artist James Flewitt Mullock, amongst them the Chartist insurrection in 1839 and the opening of the Docks in 1840 (it was hoped that Newport would become the port for the West Midlands of England). Celebrations of recent Newport centenaries include the openings in 1892 of the Museum and Art Gallery and, at about the same time, that of the Mechanics Institute. A prime mover in the establishment of the latter was Mullock. As a suitable commemoration, the Museum has mounted an exhibition of his works and this publication is a catalogue for the exhibition, together with a substantial essay on the life of the artist and his family and their close connection with the cultural life of Newport.

Mullock was the son of a farmer and a friend of Sir Charles Morgan of Tredegar House, who organised a prestigious livestock show annually. Besides a generous cash prize and



sometimes a silver cup, the winning animal was painted by Mullock and it is these portraits, all of which are reproduced in this book, which are of interest to the Rare Breeds Survival Trust, who are included in the acknowledgements to the catalogue.

Mullock clearly enjoyed painting animals and many of his pictures include horse and hound, or the family dog. The most interesting picture from an historical point of view is that of a ploughing match in 1845. A newspaper account of this event is included which describes the worthiness of the ploughmen and their advocacy of a local make of plough. The propulsive parts of the teams are merely described as 'nags', which are far from the magnificent feathered giants of the classical ploughing scene. The animals were, in fact, ponies of about 14 hands, looking more like hackney ponies than any other modern breed—emphasising the late arrival of the heavy horse, even in this prosperous area of South Wales.

**Barbara Noddle**, *School of Molecular and Biomedical Sciences, University of Wales College of Cardiff, P.O. Box 911, Cardiff, CF1 3US, U.K*

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Van de Noort, R. and Davies, P. (ed. Ellis, S.) (1993). *Wetland Heritage. An archaeological assessment of the Humber Wetlands*. Kingston upon Hull: Humber Wetlands Project, University of Hull. ISBN 0-85-958-190-X. 181pp. £8.00

Those who doubt the reality of progress in human affairs would do well to consider wetland archaeological projects in Britain. We have come a long way from the 'one man and his dog' approach of the early 1980s. It would be invidious to suggest that the role of dog was filled by the environmental archaeologist, for the importance of palaeoecological studies has long been appreciated; but the most recent wetland projects have, from the outset, attempted real integration of palaeoecological and archaeological data, besides exploiting newly-available techniques such as computerised Geographical Information Systems.

Perhaps even more important is the fact that research objectives and designs are now clearly defined from the inception of the project, and sufficient long-term funding is assured to achieve them. An essential

preliminary stage is the compilation and presentation of an information base, from which priorities for research and management may be established. This is the purpose of this thorough publication, commissioned and sponsored by English Heritage.

The assessment was primarily a desk-based study of data from the Humber Wetlands, supplemented by a small-scale pilot field study. Following a short introduction to the project (Chapter 1), the authors present a workmanlike review of landscape development from the late Devensian, drawing on published lithostatigraphic and biostratigraphic (mainly pollen) data (Chapter 2).

The outsider is struck by the diversity of wetland types represented—bogs, valley mires, palaeochannels, lakes and coastal wetlands are all considered. These diverse palaeoenvironments are, however, united by a common problem: inadequate dating. Many of the available radiocarbon dates are from possibly erosive contacts or from deposits where stratigraphic control was poor; many of the published pollen diagrams rely on Godwin's pollen zones, and are unsupported by radiocarbon determinations. This problem, which will be remedied during the project, no doubt accounts for the paucity of summary diagrams to help the reader through the text.

In Chapter 3 the known distribution of archaeological sites below the 10 m contour is presented and discussed. For most periods the detailed account of known wetland sites is prefaced by an essay placing them in a wider context. It is hard to fault this competent chapter, though in view of the results from Boxgrove and High Lodge, Mildenhall we may disagree with the statements (p. 47) that Acheulian industries are dated to warmer phases within the Anglian and Hoxnian stages and that Acheulian industries post-date Clactonian ones.

The palaeoecological and archaeological information is drawn together in Chapter 4. The critical problem of site visibility, where early prehistoric sites are overlain by later sediments, is addressed. Several case studies relating archaeological sites to environmental change are outlined and a wider preliminary over-view is presented.

'Preservation Potential and Threats' are considered in Chapter 5. The initial section (5.2.1) on factors influencing preservation is

the weakest in this publication. Protection of surface-intact sites and landscapes by later sedimentary cover and preservation of organic materials in 'anaerobic' waterlogged sediments are really two separate issues and would have been better considered separately and at greater length.

The brief summary (pp. 101-4) of variables in the sedimentary environment influencing organic preservation serves mainly to underline the paucity of real experimental data available to archaeologists attempting evaluation of wet sites. Many of the published 'data' are plain wrong (e.g. pollen is preserved in deposits whose pH is greater than 6.3: see fig. 5.2). We actually know far less about the effects of the depositional environment and microbial activity on preservation than is widely believed, and detailed research is urgently required so that informed decisions on management can be made (Wiltshire and Murphy, in preparation).

The rest of this chapter deals thoroughly with the threats to wet sites in the region from de-watering (clearly illustrated by hydrographs from critical sites), nutrient enrichment of groundwater and physical destruction by peat and mineral extraction, coastal erosion and development.

In a final section, results of the pilot field study are presented. A total of 25 areas were examined: up to eight on a single day according to the dates for site visits given. The aim was to apply a rapid method of evaluating preservation potential and threat at each of the sites by a simple scoring system. This is an interesting and novel approach which, if thoughtfully applied, should help in prioritising areas for fieldwork: in effect it systematises the process of selection that wetland archaeologists have always followed.

In the final chapter the relationship between nature conservation and archaeological organisations are considered, site management discussed and recommendations for future work presented. Clear sets of objectives and a methodology, defined in general terms, are proposed.

As with any hors d'oeuvre, the appetite is stimulated but not satisfied. I, for one, cannot wait to hear more about the Neolithic lakeside settlements of Holderness. We must await the results of the project and wish the authors every success. Meanwhile, this publication can

certainly be recommended as an eye-opening introduction to the Humber Wetlands.

**Peter Murphy**, Centre of East Anglian Studies, University of East Anglia, Norwich NR4 7TJ, U.K.

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B. Coles (ed.) (1992) *The Wetland Revolution in Prehistory*. Exeter: WARP & the Prehistoric Society. 153 pp., 96 pls & figs. £15.00 p. & p. inclusive from WARP, Dept. of History & Archaeology, University of Exeter, Exeter, EX4 4QH (£20.00 equivalent in other currencies).

Perhaps deliberately, the title of this collection of papers, consequent upon a conference organised by WARP, the Wetland Archaeology Research Project, and the Prehistoric Society in Exeter in 1991, is ambiguous. Is the revolution in the now rather outmoded Childean sense of an awakening of prehistoric peoples to the potential of wetland resources, or that of archaeologists to the fact that wetlands present an abundance, if not embarrassment of preserved artifactual and palaeoenvironmental evidence? The majority of the sixteen contributions to the volume—and in the introductory chapter and conclusion, the Coles refer to other sites which would have made the volume the more encompassing—concern only part of the latter. This is not a collection of papers concerning pollen diagrams and plant and animal microfossils, but is orientated more towards the traditional archaeologist, whose world is dominated by artifacts rather than environments. Yet this is not to disparage the book, which includes syntheses of sites and areas not readily available elsewhere, indeed where else would a review of the evidence for prehistoric settlement in North-western Russia be juxtaposed with work on pre- and post-contact period wetland sites in British Columbia? One paper, that of Bayliss-Smith and Golson on wetland agriculture in New Guinea, interprets the title of the volume quite literally and considers their evidence in a well thought out theoretical framework for agricultural origins. Evans's attempt to do the same for floodplain archaeology in England is poor by comparison, but the paper does serve to stress the importance of seeing a continuum from wetland to dryland habitats. Several of the papers provide new data on familiar sites, whilst others present impressive evidence from new localities, and the coverage is virtually world-wide. In probably the best integrated study, Niewarowski and his

colleagues set the well known late bronze age/iron age (Lusatian) fortified site of Biskupin in Poland, with its corduroy roads, houses and defences, into its regional context. Doran considers the problems of wetland archaeology in the U.S. in relation to the justly famed site at Wendover in Florida. His contrast with the European situation, however, are less than justified for sites, equally important, which fail to reach the public eye. There is still a marked reluctance to invest in the full biological study of materials from wetland sites in Europe as well as America. A token pollen diagram and perhaps a few plant macrofossil identifications are still the norm for most wetland sites. At the core remains the problem of funding, in part whether the environment should not be the responsibility of natural scientists funded outside the archaeology budget. In a situation where the level of funding lay outside the dreams of most archaeologists, in Japan, where in 1989 £289,000,000 was invested in rescue archaeology, one is still uncertain, from Matsui's review, whether the balance of funding between excavation, conservation and post-excavation research on both artifacts and palaeoecology was got right and one would have liked to have seen more of a breakdown; the impression left is that the level of study did not exceed those of less well resourced regions. The contrast between a country whose government regards archaeology as a part of the corporate past of the community and one where it is seen as a hindrance to monetarist expansion deserves to be drawn. It is unfortunate that the selfish Thatcherite dream is tending to seep out of Britain into the rest of Europe and the expensive aspects of wetland archaeology will inevitably suffer.

The discovery and careful excavation of wetland mesolithic sites in both the Lower Seine, at Noyon, and around Friesack in north Germany expands considerably knowledge of the early use of organic materials. From Noyon comes a pine dugout canoe, as well as fish traps and a basket, and Friesack has yielded nets made of bast fibre and a birch bark container. It is Gramsch's paper on the latter sites which, more than any of the other contributions, brings home the urgency of wetland archaeology, for lowering of water tables, peat and aggregate exploitation makes this a vanishing resource. Those of us concerned as much with the survival of the present as the recovery of the past would have painted a far more depressing picture than this often eulogistic volume.

The Coles's conclusion at the end of the volume, which almost makes the job of reviewer superfluous, draws attention to the fact that dryland sites need the wetlands to expand interpretation, yet do not consider the rates of loss of wetlands, important not only for their archaeology but also for their conservation value; there is still too little dialogue between the past and the present, for both have relevance to the future and the palaeoecological record contains many potential conservation scenarios. Increased investment in wetland archaeology is long overdue, and this volume goes some way towards presenting its world-wide potential to an archaeological audience; unfortunately this is rarely the cabal which controls the purse strings. It is here that the crucial importance of getting the results over to those who ultimately pay, either by use of privatised resources or by taxation, needs further stress. The public front, on a small scale evidenced in the Flag Fen project in England, is well discussed by Ruoff in his paper on the *Pfahlbau* exhibition in Zurich, where a reconstruction of a segment of a so-called lake village was presented to the public in a thoroughly interactive manner. This might offend the purists, but the balance between Disneyland and cold cabinets appears to have been effectively achieved. The basic funding was provided by the local authority, an ethic which would be frowned upon in the British Isles, where local museums continue to suffer from centralised financial control by philistine monetarists. Without investment, wetland archaeology is rapidly converted to dryland sites, pale fragments of their former selves, leaving the much more easily curated assemblages of stone tools as their only residue; for most of the World, the wetland revolution in prehistory comes fifty years too late.

**P. C. Buckland**, *Department of Archaeology and Prehistory, University of Sheffield, Sheffield S10 2TN, U.K.*

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## CONFERENCE REVIEWS

*ICAZ Fish Remains Working Group: 7th Meeting, Leuven, Belgium, 6-10 September 1993*

The seventh meeting of the ICAZ Fish Remains Working Group was held in Leuven under the efficient organisation of Wim Van

Neer and colleagues. The formal programme of papers and posters took place in the conference room of the Bank Brussel Lambert; informal meetings were held in cafés, bars and restaurants of Leuven, where the variety of beers on offer rivalled the variety of research!

Participants from at least fourteen countries were present. Twenty-seven papers were delivered and six posters displayed. Visits were organised to the vertebrate collections at the Royal Museum of Central Africa at Tervuren and to the coast at Oostduinkerke.

The meeting followed a number of themes such as case studies and recent research results, methodology and sampling, ethnoarchaeological studies and histological research. Several 'leitmotifs' ran through the papers and posters; these included taphonomic variability, the analysis of hand-collected versus sieved samples and osteometric analysis.

Instead of offering 'potted' abstracts of speakers' papers, this review will concentrate on some of the more general themes addressed by many contributors. One of the most immediate and of relevance to all researchers in the field was introduced by James Barrett, who confronted the problems inherent in research into bone weight and the intra-class comparison of fish taxa in terms of relative potential meat yield. Taphonomic variability clearly has to be evaluated in such research, but it is not clear by what methods all taphonomic factors can be evaluated on a consistent basis. Omri Lernau proposed a range of numerical taphonomic values which, he states, would be determined through charting recovered elements from excavations in decreasing order of their expected numbers according to MNI, on the basis that the data quantified the overall taphonomic conditions to which the fish bones had been exposed. One looks now to his published paper to provide more details of how this proposal may be applied. Fernanda Falabella Gellona's suggestions for evaluating differential preservation (and recovery) of fish remains from Central Chile focused on number, density, shape and size of diagnostic elements per taxon. Other speakers made reference to taphonomic variability and preservation of fish remains, but one clear trend emerged: no simple method or route for evaluating taphonomic factors could be proposed for the range of sites encountered.

Returning to the objectives of Barrett's research, it is quite apparent that most

researchers use a spectrum of osteometric and statistical techniques. These are needed, not only for evaluating and quantifying the character of their fish assemblage, but also for assessing the contribution the assemblage represents in terms of the site's economic basis or subsistence level, particularly in comparison with the dietary contributions (made by meat protein and vegetable/grain produce from other sources). Many researchers present at the meeting are engaged in biometrical analyses of great value to colleagues and, in this regard, it is appropriate to mention the biometrical research exemplified by Nathalie Desse-Berset, Jean Desse and Myriam Sternberg. However, on the subject of statistical techniques, there was little open forum discussion of the relative merits of the range of statistical applications currently on offer to researchers, particularly those techniques relevant to the interpretation and publication stages of research. Judging from the informal discussions held with a number of the participants, this is a topic of great interest and concern to many; it is to be hoped that statistical themes may emerge more strongly in future meetings of the group.

A theme that *was* strongly presented at the meeting concerned the histological structure of the fish skeleton, in particular the phenomenon of bone tumour development. Angela von den Driesch and François Meunier presented two fascinating papers dealing with hyperostosis. The first proposed that, although the location of hyperostosis may vary from species to species, within a single species the hyperostoses appear to have the same morphology and may therefore be taxonomically useful. This hypothesis will clearly have relevance to all those engaged in identification of fish skeletal elements. The second paper developed this principle through the presentation of the case study of the histological structure of the cranial hyperostosis of *Pomodasys hasta*. The assertion of taxonomic value is highly significant here, as it appears that this taxon is being identified purely on the basis of cranial fragments displaying hyperostosis. Are any specialists currently identifying *P. hasta* from post-cranial fragments alone?

The subject of the exploitation of marine resources, fishing practices, and the ethnoarchaeological perspective dominated the meeting, and the publication of the individual papers in the proceedings of the meeting will give ample opportunity for the detailed attention this current research merits. In some

instances, ethnographic examples provided possible models for the interpretation of a site's fish assemblage—for example, Irit Zohar's paper, which described the apparent specialised exploitation of grey trigger-fish (*Balistes carolinensis*) off the Israeli coast, and Kevin MacDonald and Wim Van Neer's paper, which outlined the subsistence specialisation of the inhabitants of the Méma region of Mali. William Belcher's ethnoarchaeological perspective on fish studies in the South Asian region, focusing as it did on selection, butchery, preparation and consumption according to socio-economic factors, has much relevance to projects in adjacent regions such as Ra's al-Hadd, Oman (which was the subject of a paper on seasonality given by the reviewer). Belcher's research also has general relevance to assemblages for which socio-economic factors play a major role. Analogous aspects such as seasonality and indications of climatic change were exemplified in certain papers delivered at the meeting.

Some speakers presented particular problems from their current research programmes in order to share areas of mutual concern with colleagues and to receive the advice, suggestions and comment generated by the working group. Some of these areas of concern included uncertainties inherent in balancing interpretation from hand-collected assemblages with that for assemblages recovered through methods of sieving or screening. Some speakers mentioned difficulties encountered in the analysis of fish assemblages not excavated according to modern scientific principles. Arturo Morales reminded us of the difficulties of collating information from long ichthyofaunal sequences analysed by a number of different specialists. Interesting discussion on the relative merits of radiography and scanning electron microscopy for the determination of diagnostic features, annuli, etc., was provoked by Jacqueline Studer's as yet unidentified fish from *garum*, preserved in a Roman pilgrim flask excavated from the Es Zantur terrace at Petra, Jordan.

The meeting also provided an opportunity to highlight the essential contribution to ichthyoarchaeological research by those producing reference collections of fish taxa for their areas of fieldwork. During the course of the meeting there were opportunities to view one such reference collection under the auspices of Wim Van Neer at the Royal Museum of Central Africa at Tervuren.

Apart from the informal evening gatherings, round-table sessions of the working group tackled the subject of publications, future meetings, and newsletters. Papers from this meeting were to be submitted to the editor by December 1993 and strenuous efforts made to have the publication, a volume of the *Annales du Musée Royal de l'Afrique Centrale*, ready before September 1994, when the general ICAZ meeting was held in Konstanz, Germany.

**Caroline Cartwright**, *Department of Scientific Research, British Museum, London WC1B 3DG, U.K.*

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*16th Annual Meeting of the Society of Ethnobiology, Department of Archaeology, Boston University, Boston, MA, U.S.A., 11-13 March 1993*

The *Society of Ethnobiology* was founded seventeen years ago with the aim of supporting and co-ordinating interdisciplinary study of the interrelations of plants and animals with humans, world-wide. It has around 470 members (ethnobotanists, ethnozoologists, archaeobotanists and zooarchaeologists, development anthropologists, etc). Roughly 50% of them are in the USA and most of the rest in Canada and several countries in Latin America. There are also some members in others countries, but generally the Old World seems to be rather under-represented. Its main activities are the organisation of an annual conference and the publication of the *Journal of Ethnobiology*, currently in volume 13.

The intellectual development represented by the establishment of this society can be considered as a consequence of the emergence of a distinctive anthropological trend in the United States during the late nineteen sixties and early seventies, which is usually called, 'ethnoscience'. It had its origins in the Boasian anthropological tradition and its main emphasis was in the recording of folk taxonomic classifications (Ellen 1979, 4; for a recent, comprehensive introduction to ethnobiology, see Berlin 1992). In that respect, it resembles the European and especially the French anthropological tradition in directing scientific interest towards the recording of native perceptions of plants and animals, although the difference between the two is evident: ethnoscience, unlike the European anthropological tradition, was a rigorous



attempt to describe folk plant and animal classifications and had little interest in theoretical discussion on the social context, the underlying principles and the meaning of classifications.

Today, the Society of Ethnobiology reflects the more recent trends in the diverse sub-fields of anthropology and archaeology, although the ethnoscience tradition of previous decades is still prominent in the work of several of its members.

The 16th Annual Conference was attended by around sixty researchers, mainly from the USA but also from Mexico, Canada, England and Israel. Thirty-four papers were presented in oral form and two more as posters. There was one specific thematic session: *The effect of foreign contact in native populations*. The thematic range of the rest of the papers was very wide: from theoretical issues of ethnobiological and archaeological research to presentations of ethnobotanical, archaeobotanical and zooarchaeological research, study of folk medical uses of plants, and folk strategies related to the conservation of natural resources

The specific thematic session, although initially planned to have a wide chronological and geographical perspective, was finally focused around the consequences of the European conquest to native American populations, being then so much part of the 1492 anniversary and surrounding debate. Five papers were presented: they emphasised the marginalisation of indigenous ethnobiological knowledge of native Americans as a result of foreign contact, and asked for more active involvement of natives in the process of presenting indigenous knowledge (E. Salmon). They investigated the changes in food habits of both, native Americans and Spanish colonists following the conquest, through the analysis of plant and animal remains (M. Scarry and E. Reitz). They recorded linguistic alteration in the biological nomenclature in southern Mexico, after the Western contact (A. de Avila). But they emphasised also aspects of resistance and continuity, such as the maintenance of the social importance of whale hunting for the *Inupiat* people of Alaska (A. Henshaw), or the documentary evidence for Mexican, pre-Hispanic herbal remedies, which were not altered by European concepts (R. Bye and E. Linares).

The six zooarchaeological papers provided varied and important insights: M. Zeder presenting faunal evidence from a Middle

Mississippi site (AD 1300) in S.E. Missouri, discussed an interesting attempt to match left/right side deer anatomic elements. She suggested that the occurrence of elements from the same pair in different households may reflect relations of social proximity and social distance. D. Bar-Yosef discussed marine and fresh-water molluscan material from Neolithic and Bronze Age sites in southern Levant, where she claims to have found the first freshwater shell midden in the Middle East which she interprets as evidence for subsistence pressure. K. Moore showed how the animal management during and after domestication of native camelids in Peru resulted in slower rates of cheek tooth wear, since herders took care to move herds to less overgrazed pastures (the quantity and the abrasiveness of soil taken, especially in overgrazed areas, being factors which influence the wear rate). E. Wing traced the remains of guinea pig at several locations in Latin America and suggested that it was present in the Caribbean before the Spanish invasion. D. Landon used faunal evidence to discuss the urban food supply in colonial eastern Massachusetts and concluded that urban food distribution systems followed traditional rural patterns. Finally, archaeological, ethnographic, linguistic and historical evidence was integrated to show how *Chumash* Indians in central California developed not only a productive fishery for swordfish, but also a mythical and ceremonial cult around this species (D. Davenport *et al.*).

In the archaeobotanical session, three papers from the Old World and two from the new World were presented. They included the proposal that horticulture in Egypt was introduced as a buffer against the varied and unreliable nature of Nile floods (W. Wetterstrom), as well as presentations of archaeobotanical results from Khabur basin, Syria (J. McCorriston), and the Bronze Age site of Midea, in Argos plain, Greece (T. Shay *et al.*). The two New World papers presented botanical evidence from Canadian *Inuit* and European sites (D. Laeyendecker), and seasonal dietary evidence from a 12th century AD site in Ohio (O. Shane and G. Wagner). Within this context, two more papers should be added. The first (E. Lawer), based on experiments, discussed the bias in the recovery of archaeobotanical material, consequent on the removal of seeds by rodents (which leave a distinctive breakage pattern) and ants—especially for raw material, but also for carbonised remains. And the second (Y. Hamilakis) emphasised the need

for consumption-oriented approaches in ecological archaeology and illustrated the argument with a case study from Bronze Age Greece.

The rest of the papers focused on several theoretical and empirical aspects of ethnobiological research. There were several contributions which reported fieldwork research from various contexts (from China to Canada) and others which emphasised the loss of ethnobiological knowledge in younger generations, reported several native strategies of resource conservation, emphasised the importance of the concept of place in native cosmologies, and suggested that ethnobiology should provide evidence against anti-environmentalists who express doubts about the native conservation spirit. The exceptional role of women in preserving and transmitting ethnobiological knowledge was extensively discussed. In one case from Bangladesh it was shown how the dichotomy between garden cultivation and field cultivation has gender connotations, with the women identifying themselves with the 'private' and invisible but highly significant (in both, economic and social terms) gardens, leaving the 'public' fields for men.

There was also a half-day session (five papers) on the medical uses of plants. The papers mainly reported fieldwork results from New World contexts, with one exception where research on traditional medicine in Borneo was presented.

During the conference, the urgent need for recording and so rescuing the traditional-native, ecological knowledge was repeatedly emphasised. This necessity—which is underlined by several recent publications, such as that by the World Conservation Union (Johannes 1989)—involves many important issues, however and these, to a large extent, received very little attention at the conference. An exception was the paper by Salmon, a native American himself who considered the direct involvement of the indigenous agents of this knowledge in this process, its contextual and holistic presentation and interpretation (comparisons between folk and 'scientific' knowledge, or simple recording of species' uses are not enough), and the need to avoid the academicisation of such a dynamic system.

But this enterprise has not only a rescue dimension. It reminds us the simple, but so often forgotten, truth that socially-specific perceptions seriously affect people's

behaviour. In other words, people respond, modify and manage their perceived environment and not the one described in ecology textbooks. From the archaeological point of view, therefore, traditional ecological perception and knowledge can provide alternative, emic discourses (i.e. denoting the *native* perception or point of view rather than that of the anthropologist) for the human-nature relations, offering invaluable insights for environmentally-oriented archaeological research, at both theoretical and methodological interpretative levels. Recent very fruitful attempts in this direction show how rewarding this exercise can be, but also point out the precautions which should accompany such an attempt, especially the need for the historical contextualisation of this knowledge and the subsequent practice.

On the whole, this well-organised and smoothly-run conference, with its very wide thematic and methodological range and the very high quality of talks, was a highly stimulating experience. One, rather serious, weakness was the lack of discussion time after each session. Speakers had to allow some time for questions within the twenty minutes allocated time. So the opportunity for discussing the implications of the research presented and for integrating the different approaches and results was rather lost.

The next annual meeting of the society was held at Victoria, British Columbia, Canada, on March 16-18, 1994 where the theme was 'Sustainable management and harvesting methods of indigenous peoples'.

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**Note:** I would like to thank the Department of Archaeology and Prehistory, University of Sheffield and the Prehistoric Society

Conference Fund for making my participation in the conference possible. A slightly modified version of this report has appeared in *PAST* vol. 15. (1993)

**Yannis Hamilakis**, *Wiener Laboratory, American School of Classical Studies, 54 Souidias Street, 10676 Athens, Greece*

## BOOK NOTICES

*Archeologie in Vlaanderen 2* (1993). Asse-Zellik: Instituut voor het Archeologisch Patrimonium (*Archaeology in Flanders 2*. Asse-Zellik: Institute for the Archaeological Heritage of the Flemish Community).

This beautifully-produced and profusely-illustrated 480-page volume contains 25 papers reporting on recent archaeological work in Flanders, the northern region of Belgium, by the state archaeological service.

Several contributions deal with aspects of environmental archaeology:

Van Neer and Lodewijckx discuss faunal remains (molluscs and vertebrates) from deposits of late Iron Age, Roman and late medieval date from excavations at Wange in Brabant. Vanderhoeven, Vynckier, Ervynck, and Cooremans report on rescue excavations in Roman Tongres (including work on bones and plant macrofossils. Schelvis and Ervynck review the use of mites (Acarina) as ecological indicators in archaeology by means of a case-study in Roman Oudenburg, whilst Ervynck and Pieters present a contribution to the history of the distribution of the domesticated cat.

The paper by Pieters on the medieval settlement at Raversijde, just south of Ostend, includes discussion of peat-digging pits. Human remains are dealt with in Anton Ervynck's short report on a burial from the crypt of a church at Sint-Truiden in Limburg. An unusual account of animals painted on tin-glazed tiles on the floor of a medieval abbey at Koksijde, West Flanders, is presented by Dewilde and Ervynck. With Van Neer, Ervynck also contributes an appendix on bone from a rescue excavation at a former abbey at Petegem, East Flanders, whilst these same authors report on food remains—again, bone—as well as some dog coprolites, from another religious house, this time the abbey of St Salvator at Ename, in the same province. The

last paper (by Hoffsummer) deals with typology and dendrochronology of roof timbers in a church at Ename.

Although most of the papers are in Flemish, French and English are also used, and the captions to figures are always given in two languages (one of them almost always English) and summaries are generally in English (sometimes in French).

Dewilde, M., Ervynck, A., Van Neer, W., De Meulemeester, J. and Van der Plaetsen, P. 1994). *De 'Burcht' te Londerzeel*. *Archeologie in Vlaanderen*, Monograph 1. Zellik: Instituut voor het Archeologisch Patrimonium.

This second elegant and well-illustrated tome from the IAP in Belgium, produced under the editorship of Anton Ervynck, offers a report on a medieval castle mound and the remains of a small brick-built tower on its top, in the village of Londerzeel, between Brussels and Antwerp, in the Flemish province of Brabant.

Together with a detailed history from maps and other documents, the archaeological excavations revealed much stratigraphic detail, as well as artefacts and biological remains—the latter in the form of large numbers of hand-collected and sieved bones and some mollusc remains. Each of the sections dealing separately with the archaeology, artefacts and biological remains is supplied with a summary in English.

The substantial chapter on animal remains by Ervynck, Van Neer and Van der Plaetsen is exceptionally clearly presented with some superb drawings of freshwater and terrestrial molluscs and delightful sketches of the many species of small mammal whose bones were recovered from the site—particularly from the fill of a chute. Taphonomic aspects of the infilling of this feature (especially the several hundreds of vertebrates) are also considered.

This account certainly deserves attention; had it been published wholly in English one suspects that it would be lauded as an example of presentation to be followed widely.

**Allan Hall and Harry Kenward**, *Environmental Archaeology Unit, University of York, Heslington, York YO1 5DD, U.K.*



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Articles for *Circaea* should be typed double-spaced on A4 paper with generous margins. Line drawings should be in black ink on white paper or drawing film, to fit within a frame 153 x 250 mm maximum. Captions should be supplied on a separate sheet of paper, and labelling on figures should either be in 'Letraset' (or an equivalent) or should be in soft pencil. Half-tone photographs can be accommodated, but authors wishing to make extensive use of photographs, or colour, should note that they may be asked to contribute towards the high cost of production. The editors will modify short contributions to fit the layout and convention of *Circaea*. The same principle will be applied to idiosyncrasies of spelling and punctuation. Scientific articles will be submitted to referees; authors may, if they wish, suggest suitable referees for their articles.

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The Editors, *Circaea*, c/o Environmental Archaeology Unit, Walled Garden, University of York, Heslington, York YO1 5DD, U.K., Tel. +44 1904 433848 (Harry Kenward), 433849 (Allan Hall), 433845 (Annie Milles) and 433844 (Keith Dobney) or Fax 433850 or email: [biol8@york.ac.uk](mailto:biol8@york.ac.uk).

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