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SEEDS FROM ARCHAEOLOGICAL EXCAVATIONS: RESULTS FROM SUSSEX

by M. P. Hinton

Little more than a decade ago few excavation reports included any reference to seeds, which were recovered only when they occurred in sufficient numbers to be obvious to the archaeologists. Now, mainly because of the use of flotation machines which make it possible to examine large quantities of soil, and to laboratory techniques of breaking down smaller samples, it is clear that few habitation sites are without some preserved plant remains.

There are four main means by which seeds may be preserved, and various methods of extraction. Firstly, the seeds may have been carbonized, or charred, in which case they will survive in almost any conditions and may often retain fine details of their form and structure. Carbonized seeds float readily and many samples of cereal grains are becoming available for study owing to the increasing use of flotation apparatus such as that described by French (1971) or Jarman *et al.* (1972). Some of the problems of interpreting finds of carbonized seeds are discussed below.

Secondly, seeds may be preserved because they have lain in continuously waterlogged conditions such as wells or damp ditches and pits, in places where the water-table is high and where the anaerobic conditions have prevented their decay. Flotation may be used if it is desirable to examine large amounts of soil but these deposits are often very rich in organic remains and small samples may be wet-sieved in the laboratory. This allows the recovery of all the plant remains, not only those which float. Preservation is often good and a wider range of species may be represented.

Seeds which have remained in certain conditions where there is much calcium in the ground water, such as in chalk subsoils, or in cesspits where calcium and phosphate may be derived from human faeces or other organic refuse, may become 'mineralized', i.e. they may be wholly or partly replaced by calcium phosphate. This third process of preservation is explained by Green (1979). These seeds rarely float and are usually encountered during wet-sieving or when samples of the residue from flotation are examined. Mineralized plant remains from cesspits and garderobes may provide direct evidence of diet.

Fourthly, seeds may have been incorporated into the fabric of pottery or daub or impressed into the surface while the clay was damp. These may survive as actual charred seeds within the fabric but if, as is usual, they have been completely burned away they may still be recognized from the resulting cavity. Latex casts made from impressions often reveal considerable detail of the original seeds. Of course impressions in pottery can only illustrate seeds present at the site of manufacture, which is not necessarily the place at which it was found.

As a result of the study of seeds discovered by these methods in different parts of the country many more reports have been published in the last few years or are in preparation, and still more samples are in process of analysis; thus there is gradually accumulating a body of data about the introduction and cultivation of the major crop plants and their weeds, and about other 'useful' plants which were gathered, cultivated or imported. This pattern of collection, analysis and publication is reflected in Sussex.

TABLE 1
Presence of Major Crop Species in Sussex

Location	Einkorn (*Triticum monococcum*)	Emmer (*T. dicoccum*)	Spelt (*T. spelta*)	Bread wheat (*T. aestivum*)	Indeterminate wheat	Hulled barley (*Hordeum vulgare*)	Naked barley (*H. vulgare* var. *nudum*)	Indeterminate barley	Oats (*Avena* sp.)	Rye (*Secale cereale*)	Peas (*Pisum sativum*)	Beans (*Vicia faba* var. *minor*)	*Reference*
NEOLITHIC (*c.* 4000 B.C.)													
Whitehawk							x[I]						Jessen & Helbaek 1944
Bishopstone		x			x	x							Arthur 1977
BRONZE AGE (*c.* 2000 B.C.)													
Belle Tout		x[I]				x[I]	x[I]						Arthur 1970
Telscombe						x[I]							Jessen & Helbaek 1944
Itford							x[I]						—— 1944
Lancing								x[I]					—— 1944
Plumpton Plain	x[I]					x[I]							—— 1944
Hassocks						x[I]							—— 1944
Bullock Down						x[I]							Drewett 1982
Itford Hill		x				x							Helbaek 1953; Helbaek 1957
Black Patch	?	x	x			x			x			x	Hinton 1982
IRON AGE (*c.* 700 B.C.)													
Park Brow					x								Wolseley & Smith 1924
Wickbourne Estate			x			x							Helbaek 1953; Arthur 1954
Bishopstone			x			x			x		x		Arthur 1977
Slonk Hill			x				x						Hartridge 1978
Oving			x		x	x			x				Bedwin, in preparation
Chichester Harbour			x[I]										Cartwright, in press

TABLE 1—*continued*

Location	Einkorn (*Triticum monococcum*)	Emmer (*T. dicoccum*)	Spelt (*T. spelta*)	Bread wheat (*T. aestivum*)	Indeterminate wheat	Hulled barley (*Hordeum vulgare*)	Naked barley (*H. vulgare* var. *nudum*)	Indeterminate barley	Oats (*Avena* sp.)	Rye (*Secale cereale*)	Peas (*Pisum sativum*)	Beans (*Vicia faba* var. *minor*)	*Reference*
ROMANO-BRITISH (A.D. 43)													
Thundersbarrow					x								Curwen 1933
Wickbourne Estate			x			x				?			Helbaek 1953; Arthur 1954
Bishopstone			x		x	x			x				Arthur 1977
East Dean			x	x		x			x	x			—— 1957
Falmer					x				x				—— 1957
Elsted		x		x									Redknap & Millett 1980
Bullock Down			x			x							Drewett 1982
Goring			x										Rudling, in preparation
Winchelsea					x				x				——, forthcoming
Boxgrove			x		x	x			x				Bedwin, in preparation
SAXON (A.D. 477)													
Bishopstone						x							Arthur 1977
Steyning				x		x						x	Hinton 1979
MEDIEVAL													
Stretham								x					Wilson & Hurst 1961
Glottenham					x				x				—— 1968
Bullock Down				x		x			x				Drewett 1982
Steyning				x		x							Hinton 1979
Selmeston						x							Rudling, forthcoming

Note: I = Impression. Remainder were carbonized.

The first record of ancient seeds at a Sussex site was the charred wheat found in 1921 in a pit in the early Iron Age settlement at Park Brow (Wolseley & Smith 1924). The next report was also of carbonized wheat, this time from a structure identified as a Roman corn-drying furnace at Thundersbarrow (Curwen 1933). Shortly before the last war Helbaek began a study of impressions in sherds from the British Isles and after a brief preliminary account (Helbaek 1940) he published with Jessen an important paper in which they brought together the evidence from pot impressions of prehistoric and early historic date from all parts of Britain, including several from Sussex (Jessen & Helbaek 1944). After the war Helbaek returned to England and was able to examine many more sherds and also some of the few finds of carbonized seeds, and he published a major survey (Helbaek 1953) of early crops in southern England. In this paper he included a preliminary account of a large deposit of carbonized grain found at the Bronze Age settlement at Itford Hill. Further discussion by Helbaek of this important find was included in the excavators' report (Burstow & Holleyman 1957), and this is the first comprehensive and detailed account of a large sample of grain from Sussex.

After these publications there were few reports of seeds from Sussex, apart from Arthur's comments on grain in a Roman corn-drying kiln at East Dean (Arthur 1957), his list of seeds incorporated and impressed in Beaker pottery at Belle Tout (Arthur 1970), and his reports of carbonized seeds from deposits of several periods at Bishopstone and Bullock Down (Drewett 1982). Since then further analyses of seeds from several sites in the county have been made by him and also by the writer, including the very large deposits of carbonized grain from Black Patch, Alciston (Hinton 1982).

Some caution is necessary when evaluating finds of carbonized seeds. Those at greater risk of accidental burning will be found more frequently but will not necessarily be of greater economic importance. In addition seeds are very rarely found at the location at which they became carbonized. Most flotation samples contain charred seeds which have been dispersed from various parts of the site and which have come to rest in post-holes, ditches and other sampled contexts and these cannot do more than demonstrate that they were present during the occupation of the site. Larger finds of carbonized material, often comprising grains, chaff and weed seeds, will provide more information, but these often come from pits which themselves show no evidence of burning, and the contents, apparently deliberately deposited after carbonization, do not necessarily represent the result of a single episode of burning. Even a rare find of carbonized grain in an undisturbed destruction layer cannot with complete certainty be taken as unmixed evidence of a single crop if nothing is known of the circumstances of its harvesting or treatment following removal from the field. However, despite the inevitable mixing of charred remains, many of them appear to derive from just one class of agrarian waste, namely the cleanings from grain sieving.

Table 1 summarizes the archaeological evidence so far available for the presence of the principal crop plants in Sussex. Except for the larger amounts of seed from Bishopstone, Wickbourne Estate, Itford Hill and Black Patch most of the records are for very small numbers of seeds, and in the case of impressions usually only one, but as an indicator of presence one seed is as informative as a larger number.

With the exception of a few grains of wheat and barley found in a Neolithic pit at Bishopstone, and which are therefore particularly valuable, all that we know of the crops of the earliest Sussex farmers has come from occasional impressions in potsherds. There is then a gap of some two thousand years before the seeds from the Late Bronze Age sites of Itford Hill and Black Patch provide opportunities for full analyses of samples from large deposits. From then on our information comes almost entirely from carbonized seeds.

Looking at the records for individual cereal

species there is again a reflection in Sussex of the pattern being built up from other parts of England.

There is very slight evidence indeed for einkorn (*Triticum monococcum*), or one-grained wheat, in Sussex, as there is for the country as a whole. Einkorn, a diploid species, is the most primitive of all the cultivated wheats with very brittle ears which disintegrate and sow seed easily, and in Britain it has probably never been more than a very occasional contaminant of other cereal crops. The impression of a spikelet in a sherd from Plumpton Plain was identified on the basis of its size, but the illustrated cast (Jessen & Helbaek 1944, 32) shows that unfortunately the impression was made by the abaxial side and so other criteria related to the height and width of the scar (Hillman, forthcoming) cannot be seen. The possible presence of einkorn at Black Patch was questioned solely because of the occurrence of one small part of a rachis (spike) with three spikelet bases which bore one or two of the diagnostic criteria of einkorn (Hinton 1982). It is probable that this small fragment was part of an atypical or immature ear of emmer wheat but because of the einkorn-like features the presence of this species of wheat could not be completely ruled out.

Emmer wheat (*Triticum dicoccum*) is another very ancient wheat, a tetraploid species which evolved from a cross between einkorn and a wild goat grass (*Aegilops* sp.). It was undoubtedly the predominant wheat of the earliest British farmers and remained so for several millenia. It was found at Bishopstone and also with the barley at Itford Hill and Black Patch but there is so far only one later record from Sussex where it appears to be replaced by spelt (*Triticum spelta*).

Spelt is a more complex, hexaploid, species which is more hardy and adapted to a wider range of soils and climatic conditions than emmer. It was the principal wheat of the later prehistoric and Roman periods in England but there is evidence for its earlier occurrence (Field *et al.* 1964, 373). It was present in small quantities in the Black Patch finds and it is probable that the 'wheat' from the Roman kiln at Thundersbarrow described and illustrated in Curwen's report was spelt (Curwen 1933, 121). The impressions from Chichester Harbour are of spelt chaff (glumes and spikelet bases) in fabric which may be daub or perhaps a fragment of briquetage derived from the sites of former salt production, now eroded by the sea. The use of spelt in the manufacture of briquetage has been recorded by Bradley (1975).

These three wheats, einkorn, emmer and spelt, are often referred to as 'glume wheats' because the grains are more or less firmly enclosed in the glumes. Threshing is made easier if the ears are 'parched', or partly dried, and it is probably due to accidental charring at this stage that we have many of our finds of carbonized wheat.

These wheats were eventually replaced by a species which could be threshed more easily. Bread wheat (*Triticum aestivum*) has a tough rachis and larger spikelets, each producing from two to six grains which fall readily when ripe, and from this species and the denser-headed form, club wheat (*T. compactum*), have developed the many hundreds of varieties of more recent times. There is some uncertainty about the first appearances of bread wheat in England, and some of the earlier identifications were incorrect as the distorting effects of carbonization were not understood (Jessen & Helbaek 1944). As far as Sussex records are concerned there is also doubt. There were some indeterminate grains from a Neolithic context at Bishopstone (Arthur 1977) and Arthur reported some grains of bread wheat among the spelt in a Roman drying kiln at East Dean (Arthur 1957). A few poorly preserved grains from Iron Age and Roman levels at Oving and Goring have some resemblance to bread wheat but unfortunately even in good condition these wheats are not reliably distinguished by the grains alone. Only when larger numbers of grains and other diagnostic parts of the ears are available can identification be sure.

Hulled barley (*Hordeum vulgare*), so called because the grains are tightly enclosed, occurs from earliest times until the present and the only records from Sussex of the naked variety (*H. vulgare* var. *nudum*), in which the grain is easily freed, are of impressions made in the Neolithic and Bronze Age periods and one carbonized grain from an Iron Age level at Slonk Hill (Hartridge 1978). On the present evidence naked barley appears to decline in England as a whole from the Iron Age. Most hulled barley grown today is the two-row form but all our earlier finds of grains seem to suggest, whenever there are sufficient available to study, a six-row form in which the grains occur in groups of three on either side of the spike. Occasionally this can be confirmed when fragments of the ear survive. At Black Patch measurements of the internodes, between these groups of three grains, indicated a range from a nodding, lax-eared form to a more erect, denser ear of barley.

Oats (*Avena* sp.) are recorded from many sites in the British Isles from the beginning of the Iron Age onwards, a time when many species seem to have first entered the country, possibly as a weed of other cereals before being grown as a crop in its own right. The earliest record from Sussex is the few grains which were found with the Black Patch samples. Unfortunately the wild oats (*Avena fatua*) and the cultivated species, common oat (*A. sativa*) and bristle oat (*A. strigosa*), can only be differentiated by the base of the floret, a fragile part which is rarely preserved. The modern cultivated oat has larger grains than the earliest cultivated species, the bristle oat, which in Britain occurs now only as an occasional weed; the one exception known to the writer is a small crop grown annually by a Shetland crofter for his cow.

Rye (*Secale cereale*), which became a crop of great importance in the Middle Ages, also has its first British records during the Iron Age. The evidence for early rye in Sussex is slight, being a possible identification at Wickbourne Estate (Helbaek 1953) and a deposit of germinated grain, probably charred during malting, accompanying other cereals in the Roman drying-plant at East Dean (Arthur 1957).

There are few archaeological traces of pulse crops. For one thing they are at less risk of accidental burning than the cereals. Another possible reason for their scarcity is their tendency not to float and so to be excluded from flotation samples. They have been found in waterlogged conditions elsewhere. Until recently the small broad beans (*Vicia faba* var. *minor*) were thought to have been first cultivated in England during the Iron Age but there are now more reports of impressions at earlier dates (Hillman 1981, 188) and a few carbonized beans were present at Black Patch (Hinton 1982, 383). Peas also are reported very rarely indeed. One was found in a Bronze Age level at Grimes Graves (Legge 1981, 92) and one in an Iron Age pit at Bishopstone (Arthur 1977, 274). A jar full of seeds closely resembling *Lathyrus* species (wild or cultivated leguminous plants with pea-like seeds) was found in the destruction level in the north wing of the Roman palace at Fishbourne (Greig 1971, 376). These are erroneously described as lentils in another account of the palace (Cunliffe 1971, 210). Sadly, these are the only plant remains recorded from Fishbourne.

So far the archaeological evidence discussed has been for the major crops, but seeds of other plants now regarded as weeds sometimes occur so frequently or in such numbers in samples of carbonized cereals for it to be suggested that they may have been cultivated. Seeds of chess or rye-brome (*Bromus secalinus*) constituted 40 per cent of the very mixed find of grain in the Roman kiln at East Dean (Arthur 1957), and Applebaum (1975) considered that the proportion indicated a field crop. In addition to this mixed deposit chess has been found at three other Roman sites in Sussex (Wickbourne Estate, Bishopstone and Boxgrove) and in each case in association with spelt. Helbaek (1953) thought its frequent association with that cereal meant that chess had been introduced as a weed of spelt and allowed to grow with it as its host crop. This would have ensured a secondary

harvest if the main crop were to fail. However, a lack of correlation between the evidence for chess and that of any other cereal in Holland led Hubbard (1975) to suggest that it may have been a field crop in its own right.

Many other plants will have been gathered for food, and perhaps at times cultivated, and fat hen (*Chenopodium album*) whose leaves may be used like spinach is the most frequently cited example. It is certainly found at many Sussex sites. Hillman (1978, 112) tells of a wide range of plants which older members of his family could recall being sent to gather when children in the Pevensey area as recently as the early part of this century, but plants used as leaf or root vegetables may leave little trace and the occasional occurrence of their carbonized seeds will not reflect their true value. More evidence of such food plants is likely to come from waterlogged deposits where other parts of the plants may be preserved. Cesspits of later periods in urban areas have yielded seeds of apples, pears, strawberries, blackberries, sloes, several varieties of plums, grapes and figs as well as fragments of beans and often many tiny comminuted fragments of vegetable matter, but few such contexts have been sampled in Sussex.

Many plants have been collected in the past for medicinal purposes and their seeds may be present in archaeological samples although we may never recognize their usage. Others have been used as fibres, and there is one record of flax (*Linum usitatissimum*) from Sussex, as a seed impression in an All Over Corded Beaker at Belle Tout. Of others which are sources of dyes, such as madder, dyers' greenweed and, of course, woad, there has so far been no record from Sussex. Reeds and rushes have provided roofing and flooring but of these too we have no archaeological record in the county.

Besides the 'useful' plants archaeological samples often include seeds of more unwelcome weeds, some of which are rarely, if ever, seen today. Two of the most troublesome weeds of earlier cornfields, presumably in Sussex as elsewhere, were corn cockle (*Agrostemma githago*) and darnel (*Lolium temulentum*). Both have large seeds, approximating to the size of the grain they contaminate, and for this reason were very difficult to remove by sieving. Corn cockle has a beautiful flower but its seeds if ground with wheat or rye impart a disagreeable flavour to bread and may cause sickness if too much is ingested. Its seeds appear very frequently in samples of medieval date in England and there is just one Sussex record, from Steyning (Hinton 1979), but the date of its first appearance in the country is unknown.

Darnel, a plant similar to rye-grass, will produce unpleasant and injurious effects if seeds which have been attacked by a fungus contaminate bread flour. Like corn cockle it is a formerly prevalent weed which probably entered this country with imported grain. The one record for Sussex is of two carbonized grains from Kiln Combe, Bullock Down, dated to the early 13th century (Drewett 1982, 32).

Another common weed found with carbonized grain is cleavers (*Galium aparine*) and this has recently acquired a new significance since it was observed at the Butser Ancient Farm (Reynolds 1981, 112) that while an autumn-sown crop was infested an adjacent spring-sown field was free of the weed. Cleavers seeds germinate in both autumn and spring. Whereas the preparation for spring sowing destroys the young plants from both seasons, autumn sowing, which usually takes place in early October just before the late October germination of cleavers, allows the weed to flourish. The presence of cleavers in deposits of grain may therefore indicate the practice of autumn sowing. In Sussex the seeds are associated with emmer, spelt and barley at Itford Hill and Black Patch and with spelt in the Roman period at Bullock Down. However, cleavers are also common weeds of hedgerows and waste land with seeds which cling annoyingly to clothing and animal hair and so might well be removed and discarded as rubbish. This perhaps could be the source of the seeds which occur in the smaller, scattered finds, for example as an impression in an All Over Corded Beaker at Belle Tout.

Seeds from archaeological sites may of

course illustrate the flora of the immediate vicinity, such as the seeds of damp-loving plants like sedges and spike-rushes which are frequently encountered in waterlogged deposits. Samples taken from the ground surface beneath a Bronze Age barrow at West Heath, which consisted mainly of charred heather roots, stems and leaves, also provided a clue to the season when the heather was burned. The samples included many well-preserved buds and immature flowers of both ling (*Calluna vulgaris*) and bell heather (*Erica cinerea*), and because the capsules still contained unshed seeds in their compartments, and even damaged capsules could be seen not to have split naturally, it was possible to suggest that the heather was burned early in the flowering season, that is in midsummer (Hinton, forthcoming).

Although the evidence from the county for most plant species and from most periods is undoubtedly scanty the study of ancient seeds is beginning to provide a picture of the crops grown by earlier farmers in Sussex. Hopefully in the future it will be possible to fill in more details and eventually to make comparisons between different parts of the county. As further samples of seeds are examined we may be able to resolve some of the problems, such as the doubtful presence of einkorn, the possibility of earlier appearances of a free-threshing form of wheat, and the circumstances of the introduction of oats and rye and the pulses.

Impressions in clay and the finds of usually small numbers of carbonized seeds by flotation provide sufficient evidence of the presence of plants, and the more soil examined the greater the chance of discovery of the less common seeds, but to answer other questions the more rarely discovered larger caches of carbonized seeds are more helpful. We need to know much more about the association of certain weeds and crops, and since weeds are indicators of the ecology they may tell us more about the fields, their cultivation, sowing, weeding and harvesting. The analysis of more samples of grain which also include fragments of chaff and other seeds may tell us what stage of processing had been reached at the time of carbonization, and Hillman (1983) has shown how the composition of samples may be related to the results of the various activities of parching, threshing, winnowing, sieving and preparation for storage, and even provide a clue to the function of an archaeological feature. But when attempting to interpret any find of carbonized seeds it must be remembered that only very rarely have they remained undisturbed where they were charred. Perhaps our only Sussex examples are the kilns, the jar full of seeds in a burnt-out room at Fishbourne and the heather covered by a barrow at West Heath.

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