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Ancient Monuments Laboratory
Report 57/88

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Summary

Mid thirteenth century pits of ordure yielded cereal remains with fragments of cornfield weed seeds that had probably been milled with the grain, consumed and defaecated. There were some charred grains, peas and beans, perhaps from household waste. There were also fruitstones and pips, and small fragments of Allium epidermis and a leek seed, also waterlogged pea and bean fragments. The importance of this material is that it is so well preserved that it allows new insights into past diet and farming.

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The medieval plant remains from rock-cut pits at Chester, Watergate Street; new information on food remains.

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Introduction

The material came from F9, one of the rock-cut pits found at the rear of the site. This was dated by pottery to the mid-thirteenth century. There was no obvious stratigraphy within the pit, and the samples were taken from arbitrarily-defined contexts representing different depths: (29) from 1.0-1.6m into the bedrock (30) from about 1.8m; and (31) from the bottom of the pit about 2.0m down. The material was all dark brown and organic. Macrofossils were extracted from small samples of 250 or 500cc, used for recording exact quantities of the various finds, and from larger ones which provided extra finds, recorded by presence only (+). The material was gently broken down in warm water and sieved on a mesh of 0.3mm until most of the fine particulate material had gone. It was then sieved into size fractions of more than 4.0mm, 4.0-1.0mm and 1.0-0.3mm for convenience in sorting. These were sorted in water under a binocular microscope using magnifications of x18-x32 and later stored in ethanol. Seeds and other plant remains were abundant and well-preserved.

Pollen samples were prepared in the normal way from sub-samples and (31) provided a good spectrum, although (30) was unsuccessful, which was surprising, and there was no time to make a second attempt. Apart from plant remains, animal hair, bone (especially fish), eggshell, parasite ova, fly puparia and beetle remains and various other things were extracted and some were investigated to obtain the particular information that they would provide, but lack of time made a complete study impossible.

The pollen and seeds could be identified using a comparative reference collection; other plant parts such as tissues had to be identified using comparative material especially prepared, usually with the aid of Jeffrey's solution (a mixture of chromic and nitric acids) which removed softer tissue, and mounted in either glycerin jelly or 'Gurr's Aquamount'. During the winter plant material had to be obtained from wherever possible, for example the plum skins were obtained from damson jam. The fly pupae were identified by reference to specimens that had already been named by an expert.

Interpretation

The material consisted mainly of sewage, as shown by the huge amounts of intestinal parasite ova in the microscope preparations and also by the large amounts of remains of things that would have been eaten such as cereal bran, fruit pips, stone cells, tiny fish bones, eggshell fragments and egg membrane, and so the

rock-cut feature clearly ended up as a cesspit whatever its original purpose had been.

Cereals

Evidence of cereals came from cereal bran which was present in abundance but which could not be quantified because the fragments were often only a few millimetres in size and would have been very laborious to extract, although this could have been done with a subsample of a cc. or so had there been enough time. At least half of the sieved material by volume was probably bran. It has been found to be a standard component in samples of sewage since its presence there was first recognised (Hall et al. 1983). The bran could not be identified to cereal species either. The very large amount of cereal pollen, which could not be identified to species either, probably came from the grain that provided the bran (although other sources, such as straw, are possible). The cereals show that bread or porridge was an important part of the diet for the townsfolk of Chester. A few cereal remains could be identified, such as the significant numbers of oat glumes (chaff) in (30). There were also a few charred cereal remains which had probably got into the deposit with domestic rubbish; either oddments of grain were put on the fire, or straw was burnt together with some grain, and the ash together with charred remains scatterd with the rubbish. There were also occasional mineralised grains, for example a

barleycorn. Wheat, barley and oats were present, although we do not know the proportions of each.

The remains of cornfield weeds such as charlock, corn cockle, corn spurrey, corn marigold and cornflower clearly do not represent anything growing in the town itself, because these plants are especially adapted to their cornfield habitat. One surce of such weed remains is from straw containing weeds. With this material from Watergate Street, however, it is quite clear that many remains of cornfield weeds were milled with the foodcorn and eaten. The charlock capsules and corn cockle seeds were all smashed into small pieces, and so were most of the cornflower seeds and some of the corn marigold. Small weed seeds, such as those of mayweed, were mostly found whole, so evidently the millstones were set a few millimetres apart so that the larger seeds were broken, but not the smaller ones. Even nowadays one can find small pieces of cornfield weed seeds incorporated into bread, particularly the granary kind with whole corn, because it is very difficult to separate grains of corn from closely similarly sized weed seeds even with modern machinery.

The weeds also provide information about the fields where the grain grew. This is a typical assemblage of weeds from medieval cornfields (pre- mechanisation and herbicides), in which some such as corn cockle, mayweed and cornflower are considered more characteristic of autumn-sown crops such as wheat and rye, while

others such as corn spurrey and corn marigold are more typical of spring-sown crops such as barley, oats and pulses. Many of these weeds grow best on rather acid and sandy soils, so the grain was probably grown on the sandy land around Chester even though the port would also have allowed long-distance transport of foodstuffs and other goods.

Other weeds were present, but were only present in small numbers. Many of these, such as goosefoot or knotgrass could have grown equally among various crops and in the town itself, and so add little definite to the interpretation.

Peas and Beans

The next most obvious food remains were from peas and beans. These were mostly very fragmentary, in the form of small pieces of epidermis (the skin) sometimes with the hilum ('navel'). The bean fragments were brown and wrinkled with a shiny surface, while the peas were black and matt: features which, once discovered, helped with the identification of these tiny and otherwise rather featureless pieces. Some peas and beans were found charred in a nearly whole state and could easily be identified by the small oval hilum on the pea and the elongated one on the bean, something which can be easily seen on these vegetables at the dinner table. From these specimens it was clear that the beans were much smaller than present-day broad beans, being only slightly larger and more elongated than the peas, for

our large beans are recent developments (Körber-Grohne 1987). A pollen grain of bean was also found. The peas were more like their modern counterparts, making due allowance for some shrinkage due to charring. Macroscopic remains of peas and beans are exceedingly rare and owe their presence here to the unusually good preservation conditions in the pit and to the lucky chance that some were also charred. In the past it has been suggested that occasional pea or bean pollen grains represented food that was quantitatively much more important than the remains would suggest (Greig 1983). Here there is some rare macroscopic evidence which would seem to confirm the importance of the pulses in food, although the documentary evidence seems to show that they were less important than cereals (Dyer 1983).

Flax and Hemp

A little linseed was found , which could have been eaten. Linseed is baked in bread and also sold for mixing into other foods such as muesli today in Germany, with much being made of its supposed laxative properties (which are not particularly violent). The documentary evidence for linseed consumption in food is not very clear, but it may well have been a minor additive. Flax capsule fragments were also found. It is not clear whether flax was grown specially for the linseed and threshed by householders, or whether it was also grown for linen. Flax was widely grown in gardens and in orchards, rather than as a field crop, according to the written evidence (Skeat 1882; Tusser 1984), although it

is not certain whether it would have been grown in the small gardens in Chester itself, or in the surrounding countryside. Housewives grew hemp as well as flax in the gardens, and hemp seed has been found here too. Hemp provided most of the rope used in such things as harnesses, as well as sacking (the word canvas comes from chanvres - hemp).

Fruit

Fruitstones and pips are usually very abundant in sewage because they are hard enough to be preserved under a wide range of conditions. Some, such as the bramble, are commonly found and together with the hawthorn and whitebeam represent wild plants and do not necessarily prove that humans ate them, because birds feast on the berries as well and scatter the seeds in their droppings. However, when one is dealing with sewage, these probably represent remains of what people ate. The strawberries which were found would have come from the wild plant, although quite possibly brought into cultivation as was the practice (Amherst 1894).

Stone fruit was mainly represented by the sloe, with a few bullace or primitive plums and sour (morello) cherries. I originally thought that such rather large fruitstones must represent food waste rather than sewage itself (Greig 1981) because we take care to avoid swallowing them now, but at York medieval coprolites have been found with embedded fruitstones,

and there is also documentary evidence that fruitstones were eaten (Greig 1983). Just why fruitstones were so enthusiastically eaten in the middle ages is a mystery. As well as the fruitstones, some charred or mineralised examples of sloes were found with the fruit cell structure also preserved intact, and even some of the fruit skin: both very remarkable finds. This fruit is very sour, yet the stones are frequently found in such deposits and sloes were obviously widely eaten. One of the possible ways of making sour fruit palateable is to sweeten it with honey (Hall 1986; see below), and it was cooked together with cereals into a murrey (Wilson 1972), which may have modified the sourness somewhat. The pollen spectrum contained records of a number of insect-pollinated plants such as red and white clover, trefoil and meadowsweet, which do not really belong in a town in large amounts, nor do they belong with other parts of the flora such as the cornfield weeds etc. It may be that they could represent traces of honey in the diet, although this is hard to prove because the spectrum was so mixed.

The presence mainly of sloes together with occasional bullace and primitive plums shows that much of the fruit grown at this time was scarcely domesticated; the largest fruitstone resembled that of a semi-wild plum grown from suckers from an old orchard in Worcestershire, and the fruit, although small, were good and sweet, so small-stoned fruit is not all sour. Documentary evidence such as that from Fitzherbert, although three centuries

later than this material (Skeat 1882) suggests propagating bullace, damsons and plums by grafting, and propagation from suckers 'seyences' is recommended by Tusser (1580). The morello cherry is found from the later middle ages onwards, and is a cultivated, rather than a wild tree, although, like the sloes, its fruit is very sour.

Apples and pears were identified from pips (some even still containing starch) and pieces of endocarp (the apple core) and pear/quince from the stone cells which give them their characteristic gritty texture. If the stone cells do indeed represent quince, it may be one of the first records of this fruit from Britain, and stone cells do not seem to have been reported before from Britain.

Bilberries, which were common, were probably not cultivated, but would have grown wild and been gathered on heathland and then brought into Chester. .

Fig seeds were fairly abundant, but their importance should not be exaggerated given that there may be around eight hundred per fruit. Figs are very common in sewage, especially in the later medieval period from the thirteenth century onwards. They would almost certainly have been imported. Although there were figs here, that the other important import, the grape, was less abundant.

The range of fruit recorded from medieval times is certainly large (Harvey 1981, Roach 1985) but it is not always clear how widespread some kinds actually were.

Herbs and vegetables

A few remains were detected, such as those of fennel, the liquorice-flavoured seeds of which were used in cooking or eaten alone to sweeten the breath. A tiny seed of chamomile represents a herb which was used whole, or its flowers, and it has hitherto only been found on the continent.

Vegetable remains are represented by abundant epidermis of the onion family. This is the filmy outer layer of the leaf, and it is very surprising that such a delicate tissue is preserved in archaeological deposits. It was clear from the straight-cut ends of the fragments that the vegetable had been cut into rather thin slices of 3.5 millimetres, and its presence throughout these deposits suggests that it was widely eaten. Allium (onion family) epidermis was first recognised by Philippa Tomlinson in material from York, (Tomlinson, in preparation) and thereafter it was found present in a wide range of sewage, in which the filmy remains had gone unnoticed. Investigations have so far failed to differentiate between onion, garlic and leek. All were popular in the medieval period according to documents, even being imported by sea in barrelfulls although the port records quoted do not

include Chester (Gras 1918). However, the presence specifically of leek was proved by the rare find of a single charred seed. The seeds of Brassica present a problem because they could represent the cultivated brassicas such as cabbages which were indeed grown at this time according to the historical evidence, or might merely represent their weedy relatives.

Plant materials

There was a small part of the flora which belongs in wet places, such as meadowsweet, sedges and rushes. These would be rather unlikely plants to be found growing in the centre of a town, so they might have been brought in for a number of purposes, including material for roofing or flooring. A few grassland plants were present. There was, however, no sign of the heathland material such as heather and ling which was found in the Hunter's Walk material (Greig, in preparation).

Animal remains

There were animal remains in the form of tiny fish bones, eggshell and egg membrane probably from domestic fowl, animal hairs which might have come from roughly butchered meat and a single rib. Unfortunately, it has not been possible to identify these further in the limited time available for study. The documentary evidence suggests that the diet of ordinary people was largely vegetarian until the standard of living improved in the later middle ages (Dyer 1983).

Discussion

The deposit seems to have been put into the cesspit and quickly covered over, because there was little sign of an urban weed flora, or of a very great insect fauna, things which appear when organic material such as sewage is left exposed for long enough. Fly puparia were present, although not particularly abundant (context 30 provided one hundred and thirty-one examples of Ephydridae pupae, possibly from Scatella, and two other taxa Fannia and Leptocera, commonly found in sewage were present (although there are few modern circumstances which allow the accumulation and study of such a fauna). These provided further evidence for the nature of the deposit. The parasite ova Trichuris were very abundant, and Ascaris somewhat less so and although the exact concentrations were not measured, they seemed to be as abundant as normal in sewage. It is possible that a pit such as this, cut into the rock, was used as a cesspit for a long time, being emptied when necessary. Thomas Tusser (1580) recommended the emptying of privies in November, although this may not have been a universal practice. Nightsoil was also used as fertiliser on farmland if transport did not cost too much (Campbell 1983).

An intriguing question is the seasonality of the deposits, which is occupying cesspit researchers in Germany too (Matthies, in litt.). The remains found in the 1m depth of sewage in this

cesspit seem to be rather uniform. The fruit remains which are found mostly represent late summer and autumn ripening times (although sloes and damsons may be left later, until frosted). Fruit remains are almost universal in cesspits, and while some of them could well represent late summer - autumn deposition, it seems unlikely that all of them do. It therefore seems that fruit was preserved in some way. With apples and pears, storage is quite straightforward and this may explain the abundance of these remains, but it is harder to tell how the stone fruit and berries may have been kept. Tusser (1580) recommended storing damsons on straw, and long keeping qualities may have been further attractions of such acid fruit. Figs were especially used in Lent (Wilson 1972), but so far nobody has found a convincing fig and fish-rich sewage deposit which is attributable to this time of year, and so the question remains largely unanswered.

Another interesting question is the likely status of the people whose contributions filled to the cesspit. The position of the pit suggests that the inhabitants of the nearby house either had a latrine or deposited sewage there. As townsfolk they would have been comparatively well-off, although in a mixed household there might have been people of various social standings, from the head of the household to servants.

The abundant milled corncockle remains show that the Chester townsfolk were consuming quantities of poison with their food.

Gay Wilson (1975) dealt with the toxic qualities of corn cockle in great detail (see also Hall 1986). I had originally considered the evidence that these seeds were actually eaten to be slight, thinking that their fragmentary state was explained by the fact that they broke easily. It is an interesting question whether people were actually poisoned by corn cockle or were either tolerant of it, or whether the long, slow, medieval cooking (Wilson 1972) removed the poisonous principle. Perhaps corn cockle even acted as an anthelmintic. Surprisingly, Filzherbert commended the corn cockle for its flour content (Skeat 1882), but it would certainly be strange if nobody had discovered the poisonous properties of the plant. The importance of finds such as this one is that new things can be learnt from sewage where preservation is so exceptionally good, and the material relatively unmixed with local urban weed floras. Nothing was found that appeared to have been used medicinally.

These remains may be compared with the other finds from Chester, such as the very similar ones from Hunter's Walk (Greig, in preparation) and from Goss St (Wilson 1975), as well as with sewage finds from other parts of the country, such as Worcester (Greig 1981) and elsewhere (Greig 1983). Most of these show signs of the 'medieval fruit salad', because fruitstones are tough enough to be preserved in most circumstances. Once cereal bran was recognised (Hall et al 1983) this, too, was found to be abundant in most sewage, and later on, so were remains of

onion/garlic/leek (Tomlinson in preparation). We now know from the Watergate Street site material that plenteous evidence of peas and beans may be preserved if conditions are right. It would thus appear that there was a certain uniformity in the diet of townsfolk in this period. It was mainly based on good, solid, dull food such as cereals, peas and beans, as far as can be told, with little in the way of exotica except the figs and some raisins. Fish, meat and eggs were also eaten, increasingly so later in the medieval period.

Acknowledgements

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List of plants identified in the pit sample

Sample	(29)	(29P)	(30)	(31)	(31)P	
Latin name						English name
Pteridium aquilinum	2	-	-	-	-	bracken
Ranunculus						
subg Ranunculus	-	-	-	+	-	buttercups
R. sardous Crantz	-	-	1	+	-	hairy buttercup
R. flammula L.	-	-	1	-	-	Lsr spearwort
RANUNCULUS tp	-	-	-	-	3	buttercup tp
Papaver somniferum L.	1	-	-	-	-	opium poppy
PAPAVER	-	1	-	-	-	poppies
Brassica sp.	+	-	=2	+	-	cabbages
Raphanus						
raphanistrum L.	=2	-	=4	+	-	charlock
Thlaspi arvense L.	-	-	1	-	-	penny-cress
CRUCIFERAE	-	2	-	-	7	cabbage family
Agrostemma githago L.	=12	-	=27	+	-	corn cockle
Cerastium sp.	-	-	1	-	-	chickweed
Spergula arvensis L.	-	-	1	+	-	corn spurrey
Chenopodium sp	-	-	2	+	-	goosefoot
Atriplex sp.	+	-	4	-	-	orache
Malva sp.	-	-	1	-	-	mallow
Linum usitatissimum L.	?	-	3	+	+	linseed

Sample	(29)	(29P)	(30)	(31)	(31P)	
L. usitatissimum L.	-	-	2	-	+	flax cpsl. frg.
Acer sp.	-	1	-	-	-	maple
Ilex aquifolium L.	-	-	-	+	-	holly
Vitis vinifera L.	+	-	-	-	-	grape
Ulex leaf-spine	-	-	1	-	-	gorse
ONONIS tp.	-	2	-	-	-	rest-harrow
LOTUS tp.	-	3	-	-	4	trefoil
TRIFOLIUM REPENS L.	-	5	-	-	15	white clover
TRIFOLIUM PRATENSE L.	-	-	-	-	2	red clover
Pisum sativum L.	2*	-	-	5*	-	garden pea
Pisum sativum L. hilum	4	-	11	+	-	garden pea
P. sativum L. parenchyma	14	-	11	-	-	garden pea
P. sativum L. epidermis	=4	-	10	-	-	garden pea
Vicia sp.	-	-	+*	+	-	vetch
Vicia sativa L.	-	-	1*	-	-	common vetch
Vicia faba L.	-	-	-	5*	-	broad bean
Vicia faba L. epidermis	-	-	16	+	-	broad bean
VICIA FABA	-	+	-	-	+	broad bean
LATHYRUS	-	4	-	-	-	vetchling
FILIPENDULA	-	3	-	-	9	meadowsweet
Rubus fruticosus agg.	8	-	21	+	-	bramble
Fragaria vesca L.	-	-	1	+	-	strawberry
POTENTILLA tp.	-	1	-	-	-	cinquefoils
Prunus spinosa L.	3	-	20	8	-	sloe

sample	(29)	(29P)	(30)	(31)	(31P)	
Prunus insititia (L.)C.K. Schneid.	1	-	3	-	-	bullace type
Prunus insititia (L.)C.K. Schneid.	1	-	1	-	-	primitive plum
P. cerasus L.	1	-	1	-	-	sour cherry
PRUNUS tp.	-	-	-	-	1	plum type
Prunus fruit epidermis	9	-	2	-	-	plum skin
Crataegus oxycanthoides Thuill.	1	-	-	-	-	hawthorn
CRATAEGUS tp.	-	3	-	-	-	hawthorn
Sorbus aria (L.) Crantz	1	-	1	-	-	whitebeam
Pyrus communis L. pips	4	-	10	-	+	pear pips
Malus/Pyrus pips	6	-	-	-	-	pear/apple
Malus sylvestris Mill. pips	-	-	2	+	-	apple pips
M. sylvestris endocarp	77	-	98	-	-	apple core
Pyrus/Cydonia stone cells	+++	-	83	-	-	pear/quince
Pyrus/Cydonia endocarp	?	-	-	++	-	pear/quince
HEDERA HELIX L.	-	-	-	-	1	ivy
Torilis japonica (L.) Houtt.	1	-	-	-	-	hedge-parsley
Conium maculatum L.	-	-	1	-	-	hemlock
Foeniculum vulgare L.	2	-	1	-	-	fennel
UMBELLIFERAE	-	3	-	-	1	umbellifers

sample	(29)	(29P)	(30)	(31)	(31P)	
Polygonum aviculare L.	=1	-	1	+	-	knotgrass
Polygonum lapathifolium L.	1	-	3	-	-	pale persicaria
Polygonum hydropiper L.	-	-	1	-	-	water-pepper
Rumex acetosella agg.	-	-	6	-	-	sheep's sorrel
Rumex sp.	=1	-	1	+	-	dock
Urtica urens L.	-	-	1	-	-	small nettle
Urtica dioica L.	-	-	1	-	-	stinging nettle
Cannabis sativa L.	-	-	1	+	-	hemp
CANNABIACEAE	-	-	-	-	2	hemp/hops
ALNUS GLUTINOSA (L.) Gaertn.	-	1	-	-	3	alder
Corylus avellana L.	1*	-	=1	=1	4	hazelnut
QUERCUS sp.	-	4	-	-	2	oak
SALIX sp.	-	1	-	-	-	willow
Vaccinium sp.	16	-	28	+	-	bilberry
ERICACEAE	-	-	-	-	3	heathers
Ficus carica L.	70	-	102	-	+	fig
CONVOLVULUS ARVENSIS L.	-	1	-	-	-	bindweed
SOLANUM DULCAMARA L.	-	-	-	-	1	bittersweet
Solanum nigrum L.	-	-	1	-	-	nightshade
LAMIUM tp.	-	3	-	-	6	dead-nettle
PLANTAGO MEDIA L.	-	+	-	-	-	hoary plantain
PLANTAGO LANCEOLATA L.	-	-	-	-	4	ribwort
CAMPANULACEAE	-	+	-	-	2	bell-flowers

sample	(29)	(29P)	(30)	(31)	(31P)	
Sambucus nigra L.	-	-	-	+	-	elder
Anthemis cotula L.	5	-	8	+	-	mayweed
Achillea ptarmica L.	1	-	-	-	-	sneezewort
Chrysanthemum segetum L.	=6	-	29	+	-	corn marigold
ANTHEMIS tp.	-	5	-	-	7	mayweed tp
CIRSIUM tp.	-	-	-	-	2	thistle tp
CENTAUREA SCABIOSA L.	-	+	-	-	-	grt knapweed
Centaurea cyanus L.	=13	4	=19	+	4	cornflower
CENTAUREA NIGRA tp.	-	+	-	-	4	knapweed
Lapsana communis L.	=8	-	=16	+	-	nipplewort
Leontodon taraxacoides Vill. Mérat	2	-	1	-	-	hawkbit
COMPOSITAE L	-	1	-	-	14	dandelions etc
Allium porrum L.	1*	-	1	-	-	leek
Allium sp. epidermis	+++	-	20	-	-	leek/onion
Juncus sp.	-	-	-	+	-	rush
Eleocharis unigl/pal.	1	-	3	-	-	spike-rush
Carex spp.	1	-	3	+	-	sedge
CYPERACEAE	-	1	-	-	-	sedges etc.
Gramineae	1	14	1	+	42	grasses
Triticum sp.	1*	-	-	-	-	wheat
Avena glume fr.	13	-	17	-	-	oats
Avena glume fr. *	4*	-	-	-	-	oats
Avena sp.	-	-	1*	-	-	oats
CEREALIA	2	98	-	-	108	cereals

sample	(29)	(29P)	(30)	(31)	(31P)	
Cerealia bran	++	-	+++	-	-	bran
Cerealia (mineralised)	-	-	2	-	-	cereals
total number:	302	155	607	-	251	
other biota						
musci	+	-	+	+	-	mosses
mammal bone	-	-	+	-	-	
animal hair	-	-	+	-	-	
eggshell (domestic fowl)	-	-	1	-	-	
egg membrane	-	-	8	-	-	
fish bone	+	-	73	+	-	
Ephydridae	58	-	131	+	-	sewer fly pupae
Leptocera	-	-	2	-	-	sewer fly pupae
Fannia scalaris	-	-	2	-	-	sewer fly pupae
Trichuris	-	1	+	-	+	whipworm
Ascaris	-	21	-	-	+	maw-worm

Note

plant species list in taxonomic order after Clapham et al. 1962, from macrofossils and POLLEN (P). (= denotes approximate number represented by fragments, + denotes presence, not counted, +++ abundant, * charred)

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