# Carbonized Cereals from the Roman Villa of North Leigh, Oxon.

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TWO samples of Roman Age carbonized kernels from the Ashmolean Museum, in Oxford, have been examined.[1] The first is in a small hand-made glass bottle labelled " Burnt Wheat, found in a Roman villa which was discovered near Woodstock, in 1816.—(Brought from thence by JEH in May 1821)." This has the accession number 1946.130. The other sample, in a small specimen-tube of recent make, has the label "Roman Wheat—Northleigh, Oxon " and bears the accession number 1952.72.

North Leigh is in the second and largest of the three geographical groups into which Miss M. V. Taylor divides the Romano-British country houses and farms of Oxfordshire.[1a] The seventeen or eighteen houses of this group range from small ditch-enclosed timber dwellings, to large courtyard houses such as Fawler, North Leigh and Stonesfield. The date of construction of these houses, their relationship, and their economic background are imperfectly known. It appears that the North Leigh site was occupied in the first century. The stone house was apparently built in the second century, and remained in use—whether continuously is not known—after many reconstructions and additions until the end of the fourth century and possibly into the fifth century. Its end is quite uncertain; probably it was abandoned and fell into decay naturally, but at some time some of the rooms—16, 17, 17a, 17b, and 18 were damaged by fire. In one of these, room 17a, burnt wheat, and what had been molten lead were found.

The villa at North Leigh was found in 1783 and first excavated by Brown and Hakewill between 1813-1816.[1b] In Hakewill's account published in Skelton's *Oxfordshire* (1823) he says of room 17 " a trench has been dug across this room. The floor is of plaster, and was covered in many places with wheat

[1] I am grateful to Mr. E. M. Jope for bringing these samples to my attention, to Dr. D. B. Harden for allowing them to be studied in Belfast, and to Miss M. V. Taylor for much help with the archaeological aspects of this account.

[1a] *Vict. County Hist. Oxon.*, 1 (1939), 306 ff.

[1b] In 1910 and 1911 there were further excavations, this time by Donald Atkinson and Evelyn White, working for short periods annually; some account is to be found in the Haverfield Library, Ashmolean Museum. See *Vict. County Hist. Oxon.*, 1 (1939), 317-8.

and lentils, black as if burnt; the form of the grain is, however, distinctly preserved. Several pieces of broken pottery [were] found in this trench, and one small cup nearly perfect". The villa is now in the care of the Ministry of Works and restoration of the rooms has been started.

The background of the North Leigh sample is quite satisfactory. This, however, is not the case for the 1816 Woodstock sample. Its precise origin is obscure. It is possible that it also came from North Leigh, and perhaps was recovered during Brown and Hakewill's excavation. If not, the most likely alternative is the nearby villa of Stonesfield, where a large house was first discovered in 1712 and more was found in 1779-80.[2] Most of the contemporary accounts of this large house with its fine pavements mention carbonized grain: e.g. Pointer in 1713 mentioned the mosaic being covered with " black whole, and dried *Corn* . . . about half a Foot and in some places near a Foot deep ".[3] Stukeley in 1724 says that when found it was covered a foot deep with "burnt wheat, barley and pease ".[4] It may seem unlikely that samples of carbonized kernels will have remained from the explorations of the early eighteenth century, but it is just possible that some samples were collected and kept from the 1812-1813 excavation.[5] In 1853 the antiquary, Mr. C. Faulkner of Deddington, had some *tesserae*, painted plaster, flue-tiles, and charred-wheat and vetches; and fragments of the pavement and other objects were dispersed about the neighbourhood including Woodstock.[6]

It is unfortunate that the origin of the 1816 ' Woodstock ' sample is so obscure, but it is more likely than not that it came from Stonesfield. For convenience of reference and to avoid prejudicing the question of its origin, it is referred to in the subsequent account simply as the ' Woodstock sample '.

*The general problem of identification of carbonized wheat.* Samples of early historic and prehistoric carbonized wheat may contain five so-called ' species '. These are Einkorn or Small Spelt (*Triticum monococcum* L.), Emmer (*T. diococcum* (Schrank.) Schübler), Spelt or Dinkel (*T. spelta* L.), Club Wheat (*T. compactum* Host.), and Bread Wheat (*T. vulgare* Will). Helbaek[7] generally arranges these under two headings: the Glume Wheats, and the Naked Wheats. The Glume Wheats, which keep their glumes through threshing, unless previously dried, comprise Einkorn, Emmer, and Spelt. The remaining wheats, including the Club and Bread Wheats, are collected under the Naked Wheats.

Since former threshing practice seems to have included a preliminary drying, carbonized kernels from both groups are often recovered entirely naked, that is

[2] For a detailed account of the history of this courtyard house see *Oxoniensia*, VI (1941), 1-8.
[3] *An account of a Roman pavement lately found at Stunsfield in Oxfordshire* (Oxford 1713).
[4] *Itinerarium* (1724), p. 45.
[5] *North Oxon. Archaeol. Soc. Trans.*, I (1853-5), 118.
[6] *Oxoniensia*, VI, 7 ff.
[7] Spelt (Triticum spelta L.) in Bronze Age Denmark, *Acta Archaeol.*, XXIII, 99 (1952a).

without glumes, internodes, and other appendages. In this state it is impossible to identify individual kernels. However, when a sample is available from a population of grains, the presence of certain species can probably be detected by using size and overall form-characteristics. These metrical characteristics are commonly length, breadth, and thickness, together with indices made up from them, namely $\frac{100\ B}{L}$, $\frac{100\ T}{L}$, and $\frac{100\ T}{B}$. These characteristics are most easily comprehended if the measurements are grouped in frequency classes and presented pictorially as histograms or variation polygons. These allow the overall variability of the sample to be seen at a glance and, if the intervals on the horizontal co-ordinate are suitable, enable some assessment of the homogeneity to be made. Ideally the presence of several species in a population should show on the variation polygon as well-separated peaks or modes, each with a well-defined range, allowing correlation with the appropriate species. However, these conditions seldom prevail since there is considerable range in size, and the size and index frequency curves overlap, thus preventing the appearance of distinct modes. Again, even when the sample contains only one species this may not give an unimodal variation polygon since the same species, grown under different conditions, develops different size characteristics. With material from a single farm this complexity is unlikely to be significant, but it is not unlikely that harvests from different farms were amassed at a few centres such as North Leigh and Stonesfield for threshing. These villas may have exacted a proportion of produce from adjacent small-holdings.

To confuse this problem of identification still further the wheat genus *Triticum* is made up of species, some of which the taxonomist does not regard as ' good '. They are ill-defined and grade imperceptibly into each other on all or, as in this case, on some of their morphological characters. At the present day the existence of innumerable cultivated varieties helps to fill in more completely the morphological transitions, so that a spectrum of more or less continuous variability results. However, in the Roman Age these varieties were not available, and it is because of this that there is a chance of making identifications by using principal nodes or noda.

The genetical relationships of the wheat series has been described by Dodson,[8] but in words this makes a complex statement. It is easier to appreciate the situation, even if imperfectly, from the table (FIG. 6, p. 16) which has been slightly modified after Schery.[9]

This multiple complexity strongly affirms that where carbonized grain of wheat occurs, without its respective glumes and internodes, the attempt to identify individual grains must be abandoned and its place taken by a study of the metrical characteristics of a population. In the absence of strongly disturbing factors and of cultivated varieties, these values in their manner of grouping may permit the presence of certain species to be detected.

WHEAT (*Triticum* spp.). The simple measurements and the combined measurements or indices from the two samples have been grouped in Frequency Classes and these plotted as Variation Polygons (FIG. 7). On each polygon

[8] Dodson, *A Textbook of evolution* (Philadelphia and London, 1952).
[9] *Plants for Man* (New York, 1952).

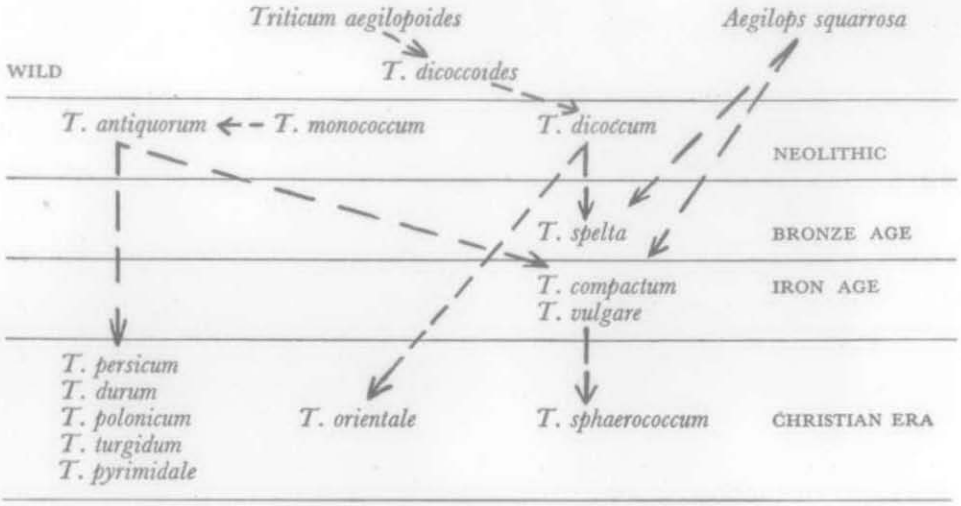



FIG. 6
Table showing genetical relationships of wheats.

the small vertical arrows mark average dimensions for Emmer, Spelt, and the Club-Bread wheats. The values have been taken from Helbaek's[10] publications. Where the number of grains on which the average was calculated is known, it has been set at the head of each arrow. The distribution of these average values and their overlap indicate the degree to which reliable identifications are possible in each case. Overlap occurs to the extent of making identifications a matter of probability rather than certainty.

For each dimension 53 grains were measured from the North Leigh sample, and 74 from the Woodstock sample. For each dimension the Mean (M) and the Standard Deviation (S.D.) have been calculated:

| *North Leigh* | *N* | *M* | *S.D.* | *Woodstock* | *N* | *M* | *S.D.* |
|---|---|---|---|---|---|---|---|
| *Length in mm.* | 53 | 5·2 | 0·32 | *Length in mm.* | 74 | 5·5 | 0·43 |
| *Breadth in mm.* | 53 | 3·1 | 0·22 | *Breadth in mm.* | 74 | 2·9 | 0·35 |
| *Thickness in mm.* | 53 | 2·3 | 0·18 | *Thickness in mm.* | 74 | 2·4 | 0·26 |

None of the polygons shows good symmetry or approach to the unimodal form, which would be clear evidence of the presence of one species only. The nearest to this is the North Leigh sample, which contrasts with the Woodstock, this latter showing something like a trimodal form, not with the modes distinct, but basally fused or overlapping. The greatest distinction between the samples

[10] *op. cit.* (1952a); Jessen and Helbaek, *Cereals in Gt. Britain and Ireland in prehistoric and early historic times*, Kgl. Dan. Vidensk. Selsk. Biol. Skrifter (1944); H. Helbaek, 'Early Crops in Southern England', *Proc. Preh. Soc.*, XVIII, 194 ff. (1952b).

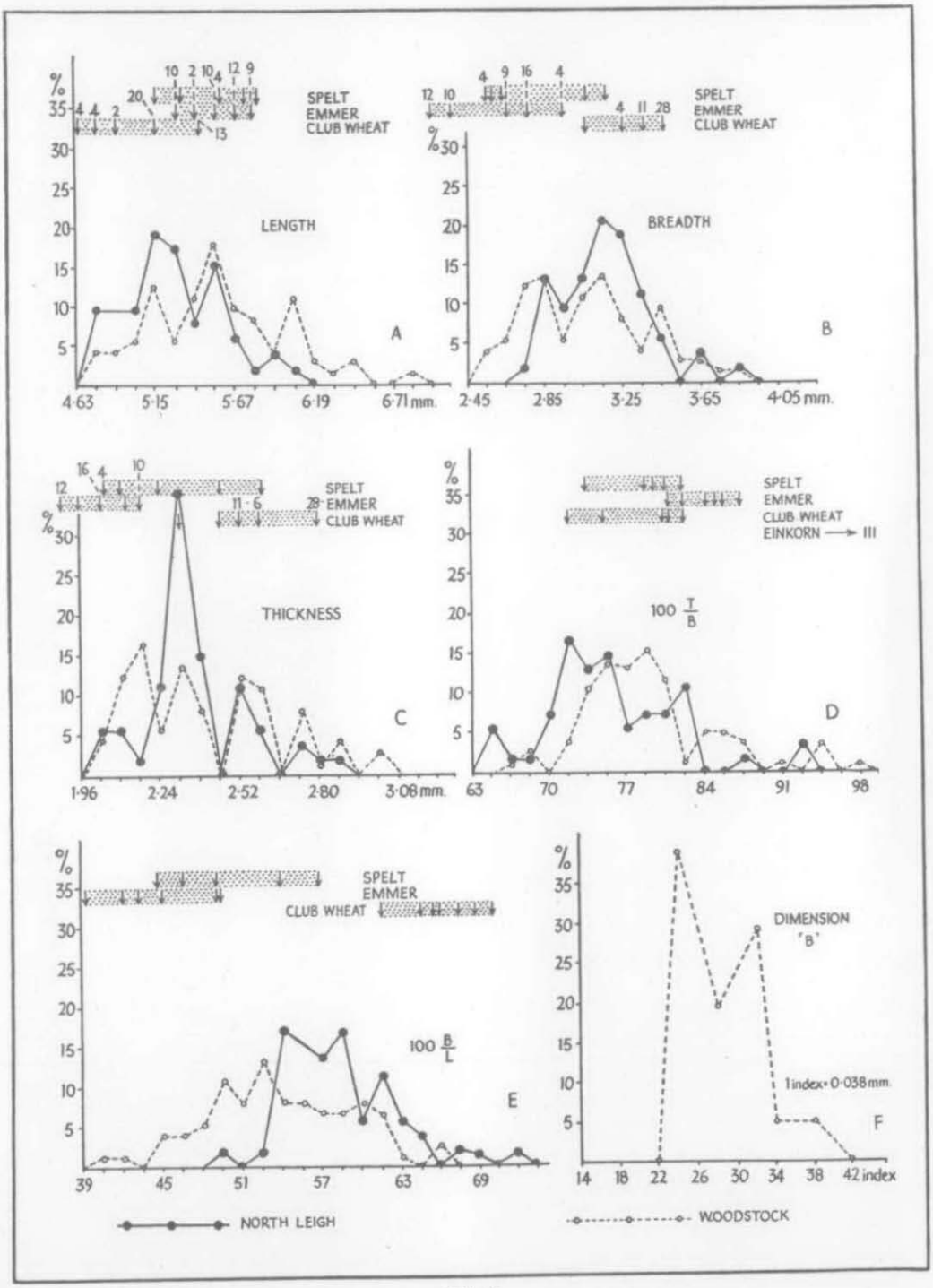

SPELT
EMMER
CLUB WHEAT
LENGTH
A
4·63
5·15
5·67
6·19
6·71 mm.
BREADTH
B
2·45
2·85
3·25
3·65
4·05 mm.
THICKNESS
C
1·96
2·24
2·52
2·80
3·08 mm.
EINKORN → III
100 T/B
D
63
70
77
84
91
98
100 B/L
E
39
45
51
57
63
69
DIMENSION "B"
1 index = 0·038 mm.
F
14
18
22
26
30
34
38
42 index
NORTH LEIGH
WOODSTOCK

FIG. 7

appears to be given by the thickness measurements which approach a unimodal form in the North Leigh material, but have a distinctly diffused distribution for Woodstock.

The grouping of the frequency classes for length indicate Emmer or Spelt or both in each sample, with Club-Bread wheats more positively shown in the North Leigh than in the Woodstock material. The groupings for breadth confirm Spelt in both, while Emmer if present is most strongly shown among the Woodstock kernels.

For the two samples a consistent picture of the ratio of the three types present is not afforded through comparison of the distribution classes for the three variates, since these simple linear measurements, taken individually, probably are insufficient to characterize the overall form of the grain. The combined measurements, especially the indices $\frac{100\,T}{B}$ and $\frac{100\,B,}{L}$ do this more efficiently. These (FIG. 7) confirm Spelt in both samples and suggest some amount of Emmer—or at least Emmer-like grains—particularly in the Woodstock sample. This fact was also shown, though less positively, by the grouping of the breadth and thickness frequency classes.

Altogether the evidence implies that the bulk of both samples, and particularly the North Leigh sample, is Spelt. Emmer or Emmer-like grains are present most probably in the Woodstock sample. Club or Bread Wheat, or grains similar in form to these, may occur in both samples, and more probably in that from North Leigh. However, these account for only a small proportion of the material.

Complete proof of Spelt in the Woodstock kernels is given by spikelet forks and glume bases, both with features, as well as measurements, diagnostic for this species (PL. II, A and B). The five spikelet forks were measured across the Articulation Scar to give Helbaek's ' Dimension A '.[11] The measurements were: 2·41; 2·41; 2·00; 1·83; 1·90 mm. (average 2·10 mm.). The measurements by themselves are inconclusive, but the manner of fracture of the spikelets from the rachis of the flower-spike is entirely Spelt-like.

The twenty glume bases were measured across the width of the basal portion of the glume to give Helbaek's ' Dimension B '.[12] The number of measurements perhaps justifies frequency grouping to produce a variation polygon. The same frequency classes as in Helbaek's paper on the Bronze Age Birknaes find in Denmark have been used and the polygon (FIG. 7, bottom right) falls within almost the same range as the similar polygon for Spelt published in that report.

[11] *op. cit.*, p. 100 (1952a).
[12] *Ibid.*, p. 100.

BARLEY (*Hordeum* spp.). Barley can be divided among its species only when found along with its internodes. But where none of these occur, as in the present sample, the material is still separable into the two groups Naked Barley and Hulled Barley. The systematist makes use of these to segregate the varieties occurring within races or species of barley which have been defined on other morphological grounds. The measurements of the grains found are given below:

| | *Length mm.* | *Breadth mm.* | *Thickness mm.* | *L:B* | *L:T* |
|---|---|---|---|---|---|
| North Leigh .. .. | 5·8 | 3·2 | 2·5 | 1·8 | 2·3 |
| | 5·7 | 3·4 | 2·4 | 1·7 | 2·4 |
| *Average* .. .. | 5·75 | 3·3 | 2·45 | 1·75 | 2·35 |
| Woodstock .. .. | 5·3 | 3·0 | 2·2 | 1·8 | 2·4 |
| | 5·5 | 3·0 | 2·5 | 1·8 | 2·2 |
| | 5·4 | 2·9 | 2·6 | 1·9 | 2·1 |
| | 5·4 | 3·0 | 2·6 | 1·8 | 2·1 |
| | 5·3 | 3·0 | 2·5 | 1·8 | 2·1 |
| *Average* .. .. | 5·38 | 2·98 | 2·48 | 1·82 | 2·18 |

Naked barley from Roman sites is of interest since, although there is a fairly large number of barley finds from the Roman period, many have been too poorly preserved to be definitely assigned either to the Naked or to the Hulled type. The view has been held that Naked barley is associated with the pre-Late Bronze age, after which time the Hulled form becomes more frequent. Helbaek[13] has suggested that the infrequency of barley in the Roman period, at least in southern England, is possibly misleading. Its absence may be due to the fact that during this period it was used for fodder and brewing and not for bread-making as it had been earlier. For bread-making a cleanly threshed grain, free from glumes and internodes is necessary, and is achieved only by artificial drying. At times excess drying led to carbonization, and this accounts for the prevalence of the early finds.

RYE (*Secale cereale* L.). Thirty lop-sided kernels were separated from the North Leigh sample. The grains are poorly preserved, the cheeks of the ventral furrow being in each case puffed. Tentatively, but only tentatively, these have been identified as Rye. The measurements made on eleven grains

[13] *op. cit.*, p. 214 (1952b).

are similar to those given by Helbaek[14] from the finds at Castle Cary, and from the Forth-Clyde canal. Despite this, one is reluctant to give a definite identification. Although the grains show something of the corrugated surface characteristic of the genus, they lack the equally characteristic blunt distal end.

| | *Length* mm. | *Breadth* mm. | *Thickness* mm. | *L:B* | *L:T* |
|---|---|---|---|---|---|
| | 5·0 | 2·4 | 1·8 | 2·1 | 2·8 |
| | 5·4 | 2·3 | 1·7 | 2·4 | 3·2 |
| | 5·5 | 2·4 | 1·6 | 2·3 | 3·4 |
| | 5·3 | 2·3 | 1·7 | 2·3 | 3·1 |
| | 5·8 | 2·4 | 1·8 | 2·4 | 3·2 |
| | 5·3 | 2·6 | 1·8 | 2·0 | 3·2 |
| | 5·6 | 2·3 | 1·6 | 2·2 | 3·5 |
| | 5·6 | 2·3 | 1·7 | 2·2 | 3·3 |
| | 5·8 | 2·3 | 1·6 | 2·5 | 3·6 |
| | 5·6 | 2·1 | 1·7 | 2·7 | 3·3 |
| | 5·3 | 2·6 | 1·7 | 2·1 | 3·1 |
| *Average* | 5·47 | 2·36 | 1·70 | 2·29 | 3·24 |

CORN COCKLE (*Agrostemma githago* L.). Two weed seeds, one from the North Leigh sample (PL. II, C), and one from the Woodstock sample, were discovered among the cereal kernels. Curiously both seeds are identical and appear to belong to the Corn Cockle (*Agrostemma githago* L.). Their dimensions are slightly smaller than those given for this species by Clapham, Tutin, and Warburg,[15] and by Bertsch,[16] though they are quite close to those indicated by Beijerinck.[17] As far as size goes, the closest match to the seeds is that of the Greater Stitchwort (*Stellaria holostea* L.).

*Agrostemma* has been recorded previously in a Roman context at Silchester, Hampshire. Godwin[18] notes that: 'there is some evidence that the corn cockle was formerly an exceedingly prevalent weed in cereal crops and that the high saponin content may have caused susceptibility to leprosy.' As well, the seeds are said[19] to have a bad effect on the physical properties of wheat flour. The decline in frequency of corn cockle, may be simply due to more

[14] *op.cit.*, p. 53 (1944).
[15] Clapham, Tutin, and Warburg, *Flora of the British Isles*, p. 287 (Cambridge, 1952).
[16] W. Bertsch, *Früchte und Samen* (Stuttgart, 1941).
[17] W. Beijerinck, *Zadenatlas der Nederlandsche Flora* (Wageningen, 1947).
[18] *The History of the British Flora* (Cambridge, 1956), p. 91.
[19] Tutin, Clapham, and Warburg, *op. cit.*, p. 287.

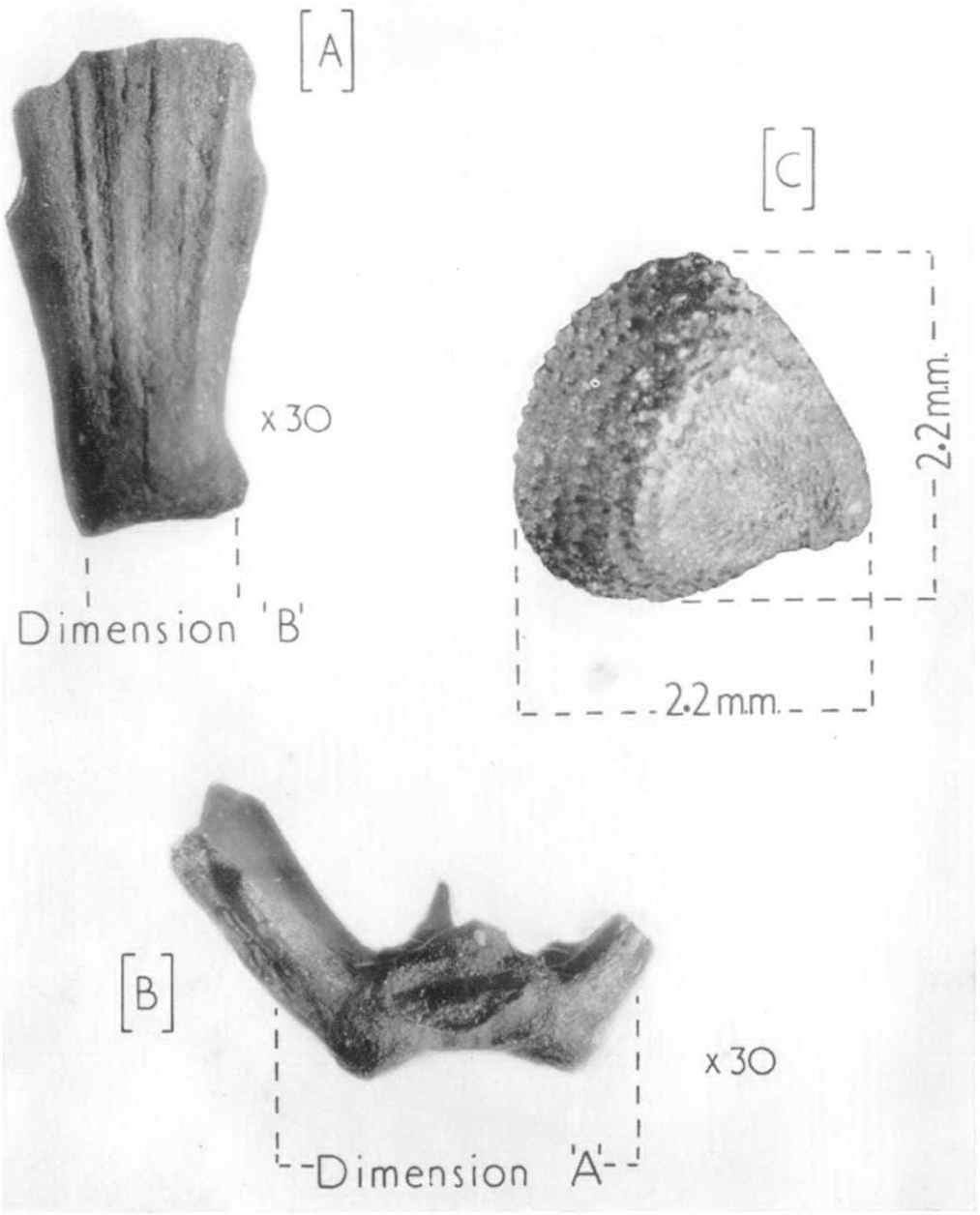
efficient methods of seed cleaning. However, Godwin throws out the suggestion that possibly the plant ' has some close biological link with the rye, which now has become a rare crop in the British Isles '.

## SUMMARY

Two samples of carbonized kernels, one sample definitely from the Roman villa of North Leigh, have been examined. They may be attributed to the late Roman period, perhaps the fourth century A.D. Wheat predominates and biometric data indicate the bulk of this to be Spelt (*Triticum spelta* L.), with traces of perhaps Emmer Wheat (*T. dicoccum* (Schrank.) Schübler), and Club-Bread Wheats (*T. compactum* Host. and *vulgare* Will.). Spelt is definitely confirmed by the presence of diagnostic spikelet forks and glume bases. Naked Barley (*Hordeum* sp.) and possibly Rye (*Secale cereale* L.) occurred in small quantity. Two seeds of Corn Cockle (*Agrostemma githago* L.) were identified. The predominance of Spelt is in keeping with the general picture of Roman period cereal finds so far examined. Helbaek[20] has stated that Emmer Wheat and Naked Barley were not found by him during his investigations in southern England. Subsequently, however, he stated that there was Emmer (identified by spikelet forks) among carbonized grain from a second century level at Verulamium,[21] Herts. Roman period sites in the north of England have yielded Emmer.

[20] *op. cit.*, p. 213 (1952b).

[21] ' The Cereals from the Burnt Corn Level ', report in Verulamium, 1949, *St. Albans and Herts. Archit. and Archaeol. Soc. Trans.* (1953), p. 91. See also in same report Henton and Kent, p. 89 ff.




Romano-British carbonized kernels: A, B, Spelt from Woodstock; C, Corn Cockle from North Leigh.