PREHISTORIC WHEATS IN SUSSEX[1]

By J. R. B. Arthur

Through the centuries our agricultural land has been brought under cultivation by the initiative of many peoples, yet what still remains of academic interest is the origin of the wheat from which our daily bread is made. The late Professor Percival believed that Bread Wheat has not a single ancestor, but is probably a cross between Emmer (*Triticum dicoccum* (Schrank) Schubeler), one of the earliest of wheats, or one of its descendants, and a grass (*Aegilops cylindrica*) which grows wild in Central Asia; but according to Dr. E. S. Beaven, Emmer is probably the original wheat plant, and one of the most ancient of cultivated cereals.[2] Emmer is still grown in parts of Asia even today. Professor Vavilov of Leningrad, working upon botanical hypotheses, considered that Emmer originated in East Africa and Bread Wheat (*Triticum vulgare* Will.) in Afghanistan and the surrounding area. Whilst archaeological evidence appears to contradict this theory in certain details, the main tenor of his argument can be appreciated, as in this part of the world so many genetical developments originated.

Among grain finds and grain impressions in Sussex I will mention two. An impression of a spikelet-fork—referred to as small Spelt (*T. monococcum* L.) was discovered on Plumpton Plain (Late Bronze Age). Emmer (*T. dicoccum*) was found among other grain at Itford Hill by Mr. G. P. Burstow and Mr. G. A. Holleyman, while excavating on behalf of the Brighton and Hove Archaeological Society.[3]

Wheat for bread-making is today of two species, *T. vulgare* and *T. turgidum*. The former is grown extensively

[1] The subject-matter of this paper is primarily on the wheat specie Spelt (*Triticum spelta* L.) in the Iron Age and the method in which it has been stored in the ground.

[2] *Barley*, by E. S. Beaven (Duckworth, 1947), p. 10.

[3] *Wheats in Gt. Britain*, by J. Percival (Duckworth, 1934), p. 17.

throughout this country and nearly over all the world, especially in temperate parts, but there are very small quantities of *T. turgidum*. Of the former there are hundreds of varieties of Bread Wheat which vary in different locations and also in their economic importance. Wheat was not the only cereal grown during the Early Iron Age; barley, oats, and beans were also grown, although wheat was preferred for bread corn. For several centuries after the Norman Conquest a mixture of wheat and rye came to be used for bread. Breads made from wheat are more palatable and digestible than those made from other cereals. Naturally the grain grown for bread varied from district to district. The choice was usually determined by the fact that certain soils are better for particular cereals.

During the summer of 1951 an underground granary pit was found on Wickbourne Estate, Littlehampton, by Mr. G. Cutler, containing pottery dated as Early Iron Age and also a deposit of prehistoric grain. A saddle quern for grinding grain was also found; this is now in the Littlehampton Museum. The grains were examined by myself and also by Mr. Hans Helbaek, that eminent scholar on prehistoric plant-breeding and archaeology, who confirmed it as being Spelt, *T. spelta*. Primitive grains have also been found in Early Iron Age settlements at Meare Lake village in Somerset, which Percival says are characteristically like Spelt 'in the mode of fracture of the axis of the ear; the form and width of its internodes and the broad-shouldered empty glumes are like those of *T. spelta*, but in shape the grain resembles that of Bread Wheat (*T. vulgare*) having a blunt apex, convex dorsal side without hump and rounded cheeks to the furrow on the ventral side, I consider it to be a primitive form of the Bread Wheat race little removed from *T. spelta*'.[1] 'Spelt was first grown in England in the Early Iron Age.'[2] Helbaek informs us that 'Spelt and corn-drying practice seem to be in-

[1] *Wheats in Gt. Britain*, p. 18.

[2] *Cereals in Gt. Britain and Ireland*, by Jessen & Helbaek (Copenhagen, 1944), p. 15.

timately connected. In Southern England grain deposits are frequently encountered in pits in the ground, dated to the latter half of the first millennium B.C. Not one find of carbonized grain can be safely dated prior to the final phase of the Bronze Age, but 17 deposits recovered within the eleven southernmost counties are dated to this period of Hallstatt-la-Tène influences and immigrations in that country, and to the Roman period. In these deposits Spelt makes its first appearance in Britain, reaching a peak of importance during the Roman Period.'[1] Changes have taken place to develop the numerous species that we have today; these changes result from self-fertilization, hybridization, or mutation. Typical specimens of the plant Spelt are not difficult to recognize, although they differ in chemical composition.[2] The essential differences between Spelt (*T. spelta*) and Bread Wheat (*T. vulgare*) can be seen in the grain-bearing part of the plant. The ears of Spelt are usually longer and lax, with fewer spikelets. These enclose the grain, being spaced farther apart along the axis of the ear, whilst those of Bread Wheat are generally closer and have a more compact appearance. Regarding the spikelet itself, it is a characteristic of Spelt that the empty glumes are strongly nerved and when the spikelet is broken away from the axis of the ear, an ascending internode of rachis is usually found attached: it occasionally widens upwards. By intensive study of the parts of the spikelet base and from the glumes (chaff fragments) taken from the Wickbourne pit, Mr. Hans Helbaek has confirmed that they are of this particular species. If anyone wishes to study the many species within the genera, including the morphological characters, the above author's works are well worth serious study.[3] It is most usual to find two—rarely three—grains in a spikelet of Spelt, while in Bread Wheat the numbers can vary from two to five grains, according to the number of fertile flowers. The grains of Spelt are

[1] *Acta Archaeologica* (Ejnar Munksgaard, Kobenhavn, 1952), XXIII. 105.

[2] 'Origin, Variation, Immunity and Breeding of Cultivated Plants', by Professor Vavilov (*Chronica Botanica*, U.S.A.), p. 272.

[3] *Acta Archaeologica*, XXIII.

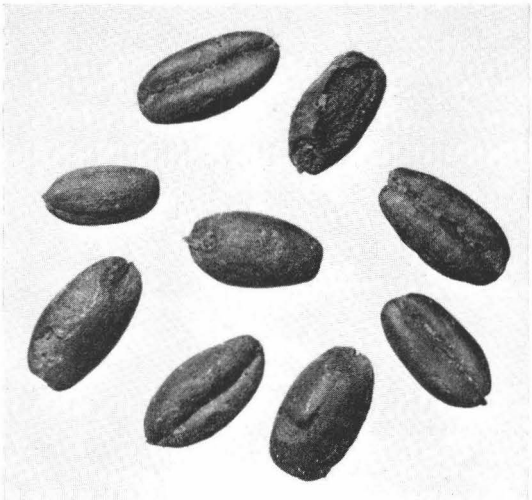

FIG. 1. CARBONIZED WHEAT GRAINS. *Triticum spelta* ($\times 3\frac{1}{2}$)

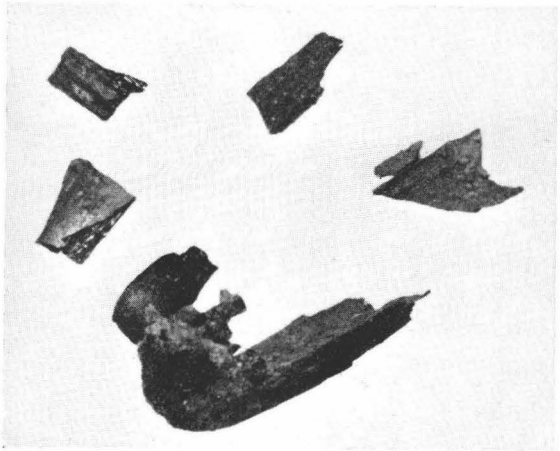

FIG. 2. FRAGMENTS OF THE SPIKELET. A small piece of the ascending internode of rachis is preserved ($\times 9$)

usually more elongated in shape, somewhat tapering towards both ends, curved on the dorsal side, with flat ventral sides. A very high percentage of the grains taken from the pit were very characteristic in shape although smaller; they can have undergone but little change of shape during carbonization. Many were taken out in pairs, furrow to furrow, that is with their flat ventral sides together, and as the *palea*, the upper inner husk between the two kernels, was charred, the two kernels stuck together. Each spikelet having one or two grains in this regard would suggest either Emmer or Spelt.

The dimensions of the grains vary in length from 6·3 mm. to 3·5 mm., in breadth from 3 mm. to 1·8 mm., and in thickness from 2 mm. to 1·5 mm. The grains are bluntly inverted heart-shaped in cross-section, while in length mostly tapered at each end of the grain as stated. Some, however, were more oval in outline, having a somewhat blunt apex. The latter are similar in shape to many varieties of Bread Wheat which we have today. Percival (quoted by Miss Caton-Thompson in *The Desert Fayum*, II, p. 47) indicated that he found the same difficulty with the carbonized material of Emmer (*T. dicoccum*). Whilst the spikelets with chaff resembled Emmer, they contained carbonized blunt-ended grains somewhat like those of Bread Wheat. Mr. Hans Helbaek points out that if the spikelet parts are of a certain species the grains must inevitably be of the same species if they are found *in situ*. He goes on to say that while the kernels change a good deal during carbonization, the spikelet and glume parts do not change principally, except as to size. This is a very important factor when it comes to identification. It is difficult to distinguish wheat grown in Prehistoric Britain by the examination of carbonized grain alone, as changes in the structure of the grain take place during carbonization. For instance, grains with an angular cross-section and pointed apex in the charred state will often appear more or less rounded.

Many who have seen the samples of carbonized grain have wondered whether the grain would grow today, but this is impossible for the following reasons; firstly, the

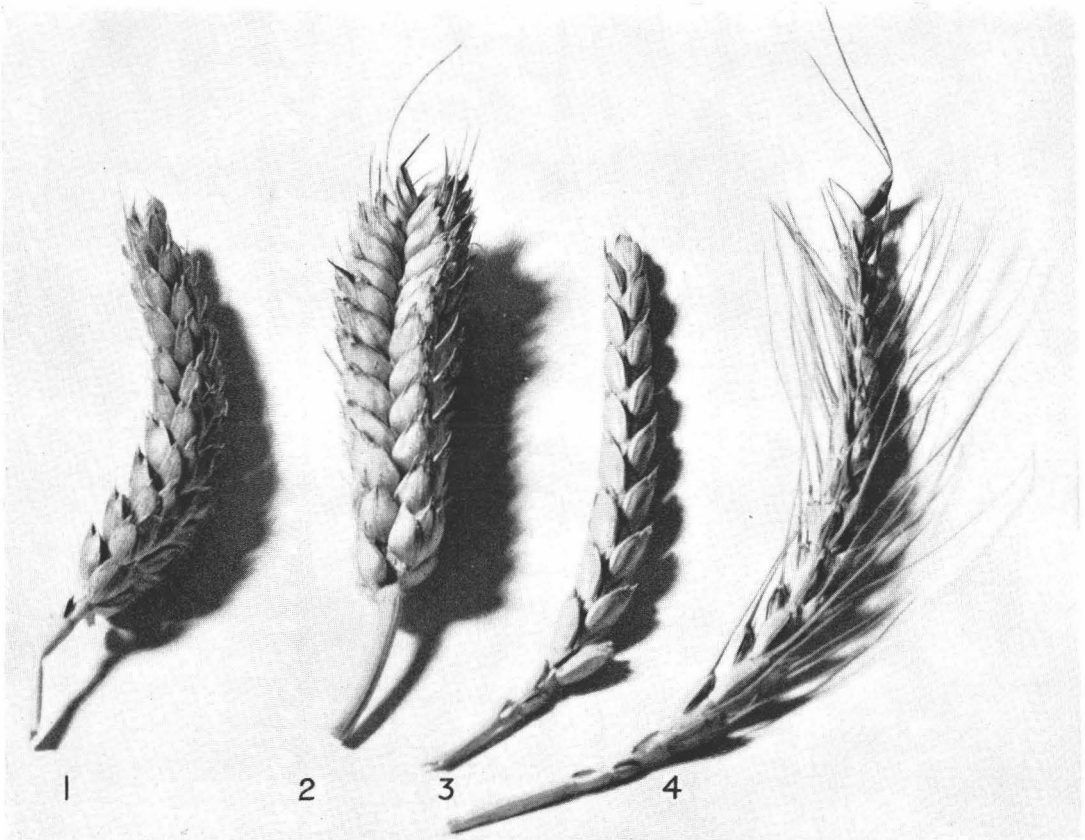

FIG. 3. EARS OF WHEAT. 1. Medium density, Red, *Triticum vulgare*; 2. Dense ear, White, *Triticum vulgare*; 3. White, *Triticum spelta*; 4. Black, *Triticum spelta* (size $\frac{4}{5}$)

grain is now carbonized. Whenever wheat is stored, the process of respiration continues at ordinary temperatures with the destruction of carbohydrates and the production of moisture and carbon dioxide. This does not necessarily involve any great heat, but is sufficient to kill the germ. Secondly, the life of the wheat germ is never more than a few years.

Much valuable information concerning storage pits and their use in Prehistoric Britain is available. For instance, the barrel-shaped pits in the Maiden Castle find in Dorset, like those cut in the natural chalk, are not reinforced; but in places where storage pits were cut through loose material they are sometimes—not always—revetted with dry-built limestone walling.[1] Apart from these pits being used for the storage of grain, pits lined with wood were used to hold water, and considerable quantities of sling-stones were often placed in pits. Pits were used for a variety of other purposes.

The storage of grain on the farm has always been a problem, and the dual need has been to ensure freedom from attack by vermin and keeping qualities. With the slightest rise in temperature due to respiration, or insect infestation, moisture will accumulate on the surface of the grain, and this will cause quick deterioration by mould and localized sprouting. In Early Britain when earth pits were probably the only means of storing wheat, a slight warming or roasting of the grain gave a large measure of safety in preserving the grain. At Wickbourne the grain in the pit had apparently been covered with a red oxide-type clay which had been slightly heated before being put into the pit. This red oxide clay and other refuse undoubtedly helped in the preservation of the grain by keeping out excessive moisture. Curwen states that grain was apparently heat-dried to facilitate storing, as seems to have been done at Wickbourne.

In 1926 Miss Caton-Thompson and Miss Gardner opened up a straw-lined granary pit in the Desert

[1] 'Maiden Castle Report of the Society of Antiquaries' (*Ant. J.* 1935), p. 511.

Fayum, situated sixty miles south-west of Cairo, containing grain, and believed to have been placed there prior to the Egyptian 'Sequences'. In comparatively recent times pits have been used for the storage of wheat, and as far as is known it has kept well for several years in such stores. When Lord Allenby entered Palestine he was informed that wheat had been grown, and not sold, but buried in the ground in pits.[1] Curwen says that if grain were to be stored in the type of storage pit found in Iron Age settlements on the Downs, the lining of the pit with straw or basketry would not prevent the grain deteriorating unless it had been thoroughly dried first with sufficient heat to kill the germ, and thus prevent germination.[2]

The discovery of this particular pit on the Wickbourne Estate, Littlehampton, has been an interesting case when one realizes that this grain has been very well preserved in the ground, and in land that is only a few feet above sea-level. I hardly expect that it would be possible to state if the diggers of this pit originally intended it to be a granary pit as we understand such today. There did not appear to be any lining to the pit. But this is not an instance of a few scattered grains thrown in with rubble; there were actually two layers of threshed corn, although not very deep, spread across the whole surface of the pit. This pit measured approximately 6 ft. across and 4 ft. 6 in. deep and contained two separate layers of charred material and grain, wheat, and a little barley. The bottom layer contained the greater amount, in places 3 in. in depth, and the two layers were separated by something like 18 in. of soil.

Each layer of corn was of varying thicknesses and spread over the whole area of the pit. This would imply that the corn was shovelled in, and, without much levelling, quickly covered with clay. Each layer was clearly defined, which would indicate that the grain was put in the pit for a purpose, either for storage or for

[1] *I Planted Trees*, by St. Barbe Baker (Lutterworth, 1944), p. 123.
[2] *Plough and Pasture*, by E. Cecil Curwen (Cobbett Press, 1946), p. 102, and *Prehistoric England*, by Dr. Grahame Clark.

drying. It was essential before the grain of Spelt wheat was used for consumption that it was roasted to enable the husk or glume parts to come away. This clay had been placed immediately above the carbonized grain, and, whilst in places the red clay is deep and the corn

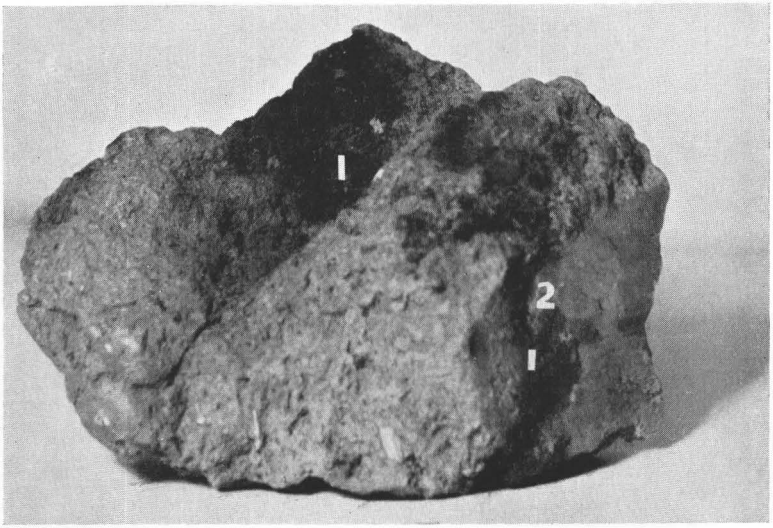

FIG. 4. CARBONIZED WHEAT AND RED CLAY FROM PIT 1. 1. Layer of Carbonized grain; 2. Red clay (size $\frac{1}{2}$)

is shallow, it could be seen that the brown top earth had been shovelled in at the same time as the red clay. This indicates that the clay had not been reddened by internal combustion; moreover, grain could not be expected to heat above 160–170° Fahrenheit, and this temperature would not be sufficient to cause any appreciable change in the character of the soil.

The carbonized grain and charred material were very well preserved. The bottom layer consisted of charred material, carbonized grain, and fragments which showed a likeness to kernels of barley; small particles of these were later isolated and under high magnification showed the cells typical for the seed coat pericarp of barley. The grain was very compact when examined, and compressed pieces and very fine fragments of spikelets

indicated probably that the grain had been crushed at some time in the place where it was found. If it had been ground in a quern no fragments as big as those found would have been preserved. The second layer of grain was more irregular in depth, nevertheless it was not less than one half-inch and in many places several inches, covering the whole area of the pit, and the red clay was found in greater quantities. Here also the grains were carbonized and associated glumes and fragments of the spikelets were well preserved. On examination it appeared that the grain had not been fully threshed, but at least part had been deposited in spikelets. No larger parts of ears were discernible.

In ancient wheats—and Spelt in particular—the structure of the ear is such that the rachis is brittle, whereas the spikelet is strong and holds the grain and its chaff as in a vice. Thus it would appear that the grain had been subjected to a primitive form of threshing. The rachis being somewhat brittle, it is relatively easy to break the spikelets away from their inter-nodes, but such gentle action is not sufficient to separate the grain from the chaff. The ears had been broken up altogether into spikelets which facilitated storing. We learn from the classical writer, Diodorus Siculus (v. 21), that about this period and to the first century A.D. ears of corn were cut off and stored in underground pits.

Acknowledgements

I should like to acknowledge my appreciation to that eminent prehistoric plant botanist and archaeologist, Mr. Hans Helbaek of Copenhagen, for his kindly help and making accessible to me the benefit of his unique experience in plant breeding archaeology; he has kindly confirmed the following botanical species (these were found in the pit described or near by during the Wickbourne excavation):

Wheat grains . *Triticum spelta*
Barley (husked) . *Hordeum* sp.
Rye, most probably genus *Secale*

Vetch or Tares	.	*Vicia* possibly *Sativa*
Chess (weed)	.	*Bromus* (*Secalinus* or *mollis*)
Docks (weed)	.	*Rumex* most probably *Crispus*

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