Cereals of Ancient Egypt and Mesopotamia

By Prof. John Percival

THE origin of civilization is intimately connected with man's discovery of the cultivation of the cereal crops, the grain of which has formed the most important part of the diet of civilized people from the earliest times down to the present day.

It requires but little reflection to realize that the lives of the millions of inhabitants of the villages and towns throughout the world to-day are dependent upon the unceasing toil of the farmer; were he to discontinue his efforts, the congested humanity of our great centres of population could not exist very long. It is, indeed, no exaggeration to say that the total loss of the cultivated crops of one, or at most, two seasons all over the world, would wipe out the greater part of the human race, and leave the towns and all they contain silent and derelict; the farmer is truly worthy of more respect and sympathy than he usually gets.

Who were the first farmers, where did they live and what were the crops which they grew, are questions of fascinating interest on which light is

FIG. 2. *a*, Spikelet and grains of Abyssinian Emmer. *b*, Part of ear, spikelet and grains of Badarian Emmer, from Mostagedda (? 5000 B.C.) (Mr. Guy Brunton). *c*, Badarian grains of Emmer from Mostagedda. *d*, Portion of ears, spikelets and grain of pre-dynastic Emmer, from the Fayum desert. *e*, Naked wheat grains from pre-dynastic Fayum site (Miss Caton-Thompson) (all natural size).

FIG. 1. *a*, Ear of modern Abyssinian Emmer, with spikelet. *b*, Ear of Bere barley, with triplet of single-grained spikelets (about half natural size).

being thrown by the patient researches of archaeologists. Historic records of man's activities take us back some four or five thousand years, at which time village settlements and towns were already established in Egypt and parts of Mesopotamia. Samples of the kind of grain forming, as now, the chief portion of the diet of the people, have been unearthed, and it is to these that I now refer.

From the earliest times in Egypt and in Mesopotamia, two kinds of cereal grains were cultivated, namely, wheat and barley. The wheat which was grown was a kind or race of this cereal known as Emmer (*Triticum dicoccum*). It was a very primitive kind of wheat, with flat ears having long awns or beards, like those of present-day barley (Fig. 1, *a*). Ears of Emmer when thrashed break up into short spikelets (Fig. 1), each of which contains two grains closely invested by the glumes or chaff, so much so that the naked grains for consumption can only be obtained free from the chaff by pounding the spikelets with a long pole

FIG. 3. *a*, Portion of ear, spikelets and grains of Emmer, from tomb of third dynasty, inside enclosure wall of step pyramid of Sakkara (about 3000 B.C.). *b*, Naked Emmer grains from underground gallery magazine, north side of Sakkara pyramid. *c*, Spikelets and grains of Emmer, from tomb of Tutankhamun (about 1400 B.C.). *d*, Spikelets and grains of Emmer from tomb of Eighteenth Dynasty (about 1500 B.C.) (all natural size).

in a kind of wooden mortar. The naked grains are narrow and pointed at each end, much narrower and less plump than the ordinary wheat of our fields to-day.

Emmer is still cultivated for human food in Abyssinia, parts of Russia and India, and in smaller amounts in north-west Persia, Serbia, south-west Germany and the Basque provinces of Spain. It is remarkable that many of the varieties of Emmer still grown are exactly similar in their specific characters to those cultivated by the most ancient Egyptians.

In addition to Emmer (*T. dicoccum*), several other different species of wheat are known with brittle ears which break up readily into short spikelets when thrashed; these are classed together as 'spelt' wheats, 'spelt' being in this case a generic term. Unfortunately, one of these has the specific name "Spelt" given to it, being called Spelt or Large Spelt (English), *Spelz* or *Dinkel* (German), *Epeautre* (French); its botanical name is *Triticum Spelta*. This wheat is a comparatively modern kind, quite unknown to the ancient people of Egypt, but Egyptologists in particular have frequently fallen into the error of translating the Egyptian term for Emmer by the word "spelt" and adding to it the name *Triticum Spelta* instead of *T. dicoccum*.

The ears of the other cereal, barley, are differently constructed from those of Emmer. In barley, three single-flowered spikelets grow close together on opposite sides of the axis of the ear; there are thus six longitudinal rows of spikelets. In the so-called two-rowed barley commonly grown in the fields of Great Britain, only the central flower of each triplet produces grain, giving rise to an ear with two opposite rows of grain. In Bere barley (*Hordeum vulgare*) and Six-rowed barley (*H. hexatichon*), all the flowers of the triplet of spikelets are fertile, and an ear with six rows of grain is produced.

All these kinds of barley are grown at the present time, the two latter being most frequently cultivated in Egypt and other countries bordering the Mediterranean. Both Bere and Six-rowed barley were cultivated in ancient Egypt and smaller amounts of the two-rowed form.

Whether the cultivation of Emmer preceded that of barley or vice versa has been the subject of controversy. A wild kind of Emmer grows in Syria, Palestine and regions near the Caucasus, and is generally accompanied by wild barley. Since there is no character in either which would suggest a preference for one of them, it would appear likely that both were selected contemporaneously by the first cultivators, probably

FIG. 4. *a*, Pre-Dynastic carbonized grains of barley, Fayum desert. *b*, Triplet of grains of Bere barley, single grains, and spikelet of two-rowed barley (?) Pre-Dynastic, from the Fayum desert. *c*, Grains of barley, and two 'seeds' of dandelion (*Lolium temulentum*), from tomb of Third Dynasty, inside north enclosure of the step pyramid of Sakkara (about 3000 B.C.). *d*, Spikelets of barley of Eleventh Dynasty (Gebelien) (all natural size).

FIG. 5. *a*, Carbonized grains of three spikelets of Emmer, from grain room at Arpachiyah, near Nineveh (about 4000 B.C.). *b*, Carbonized grains of Emmer, and *c*, carbonized grains of barley from the same source (Mr. M. E. L. Mallowen, 1933) (all natural size).

thousands of years before the large-scale farmers of the Egyptian dynastic periods. This view is supported by the fact that mixtures of Emmer and barley, and separate samples of the two, have been found dating from the earliest times.

All these ancient grains, whether taken from underground pits, storehouses, tombs or vessels within the latter, are more or less carbonized. Naked grains generally exhibit complete carbonization, becoming changed into charcoal; their appearance suggests the action of fire, and they are often erroneously described as charred or burnt.

The change from the normal to carbonized grain is, however, a natural process which takes place at ordinary temperatures. The carbohydrates cellulose and starch, of which the cereal grains are largely composed, consist of carbon united with the elements of water; under certain obscure conditions, both become slowly dehydrated, leaving behind only the carbon.

The carbonization of complete spikelets is very much less marked than naked grains. The chaff is more resistant to dehydration, and usually appears dark brown in colour. The grains within such spikelets often show little change; the form of the grain, the hairs at its apex, are but slightly altered, and the starch grains in the endosperm retain their shape and reaction to iodine. The proteins of the endosperm are, however, completely decomposed, and the embryo is always disorganized and quite incapable of germination.

For more than a hundred years, samples of wheat and barley have been taken from tombs in Egypt, but only within comparatively recent times have trustworthy records been made of the archaeological horizon from which the samples have

been derived, and the age of many of the earlier finds cannot now be determined. During the last few years, however, much well-authenticated material has been submitted to me for examination, and it is with this that I deal here.

Among the most ancient specimens of cereal grains hitherto discovered in Egypt are those found by Mr. Guy Brunton at Badari (1923-34) and at Montagadda, Middle Egypt, in 1928. Fragments of ears and spikelets were obtained, together with carbonized grains of Emmer (*T. dicoccum*) and grains of Bere barley (*Hordeum vulgare*) (Figs. 2 and 4). The Badarian folk were growing both these cereals at a date antecedent to the pre-dynastic period, which according to some Egyptologists extended from about 5000 B.C. down to 3400 B.C. when the first of the Egyptian dynasties was established. How much earlier than this these samples were harvested cannot be accurately assessed; some authorities have placed them as early as 10,000 or 15,000 B.C.

Another series of excellent samples belonging to the pre-dynastic period was obtained by Miss Caton-Thompson, in the Fayum desert, north-west of the Birket Qurun lake. A number of small straw-lined granaries or pits was discovered, in several of which were portions of typical ears of Emmer with grains (Fig. 2, *d*), as well as grains of Bere barley (Fig. 4, *b*). In some of the pits were found completely carbonized grains shorter and plumper than those of typical Emmer. Whether these are modified Emmer grains cannot be definitely settled, for the exact determination of the species of cereal grains when carbonized presents great difficulty, since the amount of

FIG. 6. Upper group: random sample of grains of wheat from a vase on the site of a Sumerian house at Jemdet Nasr, near Kish (3500 B.C.) (Prof. Langdon). First row of lower group: selected carbonized grains from the sample. Second row of lower group: grains of modern Rivet wheat (*Triticum turgidum*) (natural size).

change in the size and form of the grains which appears in some cases to accompany carbonization is not accurately known.

Very numerous examples of grain from Egyptian tombs of later date are available (Fig. 3). These are invariably samples of Emmer and barley, and for several thousand years down to the end of the dynastic period, no other form of wheat than Emmer was cultivated in Egypt.

The dryness of Egypt has greatly contributed to the excellent preservation of all kinds of objects. In Mesopotamia, however, the other great centre of early civilization, the climate and damp soil have led to the destruction of most cereal grains and other plant remains, and very few specimens of grain from this region have been recovered.

From literary evidence, Hrozný concluded that the two chief cereals of ancient Babylonia were Emmer and barley, exactly as in Egypt, Emmer predominating at the earlier dates.

Two samples of great importance have been submitted to me for examination. One of these was found in 1933 by Mr. M. E. L. Mallowen in a granary during excavations of a prehistoric site at Arpachiyah, four miles east of Nineveh. Carbonized grains of barley, and a primitive, small type of Emmer were present (Fig. 5). These are the earliest grains hitherto discovered in Mesopotamia, belonging to a period 4000 B.C. or earlier. The other sample, sent by Prof. S. Langdon, of

Oxford, was taken by Mr. Henry Field (U.S.A.) in 1926, from a vase on the site of an ancient Sumerian house at Jemdet Nasr, a few miles north of Kish.

Only grains of wheat were present, and these completely carbonized. They were of large average size, with blunt tips and the prominent dorsal hump characteristic of varieties of Rivet wheat (*Triticum turgidum*) (Fig. 6) which belongs to the Emmer group. I gave an account of the sample in NATURE of February 19, 1927. I consider that these grains represent an advance on the earliest forms of Emmer, resembling some superior types of Emmer now grown in Abyssinia, which are sometimes classed as Rivet wheats.

Mr. O. F. Phillips (U.S.A.) has expressed the opinion that these Kish grains are a kind of Club wheat (*Triticum compactum*), but I unhesitatingly regard this view as erroneous. There is no evidence that any wheat of the bread wheat group to which Club wheat belongs was known in any part of the world for some thousands of years after the date attributed to the Kish sample.

Mr. Henry Field records the discovery of barley grains at Jamdet Nasr, but these I have not seen.

It is hoped that archaeologists will look for and carefully preserve all samples of grain which they may unearth in the investigation, paying special heed to fragments of ears and chaff, for these are of importance in the correct determination of the race or species to which they belong.

Biogeography and Ecology of North African Birds and Mammals

THE animal population of the northern parts of the African continent is of exceptional interest to a biologist, both by reason of the great similarity of the conditions in coastal areas to those of southern Europe, and by the striking contrast provided by the Sahara, with its extreme desert regime and highly peculiar fauna. While the fauna of North Africa in its entirety remains still very inadequately explored, our knowledge of at least two groups, birds and mammals, is sufficiently advanced for a comprehensive survey of the fauna. Such a survey is provided in a recent memoir by M. Henri Heim de Balsac*, who has based it not only on all the available literature, but also on personal explorations carried out over many years.

A careful analysis of the mammalian population of the coastal and mountainous Berberian zone reveals the somewhat unexpected fact that its

relationship with the European fauna is not so close as is usually assumed. Apart from bats, three quarters of the species composing the Berberian mammalian fauna cannot be considered European, and are mostly Ethiopian in origin. Bats in this respect approach the birds, among which the majority are European; but there is a considerable proportion of unmistakable tropical forms. Since palaeontological studies have shown a still lower proportion of European forms in North Africa in the earlier stages of the Quaternary period, it appears impossible to retain the idea of any post-Pliocene connexion of Europe with Africa. On the other hand, an exchange of populations with palæarctic Asia, through Libya and Egypt, must have existed until the middle of the Quaternary (Rissian) period. The Atlantic islands (Azores, Madeira, Canaries) are populated by relics of the Tertiary Mediterranean fauna, and did not play any prominent part in the origin of the Quaternary fauna of Berberia.

* Biogéographie des Mammifères et des Oiseaux de l'Afrique du Nord. (Supplément xxi au *Bulletin Biologique de France et de Belgique*.) Pp. 447+7 plates. (Paris: Press Universitaires, 1936.) 125 francs.