

THE RICE GRAINS FROM KHU MU'ANG.

In my small archaeological note on Khu Mu'ang published in the *J.S.S.*, vol. XXVII, Part 1, 1934, on p. 107 I say that a well is shown in the middle of the interior moat facing west. This well is called Bô Khao Săn (the rice well) because when it was dug a thick layer of carbonized rice grains was encountered at a depth of about 3 metres. I obtained some of this stuff and Dr. Kerr, Director of the Botanical Section of the Ministry of Commerce, who kindly undertook to have it examined, confirmed that it really was rice grains carbonized by heat. From the accumulation of a layer of earth of 3 metres thickness on the top of the rice it was surmised that the fire which carbonized the rice, must have taken place long ago, probably at least 250-300 years ago. I said furthermore that perhaps the carbonized rice was the contents of a large rice bin, belonging to the garrison of this old temple-fortress, which was burnt down when it was conquered during the wars in the middle of the 16th century between the Siamese and the Burmese invaders.

From his retirement in England Dr. Kerr sent me, some time ago, a copy of the well known scientific review "Nature," No. 3485, Vol. 138, of August 15, 1936, which contains a very interesting article written by Professor John Percival on "Cereals of ancient Egypt and Mesopotamia." In this article the Professor says that "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."

Dr. Kerr now seems to be in doubt about his first definition of the rice grains as having been carbonized by heat, and he writes to me that in view of Prof. John Percival's opinion, just quoted, he may have been wrong and I right (who at that time, in 1924, considered the grain in question very old).

However, having pondered over this problem for some time I have arrived at the conclusion that the rice grains must really have been carbonized by heat.

Professor Percival says namely further:—"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".

As the climate and soil of this country, Siam, is much more damp than those of Mesopotamia the chances for the preservation of cereals buried in the ground is, of course, even smaller than in Mesopotamia. I take it therefore as the most probable course that our grains in Khu Mu'ang were carbonized by heat and not dehydrated slowly by a chemical process, as uncarbonized grains would quickly have been destroyed by the constant dampness of the soil. In this connection it must be remembered that the place of the layer of the carbonized rice is in the interior moat, which during the rainy season is always more or less inundated.

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