EGYPTIAN BRICKS.

By G. RUDD THOMPSON, F.I.C.

(Read at the Meeting, November 5, 1919.)

A word of apology is perhaps needed in bringing before the Society a paper which is largely of a historical character, but I venture to hope that it may prove of interest in some slight degree. To the average mind the aphorism of the impossibility of making bricks without straw leads one to believe that the bricks referred to (the Captivity period of the Jews) contained straw as an integral material, or some such material roughly so translated; but, though we have the authority of the late Professor Flinders Petrie in stating that it is not essential to mix straw with the native brickmaking material, although some of the ancient bricks may contain it, yet it can be shown that the actual bricks of the Captivity did not contain any.

It has been my lot to examine a number of interesting materials from the Land of Goschen (the actual site of the captivity), amongst them being bricks of undoubted Jewish origin. These came from one of the two fortified cities—Pithom, now Tel-el-Mashkuta. The Israelites being settled in Goschen, the Egyptians employed them to construct defences blocking the eastern road into Egypt in the Wady Tumilat running between the delta of the Nile and the canal. For the purpose of these defences large quantities of bricks were used made from the mud of the River Nile, and we read the order given by the Egyptian taskmasters in reply to the demand for straw: "There shall be no straw given you, yet shall ye deliver the tale of bricks." This of itself is almost evidence that straw did not enter into the composition of the bricks, but was rather used in the process of manufacture. The object of my investigation was to prove or disprove this theory.

I would first remind you that the probable date of manufacture of the bricks would lie between 1580 and 1220 B.C., these being the dates usually accepted for the commencement of the Oppression and the Exodus, so we have at any rate a fairly ancient material before us. The bricks as brought over are large, roughly moulded blocks about $14 \times 10 \times 6$ in. of a dull grey colour, and, although fairly hard and compact, yet break easily when once roughened on the surface. My samples were selected from at least fifty such blocks collected over a considerable area of ground.

I am indebted to an American source for an analysis of River Nile mud taken

near Bubastis, close to the Land of Goschen, which agrees closely with my own results for the bricks. Although an interval of something like 3,300 years has elapsed there has been but little alteration, if any, in the actual materials brought down and deposited by the Nile.

In my investigations of the bricks close attention was paid to the microscopic examination for traces of vegetable matter, especially of the nature of straw or wood fibre; but in no single instance was there any trace of such, and, further, the determination of nitrogen and phosphorus led me to conclude positively that no straw entered into the composition of the bricks.

Now what really happened to give rise to the aphorism already quoted was that in the days of the Captivity the process of brickmaking was similar to that of the present day, and that in dealing with a sticky material such as Nile mud it was necessary to employ some non-adherent material like chopped straw for the workman to dip his hands into and so prevent the mud sticking to them during the moulding and rough surfacing; also to prevent the moulded bricks sticking to the ground during the sun-drying process. The lumps of mud or the sides of the mould were covered with chopped straw so as to enable the brick to be withdrawn, or to prevent the various bricks sticking together when in the plastic condition. I am convinced that the straw or stubble was not an integral part of the bricks, but was used in a purely mechanical manner to facilitate manufacture.

							Brick.	Nile Mud.
							Per Cent.	Per Cent.
SiO ₂	...	...	...	...	...	...	70.40	71.02
Al ₂ O ₃	...	...	...	...	...	...	9.42	9.15
Fe ₂ O ₃	...	...	...	...	...	...	5.71	5.60
CaO	...	...	...	...	...	...	2.13	2.27
MgO	...	...	...	...	...	...	1.37	1.50
K ₂ O	...	...	...	...	...	...	2.32	} 4.00
Na ₂ O	...	...	...	...	...	...	1.38	
TiO ₂	...	...	...	...	...	...	trace	—
Loss on ignition trace of CO ₂	...	...	...	...	...	...	7.20	6.50
Chlorine	...	...	...	...	...	...	trace only	
N	...	...	...	...	...	...	trace only	
P ₂ O ₅	...	...	...	...	...	...	0.002	—
Total	...	...	...	...	...	...	99.932	100.04

Finally, I would mention that the authenticity of the samples is beyond doubt. The two cities or fortifications built by the Israelites were Pithom and the city of Rameses, now Tel-Rotab, the latter being about twelve miles along the narrow marshy valley and the former about ten miles east. The city of Rameses, or Tel-Rotab, is identified by the remains of a town and temple built by Rameses II. the Pharaoh of the captivity; for from this temple a large slab is now in Philadelphia

bearing a pictorial representation of Rameses with an inscription identifying it, and there is no other city except Pithom of this date along the valley, and the city itself is identified by the mention made in the above inscription of the temple of Tum—"Pa-Thum."

NOTE BY EDITOR.—Since this paper was read a communication has appeared (*J. Soc. Chem. Ind.*, 1919, **38**, 439R.) which has an interest bearing on the subject of Mr. Thompson's paper.

NOTE.

The Editor desires to point out that the pages of the Journal are open for the inclusion of short notes dealing with analytical practice and kindred matters. Such notes are submitted to the Publication Committee in the usual manner.

THORPE'S ALCOHOLOMETRIC TABLES: CORRIGENDUM.

HAVING recently noticed an error in the above, I think many analysts would be glad to know of it with a view to making the necessary correction:

Sp. gr. 0·9670. Percentage of alcohol by volume, for 28·69 read 28·60.

Sir Edward Thorpe, in acknowledging my letter, tells me that he has instructed the publishers to alter the plate accordingly.

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