As derived from 19·5743 inches cubit—

Gur = 21·60 C.I. Ka = 60 C.I. or 15,158 Imperial grains.

As deduced by Hommel—

Ka = 15,275·7 Imperial grains.

= 990 grammes.

EGYPTIAN WEIGHTS AND MEASURES SINCE THE EIGHTEENTH DYNASTY AND OF THE RHIND MATHEMATICAL PAPYRUS.

By Lieut.-General Sir CHARLES WARREN, K.C.B., F.R.S.

MR. F. L. GRIFFITH in "Notes on Egyptian Weights and Measures," vols. xiv and xv, "Proceedings Bib. Arch.," points out that the *uten* weighed from 1,400 to 1,500 grains Imperial, and that the kiti (kat) from the beginning of the New Kingdom weighed from 140 to 150 grains Imperial.

He gives the following from the Rhind papyrus and other records :—

Henu (or hon) = 5 utens of water.

Hekt (or gallon) = 10 *henu*.

Apt (dell or tovit) = 4 hekt.

By taking the lower value of the *kat* or *kiti*, this agrees exactly with the measures I have given in Table IX, "Ancient Weights and Measures in the East," Palestine Exploration Fund *Quarterly*, October, 1899.

There is, however, a difference in the number of hons or *henu* to the cubic cubit, which he takes at 20·6 to 20·65 inches. I give 320 hons at 27·3 cubic inches each = 8,755 cubic inches. Mr. Griffith gives 300 *henu* at 29·2 cubic inches each = 8,760 cubic inches. This he does by adopting the higher value of the kiti as 150 grains Imperial; and in a note, p. 406, vol. xiv, objects to 320 *henu* to the cubit cubed as leading to a hon of 27·3 to 27·8 cubic inches.

There is no doubt a great difficulty on the subject if the 300 *henu* to a cubit cubed is to be adhered to. Either Mr. Griffith's value must be accepted when the cubit stands at 20·6109 inches, or else the cubit must be reduced to 20·16 inches, for which I can see no cause.

At the same time it seems to me that there is the great objection to Mr. Griffith's values that the cube sides do not represent either palms or inches, and we have no record of any other units being used.

I think, therefore, that the following are the values to be attached to the various measures given by Mr. Griffith, and in Table IX alluded to (the cubit being taken at 20·6109 inches) :—

		Side cubed.
Cubic cubit = 8,750 cubic inches = 320 hons	.. ..	A cubit.
The *khar* or $\frac{2}{3}$ (cubit)^3 = 5,832 cubic inches = 213·3 hons		18 inches.
The *apit* or $\left(\frac{1}{2}$ cubit$\right)^3$ = 1,092·5 cubic inches = 40 hons		Half cubit.
The *hekt* (or gallon) = 273·1 cubic inches = 10 hons	..	6½ inches.
The *hon* or *hennu* = 27·3 cubic inches = 1 hon	.. ..	3 inches.
The *uten* = 5·46 cubic inches = ⅕ hon	.. .. ..	1·75 inches.

It seems to me that the Egyptians were far more likely to have used an incorrect multiple (viz., 300 and 200 for 320 and 213·3) in these calculations than to have used sides for their cubes which did not accord either with palms or inches.

It will be noted that the *khar* of $\frac{2}{3}$ (cubit)^3 is exactly one-quarter of the kor or homer (*see* Table V, Palestine Exploration Fund *Quarterly*, July, 1899, p. 266), which measure $\frac{1}{2}$ (36 inches)^3.

Mr. Griffith also speaks of a measure of 20 khar; this is exactly $2\frac{1}{2}$ (36 inches)^3 or $1\frac{2}{3}$ (double cubit)^3.

I think it necessary to point out that the term $\frac{2}{3}$ cubit cubed may be interpreted in two ways, either as $\frac{2}{3}$ (cubit)^3 or as $\left(\frac{2}{3}$ cubit$\right)^3$; the former being to the latter as $1 : \frac{4}{9}$.

Mr. Griffith does not appear to have noticed that $\frac{2}{3}$ (cubit)^3 is a cube of 18 inches: $(18)^3 = 5,832$ cubic inches, for cubit of 20·6109. Mr. Griffith, p. 421, vol. xiv, gives 5,827·88 cubic inches for cubit of 20·6. This is another strong proof of the ancients having made their cubic measurements with the cubic inch = $\frac{1}{70,000}$ of double Royal cubit cubed.