

## THE LENGTH OF THE JEWISH CUBIT.

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THE exact length of the cubit which was used by the Jews in the construction of the Temple is a problem which has given rise to much discussion and, up to the present time, it cannot be regarded as definitely fixed. Some writers consider that they have solved the difficulty, each of whom asserts confidently that the length as calculated by him must be the correct one. Unfortunately, however, the conclusions arrived at are not in accordance with one another, the lengths given varying from about 16 to 21 inches. I think, therefore, that any additional light which can be thrown upon the question may be of interest to those who wish to arrive at some definite result, and there is one method of investigation which appears to me not to have received the attention that it deserves.

This is the system of barleycorn measurement upon which, among the Jews and certain other Semitic peoples, the fixing of a standard measure was based. It is generally acknowledged that the ordinary cubit used by the Jews was one composed of 6 handbreadths or palms, each palm of 4 fingerbreadths or digits, and each digit of 6 grains of barley placed side by side so as just to touch one another. The whole cubit was, therefore, equal to 144 barleycorns thus placed. This cubit is identical with the sacred cubit of the Mohammedans both as to the total number of barleycorns contained in it and as to the different subdivisions, so that the origin, whatever it may have been, was probably the same.

Having been unable to find in any work upon the subject that the length of the cubit, as based upon the width of the barleycorn, had been carefully investigated, I procured some ordinary Syrian barley from Jerusalem, and, having cleared it of husks, made a scale of the grains, about 30 inches in total length. The grains were placed exactly touching each other with the axes parallel, and were glued down so as to remain perfectly firm, and thus enable careful and repeated measurements to be taken. To facilitate this the wooden scale in which they were fixed was grooved, the groove being equal in width to the length of a barleycorn, and in depth to the thickness of the grain. The actual length of the groove was 30·03 inches, which just contained 243 grains of barley placed side by side as described. The measurements were taken to one hundredth of an inch and gave the following results :—

Taking the whole length of the scale, 243 grains gave a length of 30·03 inches, which gave for the cubit of 144 grains a length of 17·79 inches.

The length of 144 grains, measuring from one end of the scale, gave a cubit of 17·76 inches. The same from the other end of the scale gave a cubit of 17·78 inches. The mean of these three gave a cubit of 17·777 inches.

Although the breadth of the grains of barley was very uniform, yet there were small differences, so that it appeared desirable to measure handbreadth by handbreadth in order to arrive at an average result. The length of the scale being 30·33 inches, there were rather more than 10 handbreadths in it. The following gives the result of the measurement of these consecutively :—

1st handbreadth	....	....	....	....	2·96 inches.
2nd	”	....	....	....	3·03 ”
3rd	”	....	....	....	2·88 ”
4th	”	....	....	....	2·99 ”
5th	”	....	....	....	2·91 ”
6th	”	....	....	....	2·99 ”
7th	”	....	....	....	3·05 ”
8th	”	....	....	....	2·90 ”
9th	”	....	....	....	3·03 ”
10th	”	....	....	....	2·89 ”

Giving a mean handbreadth of 2·963 inches.

A cubit of six such handbreadths is 17·778 inches, which is probably as accurate a determination of the Jewish cubit as can be arrived at by the measurement of modern Syrian barley. It would, of course, have been satisfactory if, in place of using the barley from Jerusalem of to-day, it had been possible to make the scale from barley grown in Palestine 2,000 years ago, as the size of the barleycorns may have altered somewhat, though probably not to any great extent. Although it is not practicable, so far as I know, to obtain ancient Syrian barley, we can procure Egyptian barley of great age, on account of the custom of placing corn in the cases of mummies, and I thought that it would be of interest to compare the measurement of the cubit, as derived from this mummy barley with that obtained from the modern Syrian barley. Professor Flinders Petrie was kind enough to supply me with a sample of this mummy barley taken from a tomb at Hawara in Egypt, probably dating from the third century of the Christian era. This barley is dark in colour and exceedingly dry. When the husk is removed the grains appear somewhat shrivelled, and are with little doubt rather less in diameter than when originally gathered. Otherwise, in shape and appearance they are very like the modern Syrian barley. With the mummy barley I constructed a scale in the same manner as that already described, and found that 144 barleycorns gave a length of 16·96 inches.

As the grains have shrunk owing to their age and dryness, this cannot be regarded as a positive result, and only proves that a cubit based upon this barley could not have been less than 16·96 inches in length. It is evidently important therefore to arrive at some conclusion as to what the amount of shrinkage probably has been, in order to compare this with the length of cubit as deduced from the modern barley.

There is one way by which we can obtain an approximation to the amount of the shrinkage, namely, by making a comparison with the

length of the Egyptian cubit, of which there have been many determinations, and these, though not exactly the same, agree fairly well with each other. Here, for example, are some of them, with the authorities for each :—

Name of Cubit.	Authority.	Length in Inches.
Nilometer of Elephantine ....	Wilkinson ....	20·6250
The same ....	Jomard ....	20·7484
A cubit of Thebes ....	Harris ....	20·6500
Cubit of the Pyramids ....	Petrie ....	20·6320
The Egyptian cubit ....	Perrot et Chipiez ....	20·6697
A cubit from Memphis ....	Jomard ....	20·4729
A cubit in the Turin Museum ....	Wilkinson ....	20·5730
The same ....	Jomard ....	20·5786
Another ....	” ....	20·6180
Another ....	” ....	20·6584

The mean value of these is 20·6226 inches, which is probably not far from the length of the Egyptian cubit. Many more determinations could be given, which are nearly all between 20·5 and 20·8 inches, and do not contradict the above. This cubit was 7 handbreadths in length, and if we assume that the handbreadth was the same as that of the Jewish cubit, it would be equal to 168 barleycorns.

On the scale made with the mummy barley, 168 barleycorns are equal to 19·66 inches. If we assume that the amount of shrinkage is uniform throughout, allowing for the same proportion, the cubit of 144 grains would be 17·790 instead of 16·96 inches, a result which agrees fairly well with that of 17·778 inches, as obtained from the measurement of modern Syrian barley.

The final result that we arrive at, therefore, is that the Jewish cubit of 6 handbreadths was between 16·96 and 17·79 inches in length, and was probably much nearer to the latter than the former measurement. This confirms the conclusion, based on wholly different considerations, that the cubit was about 17·70 inches. The cubit scale based on this length is as follows :—

	Inches.
1 barleycorn ....	0·123
6 barleycorns = 1 digit ....	0·737
24 „ = 4 digits = 1 palm ....	2·950
144 „ = 24 „ = 6 palms = 1 cubit ....	17·700

The Egyptian cubit of 7 handbreadths, based on the same scale, would be 20·65 inches, which agrees very well with the length of the same cubit as derived from measurements of the Egyptian monuments.

It is worthy of note that the barleycorn, as a unit of measure, gives a more accurate and uniform result than might have been anticipated. It is, indeed, doubtful whether any other natural objects could have been selected by which anyone could make his own measure without difficulty, while measures so made would vary from each other to a very small extent.