

**THE MEASURES, WEIGHTS, &  
MONEYS OF ALL NATIONS; AND  
AN ANALYSIS OF THE CHRISTIAN,  
HEBREW, AND MAHOMETAN  
CALENDARS**

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The Measures, Weights, & Moneys of All Nations; And an Analysis of the Christian, Hebrew, and Mahometan Calendars by W. S. B. Woolhouse

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**W. S. B. WOOLHOUSE**

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BY  
W. S. B. WOOLHOUSE,  
F.R.A.S.; F.S.S., &c.

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## P R E F A C E.

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THE measures, weights, and moneys, established throughout the world, are so diversified in their comparative values and systematic relations that a correct classification of them is a task of greater magnitude than would commonly be supposed. In the present work no labour has been spared to ascertain, in every case, the best attainable information, and the various details have been arranged with especial regard to facility of reference. With this object, the materials appertaining to each locality are uniformly tabulated in the same order, and opposite to each separate quantity or value the English equivalent is distinctly exhibited so as to obviate as much as possible the necessity of any calculation.

The comprehensive principles which influence the fluctuations of exchange are also briefly stated, and correct rules are given for computing the sterling value of coins and bullion.

The tables for the conversion of the standard linear and square measures of one country into those of another were before published in another form, and had recently become out of print. They are here enlarged and more conveniently arranged, and their utility will be fully appreciated by those who may have occasion to consult the architectural and other works of the continent.

The second part of the volume relates to the measurement of time, and comprises a detailed investigation of the Christian, Hebrew, and Mahometan Calendars, with formulæ, tables, and practical rules for performing the various calculations. We have been induced to go more at length into these subjects as they are imperfectly treated in chronological works generally.

We trust that the typographical accuracy of the volume may be effectually secured by the stereotype plates, and that our earnest endeavour to make it generally useful may in some degree be accomplished.

*September, 1856.*

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# MEASURES, WEIGHTS, AND COINS,

OF

## ALL NATIONS.

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### STANDARDS.

#### MEASURES AND WEIGHTS.

MEASURES are of three kinds, viz. measures of LENGTH, called Linear or Long measure; measures of SURFACE, called Square or Superficial measure; and measures of CAPACITY, called Solid or Cubic measure.

WEIGHT may be defined to be the quantity of ponderous matter contained in a solid or fluid substance, taking into account its bulk and the density or specific gravity of its parts, and is determined by the same being balanced in an accurate scale against some known or acknowledged weights placed in the opposite scale.

STANDARDS are carefully-constructed measures or weights of acknowledged authority, by which others are tested or adjusted.

Measures and Weights are of indispensable utility, and are continually employed both in commercial and scientific pursuits. For the latter of these, minute accuracy is particularly essential. There is, however, more difficulty than would at first be supposed, in establishing and preserving correct, uniform, and invariable standards of weights and measures, and a vast amount of scientific research, ingenuity, and labour has been expended upon its accomplishment.

The origin of measures of length is to be found in parts of the human body. Their values, roughly estimated, as well as their names, establish this beyond a doubt. The foot, the digit, the palm, the span, the cubit, the nail, the arm, &c., are in all languages derived from the same source; and, in the popular view of measurement, they do not considerably differ in length. It is also unquestionable that in former times, when authenticated measures were not so easily to be obtained, the hands, arms, and feet were much more frequently used than they are at present, when every workman, however humble, is in possession of a measure.

Taking a well-proportioned man, the fathom is reckoned to equal his height or stature; the girth, or the pace,  $\frac{1}{2}$  of his stature; the cubit, or measurement from the elbow to the ends of the extended fingers,  $\frac{1}{4}$ ; the foot,  $\frac{1}{3}$ ; the span,  $\frac{1}{2}$ ; and the breadth of the palm,  $\frac{1}{4}$ .

The statute 17 Edward II. (A.D. 1324) provides that three barley-corns, round and dry, make an inch, 12 inches a foot, &c. But it is so difficult to know how much of the sharp end of a barley-corn must be cut or worn away before it becomes what was called "round," that this mode of measuring by the *lengths* of barley-corns is very indefinite.

The complete table of the sixteenth century is as follows:— The *breadth* of 4 barley-corns make a digit, or finger-breadth; 4 *digita* make a palm (measured across the middle joints of the fingers); 4 palms are a foot;  $1\frac{1}{2}$  foot is a cubit; 10 palms or  $2\frac{1}{2}$  feet are a step (*gressus*); 2 steps, or 5 feet, are a pace (*passus*); 10 feet are a perch; 125 paces are an Italic stadium; 8 stadia, or 1000 paces, are an Italic mile; 4 Italic miles are a German mile; and 5 Italic miles are a Swiss mile. From this table it would appear that the foot was considerably less even than the ancient Roman foot of 11.6 English inches; the average human foot certainly has not that length.

In the year 1742, the Royal Society had a standard yard constructed, from a minute comparison of the standard ells

or yards of the reigns of Henry VII. and Elizabeth, kept at the Exchequer.

In the year 1758, a select Committee of the House of Commons was appointed to inquire into the state of English weights and measures, and were assisted in their researches by several eminent mechanists, among whom may be mentioned Mr. Bird, a celebrated optician, and Mr. Harris, the Assay Master of the Mint. This Committee prepared with great accuracy two standards, viz. the yard and the pound troy, which were afterwards carefully preserved and justly considered of the highest authority. The standard yard was copied from that of the Royal Society, and having been examined by the Committee was reported to be equal to the standard yard and marked as such.

Since that period no alteration has been made in these standards, though much attention has been paid to the subject, both in and out of Parliament, especially since the adoption of the metrical system of France.

In 1816, in consequence of an address from the House of Commons to the Prince Regent, his Royal Highness appointed a Commission, composed of Sir J. Banks, Sir G. Clerk, Davies Gilbert, Woolaston, Young, and Kater, to consider the subject of English weights and measures; to determine the length of the pendulum vibrating seconds in the latitude of London; and to settle the proportion between the long measures of England and France.

In the first Report, made in June, 1819, no alteration is proposed to be made in the English standards of long measure and of weight, those established by the Committee of 1758 having been found quite accurate.

The second Report, made in 1820, contains the final determination of the Commissioners on the standard of long measure, the length of the second's pendulum, and of that of the metre. The following are the concluding words of this decision:—

“We prefer the Parliamentary standard executed by Mr.