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The Metric System.

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THE METRIC SYSTEM.

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No one who has travelled abroad but esteems the decimal system of our coinage a nearly perfect means of representing aggregates of all kinds of cost.

The clumsy pounds, shillings, and pence of England are only used because London is the commercial centre of the world.

The conceptions of the French Revolutionists of 1798, by their conduct overturning many honored customs, nevertheless brought into being the metric system, or more properly the decimal scheme, which developed itself here as the current coin of the United States through the influence of our own inventive Jefferson;—the destiny of which coinage is to be universal. To complete the effort begun then to simplify commercial terms, Acts have been passed by Congress legalizing its use; though not yet adopted by the departments of Government.

Each State is furnished with standards in this new method. A careful survey of this grand idea—The Metric System—exhibits its breadth, and shows it to be scientific in the highest degree. I have been enabled, by the courtesy of the Deputy Secretary of Internal Affairs of this State, to show the United States metre divided into deci-metres; a deca-kilogramme, kilogramme, and demi-kilogramme, with the gramme and minute subdivisions; also a litre and deca-litre.

By the kindness of the Deputy Secretary of the Commonwealth of Pennsylvania, I am permitted to exhibit the standard U. S. yard, gallon, quart, pint, half pint, and gill, and from sixty pounds to fractions of an ounce.

The unit of measure is called metre from the Greek, *metron* meaning measure; it is one ten-millionth of a quarter of a meridian of the globe. The term "French-yard" is confusing, and should not be used; it expresses nothing, indeed far worse than the real name METRE would convey.

The metre is divided for convenience into tenths, hundredths, and

thousandths, these divisions being respectively called *deci-*, *centi-*, and *milli-*, from Latin roots corresponding to such terms.

Multiples of the unit are called *deca-*, *hecto-*, and *kilo-*, severally ten, hundred, or a thousand times, from Greek sources.

The units are—

First,	the METRE	for measure	of LENGTH.
Second,	" LITRE	"	" VOLUME.
Third,	" STERE	"	" SOLIDITY.
Fourth,	" ARE	"	" SURFACE.
Fifth,	" GRAMME	"	" WEIGHT.

The application of these names preceded by their divisibles or multiples, creates at once a uniform way of ascertaining necessary length, capacity, etc.

The facility of computing the relation which vessels sustain to given quantities is rendered apparent merely by noting that a litre is one cubic deci-metre, and a gramme *one* cubic *centi*-metre.

The correlation of weights and measures is shown to a still greater extent by observing that—

A STERE is *one* cubic metre, an ARE is *one hundred* square metres. The unit of weight, a GRAMME, does away with the three variable pounds, Avoirdupois, Troy, and Apothecaries', which awkward English customs have fastened upon us. To secure a universal unit we reduce the English measure to inches, cubic-inches, square-inches, and grains, only to be done by laborious multiplication and again by compound division.

For instance a standard gallon, U. S.—

Contains . . .	231	cubic inches.
Weighs . . .	$8\frac{3383.8822}{10000000}$	pounds Avoirdupois.
Or do. . . .	$58372\frac{1757}{10000}$	grains Troy.
Temperature . .	39.83°	Fah.
Barometer . .	30.00	inches.

Standard bushel—

Contains . . .	$2150\frac{42}{100}$	cubic inches.
Weighs . . .	$77\frac{627}{1000}$	

Temperature and pressure above.

Avoirdupois pound—

Contains . . .	$27\frac{7015}{10000}$	cubic inches.

Liable to error from mere exertion, showing plainly the need of some comprehensive exponent of quantity.

The whole metric system depends upon the METRE, hence the name; and the GRAMME is *one* cubic centimetre of water at 39.21°

Fahr., 30 in. Bar., or 4° C., and 834 mm. Bar. A litre is one decimetre of water, containing one thousand cubic centimetres, and weighing one thousand grammes. Hence it supplies this requisite integer by fixing one for the three English measures of length, land, surveyor's, and nautical.

For the three English measures of volume, wine, apothecaries', and dry, one.

For surface and solidity one to one, while Avoirdupois, Apothecaries', and Troy are absorbed into one; thus giving *five* units for *eleven*, which are even unreducible to a common one requiring the four above mentioned, namely, inches, cubic inches, and square, as well as grains; while the metric mode resolves itself into two mutually related to each other. Wherever the use of the metric system has been properly explained and understood by scientific bodies, its adoption was not long delayed; the evident ease of representing and calculating mathematical and chemical formula being so apparent and desirable. Its freedom from error and the vulgar fraction, besides the readiness by its use that manual mistake could be detected, recommend its introduction.

The continent has almost universally appropriated this method; even Great Britain has succumbed to the general advance, its learned societies endeavoring to remove the "Three barleycorns make an inch" from its statutes, and the barbaric emblems from medicine, by substituting the more modern decimal for the Egyptian symbolism of ℥j and ℨj. Incidentally I might mention that the ancient Egyptians about 3400 years ago! used these signs:—

Unit or Tenat	⅂
½ " "	ℨ
Di-Drachm	○

By placing the Di-Drachm above the ½ Tenat we get a sign like this $\frac{○}{ℨ}$; dispensing with the lower segment we may easily imagine it written for brevity ℨ.[1]

The Honorable Mr. Layard, in his discoveries about Nineveh, found in the library of the famous Sardanapalus, King of Assyria, B.C.771, units of surface, weight, and volume employed, derived from a single linear measure based upon the sexagesimal system, that is, divided or multiplied by sixty, which combined, it is said, the advantages of the decimal and duodecimal notation.[2]

[1] From American Chemist, vol. vi. p. 167, article by H. Carrington Bolton, Ph.D.

[2] Boston Med. and Surg. Journal, notes, vol. xcvi., No. 22.

The Jewish nation after their captivity brought with them the germs of a decimal system as shown by the following table:—

A Cotyla . . .	10	ounces	avoirdupois	exactly.
An Omer . . .	100	"	"	"
An Epha . . .	1000	"	"	"
A Chomer[1] . .	10,000	"	"	"

Certainly we should endow whatever professes to be scientific medicine, with such essentials as a short, clear, and decisive manner of representing quantities. After once using the metric system in prescribing by grammes, divisions, or multiples thereof, one could scarcely be induced to return to the uncertain signs of the apothecaries.

The Dispensatory and Pharmacopœia give the specific gravity of many substances; the relation sustained between weight and bulk would soon determine them for use or detect adulteration, for example,

1000 cubic centimetres of water measure one litre and weigh 1000 grammes.

1000 cubic centimetres of milk measure one litre and weigh 1032 grammes, hence specific gravity of milk 1.032.

Objection might be urged that the different specific gravities would militate against the use of this method. Three general vehicles form most prescriptions—the diluted tinctures, water, and the syrups. The two former are of nearly equal gravity, while the latter is but one-third heavier. The essential portions of medicines form but small proportions of their bulks, and do not materially increase the volume of prescriptions.[2]

The uses of the metric system to State Medicine is obvious.

Thermometry, now occupying so prominent a position in the diagnosis of disease, has a decimal gradation in the Centigrade Thermometer, that commends itself to our use for similar reasons that the weights and measures do. The melting of ice in water being placed at zero, while the point at which the mercurial column rests when water boils is indicated as the second initial. The space between these indices is divided into one hundred parts constituting a degree. These degrees may be subdivided similar to any scale.

Summing up the whole subject the Metric System impresses one with its DECIMAL order, its purely scientific character, and entire

[1] D'Oyly and Mant, Commentaries on the Bible, Art. Weights and Measures by Bishop of Peterborough. London, 1856.

[2] Am. Journ. of Pharmacy, February, 1877, Prof. Maisch.

adaptability. Why should medicine linger to adopt what chemists, engineers, physicists, and other professional men who have to do with facts and figures so heartily indorse and approve? One can hardly peruse a continental work without finding either the use of the gramme for weight or the centigrade degree for fevers.

Germany, although it despises France and her institutions, gives PARTS in her Pharmacopœia.

Boston has advanced to the use of the metric notation. The New York Medical Society, awakened to the issue, resolves to abandon the heathenish figure which clings with such pertinacity to all prescriptions, and this Medical Society of the State of Pennsylvania should recommend similar action to the scientific and enlightened physicians composing her body.

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