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## THE INTERNATIONAL LANGUAGE OF WEIGHTS AND MEASURES

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HOW difficult it sometimes is to make practise conform to theory has long been and still is shown by the continued opposition, active or passive, to the general introduction of the metric system into the United States and England. There can, indeed, be little doubt that so progressive a land as our own would long since have cast off the burden of the old scale of weights and measures, were it not for the fact that Great Britain, with which our commercial relations are so closely knit, still clings persistently to the so-called English weights and measures. On the other hand, could we pluck up courage enough to take the first step, England would most likely follow our lead after a shorter or longer interval.

Of the great advantages the metric system possesses in simplifying all necessary calculations regarding dimensions, there can be no question. Hence the opponents of its introduction here base their arguments mainly upon the difficulties involved in a readjustment of the various mechanical appliances of manufacture to a radically different scale. However, in many cases this difficulty is more apparent than real, and would merely imply a remarking in accord with the metric equivalent of the old measures, and the actual expense and very temporary inconvenience involved would assuredly be many times remunerated by the great advantages secured.

The first definite proposal for legislation to establish the basic principle of the metric system was made by as thoroughly practical a man as the great diplomatist Talleyrand, who in 1790 brought forward a measure in the French Assembly directing that a new unit of measurement should be established, based on the length of a pendulum beating seconds on latitude  $45^{\circ}$ ; the selection of a pendulum beating seconds as a standard dates back, however, to Picard in 1671 and to Huygens in 1673. While this proposition of Talleyrand paved the way for the elaboration of the metric system, the details of the plan as worked out by the mathematicians Borda, Lagrange, Laplace, Condorcet and Monge, provided for the determination of the exact length of the quadrant of a meridian. Eventually, the ten-millionth part of this became the unit of length, and was denominated "mètre." In 1791 the Assembly sanctioned the measurement of an arc of ten degrees on the meridian of Paris, and as a result of seven years' work by Delambre and Méchain, this task was successfully accomplished.

The weight of a cubic decimeter of distilled water, divided by 1,000,

gave the unit of weight, the "gram," and the contents of a vessel of such dimensions constituted the "litre." From August 1, 1793, the metric standard has been the only one recognized in France and it has since been adopted by almost all the countries of Europe and America, excepting England and the United States, although it received legal recognition here July 27, 1866.

For the effective development of our foreign trade, for the utilization of the great and unique opportunities in this direction that the world war has given and will give us, it is most urgent that all foreign catalogues and publications issued by our manufacturers should have all dimensions expressed in metric as well as in English weights and measures. This can be done by placing the metric equivalents in parentheses. No better object lesson of the superiority of the metric system could be desired than that which would be afforded in this way, as its uniformity and simplicity would thus be brought directly home to every one who consulted the figures.

One notable result of the great demand for war material in this country from the European nations has been the enforced introduction of metric measurements in a large number of the factories devoted to such manufacture. This not only refers to guns, rifles, shells, etc., but also to locomotives, rails, parts of bridges, many tools and pieces of machinery, etc. The increased demand for our goods from South America, and the movement among our manufacturers to take advantage of the check of European exports to South America in order to introduce our productions there more widely and more consistently, works in the same direction. For our manufacturers are slowly learning the important lesson that if we wish to increase our trade in foreign lands we must endeavor to conform to the standards and usages current therein. When the war is over great opportunities will present themselves; but we must prepare now with a universal language of weights and measures.

England and the United States are slow in realizing the waste of time and the chances of error involved in translating the terms of a logical and consistent standard of weights and measures into those which only owe their use to a blind maintenance of tradition. For this reason those of us who favor the widest possible use of the metric system, not merely because this system is in force in all parts of Europe and America except England and our own country, but because of its inherent merits, must welcome every step taken in what we regard as the right direction for the attainment of what would prove a most potent factor in international trade, especially in Pan-America. Hon. William C. Redfield, Secretary of the Department of Commerce, strongly supports the reform, and has noted as an instance of the present confusion that the Philadelphia Mint uses three different standards of

weight in the purchase of ordinary supplies, in that of metals, and in its laboratory, respectively.

A not unimportant step in furtherance of the adoption of the metric system has recently been taken in the gem-dealers' industry, and although this particular application may appear to many at first sight as being of comparatively slight consequence, its educational effect will be more far-reaching than is generally supposed. This concerns the adoption, in precious-stone commerce, of an international metric carat of 200 milligrams, to take the place of the various and discrepant national carat-weights that have for so long been a source of serious annoyance, inconvenience and loss of time for gem-dealers.

When we reflect that there are some 36,000 jewelers in the United States, and that because of the popularity of their wares they come into constant contact with a large section of our population, we can realize the good work they will necessarily perform in demonstrating to their customers the usefulness of the metric system in this particular case, and thus in arousing public attention to its signal merits.

The chaotic conditions with which gem-dealers had to contend will be appreciated when we consider that there were at least eighteen different national or local carat-weights, ranging from that used at Turin, equivalent to about 3.295 grains (213.5 mg.), down to the Bologna carat of 2.91 grains (188.6 mg.). Hence the heaviest, the Turin carat, was a little more than 13 per cent. heavier than the lightest, the Bologna carat.<sup>1</sup> The impossibility of carrying on a diamond business systematically with such an appalling variation in the weight of the diamond carat, and with no possible means of finding an effective check to determine the accuracy of the weights employed, must be clear to all.

As early as 1893, in a paper read in Chicago before the International Congress of Weights and Measures, held in connection with the World's Columbian Exposition, I suggested dividing the carat into 100 parts, and constituting a standard international carat of 200 milligrams, that is, 5 carats, or 20 pearl grains, to a French gram. This represented a depreciation in weight of only about  $2\frac{1}{2}$  per cent. from the carat-weights most in use, and by the universal acceptance of the new standard all the confusing conditions that have so long obtained would be done away with once and for all. Much credit for having definitely initiated this much-needed reform is unquestionably due to Mons. C. E. Guillaume, director of the Bureau Internationale des Poids et Mesures at Sèvres, who energetically and successfully advocated the reform in 1906, before the Commission des Instruments et Travaux, in Paris.

This new standard has now been either exclusively adopted, or officially recognized throughout Europe and America, England having

<sup>1</sup> "The Book of the Pearl," by George F. Kunz and Charles H. Stevenson, p. 323, New York, 1908.

fallen into line by an Order in Council, made on the recommendation of the English Board of Trade, to take effect April 1, 1914. The French law of June 22, 1909, may serve as a model of this legislation, its single paragraph containing the following concise provision:

In the transactions relating to diamonds, pearls and precious stones, the designation "metric carat" may, in violation of the first article of the law of July 4, 1837, be given to the double decigram.

The use of the word "carat" to designate any other weight is hereby prohibited.

While this law, as well as those promulgated in many other lands, make the use of the metric carat obligatory, in the United States its legalization, coupled with its official adoption and use in the Treasury Department from July 1, 1913,<sup>2</sup> for the customs service, and the support accorded it by the resolutions recommending its use from the same date passed by the National Jewelers' Board of Trade, and the National Jewelers' Association, have given to the metric carat all the sanctions that an ordinance commanding its use could have provided.

Most of us are ready to admit that the use of a universal language would do much to remove the national antipathies leading to the armed conflict of nations, and the universalizing of a simple standard of any kind brings the nations nearer together and helps on a better mutual understanding. When the same signs and symbols express to all the same weights and measurements, this will mean a distinct advance along the road leading to international peace and good-feeling. Whereas all the world can learn readily the words *mètre*, gram and litre, how many of us know the words for inch, foot, yard, rod, furlong, mile, league in more than two or three languages; yet the term *mètre* would cover all these and we could all understand what is meant, and accurately.

Our adhesion to the metric standard should be encouraged when we consider that as early as May 20, 1790, Thomas Jefferson, as secretary of state, formulated a decimal system of weights and measures, and embodied the scheme in a report. The adoption of the decimal system in our coinage, already urged by Gouverneur Morris in 1782, probably caused Jefferson to favor its extension to weights and measures as well.<sup>3</sup> Therefore, in adopting the metric system we should only be realizing one of the brilliant and inspirational ideas of the most original thinker among the founders of our republic.

The foregoing testimony plainly shows that the time is ripe for this country of ours to give serious consideration to the question of joining

<sup>2</sup> "The New International Metric Carat of 200 Milligrams," George Frederick Kunz, *Trans. Amer. Inst. Mining Engineers*, New York Meeting, February, 1913 (also the meeting, August, 1913), pp. 1,225-1,245.

<sup>3</sup> S. W. Stratton, director, United States Bureau of Standards, *Encyclopædia Americana*, art. Metric System.

with the other progressive nations of the world in doing business on a metric basis. Is not this the place to take preliminary action toward bringing about this needed reform? We have here representatives from many lines of commercial endeavor, each of whom believe that metric legislation must eventually obtain in this country. It would be a lasting pity, if before we adjourn this evening, we do not form some sort of an organization whereby the several metric committees represented at this gathering, as well as individuals interested in the metric cause will be held in touch with each other. Such an organization should be dedicated to the promotion of metric education and legislation along rational lines.

Our first step should be to bring the commercial organizations of this country to a realization of the fact that our present system of standards is injurious to our foreign trade and is wasteful of vast amounts of our most precious commodity—time. This accomplished, we should proceed to urge legislation along such lines as will bring the needed reform to those who wish it with the least amount of annoyance to those who for their own reasons oppose it.

I believe it entirely feasible to arrange legislation, either by optional use of the two systems of weights and measures for a certain term of years, or by temporary exemption of certain types of machinery manufacture, so that the change can be made with a minimum amount of loss or trouble. I feel that such work is a patriotic duty of all of us present this morning. I believe that we have right now an unusual opportunity for making the metric system, the American, as well as the International Language of Commerce.