DISCUSSION AND CORRESPONDENCE.

THE METRIC SYSTEM.

TO THE EDITOR OF SCIENCE: I wish to add a hearty amen to what Professor Webster has said in SCIENCE, for June 3, 1904, in reference to the timidity of a few (a very few, I think and hope) of the friends of the metric system of weights and measures. As it is now more than a third of a century since I joined in an active dissemination of information regarding this system and an earnest advocacy of metrological reform through its adoption, and as I have enjoyed many opportunities for knowing the attitude of the people on this question, in various parts of the United States and at various times during these years, I hope I shall not be accused of extravagant or careless statement when I say that there are many more advocates of the adoption of the metric system in the country to-day than ever before, and that the opposition to it is not increasing, but everywhere steadily, and in some regions rapidly, decreasing. I will not undertake an elaborate proof of this statement, for it is quite unnecessary to do so and it will be generally admitted, I think, among those who have thoroughly investigated the subject. This sentiment is especially reflected in the general unanimity of opinion among representatives in congress, coming from all parts of the country and particularly in the *aggressive and well-organized opposition* that has developed within a few years. Indeed, nothing has been more encouraging to the friends of metrological reform than the rather sudden appearance of this not inconsiderable and always respectable mass of conservatism in battle array, for if the metric system can not stand under the most searching criticism or relentless opposition, then it ought to fall. Although it may be truthfully declared that there is not an argument against the adoption of the system that was not met and refuted more than twenty years ago, the recent publication of papers, pamphlets, letters, etc., in which the old objections have been restated and the old arguments bolstered up, has served a useful purpose in bringing their weakness to the attention of a larger audience. The people will understand after a while, and they are beginning to understand now, that the commercial interests of the country, both domestic and foreign, are bearing an enormous and wholly unnecessary load on account of the selfishness of a really small group of men engaged in a special industry, whose opposition is generally not due to any objection to the new system itself, but only to the alleged cost of substituting it for the old. In the meantime our great competitors in the world's activities have learned their lesson, most of them long ago; the only one still holding fast (with us) to this relic of barbarism, a thoroughly unscientific system of weights and measures, is just on the point of letting go. That we must follow in the near future is certain and all discussion, even including unreasoning opposition, must hasten the day.

It is of the greatest importance, however, that there should be no temporizing or 'arbitration' with the opposition to this, one of the most, if not the most, important economic reform yet brought to the attention of our people. It would be infinitely better to wait a few years longer (in which the inevitable operation of natural causes will greatly diminish the number of opponents) than to yield to any suggestion looking to the retention of the old units of lengths and mass or to *any* modification, in any essential feature, of the system as it is now in almost universal use among civilized nations.

There is a great necessity for a reform in the method of *using* weights and measures in ordinary commercial transactions, to which the metric system lends itself, and which will be one of the most important incidental advantages of its adoption. I refer to the more general use of weight instead of capacity measures. Practically, nearly every transaction involving quantity of matter can be better managed by weighing than by measuring; better, because nearly always far more accurately, and generally more conveniently. In the part of the world in which I am writing, the kilogram is practically the only unit used in dealing with all commodities, excepting, of course, textile fabrics and the like. There is nothing taking the place of the bar-

rel, bushel, peck, quart, etc., for apples, peaches, cherries, strawberries and berries of all kinds, potatoes, asparagus and, as far as I have been able to note, all vegetables and practically all fruits, except oranges (sold by count) are weighed out in kilos or grams. The man with the push-cart who peddles these things in the street always weighs them, and even the basket-man, whose entire stock in trade may often be bought for less than ten cents, carries his steelyard-like balance thrown over his shoulder. Indeed, I have never seen, as I have gone about the streets of Italian cities, in any of the many vegetable shops or other shops where food material is sold at retail, any other method of measuring quantity, barring a very few cases in which counting is used, as in dealing with eggs or oranges; even liquids are generally sold by weight and when a liter of anything is asked for it is usually weighed. This morning I happened to visit one of the largest grocery and food-supply houses in Florence. Among an almost infinite variety of products sold here there may be mentioned, peas, beans (dry), hominy, meal of various kinds, etc., alcohol, benzine, petroleum and very many other articles, all of which in the United States would ordinarily be sold by the quart, peck, gallon or other capacity measure.

The manager told me that all of these, even including wine in which he deals largely, are sold only by weight; that he had once had a single liter measure in his store which he had used for a time in measuring petroleum, but that he now has no capacity measure whatever in his entire establishment. In some shops petroleum is sold by volume, but in many others always by weight.

The use of weight instead of volume is a great benefit to the purchaser and is equally advantageous to the honest dealer, but it is only possible in a system in which the translation from mass to volume is quickly and easily made. Weighing can always be done with a much higher degree of accuracy than is possible with volume measuring, allowing the same time and care.

Cheating by means of false measures, or by correct measures loosely filled or 'topped,' is very common, and inspectors find it difficult to deal with. False balances and weights are much more easily detected. Then there is that large collection of most uncertain measures of extensive use but without the least legal standing, including the box, basket, crate, package, 'bunch' and the like, by means of which peaches, berries, etc., are retailed to a confiding public, the capacity of box or basket depending entirely on the disposition of the dealer and the scarcity of the commodity. It is worth a good deal to be protected from this sort of petty robbery.

T. C. M.

Florence, Italy,
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HONORARY DEGREES IN ENGINEERING.

To the Editor of Science: For several years our technical press has called attention after each commencement season to the disproportionately small number of engineers among those whose attainments receive the sanction of academic approval in the form of honorary degrees. The *Street Railway Journal,* the exponent in America of the most progressive branch of electrical engineering, calls attention to this unsatisfactory state of affairs in its issue of July 16.

The value of education is to a very great extent realized in service, and there is no better indication of true appreciation of the ends of education on the part of our institutions which are devoted mainly to the beginnings of it than the conferring of honorary degrees wisely.

Our universities, to the extent that they stand for research, have an end in themselves, and academic honors are promptly bestowed upon those who contribute to the advancement of learning. Our colleges and technical schools, on the other hand, are devoted almost exclusively to teaching and they have no end in themselves. No college teacher can draw much inspiration from the meager attainments of his untried graduates. The fruit of his labor is extra-academic, and the effectiveness of his labor depends upon his being sufficiently a man of the world to know these fruits and to draw his inspiration from them. If the