THE METRIC SYSTEM.

A Highly Instructive and Interesting Lecture by Dr. James E. Talmage.

The large lecture hall of the physical laboratory of the University of Utah was packed to its full capacity last (Friday) night with students and citizens assembled to hear President Talmage's exposition of the metric system. The lecture was originally designed for the students of the University and grew out of the following resolution adopted by the faculty last week:

"Resolved that it be the sense of this faculty that the Constitution of the State of Utah should require that the metric system of weights and measures be taught in all the public schools of the State, and that the said system be made the legal system in all public business."

The interest manifested in the subject outside the University caused the time to be changed from the afternoon to the evening in order to give citizens who desired to do so an opportunity to attend. The character of the audience was a surprise to those most sanguine in behalf of the new system. A considerable number of leading merchants and citizens were among the spectators and showed all the symptoms of full converts to the reform.

The subject in the hands of a less able speaker might have been a dry one, but it proved to be anything but that in the present case. The lecturer was introduced by Dr. J. T. Kingsbury, who in a brief way forecast the subject of the evening by calling attention to a few of its most important features. One highly important points made by Dr. Kingsbury was the statement that no fully equipped college in America could be entered for study without a knowledge of the metric system. He explained that that system was the basis of all their physical and chemical apparatus—no other kind was now manufactured.

The lecturer was surrounded by apparatus and various other appliances illustrative of his subject, and behind him on black boards and charts were exhibited tables showing the contrast between the new system and the old ones now in use. The speaker was followed with the utmost attention throughout, and showed the superiority and advantages of the metric system sufficiently clear for the comprehension of the dullest mind in christendom.

Dr. Talmage said: We have all much to do with the weights and measures of material things. Magnitude is one of the general or universal properties of mater; every piece of matter possesses extension in the three directions, length, breadth and thickness; and the existence of this property, which in the simplest of expressions may be named as that of size constitutes the means of defining "matter"—the term that proved so difficult to the early philosophers. To determine and describe this property of matter, some standard of measurement is absolutely indispensable. In very early times, certain portions of the human body were accepted as convenient standards; and hence we derive our terms "foot," "cubit" (from elbow to middle finger tip), "finger's length," "finger's breadth," "hand's breadth," "span," etc. It is is plain that if a unit be adopted, multiple and fractional units may be determined from it. It is said that a certain philosopher once undertook on a wager to determine the number of grains of sand, which, placed end to end, would extend a mile. He found that a certain number of sand grains covered the space of one millet seed; so many millet seeds one bean, so many beans in a span; so many spans in a stride, and so many strides in a mile. Arbitrary standards have been very generally used, in spite of the very great uncertainty and dissatisfaction accompanying their use.

The importance of establishing efficient standards for the determination of size and weight is very clearly set forth in the House of Representatives' committee on coinage, weights and measures of the Forty-sixth Congress:—"There is no subject in which the general business interests of all countries as well as progress in science in all its departments are more deeply involved than in this, hence it is a subject which has occupied the attention of the most abstruse thinkers and the best law-givers in all ages and in all lands and climes. The establishment of the system of weights and measures belongs not merely to the domain of mechanical science, but enters as well into the higher science of metaphysics, and the generalization of history." Even semi-civilized peoples recognize the need of some standard of measurement, and the higher the civilization the more general is the use of the adopted standard. The world calls today for an international standard; a unit of measurement common to all nations having mutual relations of commerce and other dealings. Prof. Barnard writes, "No cause since the earliest organizatien of civilized society has contributed more largely to embarras business transactions among men, especially by interfering with the facility of commercial exchanges between different countries or between different provinces, cities, or even individual citizens of the same country, than the endless diversity of instrumentalities employed for the purpose of determining the quantities of exchangeable commodities."

Let us consider some of the sources of our present units. In the year 1120 King Henry decreed that the British ell or yard should be the length of his own royal arm. A standard rod, purporting to be of the exact length of the king's arm, was deposited in the exchequer. It was broken, however, and was so clumsily repaired that its accuracy could not be trusted. In 1266, during the reign of Henry III of England, grains of wheat became the basis of measurement, and in 1324 there issued from Edward II the solemn decree that barley corns should substitute wheat grains, and the royal word went forth that "three barley corns, round and dry, shall make an inch, and twelve inches a foot." In 1760 a copy of the ancient yard was prepared for the English government, and was known as "Bird's yard stick;" this was destroyed in the great London fire of 1834. At last the British authorities adopted a standard from the most reliable copies of Bird's stick; and of this copy of a copy another copy was made for the use of the United States coast survey. This yard is, however now known to be .001 inch longer than the British imperial yard, a type of which is now kept in London tower. It is copies of this scale which are furnished with sets of weights to the state governors by our common government.

Long ago the French adopted the length of the foot of Louis XIV as the standard length, but this proving as perishable as the arm of the English king, the people of France set about devising a more satisfactory standard as will be afterwards described. Their first proposition was to make the length of a pendulum vibrating seconds at sea level in latitude 45° N, a standard of measurement, and in the determination of this unit the French asked their British neighbors to co-operate, but the latter refused.

The perplexities incident to the lack of a simple and rational system of weights and measures were experienced and deplored by the early fathers of our nation. The Articles of Confederation provided, and the Constitution of our country afterward confirmed the provision, that Congress should hold supreme power in prescribing systems of weights, measures, and the units of coinage.

Washington in his first message to Congress recommended early attention to the subject of providing a uniform system of weights and measures; and in a later communication he repeated the recommendation, using these words: "A uniformity in the weights and measures of the country is among the important objects submitted to you by the Constitution, and if it can be derived from a standard, at once invariable and universal, must be no less honorable to the public councils than conducive to the public convenience." Successors to the presidential chair earnestly urged that an attempt be made to establish a desirable standard, and in July, 1790, Jefferson, secretary of state, proposed to Congress a simplified system founded on a decimal relation. The basis was to be the second's pendulum at sea level, 45° north, and of this $\frac{1}{3}$ was to be the legal foot; each foot contains 10 inches, each inch 10 lines, each line 10 points; 10 feet were to make a decad; 10 decads a rood, 10 roods a furlong; 10 furlongs a mile. The cubic foot was to constitute a bushel, which with multiples and fractions decimally determined was to furnish the secondary units for liquid and dry measure, and the weight of a definite volume of water was to constitute the unit of