THE WAR OF THE METRIC SYSTEM.*

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Although an advocate and user of the metric system, so far as practicable in this country, for nearly thirty years, it amused me to see the present European war thus characterized by an amateur writer for a newspaper. After seeing the same view expressed in one of our critical weekly reviews, the suggestion did not appear so ridiculous.

Offhand, the fact that practically all of the combatant nations use the metric system almost exclusively, with the sole exception of Great Britain, whose entrance into the war is historically an after event, would seem to dispose of the question. But it must be recognized, first, that the Germans have persistently regarded the war as primarily against England, and while present history taken literally shows this view to be an anachronism, it is only fair for a neutral country to await the subsequent submission of evidence before making a final decision. It may be that the German claim can be shown to be not only persistent but consistent. At any rate, getting behind the immediate cause of precipitation of conflict, which was too far fetched to be an explanation and which has practically been forgotten, there is no question that the essential cause of the state of tension in Europe was the growing power of Germany, economically rather than directly military, up to the point at which the restraint of England became an appreciable factor in limiting its further growth.

Taking this deeper view of the war, its designation as one of the metric system is quite understandable, and in no such symbolic sense as the War of the Roses, or the cruder and very recent designation of the present war as one of the sausage against the beef steak. In the literal and narrow sense, the adoption of the metric system by Germany was one of the most important minor reasons for the phenomenal industrial and commercial growth whose regrettable result has been the present war, and we need not discuss the question, at present quite academic, whether this result was necessary. In a somewhat figurative and broader sense, the designation, war of the metric system, is still more applicable. It implies prompt and universal adoption, at the cost of temporary inconvenience and contrary to habit, of something that is ultimately desirable and economic. By itself, the adoption of the metric system by Germany would not have been important—no more important, for example, than the change from Gothic print and script to Roman a few years ago, nor the omission of a few silent letters to simplify the spelling, already close to phonetic perfection compared with the almost purely arbitrary spelling of English. But as one of a considerable number of changes, adopted universally in a comparatively brief space of time historically and involving social, educational, economic, industrial, political, military, naval, and other factors in the welfare of a people, it stands out as a type of German achievement rather than as belonging to other countries, even perhaps including that in which it originated. In this sense, it typifies efficiency and far-sightedness. Grant that not every one of the changes introduced, at the expense of immediate convenience and with a view to ultimate improvement, has been successful. Grant even that this particular change has been unwise, as most of the readers of this article will, if they think as they practise, and it is still evident that the same spirit of seeking

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efficiency in details, broadly applied, will in the aggregate result in superior rate of advancement, unless we assume a general faculty of making unwise decisions.

The metric system typifies German efficiency, civil and military, in quite a different way—convertibility and correlation. This is true in both the literal and the figurative sense. Everything that the army requires that is ponderable, a hypodermic medicine, a loaf of bread, a bullet, a gun; anything that it secures from ordinary commercial supplies without special preparation in advance, is weighed in some decimal multiple or fraction of a gramme. Everything that is measured along a line, the soldier's height, his step, his roads, his blanket, the calibre of weapons, the distance that he travels, and everything that he encounters that is not directly designed for military use but which he may need, is similarly measured by the meter. The sole exception, and this may no longer be true, is that the importation of railroad tracks and rolling stock from England left this form of transportation with the impress of the old miscellaneous units of measurement. The obvious exception of other imports, mostly in bulk, need not be considered as a practical handicap.

Further than this, every branch of the metric system comes together, somewhere, with the others; for example, the Cc. and the gramme, the solid and the liquid bulk ton. Even the mark, the unit of money value, is practically a six gramme weight. It is the same spirit of correlation that has made the immediate adaptation of the railroads and postal service to military requirements possible, that has put the travelling soup wagon, the automobile truck, and a host of other things immediately in the category of military auxiliaries.

As an illustration of the value of the correlative spirit of the metric system, the negative method is the more striking. Ask yourself, for instance, how many pounds there are in a bushel of potatoes, or how much a bushel of water would weigh, or how many cubic inches there are in a gallon. There is an old rhyme to the effect that a pint is a pound. Probably there is some liquid that at some temperature and pressure would weigh a pound to the pint, but there is no accurate and simple relation among any of the necessarily diverse methods of mensuration by weight, length, area, and volume, except in the metric system.

Another negative illustration of the value of the metric system may be put in the terms of the logical development of land. It is first mapped out in degrees and minutes, then surveyed by the square mile, roads are run through by the rod, distances are measured by chains and links. The land is farmed by the acre. It becomes valuable for building purposes and is sold by the foot, linear frontage or square, according to local custom, depending largely on value. The building is erected by feet and inches, some of the metal work being in feet and tenths. Feet of lumber, neither linear nor cubic, come into the estimate. The house is ready for occupancy and is supplied with carpets and curtains by yards of varying width, for carpets even the grade and price deciding whether we deal with three-quarter or one-third fractions if we think in yards or improper fractions, or units if we think in feet. Contrast this with the metric system where, from degree of latitude —obviously the degree of longitude varies—in the original map down to the minutest particular of house furnishing, we are dealing with even multiples of the same unit.

I do not wish to discuss military preparedness further than to say that, so far as the medical profession is concerned, a very important item would be familiarity with the metric system, which is at least theoretically standard for the existing government services. Without such familiarity, much confusion would result in the military medical service if war came. But military preparedness includes a

multitude of items that have nothing directly to do with killing. Nearly every fundamental science which applies to development in peace and equally to war has for some years worked in metric units. This is true of medicine, of physiology, and chemistry, and of a large number of special scientific branches which can scarcely be termed independent sciences, microscopy, pharmacology, bacteriology, serology, etc. A change of units in passing from the scientific to the practical has its obvious disadvantages. The same statements may be made, with some qualifications, as to the relation of the scientific and the practical in nearly every art and industry of peace. Both in its own field and as an example and incentive to other professions and trades, our profession can perform an important service by furthering the general use of the metric system. This service would be of incalculable value from the peace standpoint; it would do much to avert catastrophe if we are to have war. Let us not forget that this service would be something more than facilitating measurements by substituting the advantages of decimal computations and correlated units. It would be a training in coöperative foresight and initiative to secure efficiency.

BRITISH CHEMICAL SOCIETY.

A meeting of the above was held on Thursday, February 3, at 8 P.M., at Burlington House, Piccadilly, W., Dr. Alexander Scott, F.R.S., being in the chair, when Professor W. H. Bragg, M.A., F.R.S., delivered what was subsequently described as a unique lecture, and one of the most remarkable ever delivered in Great Britain. Professor Bragg, together with his son, was awarded the Nobel Prize of last year for the work of which the present lecture was a record. It was entitled "The Recent Work on X-rays and Crystals and Its Bearing on Chemistry," and dealt with a new conception of the atomic and molecular structure of crystalline substances and a method by which the subject might be elucidated.

Professor Bragg said that the subject was still a novel one. It had started from very small beginnings—from the discovery of Dr. Von Lowe that crystalline structure acted as a diffraction grating for X-rays, and that it was possible to throw on a screen a pattern of the structure of a crystal by this means, which gave some idea of the molecular constitution of the substance. By a happy chance, due to the work of the lecturer's son, Lowe's work was simplified, and, what is much more important, made quantitative. The principle upon which the work subsequently described is founded depends upon a simple phenomenon of light. In the ordinary soap film, for instance, if a ray of light is incident upon it at an angle, then one sees a play of rainbow colors over the surface. This is due to the fact that there is reflection of light at both upper and under surfaces of the film.