Letters to the Editor

Relative to the B.S. Degree

After a careful reading of the article entitled "Need for a meaningful B.S. degree" (*Science*, 1946, **103**, 438), I fail to find any references to the A.B. degree, which is far the more common in the colleges. It has been my experience in placing men in graduate positions over a long period of years that graduate schools give preference to A.B. graduates over those who hold the other degree, mainly because the A.B. degree stands for a larger amount of preparation.

In our own institution, which I believe is typical of most others in its class, requirements for the A.B. in Physics include a major of 25 to 35 hours in that subject, 20 to 25 hours in Mathematics, and 10 to 20 hours in Chemistry. The requirements for a Chemistry major are similar, with the emphasis on that subject.

The trend of the discussion in the article mentioned above seems to imply that those who are employing scientists prefer the B.S. degree. Is that a fair statement of the case?

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The Metric System and the Historical Record

Discussion of the history of weights and measures in "Scanning Science" (*Science*, 1946, **103**, 446) and subsequent comment by Arthur Bessey Smith (*Science*, 1946, **103**, 634) invite elaboration.

Duplicates of the standard meter and kilogram, now in the custody of the National Bureau of Standards, were brought to this country late in 1889 and on 2 January 1890 President Harrison officially received and opened these prototypes, allotted to the United States as national standards of weight and length. Although that event created considerable interest in scientific circles and induced widespread notice by the daily press, apparently the general public gave no more than passing attention to the advantages of metric units of weight and measure.

Earlier, in 1866, as Arthur Bessey Smith points out, Congress sanctioned use of the metric system and indicated its relation to the system customarily employed. As the result of legislation in that year, no contract or dealing, or pleading in any court, could be deemed invalid on account of reference to metric weights and measures. No metric standards were established, however.

A proposal to legally define the customary units of weight and measure in terms of the metric standards in possession of the National Bureau of Standards was contained in bills introduced by Representative A. R. Somers (H. R. 8974) and the later Senator Royal S. Copeland (S. 3609) in the 75th Congress, second session, 1938. Similar bills had been introduced by the same sponsors in the first session of the same Congress as H. R. 7869 and S. 2789. The import of the proposal may be ascertained from the following excerpt from testimony by Lyman J. Briggs, director of the National Bureau of Standards, at the hearings on H. R. 7869: "By defining the inch and the pound as certain specified fractions of the meter and kilogram, we base our customary system of weights and measures on material standards that have been shown to be highly stable and constant in value. But in doing so we do not for a moment relinquish the units of our customary system of weights and measures. On the contrary, for the first time in the history of our country their values will be definitely established by this legislation."

From time to time use of the metric units of weight and measure has been seriously urged by various groups and members of Congress. One bill to that end (H. R. 10, 69th Congress, first session, 1926) was subjected to extended study, and the hearings were published. This particular bill provided for the use of metric units in merchandising transactions only and allowed businessmen a period of 10 years to make necessary adjustments. A somewhat different objective is exemplified by H. R. 12580, 66th Congress, second session, which was designed to decimalize the customary units though not to replace them by the metric.

The metric system has figured incidentally in occasional legislation to establish standards for special uses. A Federal enactment in 1893, for example, established "the only standard gage for sheet and plate iron and steel in the United States of America." For each number of gage, tables specified the approximate thickness (in inches and millimeters), weight per square foot (in ounces, pounds, and kilograms), and weight per square meter (in pounds and kilograms). The Secretary of the Treasury was required to prepare suitable standards in accordance with this law.

The charge in "Scanning Science" (*Science*, 1946, **103**, 446) that Congress has left practically unexercised the power of fixing the standard of weights and measures, granted by the Constitution (and previously by the Articles of Confederation), is perhaps a little too strong, even in reference to the metric units. Review of the pertinent literature discloses that several economically important Federal statutes have been passed under the power referred to, and others under the interstate commerce clause of the Constitution. Federal statutes, standards, or orders relate to a varied list of items which includes barrels and baskets, bills of lading, coins, cosmetics, drugs, electrical measure, foods, metals, packers and stockyards, precious stones, proof spirits, and screw threads.

A present problem more urgent than further Federal legislation is that of achieving greater uniformity in the State laws pertaining to bread, coal, packages of merchandise, weighing and measuring devices, and other commodities or articles of direct concern to the public.

Much of the educational leadership in connection with this problem has been borne by Lyman J. Briggs, Ralph W. Smith, and the late F. S. Holbrook, of the National Bureau of Standards. A Model State Law on Weights and Measures, recommended by both the National Council on Weights and Measures and the National Bureau of Standards, is recognized as the most satisfactory basis for developing sound State or local regulation.

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A Dangerous Postwar Development in Science Teaching

Is the teaching of first-year science courses in the colleges and universities of the South to be taken away from the science departments of these institutions? This alarming possibility is proposed in a bulletin, entitled "Studies of higher education in the South," put out by no less an authority than the Committee on Work Conferences of the Southern Association of Colleges and Secondary Schools and currently being circulated for approval by the institutions concerned. The proposal in question is found in Chapter IV, which deals with the teaching of first-year courses in the natural sciences in the postwar era. The following specific proposal is made: "It is further proposed that college and university departments as presently constituted not have control over either methods, subject matter content, or objectives in this phase of general education" (p. 43).

It is significant of present-day trends in higher education to note that no representative of the natural sciences was on the committee which drew up Bulletins VI and VII, Seventh Series, 1946. The opening paragraph of Chapter IV asserts that educators have assigned the natural sciences a place of peerage with the humanities and the social sciences. If the group which prepared this report believes this statement, why were not the natural sciences given some representation on the committee?

There are a number of other disturbing statements made in this bulletin concerning the teaching of science in institutions of higher learning in the South. This note is written to call attention to the fact that the teaching of science is definitely on trial in these postwar days, and that now is the time for scientists to express their criticisms of the unique document under consideration by writing to Dr. Roscoe E. Parker, Executive Secretary, Committee on Work Conferences, Southern Association of Colleges and Secondary Schools, University of Tennessee, Knoxville, Tennessee, prior to the summer meeting of the committee.

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Death-rate Study on a High Molecular Quaternary Ammonium Compound With *Bacillus metiens*

The few reports appearing in the literature on the germicidal activity of high molecular quaternary ammonium salts against spores indicate a very low order of activity for these compounds, especially when compared with their efficacy against vegetative cells. For instance, alkyl dimethyl benzyl ammonium chloride has been shown to kill spores of *Clostridium tetani* in 20 but not 10 minutes at a concentration of 1: 100 at 20°; of *Bacillus anthracis* in 15 minutes at a 1: 10 dilution; and of *Bacillus subtilis* in less than 30 minutes at a 1: 10 dilution at 37° at pH 8.6 or greater. There are numerous reports to indicate that dilutions of the order of 1: 500 of this compound are not effective against spores. The killing action of alkyl dimethyl benzyl ammonium chloride against spores is enhanced at higher temperatures.

As part of a program of study on the rate of action of high molecular quaternary ammonium compounds against bacteria, preliminary experiments were run against *B. metiens* following the procedure described by Weber and Levine (*J. Amer. publ. Hlth*, 1944, 34, 719). The suspension of *B. metiens* in distilled water was heated to 80° C. for 10 minutes to kill vegetative cells, and 1 ml. was added to 99 ml. of the proper dilution of the compound to be tested. The solution was stirred throughout the period of test and samples plated at various time intervals. The germicide used was alkyl dimethyl 3,4-dichloro benzyl ammonium chloride (Tetrosan), and the tests were made at 20° at pH 7.

A 1: 10 dilution of Tetrosan was found necessary to kill *B. metiens* at 20° when tested by the FDA method. The killing dilution of Tetrosan against spores by the FDA method is of the same order as that of alkyl dimethyl benzyl ammonium chloride. A comparison of this killing dilution with the data on death-rate studies emphasizes the striking percentage reduction in the number of spores obtained with dilutions as low as 1: 5,000 and 1: 20,000. These high dilutions seem to kill a large number of spores (60–75 per cent) almost immediately, with a subsequent marked reduction in the rate of killing. Even after six hours only about 90 per cent of the organisms are killed. These results provide an indication that the FDA method does not give a complete picture of the germicidal action of a compound.

It is difficult to reconcile the data obtained with the concept of a logarithmic order of death. Actually, the experiments seem to demonstrate that the original population is made up of spores of very different resistance and that the death-rate pattern is due to the individual resistance.

The results of preliminary experiments, using the same technique with Tetrosan and cetyl trimethyl ammonium bromide, against *Staphylococcus aureus* parallel those obtained with spores. Whereas the killing dilution of these compounds against *Staph. aureus* is of the order of 1: 50,000, when determined by the FDA method, death-rate studies indicate that over 90 per cent of the organisms are killed immediately by dilutions as low as 1: 300,000. These experiments are being extended and will be published in a more detailed form at a later date.

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