sugar, tea or coffee and the hard palates served in the form of meat loaf. Butter was used in the preparation of the meat loaf and it was also served as a spread for the potatoes and crackers. From the results of the digestion experiments with the hard palate it was found that the total fat of the diet was 94.6 per cent. digested. Since the greater portion of the fat consumed was butter this figure is virtually that for the butter included in a protein rich diet—an average of 131 grams of protein was ingested daily by men employed at sedentary occupations. This should be sufficient indication that butter is very completely absorbed when eaten in conjunction with a high protein diet of this character.

SUMMARY

From the foregoing results of numerous digestion experiments it is evident that dairy butter is very completely utilized by the human body. In those diets in which the accessory foods were very nearly if not entirely absorbed by the human body, butter was found to be practically completed digested. When coarser materials, particularly those which provided considerable refuse, were included in the diet it was found that butter was somewhat less completely absorbed by the body. The general conclusion to be drawn from the results of the digestion experiments cited above is that butter eaten in conjunction with ordinary food materials is very completely digested and that for the diets studied, the nature of the diet does not produce a marked difference in the amount of butter absorbed by the human body.

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ARE SCIENTISTS ENCOURAGING POPULAR IGNORANCE?

I HEARTILY agree with the view of Mr. Halsey that readers of SCIENCE should become familiar with the anti-metric case as presented in the recent report of the National Industrial Conference Board, The Century Company, $2.00. This report gives the pro-metric argument as well as the anti-metric argument and is, therefore, signed by the metric members of the committee, but not as Mr. Halsey states, "because they could not do otherwise." Scientists do not need to be told the pro-metric argument, but they should know the character of the arguments advanced by the so-called American Institute of Weights and Measures against the metric system, Mr. Halsey being their paid commissioner. Beyond quoting them at length no comment of mine is necessary.

> For years . . . . the minds of children have been trained to believe in it (the metric system) as the only scientific system certain to become universal. Children leave school imbued with the metric fallacy. . . . Editors of newspapers knowing practically nothing about the subject have aped the schools and colleges, taught the fallacy and increased the ignorance. In the encouragement of the popular ignorance lies the chief danger to our established standards. p. 193.

> Advocates of the English system deny most emphatically that there is any demand worth serious consideration in favor of a change to the metric system in the United States. The deductions drawn from lists of names presented by the metric advocates . . . are wholly fallacious and misleading. . . . If this is the best the pro-metrics can show, only 60,000 to 80,000 people in the United States out of a population of one hundred millions—less than one tenth of one per cent. of the whole—favor a change. Such a demand . . . could be accounted for by the scientific group in this country, which comprises about this proportion of the population and is known to advocate the metric system. . . . The propaganda in favor of the metric system has emanated from one or two propaganda organizations working for the purpose, which have spread broadcast throughout the United States literature of an essentially misleading character. . . . The prominent individuals most frequently quoted as favoring the metric cause are not industrialists and business men, but such professional men as teachers, doctors, inventors and others who are interested chiefly in the scientific aspects of the question and have nothing of material value at stake or have espoused the cause as fallaciously represented by metric propagandists without having given due consideration to the practical side of the issue. p. 192.

We note that the American Association for the Advancement of Science, the American

Chemical Society, etc., have repeatedly passed strong resolutions in favor of the metric system and if we have been duped it is time to know it, because scientific men and teachers do have something at stake in the prosperity of America. We should be informed as to who these propagandists are who are spreading ignorance, what their motive is, and convincing evidence should be given and not merely dogmatic affirmations.

Practically all the real sentiment in favor of a change . . . comes from teachers, scientists, some engineers and from a few manufacturers making refined instruments or other articles requiring a minuteness of measurement. p. 194. Science stands in a unique position. Its methods are ever changing and are easily changed. . . The number of persons and interests involved in the field of scientific activity are small compared with those involved in other fields. For these reasons, . . . the usefulness of parts of the metric system in scientific work and in fine instrument making can not be taken as an indication of the advisability of adopting it gradually in the United States. p. 145. In fact, it is the so-called 'absolute' or centimeter-gram-second (C. G. S.) system rather than the metric system which is actually employed in scientific work. p. 145. In engineering practice it is, as in scientific work, a mixture of other units that is used and has been found of advantage in some connections rather than the metric system exclusively. This is demonstrated in electrical engineering . . . where a 'mongrel system' comprising the C. G. S. or absolute system, the metric system with the centimeter instead of the millimeter as a unit, and English feet, inches and square inches, is used. The units of electrical measurement, the ohm, ampere, volt and others . . . are not intrinsically more metric than English. p. 147.

Whether the absolute system bears the stigma of a "mongrel" system because of the use of the centimeter instead of the millimeter or because of the character of the gravitation constant or because there are 60 seconds in the minute is not clear, but it is hardly an argument against the adoption of the metric system in any case.

English measures and weights are no haphazard modern invention, but have come down to us from prehistoric times. p. 4.

This will be news to many who have been led to suppose[1] that the English yard has been recently established on the basis of the standard meter, replicas of which are kept by the U. S. Bureau of Standards. But the report says:

In fact, the Anglo-Saxon measures of length down to the present have remained on the same basis as is given in the statute of Edward II (1324) where a statement in statutory form of what has since become the well-known rule that 'three barley corns round and dry make an inch, etc.' p. 5.

"The organic growth and selection of the fittest units in the English system make it infinitely better adapted to different uses than the metric system. p. 138. In short, from every angle, the metric system is devoid of the English system's handiness and convenience; its units are either too large or too small for general everyday requirements. . . . The character and names of its units are so tied in with every-day experience that they are readily learned and retained; and the features just mentioned make the English system, as compared with the rigid and inflexible metric system, much more comprehendible to the average mind, and more convenient, adaptable, and comprehensive in filling the needs a system of weights and measures is called upon to fill. p. 140.

The current extensive use of decimals in connection with English units in modern calculations has made the work of computations in that system as easy as in the metric system. The rapid development and extensive use of calculating machines, slide-rules, etc., has . . . enabled computations of whatever kind to be made with equal ease in any system, so that the metric and English systems have in present practice been put on the same footing in this regard. . . . Supporters of the English system deny that there would be any saving of time through the more general use of the metric system in the schools. p. 143.

[1] U. S. Bureau of Standards Bulletin 1, 380 (1905).

"History of Standard Weights and Measures of the United States," by L. A. Fischer.

The United States yard and the British imperial yard were found to differ in length by one ten-thousandth of an inch, but the imperial yard differs in length from its authentic copies by amounts which are at least as great as this. Consequently, it was hopeless to obtain the exact length of the yard and on April 5, 1893, the meter was taken as the standard unit of length for the English system in the United States and containing exactly 39.37 inches.

The same argument in England is made in regard to English money.

The English system . . . has been found acceptable to the great majority of the Latin-American importers and the imports into these countries consist in preponderant degree of manufactured products into which the English system of weights and measures is definitely incorporated,'' in spite of those countries being metric. p. 158. ''Of the millions of dollars worth of machine tools which . . . have (been) sold to France and Germany, the great majority have been sold without request or suggestion that any of the dimensions be made in accordance with the metric system. p. 159.

It would be impossible gradually to substitute new metric standards and equipment for the old as the latter wore out without catastrophic confusion to industrial processes through a protracted period. Even if the change were made suddenly, . . . a long transition period fraught with confusion and disorder would inevitably follow. p. 175.

The proposal actually made by scientists that as far as possible metric designations be used for our existing English standards the report dismisses briefly by saying that it

is impractical and in any event would be quite pointless because it could hardly be considered an adoption of the metric system. p. 175.

Of the well-known case of the Baldwin Locomotive Works building locomotives for Russia purely on metric specifications without changing their equipment, or working force or suffering any inconvenience or delay, the report says:

If we continue to make equipment to existing standards and merely apply metric designations as was done in the case of the 'metric' locomotives built by the Baldwin Locomotive Works, this would be neither the adoption nor the use of the metric system. It would merely be expressing in terms of the metric system, with which the English is incommensurable, an existing standard dimension which is integral and exact in the English system. Such a change, it is held, besides being quite meaningless, would, if feasible, simply introduce confusion and error through calling things by wrong names. p. 176.

So the report proceeds to tell all of the dire calamities that will certainly befall us when the befuddled teachers and scientists have their way over the practical every-day business man.

No possible advantages could result from a change to the metric system, but on the contrary, through such a change Great Britain and the United States would lose the vast trade they now possess with non-metric countries and with respect to metric trade they would surrender their advantages to such metric countries as France and Germany. p. 160.

In spite of Mr. Halsey's statement given above that products incorporating the English system can be used in countries which have adopted the metric system, it appears that if we adopted the metric system *we* could not do the same.

Some conceptions of the difficulties which would be involved in such a destruction of standards is given in the following: . . . All rules, tables, formulæ, used in calculations involving measures of length. All drawings of manufactured articles. All measuring scales and measuring tools, calipers, verniers, etc. . . . All machine tools, leading screws of lathes, . . . locomotives, cars, railroads, and their appurtenances, all marine and stationary engines, all ships. p. 177. We can not regard the use of both systems on the same machine as a thing to be tolerated, much less deliberately encouraged. p. 179.

The man who can estimate or indicate in words the value of mechanical standards to this country does not live. The cost of attempting to change air-brake hose couplings is not represented by the value of the tools for making the couplings in the Westinghouse Works, but by the infinite confusion of the railroads in getting from one standard to another. p. 187.

Finally the report attempts to show that whereas every civilized country except Great Britain and the United States is metric, this is only nominally the case.

The statement that the countries named (France, Germany, Norway, Sweden, Belgium, Switzerland, Italy, Japan, the Central and South American countries, etc., and the Latin acquisitions of the United States) customarily employ the metric system is a pure assumption. No evidence of this is submitted, while, on the contrary, all available evidence shows that in some of these countries the system is used but little, and in none of them is it universal. p. 168.

Hence the report suggests

that a conference of Great Britain, the United States and other countries be called to study carefully all natural systems of weights and measures

with a view to a more complete standardization of the inch and the foot the world over and to draft legislation . . . legalizing it in various countries as a world standard along with, if not superseding the metric system. p. 211.

The reader is referred to the report to see that the true spirit of the argument of the report has been preserved and also to get the pro-metric side.

Such a tissue of deliberate misrepresentation needs merely to be presented to scientific men for its refutation line upon line. Were it true that American scientists and teachers are spreading ignorance, this report would deserve to be a "best seller." But the challenge which it contains should not go unmet. The Council of the American Chemical Society at its recent meeting voted to ask the various scientific, educational, engineering, medical and pharmaceutical societies to send representatives to the Pittsburgh meeting of the society in September to consider what further steps can be taken toward the gradual introduction of the metric system. Here is an opportunity to answer the challenge.

The best answer to Mr. Halsey's contention that it can not be done is that *it is being done.* There has just come to hand the current schedule of chemicals of the national government, which is class 4, which has practically all pure chemicals listed in metric units only. Henceforth all pure chemicals appearing on the general schedule of supplies will be listed and purchased entirely in the metric system for the sixteen bureaus of the government.

In a volume which has just come from the press entitled *Metric System for Engineers,* written by Charles B. Clapham, a London engineer, the author gives an unbiased answer to many of the anti-metric arguments. For example, he says:

All the metric screws likely to be required can be cut on the usual English and American lathes, well within the accuracy required for manufacturing purposes, if *one additional change wheel* is provided. p. 33.

He says significantly, p. 148:

In considering the cost and inconvenience aspect, it is to be feared that many false objections have been put forward; etc.

He notes that a hundredweight contains 112 pounds, that a "stone" if used in weighing potatoes consists of 14 pounds, but when weighing butcher's meat contains only 8 pounds! This is far surpassed, however, by the complexity of the United States bushel. The use of the metric system is steadily growing, every school-boy talking of wave-lengths in hundreds of meters. Much further information on metric progress is given in an excellent work on *World Metric Standardization* published by the World Metric Standardization Council of San Francisco.

The *Valve World* for May, 1922, states:

More than 215 member organizations of the Chamber of Commerce of the United States have gone on record in favor of gradual metric standardization. More than 15,000 manufacturers and engineers have petitioned Congress to enact metric standards legislation, and these represent concerns capitalized at several billions of dollars. The states of Maine, Connecticut, New Hampshire, Utah, Illinois, California, North Dakota and Tennessee have officially memorialized Congress to adopt the metric system as the sole system of weighing and measuring for the benefit of all the people of the United States.

One is reminded of an old couple up in Vermont who went to town; and, passing a shop window, Lucy remarked, "George, why don't you buy a new hat in place of that disgraceful old thing?" To which George replied without going inside to inquire the price of the hat he saw, "I can't afford it. I'd have to get used to a new one. Besides I like the old one and I couldn't wear two."

EUGENE C. BINGHAM

AMERICAN COMMITTEE TO AID RUSSIAN SCIENTISTS WITH SCIENTIFIC LITERATURE

RUSSIAN scientists have been almost completely cut off from access to western European and American literature since 1914. This isolation, coupled with great physical hardships, is naturally interfering with the progress of their work, although it has by no means entirely put a stop to it.

Through many sources appeals are coming from Russian botanists, zoologists, chemists,