

enterprises, directly beget reproductive material capital and increase in corresponding ratio the moneyed wealth of the country, they do so indirectly by their influence on every industry to which beauty lends additional value. Besides this advantage, there is another collateral one of equal consideration: These museums attract myriads of visitors of the best classes, whose necessary disbursements largely enrich the community which founds them, and become a prolific incentive to new business enterprises and industries.

Since the opening of the South Kensington Museum, about twenty years since, up to October 20, 1877, it has received 16,698,008 visitors, a large number of whom were non-residents of London. Yet these indirect material benefits, vast as they be, are but secondary. The chief gain comes from the effect on *mind*. Museums stimulate the intellectual capital of a country to active reproduction in numberless ways that affect profoundly the character and welfare of the people.

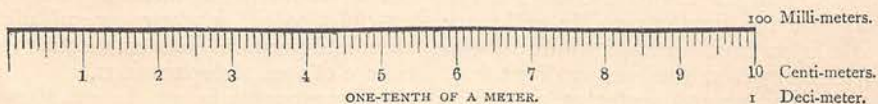
### THE METRIC REFORM.

A REVOLUTION in the humble matter of weighing and measuring, which affects every man, woman, and child in the United States, is now making quiet progress. We are entering upon the transition stage, for we have in partial use two discordant sets of weights and measures. One is the medley inherited from Great Britain and used here from the beginning of our national existence; the other is the metric system, the gift of Continental Europe, predestined, from the time when our Constitution was adopted, ultimately to supplant its rival.

The First Congress passed a vote, 15th January, 1790, calling upon the Secretary of State for a "plan or plans for establishing uniformity in the currency, weights and measures of the United States." In his very able report in reply, dated 4th July, 1790, Thomas Jefferson said: "The experiment made by Congress in the year 1786, by declaring that there should be one money of account and payment through the United States, and that its parts and multiples should be in a decimal ratio, has obtained such general approbation both at home and abroad, that nothing seems wanting but the actual coinage to banish the discordant pounds, shillings, pence, and farthings of the different states, and to establish in their stead the new denominations." He proposed two plans for weights and measures.

One was a simple revision of the existing practice: defining our foot with reference to a pendulum rod; establishing a bushel of  $1\frac{1}{4}$  cubic feet, equal to 8 new gallons, for both liquid and dry substances; making the ounce the weight of  $\frac{1}{7000}$  of a cubic foot of water, and abolishing the troy ounce and pound and the avoirdupois drachm. The other scheme was a purely decimal system, to be founded on a unit of length equal to  $\frac{1}{10}$  of a cylindrical iron rod oscillating in seconds. The cube of this length was to be the "meter" or unit of capacity, and the weight of water it would hold was to be the new ounce, equal to the weight of the silver dollar. Neither of these alternative suggestions produced any practical effects.

A very similar proposition, made at the same time by Talleyrand in the French Constituent Assembly, resulted in the metric system. A decree of 8th May, 1790, sanctioned by Louis XVI., 22d August, requested the king to write to His Britannic Majesty asking the British Parliament to concur with the French Assembly in fixing an invariable standard based upon pendulum experiments, to be conducted by the *savants* of both countries. Great Britain did not join in the movement, but several other nations did take part in the slightly different scheme which was actually adopted. A system of the simplest kind was prepared for the com-



mon use of the whole world; and to avoid offending local prejudices, it was not connected with any existing metrology. The unit of length is the meter,  $\frac{1}{10}$  of which, decimally subdivided, we have just shown.

The unit of weight is the gram, the weight of four cents' worth of our subsidiary silver coinage introduced in 1876. The abridged table on the next page exhibits the character of the system. Annexed to it are the old measures which best correspond with the metric units. Their average variation from exact equivalence is a little over ten per cent.

The alleged merits and defects of the metric system have been warmly discussed. The disputants have ransacked the storehouses of physics, mathematics, history, antiquities, law and social science, in search of ammunition; and have fired a great deal of shot outside of the real battle-field. With regard to the basis of the system, for instance, it has been repeatedly asserted and repeatedly denied that the meter is one ten-millionth part of the earth's quadrant.

On one side is the fact that it was so established by an elaborate meridian survey made expressly for the purpose at the time of the French Revolution. The exciting circumstances under which the task was accomplished arrest the attention. It was conducted by the astronomer, Delambre, who set out under the protection of a royal proclamation; but as the king was soon deposed and beheaded, Delambre became an object of grave suspicion as he traveled about, carrying strange implements and making signals from the hill-tops. He had to explain the principles of geodesy to the natives, and was occasionally arrested when they were not satisfied with his account of himself. Spires were particularly useful landmarks, for many of them had been located by a former survey; but in one region the revolutionists, having an especial grudge against church-towers, had thrown most of them down. When Delambre stretched a white cloth upon a tower to make it more conspicuous for his observations, it was taken for the emblem of a counter-revolution, and he had to put a red stripe on one side of it and a blue stripe on the other, to appease the village patriots. Robespierre and others constituting the Committee of Public Safety compelled him to drop his labors when half finished, alleging that the work ought to be intrusted only to men known for their republican virtues and their hatred of kings. But perseverance finally conquered all difficulties, and the devoted spirit with which the

work was pursued, and the high degree of accuracy attained in its results, alike compel the admiration of opponents.

On the other hand, some later investigators have thought that the actual standard meter is shorter than was intended by about as much as the rule lying on a machinist's work-bench is shorter than the same rule when carried in his pocket and expanded by the warmth of his body. It is said that the earth's figure is irregular; that the length of a single quadrant is not certainly known by the measurement of one-seventh part of it in France and Spain; that other quadrants are of different lengths; and that, in selecting the basis of a system, instead of any one of an infinite number of quadrants, it would have been better to choose the earth's axis of rotation, which is unique. One ten-millionth of the earth's semi-axis is a hair-breadth longer than twenty-five inches. This leads the way to speculations that have less substantial foundation. The supposition has been made that the Hebrews had just that measure; that it was used by divine inspiration in the construction of the Great Pyramid (in addition to other Egyptian cubits, which plainly appear to have been in the builders' hands); and that one purpose of that majestic monument is the preservation of a standard of weights and measures, to abandon which is sacrilegious. Here are involved researches into the wonderful lore of a forgotten civilization, which must deeply interest the thoughtful student.

But what has this to do with our daily weighing and measuring? Few men expect to measure through the earth, or from the equator to the pole, or concern themselves about errors that can only be detected by the microscope. Neglecting the foregoing, therefore, and a variety of other entertaining and instructive arguments, the practical reasons for and against using the metric system here and now may be arranged under five heads:

1. *The metric system is decimal.*

FOR. It is therefore superior for computation. A considerable part of the money which it costs to keep the accounts and do the business of the country would be saved by its introduction. It is unnecessary to argue at length as to the enormous advantages of a decimal progression; for they are made familiar by means of coinage to everybody, excepting only the subjects of Queen Victoria, throughout the civilized world.

ABRIDGED METRIC TABLE.				<i>Corresponding old measures.</i>	
	Myria- means 10,000				
	Kilo- " 1,000				
	Hekt- " 100				
	Deka- " 10				
	Deci- " 0.1	METRIC LENGTH.	<b>METER.</b>	<b>YARD.</b>	
	Cent- " 0.01		DECI-METER.	HAND (4 inches).	
	Mill- " 0.001		CENTI-METER.	BARLEYCORN.	
			MILLI-METER.	1-32 OF AN INCH.	
<i>Corresponding old weights.</i>	METRIC WEIGHT.	<i>Volume of water which has metric weight and fills metric capacity measure.</i>	METRIC CAPACITY MEASURE.		
(Gross) TON.	TON (metric)	1 Cubic meter.	KILO-LITER.	TUN.	
Standard weight of BARREL OF FLOUR.	QUINTAL (metric)	0.1 "	HEKTO-LITER.	BARREL (31½ wine gallons).	
(Net) QUARTER.	MYRIA-GRAM.	0.01 "	DEKA-LITER.	PECK.	
(Av.) <b>2 POUNDS.</b>	<b>KILO.</b>	0.001 "	<b>LITER.</b>	<b>QUART</b> (wine).	
(Troy) ¼ POUND.	HEKTO-GRAM.	0.0001 "	DECI-LITER.	GILL.	

AGAINST. Currency is largely a matter of computation, and is a different affair from weights and measures. The natural division of material things is not decimal, but is by halving and quartering. Even in coinage the 20-cent piece, which is a decimal of a dollar, recently proved to be very unpopular, while the 25-cent piece, which is a quarter of a dollar, is in constant use.

FOR. In weights and measures, as in coins, people can use  $\frac{25}{100}$  and avoid  $\frac{20}{100}$  if they wish. The United States 20-cent coin was unsatisfactory for the simple reason that it was made so much like a 25-cent piece as to be frequently mistaken for it. There is no complaint of the 2-cent piece, the 2-dollar note, and the double eagle, and no demand for a 25-dollar bill or a 2½-cent coin. The 2½-dollar gold piece circulates readily, but so also does the 3-dollar gold coin.

AGAINST. Decimal subdivision is not peculiar to the metric system. The Chinese, who of course invented everything before it was dreamed of by outside barbarians, have long used a decimal system of coinage, weights and measures. About twenty years ago Sweden adopted a complete decimal system based on her old foot and pound. If that is all we want, our easiest way to get it will be to follow her example. Indeed, for some purposes such a practice has been established. Land surveyors have for some centuries used a "chain" divided into 100 "links," and 10 square chains make an acre. Railroad engineers have preferred a chain of 100 feet, decimally subdivided.

FOR. In proportion to its numbers the engineering profession now is one of the most prominent in urging the adoption of the metric system. Last year the Boston and Providence Railroad set up a row of stone posts two kilometers apart along its whole line. Sweden voted in 1876 to abandon her decimals of a foot and a pound, and adopt the meter, and the change will be accomplished in a few years; for, with decimal subdivision, the metric system combines other merits.

2. *The metric units of length, area, volume and weight have very simple relations to one another.*

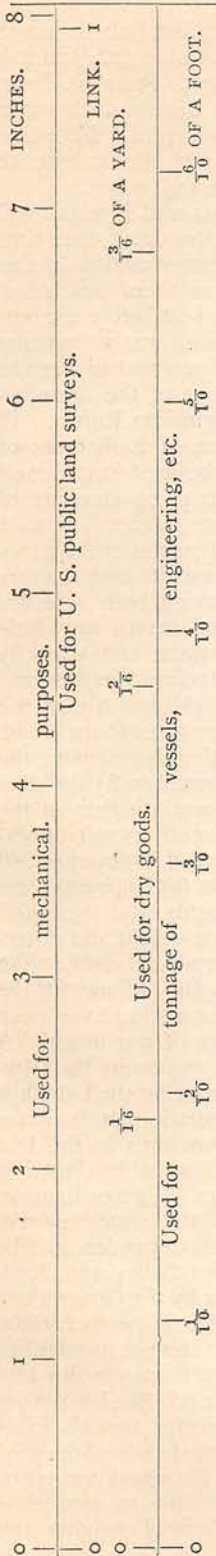
FOR. In this respect they contrast very favorably with the confusion among our old units, as will appear from two or three illustrations.

There are 100 square meters in an ar of land; how many square yards are there in a square rod?

There are 10 hektoliters in a cubic meter; how many bushels are there in a cubic yard?

The pressure of the atmosphere is 1.033 kilos on a square centimeter, or 14.7 pounds on a square inch. To express this pressure as a head of water, move the decimal point one place and we have 10.33 meters as the equivalent height of water column by the metric system. How is the number of feet of water computed by the old method?

If a man wants to know from how deep a well he can raise water with a common suc-



tion pump placed at the top, or if he wishes to reckon the dimensions of a bin to be made for containing a given measure of grain or other commodity, he will appreciate the convenience of these relations.

3. *The metric system has a uniform nomenclature*, simple, significant, and derived from the classical languages of antiquity, the common heritage of all nations.

FOR. Owing to this and the two characteristics previously mentioned, it is very easy to learn, remember and use. On the other hand, any one to whom our old weights and measures are an entire novelty finds it a formidable undertaking to learn all their complicated and irregular tables, with several different tons; with an avoirdupois pound which is heavier than the troy pound, and an avoirdupois ounce which is lighter than the troy ounce; with one measure for dry substances based on a bushel of  $2150.\frac{42}{100}$  cubic inches, and one or two others not in harmony with the first for liquids; with a unit of area equal to a square whose side is 208.71 feet; and with sundry incongruous units of length according to the objects to be measured, the most common ones being shown in the margin. Experienced teachers estimate that the substitution of the metric system would make

a fabulous saving in the work of schools, and, consequently, in their cost. In a country whose salvation depends on popular education and whose money is liberally paid for it, this argument is very weighty.

AGAINST. These many-syllabled Latin and Greek names constitute a great stumbling-block in the way of introducing the metric system. All history shows that in spite of subversive changes in actual things, old names generally survive to be misapplied to new uses. Our very proverbs bristle with references to familiar weights and measures with short names. An ounce of prevention is worth a pound of cure; the word pound remains the same, whether it means 12 ounces or 16; though ounce is the Latin *uncia*, meaning  $\frac{1}{12}$ ; hence, one inch. A miss is as good as a mile, be it statute mile, nautical, geographical, Roman, English, or what you please; the name is quite satisfactory, if it is a miss.\*

FOR. "With what measure ye mete, it shall be measured to you again," comes from a well of English undefiled. According to our dictionaries meter is that which measures. The word is perfectly familiar to our tongues, as the meter of verse, a gas-meter, etc.; and it is appropriately applied to a standard of length. That can hardly be said for mile, which is the Latin *mille*, a thousand. As a length it meant a thousand Roman *passus*, or double steps, and now means about two thousand single steps, or English paces. The new system applies the word as a prefix and says that a millimeter is one-thousandth of a meter, just as we already say that a mill is one-thousandth of a dollar. The metric names will probably be abbreviated in ordinary use; millimeter is one of the longest, and compares favorably with the customary hundred-weight avoirdupois; which, by the way, means 112 pounds, while avoirdupois is a noticeably French word. Pound may be English; perhaps that is the reason why we commonly write it lb., meaning the Latin *libra*, a balance. The same word in Greek is *litra*, whence comes *liter*, the new unit of capacity, according to the appropriate nomenclature adopted by United States law a dozen years ago. It is a little larger than the United States liquid quart and a little smaller than the United States dry quart. It is not a quarter of the old beer gallon, nor of the new British imperial gallon. To

\* The proverb is supposed to have originally referred to two of Charlemagne's soldiers, equally celebrated for gallantry, named Amis and Amile.

propose naming it a quart, which it is not, instead of calling it what it is, a liter, would be an insult to the intelligence of the American people.

AGAINST. Nevertheless the effete despotisms of the old world have frequently found it best in introducing the system to label the new units permissively and temporarily with old familiar names. Witness Belgium, Holland, Germany, Austria-Hungary, Greece and East India.

#### 4. *The metric system is international.*

FOR. Adopted first in France toward the close of the last century, it has been successively introduced by the governments of nearly all the nations in Christendom. Among the people of several of these nations the old standards are already driven out of use, and in the others they are gradually disappearing and are destined soon to be obsolete. Under the Postal Union treaties of 1874 and 1878 the metric system is now used for international postal purposes by the United States, the whole of Europe, and large parts of Asia, Africa, South America and Oceanica. In the vast and increasing intercourse between nations, the advantage of uniformity would be felt in travel and study abroad, in reading foreign literature, and in importing foreign goods. The mere saving in the computations of the custom-house which are due to diversity of standards would furnish a powerful argument on the score of economy. We are now trying to introduce our manufactured goods into foreign markets; if we can make money in that way when our standard sizes and units of measurement are not in harmony with those of the buyers, we could make more money after adopting their system.

AGAINST. The two important exceptions to the list of metric nations are Great Britain, with whom we have about as much to do as with all the rest of the world put together, and Russia, whose measure of length is already commensurable with our foot. We shall lose on the one hand what we gain on the other.

FOR. Fifty years ago Great Britain introduced new capacity measures; they are completely independent of her former standards, which the United States still retains. All our capacity measures, therefore, by which a considerable portion of our commerce is measured, are now entirely at variance with those of the mother country.

The correspondence of Russian measures with ours does not relate to weight nor the

usual capacity measures, but only to length and the square and cube of length, and it is inconvenient enough there. Peter the Great, after his experience in British dock-yards, made the Russian sagene equal 7 feet; that makes the verst 3,500 feet, the archine 28 inches, and the verchok  $1\frac{3}{4}$  inches.

Sometime both Russia and England will change to the metric system, and that time can be hastened by prompt action in this country, which will leave them isolated if they postpone further. Just before the outbreak of the recent Turkish war an imperial commission which had been sent to Paris to examine, reported in favor of the introduction of the metric system into Russia. In Great Britain, by an act of Parliament of 1864, metric terms may be used in contracts and are defined to mean given amounts of British imperial measure; according to a heated opponent, the advocates of the adoption of the meter for use in that country are a strong and increasing body. In India, British measures of length are little used, and those of weight and capacity scarcely at all. The Indian Weights and Measures Act, 1870, establishes the metric units for ultimate adoption throughout British India, and leaves it to the discretion of the Governor-General in Council to fix the date for their use in the several districts of the country, and by particular offices or corporations, or by persons engaged in any specified business or trade, without forbidding the use of British imperial weights and measures. It is expected that metric weight and capacity measures will be introduced earlier than the metric unit of length. Some of the Indian state railways, however, have been constructed with a gauge of one meter. A Canadian Act of 1871 empowers the Governor in Council, whenever he shall think it necessary, to provide metric standards for verifying weights and measures in the Dominion. For years Canada has used a decimal coinage like ours. Two ordinances for the introduction of the metric system into the Mauritius and its dependencies (the Amirante Islands, the Seychelles and Rodriguez), after notification by the Governor in Council, bear date of 28th December, 1875.

AGAINST. It will be safer not to calculate upon any reform England may make until after she shall have made it. She has not yet established a decimal coinage, though that is a matter completely in the hands of the government and has been discussed for years. Her people are thus unable to appreciate justly the merits of decimal weights and

measures; yet their active concurrence will be required for a thorough metrological reform. Within fifty years she kept her exchequer account in Latin with Roman numerals, and a century ago it was kept on notched sticks; in 1834, in burning up those old tallies she set fire to her Houses of Parliament and destroyed her standard yard, pound and gallon. She was a century and a half behind her neighbors in adopting the Gregorian calendar.\*

FOR. The delay with the calendar has been largely due to religious prejudice against the Roman pontiff. But even if England were not likely to abandon her mediæval weights and measures, that would not justify us in adhering to them. She continues to use pounds, shillings and pence; and our substitution of dollars and cents has introduced a great deal of friction into all our commerce with the mother country; yet we honor our ancestors for their action, and we ought to follow their example.

5. *The change will cost a great deal of trouble and some money.*

AGAINST. This is the one great argument against the introduction of the metric system, or any other improvement. Our knowledge of weights and measures is not the mere learning of a few tables by rote. It is our familiarity with certain standards in all of our thoughts and transactions which involve quantity. We conceive of the weight and dimensions of our own bodies, our provisions of food, supplies of clothing, materials of building, of the areas of our farms and house lots, the quantities of our commercial and manufactured products, the distances we travel,—in fact, we conceive of nearly everything that enters our minds, in terms of certain units of weight and measure. To oblige every human being in the United States to forget all that he knows now about size and quantity and begin anew, thinking of everything in terms of unfamiliar units, which are at variance with all our written records of the past, also to manufacture every thing in new standard sizes, is a prodigious undertaking. It is an old saying that you may conquer a people, but you cannot conquer their language. It is now proposed to alter the language of quantity, which is a part (though a small part) of the Queen's English. All our measuring imple-

ments, every yard-stick, quart pot, and bushel basket, the beams of all our scales, every nest of weights and the very gauges of our machinery are to be laid aside for new ones, which, until we become accustomed to them, will seem awkward. This will require a downright outlay of money which is not to be submitted to for any fanciful or merely sentimental reasons.

FOR. This would be a plausible objection if the thing had never been done; but the same transformation has lately been made in central and southern Europe with such success as ought to win over the most hard-headed "practical" man. It is no merely sentimental gain; it is a substantial benefit. In ways already pointed out it will be well worth all that it will cost. The cost will depend very much on the manner in which the improvement shall be made. The remainder of this paper will consider what is the best method of accomplishing this reform.

Although the coming change is necessarily somewhat abrupt in its character, like many others which occur in the natural world and in human society, it may be made, as most of them are, less sudden in fact than appears to a superficial view, by being carefully prepared for in anticipation and gradually perfected after seeming completion. The duration of the interval of chaos should be made as short as circumstances will allow by general and simultaneous action during a period fixed in advance, and thoughtfully provided for. In Europe the nominal time of the metrological reform has varied considerably in different countries, but has generally been from three to seven years.

Suppose everybody to know upon evidence commanding the utmost confidence, that this change is certainly going to be made on or before some particular date, for instance, December 31st, 1889. The largest part of the scale-beams, pocket-rules, taps, dies, and machine-tools, of which such a bugbear is made, will be worn out before that time; and in making renewals previously any man of forethought can manage to avoid much extra expense. The clothier can buy a new measuring wand one meter long, with a yard marked on the back for temporary use. Having this continually before his eyes he will gradually become accustomed to it, and will learn to think in meters as well as in yards without any great effort. The grocer may get a double scale-beam, such as Fairbanks & Co. have been selling for

\* Russia is about adopting it now, it is said, having had enough of reckoning at twelve days variance from the rest of the world.

many years to their South American customers, with pounds marked on one branch and kilos on the other. By thus bridging over the chasm between old and new, he can change his language almost as easily as his coat. New machine tools can be built upon the metric basis and used on any work which is to last long after 1890, while the old machinery continues in service for several years in the completion or repair of former work, and for every thing of a temporary character, which will not outlive 1890. In this way the change was made about ten years ago at the watch factory at Waltham, Mass. Experienced machinists say that they could do likewise with but little trouble. If everybody must have new tools, the shops that make the tools would appear to be special gainers by the reform. If, however, there should be extraordinary expenditure required of them, their customers would have to repay it in increased prices. Some individuals suffer peculiar hardship from any improvement; the introduction of labor-saving machinery throws handicraftsmen out of employment; by the adoption of new weights and measures to save mental labor, some few persons, of necessity, will be injured (professional agitators, if nobody else); but the progress of civilization is not on that account to be stopped. The proposed interval prior to 1890 would afford time for all necessary state legislation. The general government has already supplied accurate metric standards to the several states; they ought to distribute copies, if they have not yet done so, to their local officers, and to make the usual provisions for verifying the actual weights and measures of trade according to the metric system. Time would be allowed also for the preparation of all the technical and other books required for the new system, the apothecaries' pharmacopœia and tables of data, reference manuals, and literature of whatever kind, adapted to the wants of any profession; some of this work is already done. If every man were looking forward to the change as inevitable, and studying how to make it as light a burden as possible to his own business, various ways would be contrived to introduce the new terms gradually into every department; measurement, standard sizes, price-lists and advertisements would all conform to the new *régime*; and the difficulties, which on a general view appear almost insuperable, would be surmounted in detail by a moderate expenditure of money, patience and sustained effort.

The effort ought to be made during an assigned period of years, not whenever it suits individual whim. The latter method is now being tried in some places; in the United States of Colombia (formerly New Granada), the process, still incomplete, has been going on for thirty years or so with sadly picturesque effect; and if our people do not know enough to use a better method, we shall probably drift or be driven into making the change in just that way, with vastly more annoyance and expense than there is any necessity for. So the Erie Railway, which formerly had a broad gauge, has laid down a third rail and now runs trains of both gauges, and could run a mixed train; eventually the outer rail will be taken up, and the road will be of the usual gauge only; but the change thus made will be at the extra expense of maintaining for a series of years about 660 kilometers of rails.

To produce simultaneous action requires that every one shall be seasonably notified and shall be ready. The work of preparation is already going on bravely in the item of teaching children the new weights and measures in school; but it would go on a great deal more merrily if the tax-payers could know that their children would have to use nothing else in practical life a dozen years hence. The schools can do a great deal directly and indirectly. But alone they can never accomplish the desired change; the country will always contain adults who have forgotten much that they learned in school, and it will ever be hard to drop what the business of life makes familiar, and to take up something strange.

It will be a very simple matter to circulate all necessary information about the metric system, and the time allowed for its introduction. We have, moreover, much immigration and importation of books and merchandise from lands where it is already in use, and this will greatly facilitate its introduction. By contrast, it is interesting to observe the difficulties which were experienced in former days of popular ignorance, when the system was new and untried, and had to meet not merely the usual prejudice against any thing strange, but also the patriotic spirit which regarded it as a badge of subjection; for Napoleon's victories carried it forcibly into the Netherlands, Westphalia, Spain and Italy, which promptly rejected it when relieved of the French yoke, but were glad to adopt it again in later years on its merits.

In some cases a compromise has been

resorted to, as in Switzerland, where a foot is established equal to 30 centimeters and divided into 10 thumb-breadths, each equal to 3 centimeters; there is also a pound equal to 500 grams, and capacity measures equal to 15 liters and  $1\frac{1}{2}$  liters. The result of this is that the Swiss metrology has yet to go through a second metamorphosis in order to come into complete harmony with its neighbors. In France, a similar scheme, though somewhat different in detail, was legalized from 1812 to 1840, and was known as the *système usuel*. In ducal Hesse a still different modification was formerly used, and in Baden there was one like the Swiss. Throughout Germany and Austria for customs purposes the zollpfund, equal to a half kilo, was long in use; and it is now the standard in Denmark. In this connection may be quoted some extracts from the report of a committee of the Federal Parliament in 1868, on the project of a law for the regulation of weights and measures for the North German Confederation:

“ \* \* \* If the new [metric] system is to be adopted at all, it must be introduced in its full integrity; any half measure now must necessarily lead in a short time to further changes, and consequently new annoyances to the public. The introduction of the zollpfund in 1856 may be held up as a warning in this respect. The great inconvenience and cost of its introduction will be in every one's recollection; all was willingly borne because it was universally acknowledged to be a real step in advance, the new pound being exactly equivalent to a half kilogram. But if, instead of this half step, the whole step had then been taken of adopting the French kilogram as unit of weight, we should have been saved the present necessity of once more changing our weights. \* \* \* ”

“ To those who at the time advocated the entire adoption of the kilogram, it was objected that it differed too much from the unit of weight in common use, and that it was desirable to approximate the new pound as closely as possible to the old one. Now the truth lies just the other way. The transition from one weight to another is much easier when the new weight differs so greatly from the old as to preclude the possibility of confounding one with the other. Thus the old pound of 28 loth weight has doubtless often been confounded with the new pound of 30 loth, but certainly never with the kilogram of 60 loth. Nor will a new name be in any way detrimental, but rather advantageous.”

The body which in our country should naturally express the popular will in favor of any change of standard, and should determine and make known the period at which the change can be accomplished, is plainly Congress. The Constitution expressly pro-

vides that “the Congress shall have power” to “fix the standard of weights and measures.” The House of Representatives has had a standing committee on coinage, weights and measures for about fifteen years past. The Act of July, 1866, permitted the use of the metric system. The committee then said in their excellent report accompanying their bill for this purpose:

“The interests of trade among a people so quick as ours to receive and adopt a useful novelty will soon acquaint practical men with its convenience. When this is attained,—a period, it is hoped, not distant,—a further act of Congress can fix the date for its exclusive adoption as a legal system. At an earlier period it may be safely introduced into all public offices, and for government service.”

That earlier period is now at hand; for, in the last Congress, the committee, after obtaining the opinions of the officers of the executive departments, presented an elaborate report (7th January, 1879), which closes with an earnest recommendation of the early enactment of a law to establish the metric system in the post-offices and custom-houses July 1st, 1880. It is already in use on the Coast Survey and in the Mint, for foreign postal purposes and by the medical department of the Marine Hospital service, but these uses do not bring it much in contact with the people. Its use in 40,000 post-offices, and in every custom-house, arsenal, dock-yard, fort and military post, in all contracts for government work and every purchase of government supplies, would carry the new system among our whole population more effectively and economically than any other instrumentality.

It ought not to be overlooked, however, that for any government to adopt the new weights and measures entirely in advance of the readiness of its people for the change would produce a lamentable state of confusion; such as may now be seen in several of the republics of Central and South America. Their citizens, who are but imperfectly qualified for the onerous duties of self-government, continue to use in private transactions a variety of old standards, generally of Spanish origin, in spite of legislation expressly prohibiting them, while the official business of the governments is conducted in terms of the metric system. In order to secure decisive action by our Congress, the people must make known their desire for it; and the simplest course is to petition Congress.