M.R.O. 1—39,000—16-10-20.

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 1147 — Press Mis.

582-583

Dated 28 th April 1869

Not to be folded or roughly handled

No. 582. Read the following letter from the Metric Committee of the British Association, to His Excellency the Governor of Madras, dated 10, Farrar's Building Temple, London, 25th January 1869 :—

A DEPUTATION from the Council of the International Association for obtaining a Uniform Decimal System of Measures, Weights, and Coins (British Branch), and the Metric Committee of the British Association for the Advancement of Science, having waited upon the Secretary of State for the Colonies to urge the expediency of extending the use of the Metric System of Weights and Measures in the Colonies, we have the honor, in the name of the Council and Committee, to lay before your Excellency the following facts.

As your Excellency is aware in 1864 an Act of Parliament passed, being the 27 and 28 Vic. Cap. 117, entitled, "An Act to render permissive the use of Metric Weights and Measures in the United Kingdom," which was the result of a Parliamentary inquiry conducted in 1862 by a Committee of the House of Commons, appointed to consider the practicability of adopting a single and uniform system of Weights and Measures, with a view not only to benefit our internal trade, but to facilitate our trade and intercourse with foreign countries. Upon reference to the report of that Committee, whose Resolutions we have the honor to append, your Excellency will see that it came to the unanimous conclusion to recommend the introduction of the Metric System in the United Kingdom, as the only means for remedying the great inconvenience now experienced from the multitude of Weights and Measures in use.

Since the passing of the Metric Weights and Measures Act, much has been done to promote the practical adoption of the new system, and we trust that, with an increasing knowledge of the same throughout the country, the time will speedily arrive when a still more definite legislative measure may be safely introduced. A Bill to render the Metric System compulsory within three years was, in fact, introduced in 1868 by Mr. Ewart, and passed a second reading by a majority of 217 against 65, and it was withdrawn only because it was too late in the Session, and the House was greatly occupied with the Reform Bill.

It is quite unnecessary for us to call the attention of your Excellency to the fact, that the Metric System is founded upon a scientific basis, the principal unit, the unit of length—the Metre—being a definite portion of the quadrant of the earth's Meridian, and that it has a decimal system of divisions and multiples, with a special nomenclature at once simple and significant of the respective quantities. This system, ever since its introduction, has made a steady advance towards universal adoption; and wherever any change has been made, as in Spain, Portugal, Italy, Greece, Belgium, Prussia, South America, etc., etc., the Metric is the only system chosen, and, when once chosen and put in practice, it has never been abandoned. At this moment, as your Excellency will see from the Table appended, as many as 116,000,000 of people have adopted it in a compulsory

manner, 43,000,000 more in part only, and 86,000,000 more in a permissive manner, giving a total of 275,000,000 of people recognising this system as the only basis of uniformity, with whom more than half the total foreign trade of this country is carried on. But much remains yet to be accomplished; and the desire for universal uni formity in these great instruments of international intercourse has been expressed on many occasions of a public character, such as the International Exhibitions of 1851, 1855, 1862, and 1867, and the International Statistical Congress held at Brussels, Paris, Vienna, London, Berlin, and Florence.

From this distance, the Council of the British Branch of the International Decimal Association and the Metric Committee do not venture to suggest to your Excellency any specific measures. Yet they would respectfully submit that it would be a decided advantage, first, to legalise the use of Metric Weights and Measures in the Colony, in order that its legislation on the subject may be in unison with that of the United Kingdom; and, secondly, what is equally important, to promote the teaching of the Metric System in all public schools. The rapid increase of the commerce of all British Colonies with countries using the Metric System, renders such steps highly necessary; and the Council trust sufficient reasons have been shown for recommending to your Excellency a measure which is likely to bring your Colony within the net-work of Countries and States throughout the world having one Uniform System of Measures, Weights, and Coins.

We have much pleasure in informing your Excellency that the "Warden of the Standards," who has charge of the Weights and Measures Department of the Board of Trade, and who also has the custody of the Imperial Standards will be happy to forward to your Excellency any information respecting the law on the subject in this country.

We have the honor to submit to your Excellency the enclosed Documents, viz:—

Concise Narrative of the International Decimal Association.

Reasons for the adoption of the Metric System.

Description of the Measures and Weights of the Metric System.

Debate in the House of Commons, 1st July 1863.

Debates in the Houses of Commons and Lords, 1864.

Copy of an Act to render Permissive the Use of the Metric System of Weights and Measures, 1864.

Debate in the House of Commons on Mr. Ewart's Bill, 1868.

Copy of the Bill to establish the Metric System of Weights and Measures, 1868.

Last Report of the Council of the British Branch of the International Decimal Association.

We would also call your Excellency's attention to the Report of the Committee of the House of Commons, 1862, already referred to; the Report of the International Conference on Weights, Measures, and Coins, held in Paris in 1867, communicated by Professor Leone Levi to Lord Stanley, and presented to both Houses of Parliament

by command of Her Majesty, 1868; the Report of the Royal Commissioners on International Coinage, 1868; and to other papers and documents published by the International Association on the subject. A Mural Standard, exhibiting the Metre and Yard in juxta-position, has been carefully executed in porcelain for public exhibition, and this, with an explanatory Tablet of the Metric System, may be obtained at a moderate charge by application to the Secretary.

By the kind permission of the Secretary of State for the Colonies, this letter and enclosed documents are transmitted through the Colonial Office.

Resolutions of the Committee of the House of Commons, 1862.

That the use of the Metric System be rendered legal. No compulsory measures should be resorted to until they are sanctioned by the general conviction of the public.

2. That a Department of Weights and Measures be established in connection with the Board of Trade. It would thus become subordinate to the Government, and responsible to Parliament. To it should be entrusted the conservation and verification of the standards, the superintendence of Inspectors, and the general duties incident to such a department. It should also take such measures as may from time to time promote the use, and extend the knowledge of the Metric System in the departments of Government and among the people.

3. The Government should sanction the use of the Metric System (together with our present one) in the levying of the Customs duties; thus familiarising it among our merchants and manufacturers, and giving facilities to foreign traders in their dealings with this country. Its use, combined with that of our own system, in Government contracts, has also been suggested.

4. The Metric System should form one of the subjects of examination in the competitive examinations of the Civil Service.

5. The *gramme* should be used as a weight for foreign letters and books at the Post Office.

6. The Committee of Council on Education should require the Metric System to be taught (as might easily be done by means of tables and diagrams) in all schools receiving grants of public money.

7. In the public statistics of the country, quantities should be expressed in terms of the Metric System in juxta-position with those of our own, as suggested by the International Statistical Congress.

8. In private Bills before Parliament, the use of the Metric System should be allowed.

9. The only Weights and Measures in use should be the Metric and Imperial, until the Metric has been generally adopted.

10. The proviso (already noticed) in the 5 and 6 Wm. IV. Chapter 63, Clause 6, should be repealed.

11. The department which it is proposed to appoint should make an annual report to Parliament.

COUNTRIES WHERE THE METRIC SYSTEM HAS BEEN INTRODUCED IN AN OBLIGATORY, PARTIAL, OR PERMISSIVE MANNER.

THE AMOUNT OF TRADE BEING EXTRACTED FROM THE ANNUAL ACCOUNTS OF THE BOARD OF TRADE FOR 1867.

Countries.	Population.	Real Value of Imports.	Declared Value of exports of British, Foreign, and Colonial Merchandise.	Total Trade.
Countries where the Metric System is obligatory.				
France, with Algeria	40,500,000	£34,600,000	£23,000,000	£57,000,000
Belgium	5,000,000	7,500,000	7,300,000	14,800,000
Netherlands	23,000,000	11,000,000	16,300,000	27,300,000
Italy	24,000,000	3,100,000	6,000,000	9,100,000
Roman States	700,000	—	—	—
Spain and Colonies	21,000,000	11,400,000	6,800,000	18,200,000
Portugal and Colonies	8,000,000	2,800,000	2,300,000	5,100,000
Greece	1,200,000	1,100,000	900,000	2,000,000
Mexico	8,000,000	300,000	900,000	1,200,000
Chili	1,600,000	4,400,000	2,600,000	7,000,000
Brazil	8,000,000	5,900,000	5,800,000	11,700,000
New Grenada	2,000,000	1,000,000	2,500,000	3,500,000
Other S. American Republics ...	3,000,000	6,000,000	6,500,000	12,500,000
Total ...	146,000,000	£88,500,000	£80,900,000	£169,400,000
Countries where the Metric System has been only partially introduced.				
Switzerland	2,500,000	—	—	—
Hanse Towns	500,000	£9,400,000	£24,000,000	£33,400,000
Denmark	3,000,000	2,700,000	2,100,000	4,800,000
Austria	37,000,000	1,300,000	1,000,000	2,300,000
Total ...	43,000,000	£13,400,000	£27,100,000	£40,500,000
Countries where it is permissive.				
United Kingdom	29,000,000	—	—	—
United States of America	31,000,000	£41,000,000	£24,000,000	65,000,000
Prussia and North Germany ...	26,000,000	9,400,000	8,500,000	17,900,000
Total ...	86,000,000	£50,40 ,000	£32,500,000	£82,900,000

SUMMARY.

Countries where it is obligatory ...	146,000,000	£88,500,000	£80,900,000	£169,400,000
In part only	43,000,000	13,400,000	27,100,000	40,500,000
Permissive	86,000,000	50,400,000	32,500,000	82,900,000
Total ...	275,000,000	£152,300,000	£140,500,000	£292,800,000
Total Trade	—	£275,000,000	£228,000,000	£501,000,000
Per-centage of the Trade with Countries using the Metric System ...	—	55	62	58

Proceedings of the Madras Government, Revenue Department,
28th April 1869.

No. 583. ORDER THEREON, 28th April 1869, No. 1,147.

Miscellaneous.

ORDERED to be recorded; the entire correspondence connected with the Weights and Measures of India having been laid before the Secretary of State by the Government of India, with their Despatch, dated 6th November 1868, No. 163.

(True Extract.)

(Signed) R. A. DALYELL,
Acting Secretary to Government.

To Sir John Bowring, KNT. F. R. S.,
Chairman of the Metric Committee of the British Association.

Ed. F. R. Bantleman.

Debate in the House of Commons

ON THE

PROPOSED INTRODUCTION

OF

THE METRIC SYSTEM

OF

WEIGHTS AND MEASURES,

1ST JULY, 1863.

CORRECTED BY THE RESPECTIVE MEMBERS WHO TOOK PART IN THE DISCUSSION.

AND PUBLISHED BY THE

International Decimal Association.

LONDON:
BELL AND DALDY, 186, FLEET-STREET.
1863.

INTERNATIONAL DECIMAL ASSOCIATION.

President.

THE BARON JAMES DE ROTHSCHILD.

Vice Presidents for Great Britain.

HIS GRACE RICHARD WHATELEY, D.D., Archbishop of Dublin.
RIGHT HON. THE EARL OF ROSSE, K.P., F.R.S.
RIGHT HON. THE EARL FORTESCUE.
THE VERY REV. RICHARD DAWES, M.A., Dean of Hereford.
RICHARD COBDEN, Esq., M.P.
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HOFMANN, PROF., F.R.S., Royal College of Chemistry, Oxford-street.
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LORSONT, J. P., Esq., 56, Cannon-street West.
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MOCATTA, DAVID, Esq., 29, Gloucester square.
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SQUIRE, PETER, Esq., 277, Oxford-street.
WINKWORTH, THOS., Esq., Gresham Club, Old Broad-street.
YATES, JAMES, Esq., F.R.S., Lauderdale-house, Highgate.

Honorary Secretaries.

R. G. WILLIAMS, Esq., M.A., 3, King's Bench-walk, Temple.
JOHN MIDDLETON HARE, Jun., Esq., B.A., War Office, Pall-mall.

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LEONE LEVI, Esq., LL.D., F.S.S.

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R. G. WILLIAMS, Esq., M.A.
E. BELLROCHE, Esq.

Contributions to the object of the Association, and all communications respecting it, will be received by Professor Levi, 10, Farrar's-buildings, Temple, E.C.

INTRODUCTION.

It is gratifying to the Council of the International Association to state that the House of Commons has affirmed the principle of introducing into the United Kingdom the Metric System of Weights and Measures. Mr. William Ewart's Bill, which was read a second time by a majority of 110 to 75, provided for the establishment by law of four new units, of length, of surface and land measure, of capacity, and of weight, identical with those of the Metric system, with the same nomenclature as that in existence in this country, with the addition of the word "new," corresponding with the Metric nomenclature of "Metre," "Are," "Litre," and "Kilogram;" the new system to be permissive for three years from the passing of the Act, and obligatory after that time.

Nothing is easier than to form a correct view of the whole Metric system. The unit of length, which is also the basis of all the weights and measures, is the metre, which is about three inches longer than the yard. Advancing decimally, we have in a thousand of such yards the unit of road-measure, which is the Kilometre, or mile; and, descending decimally, we hav in the tenth of the metre, the Hand, and in the thousandth part of the metre the smallest unit required for machine work. The square metre is the unit of superficial measure, called the Are, and a hundred such is the Hectar, or new acre. This new acre will be larger, certainly, than the present one. Instead of 4,840 square yards, it will be 11,960 square yards; but the Cheshire acre now in use is 10,240 square yards. The gram is the unit of weight, and a thousand grams make the kilogram, the half of which is very similar to our present pound, whilst a thousand kilograms is nearly the same as our ton.

In the debate it was objected that, instead of taking the French metre as the unit of measure, the Bill gave the number of inches contained in the metre. It would, perhaps, be better to take as a unit the "Standard Metre" in the hands of the Royal Society. But it is important, for the purpose of comparison, to give the exact equivalent of the metre in standard inches, especially as this has been already ascertained. A reference to the report of the Commissioners on Weights

and Measures, in 1820, will show that the length of the pendulum vibrating seconds in a vacuum on the level of the sea, in London, by which the standard yard was intended to be computed, in case of loss, has been found to be 39·13929 inches, and that of the French metre 39·37079 inches, the English standards being employed at 62° Fahrenheit. In the same manner the kilogram, a standard of which is kept at the Royal Observatory, has been ascertained by the most careful calculation to be equivalent to 15,432·34874 grains, of which our lb. contains 7,000.

The question of nomenclature is quite a subordinate one, and it is quite open for us either to adopt that in use in France and other countries, or to do the same as has been done in Holland, where they adopted the old Dutch nomenclature for the new quantities.

Much has been said upon the expediency of making the measure permissive only, and not compulsory. The Bill was permissive for three years, a certain time being absolutely necessary for preparation. The question simply is, whether or not we shall fix a time beforehand when the new system of weights and measures shall be made compulsory. No one will advocate the permanent introduction of another system side by side with the existing one; that would add to the present confusion. The great advantage of fixing a time when the new weights and measures shall be compulsory is that the nation will be thereby forced to adapt itself to the use of the new system, and teachers of schools will find it necessary to give themselves in earnest to teach the system in all the schools of the United Kingdom.

The sense of the House, however, being adverse to any compulsory measure in the first instance, and the Committee of the House of Commons having left the matter open, the Council are prepared to support a Bill to that effect, and rejoice to find that Notice of a permissive Bill for next session of Parliament has been given by Mr. Ewart.

The recommendations of the Committee of the House of Commons on the subject were as follows:—

1. That the use of the Metric system be rendered legal, though no compulsory measures should be resorted to until they are sanctioned by the general conviction of the public.

2. That a Department of Weights and Measures be established in connection with the Board of Trade. It would thus become subordinate to the Government, and responsible to Parliament. To it should be intrusted the conservation and verification of the standard, the superintendence of inspectors, and the general duties incident to such a department. It should also take such measures as may from time to

time promote the use and extend the knowledge of the Metric system in the departments of Government, and among the people.

3. The Government should sanction the use of the Metric system, together with our present one, in the levying of the customs duties; thus familiarising it among our merchants and manufacturers, and giving facilities to foreign traders in their dealings with this country. Its use, combined with that of our own system, in Government contracts has also been suggested.

4. The Metric system should form one of the subjects of examination in the competitive examinations of the civil service.

5. The gram should be used as a weight for foreign letters and books at the Post-office.

6. The Committee of Council on Education should require the Metric system to be taught (as might easily be done, by means of tables and diagrams) in all schools receiving grants of public money.

7. In the public statistics of the country, quantities should be expressed in terms of the Metric system in juxtaposition with those of our own, as suggested by the International Statistical Congress.

8. In private Bills before Parliament, the use of the Metric system should be allowed.

9. The only weights and measures in use should be the Metric and Imperial, until the Metric has generally been adopted.

10. The proviso in the 5th and 6th William IV. c. 63, s. 6, should be repealed.

11. The department which it is proposed to appoint should make an Annual Report to Parliament.

The expediency of introducing the Metric system has thus been admitted, first, by the unanimous opinion of the Select Committee of the House of Commons, and, secondly, by a large majority of the House itself.

We shall now conclude our observations with a brief summary of the principal reasons in favour of the measure:—

1st. The uniformity in Weights and Measures which it has always been the great object of the Legislature to establish, is defeated by the vast variety of Weights and Measures in use in every part of the country and in many branches of trade.

2nd. The existence of so many Weights and Measures other than the Imperial, proves that we do not at present possess a system adequate to the requirements of trade, and adapted to daily intercourse, and to the purposes of science.

3rd. The Metric Weights and Measures are universally admitted to fulfil the conditions of a sound and convenient system.

4th. This system has been adopted not only in France, but in Belgium, Holland, Spain, Italy, Portugal, Germany, Switzerland, and Greece, and is rapidly extending over other parts of Europe and in America.

5th. The increase of our trade with those countries which use the Metric Weights and Measures renders its adoption by ourselves a matter of great practical importance.

6th. The permissive use of Metric Weights and Measures is highly expedient for the purpose of legalising the transactions now carried on according to that system.

7th. The country has already expressed itself in favour of the Decimal method of calculation, on which the Metric System is based.

8th. The Metric Weights and Measures admit of binary divisions.

9th. By decimalizing the Weights and Measures we best pave the way for the decimalization of our coinage.

10th. Extensive inquiries have been proved that the introduction of the proposed system would secure an immense saving of time in education.

11th. The adoption of the Metric System has been decidedly and unanimously recommended by a Committee of the House of Commons, after most careful inquiry and discussion.

Up to the 10th July, nineteen Petitions were presented to the House of Commons, among which were the following :—

Members of the Chamber of Commerce of Huddersfield, in the county of York, Thos. P. Crosland, Vice-President.

Members of the Council of the Chamber of Commerce for Birmingham and the Midland District. Signed by the direction and on behalf of the Council, George Dixon, Vice-President.

Members of the Leeds Chamber of Commerce, through its President, Darnton Lupton.

Members of the Bradford Chamber of Commerce, Henry W. Ripley, President; John Darlington, Secretary; 29th June, 1863.

Members of the Hertford Literary and Scientific Institution.

Halifax Chamber of Commerce, through its President, Edward Akroyd.

Hull Chamber of Commerce and Shipping, John Lumsden, President of Chamber.

Wolverhampton Chamber of Commerce. Signed on behalf of the Chamber, Edward Perry, President.

Liverpool Chamber of Commerce. Signed on behalf of the Liverpool Chamber of Commerce, R. A. Macfie, President.

Sheffield Chamber of Commerce and Manufactures. Robert Jackson, President.

Pharmaceutical Chemists of Newcastle-upon-Tyne and Gateshead.

Physicians, Surgeons, and Chemists in the Borough of Wakefield, in the county of York.

Inhabitants of Highgate, in the county of Middlesex.

Association of Chambers of Commerce of the United Kingdom, of which are member—the Chambers of Commerce of Belfast, Birmingham, Bradford, Bristol, Coventry, Dewsbury, Gloucester, Goole, Halifax, Huddersfield, Hull, Kendall, Leeds, Newcastle-on-Tyne, Nottingham, Sheffield, Staffordshire Potteries, and Wolverhampton. Signed on behalf of the Association, Sampson S. Lloyd, Chairman.

Members of the Chamber of Commerce of the town of Batley, in the West Riding of the county of York. Signed on behalf of the Batley Chamber of Commerce, John Jubbs. President.

A petition was also entrusted to Mr. Ewart for presentation, from the merchants and traders of the city of London, numerously signed, and comprising the signatures of some of the largest merchants in the City.

The following is the text of some of the petitions :—

THE PETITION OF THE ASSOCIATION OF CHAMBERS OF COMMERCE OF THE UNITED KINGDOM, OF WHICH ARE MEMBERS THE CHAMBERS OF COMMERCE OF BELFAST, BIRMINGHAM, BRADFORD, BRISTOL, COVENTRY, DEWSBURY, GLOUCESTER, GOOLE, HALIFAX, HUDDERSFIELD, HULL, KENDAL, LEEDS, NEWCASTLE-ON-TYNE, NOTTINGHAM, SHEFFIELD, STAFFORDSHIRE POTTERIES, AND WOLVERHAMPTON,

Humbly sheweth,

That the numerous evils and inconveniences to which the trade of this country is exposed from the almost endless differences existing in the weights and measures used in the United Kingdom, have long been matter of regret to the commercial and trading classes of this country.

That these evils would be effectually remedied if the weights and measures of the United Kingdom were decimalised, and made to correspond with those of other countries.

That the great and rapid increase of the trade of this country with those of foreign countries in which the metric and decimal system is adopted, renders this a question of increasing practical importance.

That at the annual meeting of the Association of Chambers of Commerce of the United Kingdom, held at the Westminster Palace Hotel on the 24th of February in the present year, it was unanimously resolved to Petition both Houses of Parliament in favour of such a measure.

That a Bill for this purpose is now before your honourable House, entitled "A Bill for Decimalising our existing system of Weights and Measures, and for establishing an accordance between them and those of Foreign Countries," which, if carried into a law, will effect this most desirable object.

Your Petitioners therefore humbly pray that your honourable House will pass the above-named Bill.

And your Petitioners will ever pray, &c.

Signed on behalf of the Association,

SAMPSON S. LLOYD, Chairman.

THE PETITION OF THE LIVERPOOL CHAMBER OF COMMERCE,

Humbly sheweth,

That a Bill is now before your honourable House for the introduction of a metrical decimal system of weights and measures in lieu of several cumbrous and confused methods formed by no rule and adhering to no standard (save local custom) now existing throughout the United Kingdom.

That your Petitioners believe that such a system as that advocated would be a boon to the educator, the merchant, the dealer, and the working man. That it would simplify all commercial calculations, bringing them within the capacity of the humblest trader. That its assimilation to the system of so many other countries would facilitate and enlarge the operations of commerce, promote peace, and must therefore be considered as needful to secure and complete international free trade.

Your Petitioners therefore pray for the adoption of the Bill now before your

honourable House for the decimalisation of weights and measures and their assimilation to those of foreign nations as far as practical.

And your Petitioners will ever pray, &c.

Signed on behalf of the Liverpool Chamber of Commerce,

R. A. MACFIE, President.

THE HUMBLE PETITION OF THE SHEFFIELD CHAMBER OF COMMERCE AND MANUFACTURES,

Sheweth,

That your Petitioners have had under their consideration the provisions of a Bill introduced by Mr. Ewart and other Members into your honourable House, entitled "A Bill for Decimalising our existing system of Weights and Measures, and for establishing an Accordance between them and those of Foreign Countries."

That the said Bill has been so introduced in compliance with a request made to Mr. Ewart by the Associated Chamber of Commerce of the United Kingdom. That in consequence of recent alterations in foreign tariffs an active trade between this country and continental houses is rapidly springing up; and your Petitioners are constantly made to feel the inconvenience arising from the difference which exists between the British system of weights and measures and that of foreign countries.

Your Petitioners therefore pray that your honourable House will endeavour to pass such a measure as will speedily establish an accordance between the system of weights and measures of this country and that of foreign countries.

And your Petitioners will ever pray, &c.

ROBERT JACKSON, President.

THE HUMBLE PETITION OF THE COUNCIL OF THE CHAMBER OF COMMERCE FOR BIRMINGHAM AND THE MIDLAND DISTRICT,

Sheweth,

That your Petitioners, as merchants or manufacturers, are extensively engaged in commercial transactions in both the home and foreign trade of this country.

That great irregularities at present exist in the ordinary transactions of trade, in consequence of the variety of measures and weights now established by law or custom in this country, which are so ill adjusted to each other as to occasion loss of time, liability to error, and other serious inconvenience in conducting mercantile operations.

That it is of the utmost importance that measures and weights, which have reference to innumerable transactions in daily life, should be established upon a clear and intelligible basis, and should be easy to be comprehended and remembered, capable of simple and uniform sub-divisions, and generally adapted to the wants and understanding of all classes.

That the metric decimal system which is gradually extending itself throughout the Continents of Europe and America, is eminently distinguished by these advantages, and if it were adopted in this country for commercial as well as scientific purposes, would confer great benefits on all classes.

That the increased intercourse between this country and the Continent of Europe arising from the treaty of commerce with France, from the reduction of rates of postage, the abolition of passports, the progressive adoption of more liberal tariffs by other European States, and generally the increased facilities for travelling and international communication, renders it of the highest importance that the measures and weights in use in the United Kingdom and on the Continent of Europe should be assimilated as much as possible.

That, in the opinion of your Petitioners, the present is a favourable time for introducing this change, to be inforced after a sufficient interval of preparation, and they therefore pray that the Bill now before your honourable House for the establishment of a metric decimal system may with such changes of details as may be deemed expedient pass into a law.

And your Petitioners will ever pray.

Signed by the direction and on behalf of the council,

GEORGE DIXON, Vice-President.

DEBATE

ON

METRIC WEIGHTS AND MEASURES.

Mr. WILLIAM EWART moved the second reading of the Weights and Measures (Metric System) Bill. He said—A Committee (of which he had the honour to be chairman) had been directed last session to "inquire into the practicability of adopting a simple and uniform system of Weights and Measures." Two main considerations guided their inquiries—the benefit of our home trade, and the benefit of our trade with foreign countries. The occasion of the International Exhibition was thought a favourable opportunity for ascertaining the improvements which had been effected, and the opinions which prevailed, among continental nations. About twelve eminent foreign witnesses were examined, at the head of whom might be named M. Michel Chevalier. They were unanimously favourable to the metric system. The committee also, whatever might have been their first impressions, unanimously recommended the gradual adoption of that system. What did they find to have been the history of our own system? Before the time of Magna Charta, in the Reign of Richard I. (and even in the Saxon times) it was declared that "there should be one weight and measure throughout the land." From those days down to the last modern act, uniformity was the aim, or the dream, of our legislation. (Hear, hear.) Yet what did we find as the result? We had at present no less than ten different systems of weights. For our ordinary measure we had the inch, foot, and yard. For cloth measure we used yards, nails, and ells. We had about seven sorts of acres. We had an Irish mile, a Scotch mile, and an English mile. There were 20 different bushels, 10 different stones, three sorts of hundredweights, several kinds of tons, and many sorts of gallons. He believed we might lose ourselves in these mazes of numerical confusion. It might literally be said of our system, as was said by Horace of a more poetical one, "*numerisque fertur Lege solutis.*" Every one, he thought, would agree, that certainty is the soul of commerce, yet our transactions between man and man are full of uncertainty. (Hear, hear.) Meanwhile the number and extent of those transactions were constantly increasing. They became more and more accelerated and multiplied as the post, as railways, as the electric telegraph, gave wings to the internal commerce of the country. Therefore, as exchanges

between man and man increased, the impediments to those exchanges were felt to be more and more oppressive. (Hear, hear.) On this point the right hon. the member for Oxfordshire gave them the benefit of his evidence. He observed (and his observations were sound and intelligent) that "the great facility of intercourse now taking place has made the necessity or the wish for uniformity in weights and measures stronger than it was ten years ago." "I think," he added, "there is a greater tendency in the public mind to consider the question now. The railways have brought people from east, west, north, and south to every market. It is a great inconvenience to those travelling dealers to go down to markets of which they do not understand the custom. They may have bought and sold, and they really do not know what they have bought and sold." Such were the great and increasing disadvantages of the present system in our home trade. They were also strongly apparent in our foreign commerce and our foreign intercourse. (Hear, hear.) They had made themselves manifest during the Great Exhibition of 1851. In comparing the weights and measure of foreign and British articles, the Jurors of the Exhibition could not understand each other. A similar difficulty occurred at the Great Paris Exhibition of 1855. The International Jury thus expressed their opinion: "They" (the Jury) "deem it their duty earnestly to recommend to the consideration of their respective Governments and the friends of civilisation the adoption of a uniform system of weights and measures computed decimally, both in regard to its multiples and divisors, and also in regard to the elements of all the different units." In 1860, at the London Statistical Congress, the Prince Consort, a name ever memorable, not only in the history of this nation, but in the history of the world, used the following words: "The different weights and measures and currencies, in which different statistics are expressed, cause further difficulties and impediments. Suggestions as to their removal have been made at former meetings, and will, no doubt, be renewed." Can we doubt that an improvement of the present system would have found a supporter in that illustrious Prince

whose philosophic mind
Joy'd in the general good of all mankind?

After 1860 repeated discussions on the subject took place in the Society of Arts; and in 1861 the Associated Chambers of Commerce passed the following Resolution:—"It is highly desirable to adopt the metric system, which has been introduced into other European countries, with great advantage in saving time in trading and other accounts." Now, what was the metric system? It was a decimal system based on the metre as the unit of length, from which the units of weight, capacity, and surface are derived, with multiples, expressed in Greek, and divisors expressed in Latin terms. In fact, it is a framework of decimal calculation, a machine, saving a large amount of labour in the transactions of life. The great men, La Grange, La Place, Condorcet, Monge, and others, who presided at its creation, chose to take the metre from the ten millionth part of a quadrant of the meridian. It was now represented by a fixed

standard, kept in the archives at Paris, of which the nations adopting the metre secure an authentic copy. For a long time a mixed system, the old weights and measures and the new system conflicted with each other in France. The great Napoleon, as he rose in power, favoured the usages of antiquity, and discountenanced the metric system. With the imperial purple he put on the policy of reaction; "*Cum pulchris tunicis sumpsit nova consilia et spes.*" The result was doubt and disorder in commercial dealings. That doubt and disorder continued under the Bourbons. But under Louis Philippe, the monarch of the middle classes, a final law was passed, which insured the introduction of the metric system after an interval of three years, dating from 1837 and ending in 1840. France then passed under the dominion of the metre, and a very competent witness had declared that it was "one of the greatest blessings ever bestowed on France." As to other nations, Holland had long ago adopted the metric system, though retaining her national terms. Belgium had also long since adopted it. So had Spain. Portugal and Spain were now undergoing the process of adoption, ten years being the term allowed. All Italy, following in the footsteps of Sardinia, was rapidly passing within the orbit of the metric system. Switzerland has already done so. In South America it is largely used. Only within the last few weeks its adoption has been approved of in an assembly of the three Scandinavian nations. The following resolution was passed on the 20th May, at the Scandinavian Meeting for Political Economy, consisting of near 500 Swedish, Norwegian, and Danish members of the three parliaments, and others:—"It is expedient to adopt the French metric system, with attendant subdivisions and denominations for weights and measures in the three Scandinavian countries, and to adopt the French franc of five grammes, nine-tenths silver and one-tenth copper, as the unit of Scandinavian coinage, with decimal subdivisions." Since then, the King of Denmark has appointed a commission to study the question, and to draw up a Bill applying the decimal system to the money, weights, and measures of Denmark. Within the last few days our own Post-office, in unison with all those of the Continent, has adopted the metric system for postal objects.* So that we are silently lapsing into the general European system. (Hear, hear.) Ought we then to remain behind other nations—we who have been accustomed to lead them, and of whom Milton has declared it to be the privilege "to teach the nations how to live?" (Hear, hear.) This circumstance is also worthy of consideration—our trade with nations using the metric system is larger than our trade with nations using the English system. To the former our exports in 1861, in round numbers, amounted to £55,000,000; our exports to the latter were only £24,000,000. Our exports to countries using the metric system was greatly increasing. In 1853 they were £32,000,000 in value; in 1861, £55,000,000. It appeared also that, in 1859, 40

* Resolved—"Le système métrique décimal étant de tous les systèmes de poids celui qui satisfait le mieux aux exigences du service des Postes, il y a lieu de l'adopter pour les relations de poste internationale, à l'exclusion de tout autre système."

per cent. of the tonnage of our shipping were employed in trade with countries which use the metric system. According to the returns just published by the Board of Customs, our exports to France (the primary metric-system country, if he might use such a compound) were, including foreign and colonial goods, in 1860, £12,700,000; in 1861, £21,800,000. But let us look forward to the future. Our trade with France and Italy, Spain and the Mediterranean, and Eastern countries, is probably only in its infancy. "The metric system," says a mercantile witness, "will be adopted in a few years throughout Europe." Will it then be possible for England to remain isolated? (Cheers!) Let us now view the question under another aspect—the saving of labour by means of the metric system in the common operations of commerce. Mr. Lorsont, a Belgian and English merchant, says, in his evidence before the committee, "By using the metric system I could spare two clerks, and prevent a great deal of error." He adds that the maintenance of our system is as bad as if we retained the old Roman figures. Mr. Dickson, a manufacturer and landed proprietor near Dunkirk, also says that, "by using the metric system he could carry on his trade with fewer clerks. He considered the metric system one of the greatest blessings ever conferred on France." Mr. Fellows, a British manufacturer and merchant, says, "The calculations of a French merchant may be made in one-half the time, or less than half the time we employ." The Associated Chambers of Commerce stated, in 1861, that "the present system is very inconvenient to a great commercial nation," and that "the use of the metric system is likely to be a boon to all the community." But there was another important aspect of the question. He meant its reference to machinery and manufactures. We ought, in consequence of our iron, our coal, and our mechanical powers, to be the greatest machine makers in the world. Now Mr. Crossley, an engineer, says in his evidence that "the demand for our machinery would extend much more if an international system of weights and measures were adopted." Mr. Fairbairn, himself celebrated as a mechanist, is of opinion that, "The decimal system will ultimately be introduced into all our mechanical operations. The metric system is, of all he knows, the best." An important point in machine-making is exactness of admeasurement. Can we, under our own system, make machines of such exact dimensions as are made in Belgium, where they make use of the metric system? The importance of minute exactness was shown in the formation of Armstrong guns, where the nice fitting of the concentric circles of iron is of the utmost consequence. For all such operations the use of the millimetre was said by an eminent civil engineer, Mr. Siemens, to be highly advantageous. But, if it be true that we should be the machinists of the world, our workmen must probably travel abroad for employment. How important it is, if not indispensable, that they should previously know the foreign weights and measures, and be instructed in the metric system. (Hear, hear.) But another point remained for consideration. He meant the time which might be saved in education by the adoption of the metric system. Some time

ago the International Association for Decimal Weights and Measures caused an inquiry, on this branch of the subject, to be extensively circulated among the schoolmasters of the United Kingdom. The answers they received led to this conclusion, that learning arithmetic by the youth in our schools now ordinarily takes two years, but that under the decimal and metric system it would only take ten months; but let us suppose that the time saved is only a year—is that no great gain to the cause of education? Professor De Morgan stated before the committee that "the time devoted to education in arithmetic might, by the new system, be reduced by one-half, if not by more." Dr. Farr said, "You would get rid of all compound arithmetic, and make calculations simple and mechanical." We should thus liberate ourselves from Reduction, Practice, and other elaborate expedients, to the contentment of our children and the emancipation of their intellect. (Hear, hear.) Dr. Ihne, a German teacher of great experience at Liverpool, stated that the new system gave "a great advantage to boys in foreign schools over our own;" and added that "our boys were deterred by the present system from pursuing the higher mathematics." The Rev. Mr. Barrett, also extensively engaged in teaching, says that, on account of the difference between the two systems, "Education in the French military academies is much higher and more forward than in ours." "Boys," he adds, "are deterred and disgusted" by our present complicated system. May we not, in fact, describe these impediments as so many toll-bars on the highway of education? (Cheers.) But it was shown that, even at a more advanced age, our working men could easily master the metric system. Mr. Dickson, an extensive employer of them abroad, said that "his overseers came from Scotland, knowing nothing of French weights and measures; but they soon acquired the metric system." The Committee examined a working man, Mr. Wyse, who had been twenty years in the employment of Mr. Brassey, the great contractor. Mr. Wyse said that "he very soon understood the metric system, and found it easier to learn than the English scale of yards, feet, and inches." He adds, "All the workmen I ever had to do with prefer the French method to the English." In fact, to pursue our system when we could take advantage of a new one, was like avoiding a railway to go by the old turnpike-road. (Cheers.) In these circumstances, what course shall we adopt? There are, to use the often-quoted phrase of Sir Robert Peel, "three courses open before us." First, shall we retain our present system? The answer, he thought, would be a universal "No." Next, shall we create, or rather patch up, a tesselated system out of the worn-out materials of the present? That course would involve as much trouble as the adoption of the foreign system, and it would have the immense international disadvantage of not agreeing with the system of other nations, a system, with which, after all, we should eventually be obliged to conform. It would be taking two steps, or rather two journeys, when we need only take one. Lastly, shall we gradually adopt the metric system? That system has succeeded wherever it has been tried. All the foreign witnesses, without exception, are in its favour.

It is a perfect decimal system, with ascending decimals to multiply, and descending decimals to divide by. It is no longer a theory. It has become a practical system, involving no preliminary scientific measurement. We have only to copy an existing standard, to pursue the path already trodden by other nations. In short, to use a familiar phrase, it is "ready-made to our hands." He (Mr. Ewart) would therefore say, "Begin." Inquire how Portugal is successfully proceeding; what preliminary steps she took. Inquire of other nations. In the mean time (as the committee advise) give instruction in the metric system in your schools, use it in the Customs department, and, where available, in the other departments of the government. Prepare for the coming change. Defer it, if needful; but prepare. The Bill before the House, for the construction of which we are indebted to the skill and ability of Professor Levi, gives three years' time for preparation. If, at the end of that time, we are not ready, we have only to give three years more, or as much time as might be needed. Next, he came to the objections. It was objected that the Bill should have been only a permissive Bill. He had indeed had a permissive Bill framed, and he was still quite willing to assent to a permissive Bill. That was the suggestion of the committee. But practical men objected to a permissive Bill. They said, "Give us something positive and final; we are tired of alternatives." It was true that in France they went on hovering between two systems for forty years, but those were forty years of confusion, and they were obliged to fix a term at last. But, as he had said before, we are not bound to three years. A continuation Bill is an easy and a common remedy; or, if the House willed it, they could try a permissive system. There was another objection, of which he fully felt the force. It was, the trouble which any change of system would cause to the retail trader. To his case every consideration should be given, and every indulgence shown. He thought that some allowance might be made for the cost which the change in weights and measures would inflict upon the retail dealers. But they also would eventually profit by extended trade and facility of calculation. It was shown, in the evidence of M. Visschers, of Brussels, that the "tradesmen of Belgium were much benefited" by the introduction of the metric system; and Mr. Dickson stated that its advantages, in saving time and trouble, were felt by the "small traders" in France. Another objection raised by the opponents of the metric system was, that it did not admit of the same binary subdivisions as the duodecimal system. That was true. But we give a power of using the binary system to a sufficient extent in our Bill, and our mode of arithmetical notation being (like that of other nations) decimal, what other system can we adopt but the decimal? Repugnance might be felt to the use of the Greek and Latin terms in the metric table. But in our Bill we retain the English units, and it would be easy to substitute English words for the classic terms in the metric scale. The Greek and Latin names are indeed too long. They presuppose some knowledge of the classic languages, and all experience is in favour of monosyllables, which the people seem to have chosen as the most

rapid vehicles for bargain and sale. The pound, the ounce, the yard, the foot, and many more such terms, prove this tendency. (Hear, hear.) Nevertheless it was easy, even for a child, to learn the French metric table, with all its Greek and Latin numerals. Could every, or any, member present correctly repeat the English table of weights and measures? (Laughter and cheers.) Yet all of them, he thought, could learn the French metric table in a quarter of an hour. In fact, they had only to learn seven prefixes and four principal units. On the whole, he was justified in concluding that the disadvantages ascribed to the metric system were slight and transitory; the advantages substantial and lasting. But, it may be said, the adoption of the metric system of weights and measures would be incomplete without a decimal system of coinage. That he granted; but, when a decimal system of coinage was under consideration, a great authority, Lord Overstone, said, that "it would be a mistake to decide in favour of a decimal coinage without determining the best course as to other parts of the metric system. If the number *ten* should be selected as the base of the general metric system, the question of the coinage would be greatly simplified." And in other parts of his Report, Lord Overstone seemed to think that the consideration of a decimal system of weights and measures ought to precede the consideration of a decimal coinage. In his (Mr. Ewart's) opinion they ought to be as nearly as possible simultaneous, but the introduction of the metric system of weights and measures would, in itself, be a great acquisition. (Hear, hear.) Reverting to the former part of his speech, he thought he had established the following propositions—that the present state of our weights and measures is intolerable; that it is growing worse as our internal trade increases; that it impedes our trade with foreign nations, and will impede it more as that trade increases; that other countries have adopted, and are rapidly adopting, the metric system; that it is acknowledged to be a great boon by all the countries in which it has been established; that our trade with the nations using it is rapidly extending; that it would save time in commercial operations; that it would confer great advantages on our machine makers and manufacturers; that it would save a large amount of time in education; lastly, that if we failed to adopt it we should be behind almost all the nations of Europe. At all events (said the hon. gentleman) let us not remain in the "slough of despond," or the "Serbonian bog" in which we are now engulphed. We have achieved the great victory of free-trade; let us adopt the machinery by which free-trade may be set in motion among the nations of the earth. Let us remember that different provinces of the same country were once distracted and divided by discordant systems of weights and measures, as different nations are now. Why should not one uniform system bind countries, as it has bound provinces, together? We have, by solemn treaty, interwoven our interests with those of France and of other nations. Let us, by adopting a common system of weights and measures, give to our commercial intercourse a common language. Let us, in the words of one of our greatest moral and religious poets, not only

but also "Give to the North the products of the sun,"

"Knit the united nations into one."

So shall we best pursue and accomplish the great mission prescribed to all nations, but pre-eminently to our own—to promote the peace, by extending the commerce, of the world. (Cheers.)

Mr. HENLEY said he had certainly expressed an opinion that the metrical system was a good one, but that had nothing to do with the question whether it was desirable to agree to the Bill which made so great a change as that now proposed. No one was more sensible of the inconvenience and uncertainty of the present system of weights and measures than himself. The imperial bushel was as definite a measure as could be set up, and 20 or 30 years ago the Legislature attempted to make that the uniform bushel. The imperial bushel was declared to consist of a certain number of cubic inches. All bargains made in any other bushels were declared void, and penalties were enforced against those who used any other. What had been the result? The bushel still meant one thing in one town and another elsewhere; nay, people who went to the same market could not always agree as to what kind of bushel was meant. He did not believe that a more stringent law could be passed to enforce the use of the new metrical system, and what greater security could the hon. gentleman have that his new weights and measures would be adopted? He agreed with the hon. gentleman that it would not be desirable to adopt such words as myriametres, decametres, and centimetres. He did not think they would ever go down with an English mouth. (A laugh.) But how would the hon. gentleman prevent people from continuing to use the present weights and measures? He did not believe that Parliament could prevent it. A great deal had been said of the inconvenience of the present want of uniformity in foreign trade. No doubt, if it had pleased God that there should never have been a Tower of Babel, it would have been a great convenience to merchants and those who went about visiting different countries. (A laugh.) But the hon. gentleman could not bring about the uniformity he desired by Act of Parliament. (Hear.) What the hon. gentleman had said about France was not very encouraging. The new system was no doubt introduced in France by very scientific men, but it was carried after the French revolution, when everything that had formerly been accepted was torn up and displaced, and when the mind of the nation was engaged in setting up something that had not existed before. The hon. gentleman had not told the House how many years had gone over before the new system became settled in France; but, if he remembered aright, it was a great way down into the present century. The hon. gentleman told the house something about the spread of the French system over other countries, but he did not tell them that that was materially facilitated by the French occupation of those countries up to 1814; that all those countries had had a most debased coinage, and that it was a great benefit to them to have the

French 20f. piece in their dealings with other countries. It was not pretended that the trade of this country with countries which had the metrical system was to be compared for a moment with our trade with countries which had it not, and, therefore, the adoption of the system would introduce great confusion in our transactions with the latter. (Hear, hear.) This Bill did not take, as one would have expected, the French metre as the unit of measure. The French, he believed, took the ten-millionth part of the distance between the equator and the pole, but the Bill proposed to take a certain multiple and decimal part of an inch. But, then, it would be necessary to lay down what an inch was, and if we wanted to know whether that was right we should have to march over to Paris to compare our standard with the French, and see if they agreed. There was a great deal of Gallo-mania going about this country and elsewhere just now; but he did not think it very convenient to have to settle our measures by going over to France. He had always believed that the size of the world was a fixed quantity, but learned pundits were of opinion that the world was growing. (A laugh.) If that were the case the quarter of it must be growing too, and then what was to become of the metre? (Laughter.) While the earth was growing, perhaps the scientific men in France might find some little variation in their metre. (Hear.) It would not be very easy to establish that Chinese exactness in all things which was expected. But coming to the practical part of the business, the tithe was levied on land measured by the acre, and was it a light thing to unsettle the tithe commutation? Was it a light thing to compel people, from the great millionaires down to the poor shopkeeper who had not a £5-note in the world, to get a new set of weights and measures? (Hear, hear.) The benefit to be obtained ought to be very great and certain before putting people to that inconvenience. (Hear, hear.) Then the foreign names would be very inconvenient, and would never suit the mouths of Englishmen. (Hear, hear.) It was proposed to remedy that by the introduction of a sort of Græco-Latin names, such as *decil* or *deil*, but if he knew anything of his countrymen they would soon get to corrupt such a word into devil. (A laugh.) It would be a very good thing no doubt to have uniformity in language and other things all over the world, but we had not arrived at that yet, and the question was whether the evil and inconvenience of the proposed change to the greater number of the people would not more than counterbalance the advantages. (Hear, hear.) He believed it would; that the uncertainty under the new system would be quite as great as existed at present, and he was therefore disposed to vote against the Bill.

Mr. LOCKE said he had paid some attention to this subject, and he concurred in several of the remarks that had fallen from the right hon. gentleman (Mr. Henley). No doubt great inconvenience would arise in the ordinary transactions of life if this system were introduced, but he did not think that such inconvenience existed in our mercantile transactions with foreign nations. His honourable friend who had introduced this Bill was no doubt familiar with that popular work

Murray's Handbook of France, and would remember that in the first pages of that book there were tables giving the comparative value of the coins of the two countries, and also the comparative proportions of their weights and measures. But there was no doubt our system of weights and measures was a most inconvenient one. It was perfectly immaterial what we took for our unit, the difficulty arose from the complicated way in which the unit was dealt with. The troy weight, for instance, was very different from the avoirdupois. In the one case 12oz., in the other case 16oz. made a lb., and then we had grains, and pennyweights, and drams, and to learn the distinction between these different weights was to the youthful part of the population one of the most painful processes which they had to undergo. (A laugh.) But if the unit were treated in a different way and were not twisted about, there would be none of the inconvenience which was now so much complained of; as an instance of the treatment of the unit, let the House take what was called the imperial measure of length: 12 inches make one foot, three feet one yard, and then five and a half yards one rod, pole, or perch. The right hon. gentleman seemed to think there would be some difficulty in finding the French standard and comparing it with the metre proposed by the Bill; but that was not the case. If the right hon. gentleman, the next time he was in Paris, would go to the Place Vendôme, he would find the metre there already made to his hand, painted in a most conspicuous place on the front of one of the government offices. (Hear, hear.) The right hon. gentleman was mistaken when he supposed that a metre different from the French was proposed to be adopted by this Bill. The inch and parts of an inch in the Bill made up the exact measure of the French metre. (Hear, hear.) But while he gave great credit to his honourable friend who had introduced the Bill, he thought that an effort should have been made to perfect the present law, with a view to uniformity. By the 5th and 6th Wm. IV., cap. 63, sec. 6, all local and customary measures were abolished, and a penalty imposed on persons selling by any denomination of measure other than by one of the imperial measures. If the section had stopped there the law would have been perfect, and uniformity in the use of measures clearly established, but at the instance of interested parties, the House was induced to introduce a proviso, which had entirely defeated the object of that section of the Act. The proviso was as follows:—"That nothing herein contained shall prevent the sale of any article in any vessel, where such vessel is not represented as containing any amount of imperial measure, or of any fixed local or customary measure heretofore in use." So that articles were now sold in all kinds and descriptions of vessels, whose capacity was undefined. In the year 1858, he (Mr. Locke) had introduced a Bill to amend the 5th and 6th Wm. IV. cap. 63, which Bill contained a clause for the regulation of the sale of fruit and vegetables, requiring that all vessels other than the imperial measures used for that purpose should have marked upon them the amount of imperial measure which they contained. This clause had been strenuously opposed by market-gardeners and others, and he (Mr. Locke)

had met a deputation from these parties at the Board of Trade, before the right hon. gentleman the member for Oxfordshire, who took the side of the market-gardeners. However, the Bill had been defeated only by a majority of eight. He (Mr. Locke) had brought it in again the next year, and passed it, but with this clause omitted. Thus by this proviso in the section regulating measures, the intention of the Act had been entirely evaded; but how did the law stand with regard to weights? The 11th section commenced by defining what a stone should be—it was to consist of 14lb.—and at the end of the section a proviso was introduced, which stated that that was not to interfere with selling by the lb., or any multiple or aliquot part of the lb. A case came before Baron Martin at the Middlesex sittings, in Michaelmas term, 1853, which was afterwards argued in the Court of Exchequer, June 15th, 1854, and again in the Exchequer Chamber, June 30th, 1855 (Jones and Another *v.* Giles and Another, 10 *Exchequer Reports*, p. 119, and 11 *Exchequer Reports*, p. 393), in which a bargain had been made by what was called "the long ton," consisting of 2,400 lbs., but as that was not one of the legal weights named in the Act, one of the parties refused to complete the bargain. It was, however, decided, that "the long ton," after all, was as a multiple of a lb., and that, if the Legislature had intended to exclude "the long ton," they should have introduced such words as "multiple of a lb. numerically expressed." Now, if the words "numerically expressed," were introduced into the 5th and 6th Wm. IV., a perfect certainty would be obtained. If the names given to weights and measures used in different places meant the same thing there would be no difficulty, but they meant a different thing in every different place. (Hear, hear.) The consequence was that, with respect to measures, the introduction of the proviso in the 6th section, and the absence of the words "numerically expressed" in the 11th, opened the door to all the inconvenience. There would no doubt be great difficulty in carrying such a system as was now proposed into effect. He would, however, support the second reading, hoping that at a subsequent stage some useful suggestions might be made. It was proved before the committee which sat in 1834, on the sale of corn, and over which the right hon. gentleman the present Speaker presided, that even in France people could not be induced to adopt the metrical system.

Mr. BAINES—It was not compulsory before 1837.

Mr. LOCKE—Well, there was one thing they all had to do with when they went over to France, though he did not know that his hon. friend (Mr. Baines) had, and that was the wine-bottle. (A laugh.) But every hon. gentleman knew that the French bottle, and more especially the German bottle, varied very much—it was growing "small by degrees and beautifully less," and he was satisfied that the ingenuity of that great nation would make it smaller and smaller, till it reached the vanishing point at last. (Laughter.) He was informed that in the country districts of France the people still used the weights and measures which their

ancestors did, and such as Napoleon I., were he resuscitated, would have approved. In answer to a question it was stated some few nights back that the standards of weights and measures had not been reverified for the last thirty or forty years; and previously to his introducing a Bill in 1859, and which passed, being the 22nd and 23rd Vic. c. 56, he was informed that the models or copies of the imperial standards deposited in the several districts for the inspection of weights and measures in course of time became incorrect, and therefore, in that Bill a clause was contained, making it necessary that these models should at stated periods be reverified; but if the models were to be compared with the standards in the metropolis it was necessary that the latter should be ascertained to be correct. He was told, however, that such was not the case, and that these standards were bricked up in one of the walls of this house and never used for the purpose for which they were intended. This was certainly a very curious state of things, and should the New Zealander who was pictured viewing at some future time the ruins of this city discover them, he would no doubt exclaim, "That was a most wonderful and extraordinary people!" On one occasion he moved for a return of the number of convictions which had taken place throughout the country for selling by false weights and measures; and he was told that the return would be most voluminous. He consequently limited the return to the metropolis, and it was voluminous then. The great majority of the offences which had been committed were of the most trifling description, but he was informed that the magistrates considered that they were obliged to impose a fine, when it was shown that weights and measures were not accurate, and that they had no right to inquire whether the use of these inaccurate weights and measures was wilful or not. This was a very great hardship on tradesmen, and he wished that that House would attempt to perfect the English system before adopting a French one. He did not think that there was any difficulty at present about the imperial bushel. They all knew what its contents were; but the difficulty was in preventing persons from using a local or customary bushel, or something they chose to call a bushel. He wished his hon. friend, the proposer of the present measure, success in his attempt, and though he did not mean to say that he would support all its clauses, yet he regarded the Bill as a step in the right direction and capable of affording the opportunity of remedying the inconveniences of the present system. (Hear, hear.)

Mr. POLLARD-URQUHART observed that the hon. member for Oxfordshire had dwelt at considerable length on the inconveniences attendant upon the change now proposed, but it was satisfactorily established before the select committee that to secure uniformity throughout the whole of the United Kingdom some change was necessary. If that were so, why should not the best standard be adopted—a standard which would facilitate throughout the whole of Europe the commercial operations of this country? (Hear, hear.) The want of a decimal system was equivalent to a tax on mercantile transactions; and one of the witnesses before the

committee stated that it was equal to a tax of £10,000 a-year on the profits of the London and North-Western Railway. In these days of free trade, was it right that this heavy tax should be continued on book-keeping and exchanges? It had been remarked by Sir R. Hill that, for want of a system such as the hon. member for Dumfries advocated, great difficulty was experienced in arranging postal treaties and fixing international rates of postage. This difficulty was felt more and more every day, and he sincerely hoped that the Government, who came into office very much on the free-trade principle, would give their support to the Bill of the hon. member for Dumfries.

Mr. ADDERLEY said that no one had denied that some simplification of the present English system was desirable. One could not hear of twenty various bushels, and fractional computations of relative values, without recognising the disadvantage under which English commerce labours. In reply to the hon. gentleman who spoke last but one, and who objected to going to France for a pattern before the system in England should be improved, he remarked that the best way to improve the system in England was to adopt the system in France, because it was a good system, and because, a world-wide commerce being the subject, it was a principal requisite to adopt a system which was already understood in a great number of countries. (Hear, hear.) It was better, he thought, when an object was confessed to be most desirable, to manifest wisdom in endeavouring to attain it, than to exercise wit in showing up the difficulties connected with it. He conceived that the difficulties suggested by the right hon. member for Oxfordshire were most far-fetched and absurd. The right hon. gentleman spoke of the French metre, and of some fantastical notion of the growth of the earth, which might throw out calculations based on a fraction of its meridian, but the right hon. gentleman must be aware that the basis of the English measure of length was the "seconds pendulum," and that that depended on gravitation, which would equally vary with his fantastical supposition. The introduction of a more simple system of weights and measures would be an enormous addition to the wealth of this country, as railways, by economy of time and facilitation of commerce, had been practically increments of national capital. (Hear, hear.) The right hon. gentleman seemed to think that during the French revolution everything new was set up, and everything old was cast down, and he supposes everything new must be bad, and everything old good. This metrical system certainly was one of the wonderful products of the seething brain of revolutionary Europe, yet it must be admitted that hardly anything could be more beneficial than the simple process of calculation which was now under the consideration of the House; and it was a rational proposition, wherever it came from, that this country should take the unit which so many countries of the world had already satisfactorily adopted. (Hear, hear.) The metrical unit of measure at once applied to calculations of length, area, capacity, and weight; and with singular luck it was, within a tenth, identical with our existing yard, so that our adoption of

the metre would little vary our old calculations. There was, of course, a difficulty connected with the introduction into this country of a new system and a new nomenclature, for their adoption must inevitably be repugnant to English conservatism, and could not be so easily enforced in this country as in nations where the Government was autocratic. The difficulties of a new nomenclature had been exaggerated and caricatured; but even Englishmen might as soon learn to drink a tentol as to invest in consols; the etymology was not more fanciful in one than in the other. He did not think that the hon. gentleman would pass his Bill as a compulsory measure. But there were other modes of facilitating the introduction of the system the hon. gentleman advocated. The system, in fact, was rapidly introducing itself by its own beauty, and by the necessity of the case. In all the large transactions of the country, and in various departments, such as the Mint, the Bank of England, and the Post-office, in short, wherever operations were on a very extended scale, or in concert with foreigners, it proved, not a matter of choice, but of necessity. In respect to science, it was impossible to have any other system, for the calculations were constantly growing much larger than they used to be, and the old system was not found sufficient for modern science. Students in mathematics were kept back in their pursuit, if they attempted to make use of the old system, by which the higher branches of mathematics could not be reached, and the adoption of a new system was also, in reference to international commerce, imperative. (Hear.) Under these circumstances he would suggest that all means should be made use of for facilitating the self-introduction of the new system. The children of the labouring classes were now in schools aided by the State, and the Department of Education had more or less the power of teaching that system to the next generation of the working men of this country employed as they would be all over the world. Diagrams illustrating its simplicity might be distributed throughout the kingdom. We were spending a million yearly now in conquering "the three r's" at elementary schools. This system would reduce one of them to easy conquest. Compound arithmetic would cease. Another mode by which the introduction of the new system might be facilitated would be by the Government going on a little faster in making their departments adopt it. Every department into which the system might be introduced would be found able to reduce the number of clerks, and consequently this became also a money question. (Hear, hear.) It had been alleged that the present law on weights and measures was rendered nugatory by the permissive clause which relieved from penalty those who used measures, though not imperial, provided they did not profess to be so. But that proviso seemed to him to suggest exactly the right way to proceed with any legislation in England on the subject. They might now legalize the metrical weights and measures, or even substitute them as imperial for those now so designated, leaving it a matter of permission to use others, but not as imperial or standard. An amending Bill of the existing statutes, to this effect, would, in his mind, be the most practical measure to attempt. He thought it was not necessary that the Bill should be compulsory in its enactments, and he

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therefore suggested that it should be converted into a permissive measure. The decimal coinage must no doubt follow the adoption of the decimal system of weights and measures, but it was not necessary to complicate the matter by propounding the two subjects at once. (Hear, hear.)

Mr. BAINES would not detain the House more than a few moments, because he saw his hon. friend, the Member for Rochdale (Mr. Cobden), who, he hoped, would tell the House the results of his great experience of the English and French systems during the negociation of the late Commercial Treaty. He would however draw the attention of the House briefly to two points: the first was, the great number of eminent authorities who were in favour of the new and improved system. The Chambers of Commerce throughout the country had almost all petitioned in favour of the measure. The International Statistical Congress, composed of the most able statists of all nations, had also passed resolutions to the same effect. The jurors of the great Exhibitions of 1851 and 1862, comprising men eminent in trade, science, and official life, were almost unanimous in recommending the metric system, which was the simplest, easiest, most scientific, and perfect that had ever been devised. (Hear, hear) It was of the utmost importance that a people so largely engaged in trade as we were should discard the present complicated, vicious, and irregular system for the new and improved one. M. Michel Chevalier had described the ease and celerity with which the metric system had been introduced into France. A law was passed in July, 1837, rendering it compulsory on and after the 1st January, 1840, but it was very generally in operation before that time arrived. (Hear, hear.) In 1841, M. Chevalier, in the course of a long journey, on inquiring of the postilions as to distances, found that they almost invariably calculated by kilometres and not by the old measure of postes. The second point to which he would refer was the very great gain there would be to the education of the young from the introduction of the metric system. It had been estimated, on reliable grounds, that as much as a year's schooling would be saved to the young by the adoption of the easy and improved method, instead of the present difficult one. As there were 2,000,000 of children in this country in the course of receiving their education, it was easy to conceive the immense saving of time which would thus be secured. (Hear, hear.) If put in an arithmetical form, it would give the startling result of a gain to the nation of two millions of years with every generation of children who passed through their schools. This would not indeed be a money saving, but it would not the less be a real saving, inasmuch as it would enable the young to acquire other branches of knowledge and a more perfect education. He thought, therefore, the advantages of the new system would be vast and permanent, and such as immeasurably to outweigh the inconveniences of the change. (Hear, hear.)

Sir M. FARQUHAR observed that the committee comprised repre-

sentatives from each division of the empire—England, Scotland, and Ireland—who had come almost unanimously to a conclusion in favour of the metric system. He supposed his hon. friend would accept the modifications which had been suggested, and would withdraw the compulsory clauses of his Bill. If the system were gradually introduced, it might, in the course of time, be established as a whole. The extraordinary diversity of weights and measures which now prevailed was intolerably perplexing. Professor Leone Levi, in an able pamphlet on the subject, observed:—

"For measures of length we have the ordinary inch, foot, and yard. In cloth measure we have yards, nails, and ells. There are four different sorts of ells. For nautical purposes we have fathoms, knots, leagues, and geographical miles, differing from the common mile. The fathom of a man-of-war is 6 feet; of a merchant vessel, 5½ feet; of a fishing smack, 5 feet. We have also the Scotch and Irish mile, and the Scotch and Irish acre. There are several sorts of acres in the United Kingdom, and there are a great variety of roods. We have in almost every trade measures of length specially used in those trades. For the measurement of horses we have the hand; shoemakers use sizes; and we are compelled to adopt guages where the French use the millimetre. The guages are entirely arbitrary. The custom of the trade is the only thing which would decide the question in case of dispute. For measures of capacity we have twenty different bushels. We can scarcely tell what the hogshead means. For ale it is 54 gallons; for wine 63. Pipes of wine vary in many ways; each sort of wine seems to claim the privilege of a different sort of pipe. For measures of weight we have about ten different stones; a stone of wool in Darlington is 18 lb., a stone of flax at Downpatrick 24 lb., a stone of flax at Belfast 16¾ lb., but it is also at Belfast 24½ lb., having in one place two values. The cwt. may mean 100 lb., 112 lb., or 120 lb. If you buy an ounce or a pound of anything, you must inquire if it belongs to Dutch, troy, or avoirdupois weight."

It was surely high time that these anomalies should be corrected. (Hear.) France, Holland, Belgium, Italy, Spain, Greece, and several other countries, even down to some of those of South America, had adopted the metric system, and others were anxious to introduce it. Why then should we not be able to do so? Some thought that our present system should be amended, and advised that we should be satisfied with the introduction of uniformity in our own weights and measures, whilst others urged that it would be far better that England should establish a system which would not only be uniform within our limits, but in accordance with that of those nations which had accepted the metric system. (Hear, hear.) The last course would certainly be the most desirable one. The whole world traded with us, and if a uniform system could be established between us and other nations, many existing difficulties would be corrected, and the interests of the trading community both here and abroad materially advanced. (Hear, hear.) His hon. friend said that the Emperor Napoleon had been a supporter of the metric system until he put on the Imperial purple, when he became a Tory. Now he (Sir M. Farquhar) did not know what a Napoleonic Tory meant, but his hon. friend was mistaken if he thought that the party among whom he had the honour to sit, now often again called the Tory party, was opposed to the introduction of improvements and well-considered reforms. *Stare super antiquas vias* was an expression which

he cheerfully accepted in its meaning of opposition to sudden and organic changes; but where the road was difficult he for one was anxious to have it made easy, where it was rutty and heavy to have it made smooth and light. (Hear, hear.) There were no doubt difficulties in the way of carrying out the contemplated change, but they were not insuperable, and should not be permitted to daunt the supporters of the improved system. There was habit, and prejudice too, and the present system of weights and measures was so impressed upon the minds of those who used them in their different localities, that the change to another and uniform plan must necessarily require time. He trusted his hon. friend would bring his measure forward again next year amended as suggested, and he had no doubt he would then receive the support of the House and the country. This question had lately been much discussed in the literary and scientific institutions of the country. He had received a communication upon this subject, about a fortnight ago, from the members of the Literary and Scientific Institution in the town of Hertford, of which he had the honour to be one of the representatives, and this morning he had received a "refresher," and although it was not accompanied by the fee which gentlemen learned in the law knew something about—(a laugh)—he should be happy to give his willing support to the efforts of his hon. friend to introduce the metric system of weights and measures into this country. (Hear, hear.)

Mr. HUBBARD reluctantly fulfilled the ungrateful task of objecting to a measure prepared by men of great intelligence who were animated by no other wish than that of promoting (as recited in the preamble of the Bill) our foreign and our internal trade; yet he felt bound to express the conviction which he formed when on the Royal Commission on the decimal question, that while the decimalization of coins was, on the whole, inexpedient, the decimalization of weights and measures was out of the question. (Hear, hear.) The example of other nations had been cited, but it should be remembered that the decimal system was introduced on the Continent at the time of the French revolution, when men were prepared to accept the most extreme changes, and when it was contemplated to decimalize not only coins and weights and measures, but even the measurement of time. One argument in favour of the new system was its intrinsic perfectibility, but let it be remembered that in the attempt to decimalize time the reformers failed, for nature itself declared against them. He could not regard the decimal system as a revelation from Heaven, or believe that the present method could have grown up without possessing some convenience or advantage. (Hear, hear.) France had, by the aid of conquest, imposed the decimal system on some of her neighbours, and other adjoining countries had found it convenient to use it too. That was, however, no reason why England should adopt it. It had been said that it would extend by facilitating commerce. As a merchant he must express his belief that its introduction would not facilitate in the slightest degree any foreign trade which he carried on. (Hear, hear.) It would not diminish the price of any

commodities that were imported, or affect their quantity. Of course the calculations of price and quantity would be more simple and more rapid under a decimal metric system, and thus, as far as mere counting-house work was concerned, some economy might be effected. (Hear, hear.) A house carrying on a large business might perhaps save the salary of a clerk. (A laugh.) As to the operations in Bills of Exchange the equivalents were so familiar to merchants that they experienced no difficulty now and needed no relief. The hon. member for Leeds had stated the saving of time in the education of the young through the use of the new method in very formidable figures. If it were true that a whole year was thrown away at present, then he would willingly agree to the change, but he could not admit the correctness of that statement. Could it be said that to teach a child to multiply and divide decimally constituted a sufficient arithmetical education? Admitting that the more complex rules now requisite for children to learn occupied an additional portion of their school life, was the time so expended wasted? Was it not rather well bestowed in improving their intelligence? ("Oh," and "Hear, hear.") The value of education did not consist in merely enabling a child to buy a pound of butter or an ounce of snuff, but in the development of his mental powers, so as to render him in after life a wise and useful citizen. (Hear, hear.) Therefore, he did not grudge this additional year spent at school, and could not allow that it was wasted. In considering the convenience of the new system it should not be forgotten that a vast number of small trade transactions were carried on by old women, children, and illiterate men in the markets, streets, and alleys of every large town. How would these people be able to adapt themselves to the change? Their monetary unit was the penny—their unit of weight was the pound—most of their staple articles of consumption were bought by the pound or by its aliquot parts, and paid for by the penny or its quarter parts. These standards, either of quantity or value, were familiar to their minds, and a change in either would produce a serious and universal annoyance. It was right that their case should be taken into account in dealing with this matter. Fifty years after the decimal system had been introduced into France it was found necessary to enforce it by a compulsory law. Was the House prepared to carry out this measure by imposing penalties on the great body of the people? Such measures might be very well for despots, but they did not suit the genius of the English people. (Hear, hear.) Even at this moment, the system was not perfect in France. In parts of France the old weights and measures were still in use. Even in Paris one found that the bougies were practically sold by the old measure, for they were done up in packets of as many grammes as made the livre. (Hear, hear.) It had been said that the advantages of the metric system were permanent and positive, while its disadvantages were only temporary and accidental. He denied its advantages, and when it was said it would entail inconvenience only on the next generation or two, he must observe that that was really no small matter. (Hear hear.) It had been said that Lord Overstone had expressed the opinion that the decimalization

of weights and measures and of the coinage should go together; but he was able to state that his lordship meant only that a perfect system would involve that duplicate decimalization, and did not in the least intend to give any countenance whatever to a change in either respect. (Hear, hear.) If the House approved the decimalization of weights and measures, the same process would have to be applied to the coinage, and great expense as well as inconvenience would accompany the recoining of the currency. On the whole the balance of advantages seemed to him to be on the side of leaving things as they were. (Hear, hear.) Those who would gain anything by the change would be those who could best endure the drawbacks of the existing system. Trade did not want it, science was independent of it, and those who would suffer most disadvantage from it were the people who carried on the petty but by no means unimportant industry of the country. (Hear, hear.)

Mr. COBDEN—There are two subjects before us which have been rather inconveniently confounded in the course of this discussion—the question of decimalisation, and the question of adopting the metric system. You may have the decimal system without the metric system. I think there is a unanimity of opinion in favour of the decimal system in preference to our present mode of notation. There may be the exception of Lord Overstone, but whenever I am advocating a reform, especially one about which the common sense of the community is pretty well agreed, I have made up my mind not to have the honour of the company and countenance of Lord Overstone. Looking to the evidence given before the committee on which I sat last year, there is a weight of authority in favour of the decimal system, on scientific, educational, and commercial grounds, such as I hardly ever before saw equalled in any committee. There was, for example, the evidence of Professor De Morgan, the great mathematician and actuary. He was not of opinion that the metric system should be adopted, but he declared—and it is a fact that should be deemed important in this discussion—that boys would save one-half the time they spent in the study of arithmetic, by following the decimal instead of the present system. The Rev. Alfred Barrett, a clergymen who instructs youths for the Artillery service, made the following statement to the committee:—"It appears to me that the work of education in the French Military Academy is much more forward than ours, and arises very much from the time of the juvenile pupils being lost in the stupid system of arithmetic which we adopt." He was asked, "How much do you think the time spent in education would be shortened by adopting the decimal system?" He answered, "Two years." He was asked if learning according to the decimal system would be more agreeable, and his answer was, "Yes, I think so, and more complete." Dr. Farr produced a letter from Lord Brougham, who had collected the testimony of schoolmasters on the subject, and he had come to the conclusion that one-third of the time spent by boys at school in learning arithmetic would be saved by adopting the decimal system. My friend Mr. Edwin Chadwick has given his attention to a new system of educa-

tion for the poorest class of schools, by which he proposes, without any diminution of the amount of their education, to shorten the time for the instruction of children to three hours a day instead of six. Mr. Chadwick says that more than one hour out of three is wasted by the poor children learning arithmetic, in consequence of the complicated system which they are taught. The gentleman who just sat down (Mr. Hubbard) has offered a most astounding argument in defence of his views, he is in favour of puzzling the children's heads with the present system of arithmetic, for the purpose of exercising their brains; but does not the hon. gentleman know that if you give to those poor children greater facilities for studying the simple rules of arithmetic, they will be able to mount up to the compound rules, or even to the higher regions of mathematics? They will be stopped soon enough by the rules of mathematics, which will abundantly exercise their brains; but let it be done for a useful object, rather than for the mere purpose of tormenting them. I commend to the hon. gentleman those doggerel lines, written, no doubt, by some despairing urchin, in a moment of distraction:—

"Multiplication is vexation,
Division is as bad;
The rule of three it puzzles me,
But practice drives me mad."

The question of education is mixed up with the question before us in this way:—you cannot teach children the decimal system with any advantage unless it is to be available in the ordinary transactions of the affairs of life. My hon. friend the member for Staffordshire has been arguing for a permissive and temporising treatment of this measure. He pities the boys who are learning the present system of arithmetic, and says he would allow the decimal system to be permissive; but what would follow? The poor boys would learn the decimal system and the present system, and that would be no relief to them. Now I apprehend that what will come out of this discussion is this: you must either adopt the whole of it or not take a step in it at all. You must adopt the system of decimalising your coins and your weights and measures. Then comes the question, What mode of decimalisation will you adopt? The right hon. gentleman the member for Oxfordshire says he is in favour of taking a foot measure for decimalisation, but objects to the proposed metre as outlandish. I think he has some objection to the origin and source from which the new metre is to come. I suppose the right hon. gentleman would not object to mechanics or scientific men decimalising their foot rules and carrying it through a calculation of measurements; but what is the use of decimalising a foot or a yard unless you decimalise all the measures into which these merge and to which they have relation? If you agree to decimalise your foot, you must decimalise your inch and yard to make it of any value; and if you decimalise your pound you must decimalise your ounce and other weights. If you adopt the decimalising system at all, about which everybody is agreed, you must enter upon a complicated change of your own weights and

measures that will be just as troublesome to you and cause as much embarrassment to your trade as if you adopt the French system. What is the French system? The hon. member for Leeds said that I had an opportunity of forming an opinion respecting the systems of France and England. I had that opportunity, and probably should not have taken part in the discussion of this question if it had not been forced upon my attention. I was engaged, for I believe six months, in the constant study and conversion of English weights, measures, and prices into French weights, measures, and prices. To say I felt the disadvantage of our system as compared with that of France, and felt mortified and annoyed, would not express my feeling at the time; I felt humiliated. The one is simple, symmetrical, logical, and consistent; the other is dislocated, complicated, uncouth, and incoherent. We need not be alarmed about the French system because it is French. The French system is not founded upon anything peculiar to France. Before the French metric system was adopted, the French Government, in 1790, invited the English Government to send learned Fellows of our Royal Society to France, to devise a system of weights and measures for the world. We declined to interfere, and what is the result? Instead of taking anything peculiar to themselves, the French Government adopted a cosmopolitan standard. They took for their unit of length, weight, and capacity, a geographical and mathematical fact, the ten-millionth part of the quarter of the circumferenee of the globe, or a little more than an English yard. There is nothing in that to excite the jealousy of Englishmen. If we were asked to take the meridian of Paris for the calculation of the longitude in our navigation tables you might resent it, but in this case a cosmopolitan standard has been adopted which has no special reference to France. You may adopt the system, therefore, without making the slightest concession to French ideas. I don't know that I could explain the advantages of the system more clearly than by quoting a few words from the evidence of M. Chevalier. He said that "the evidence in favour of a good spinning or weaving machine, instead of an obsolete one, would be also evidence in favour of the metric system of calculation." If it were discovered by a traveller in France that the ploughs or scythes used by our agriculturists were inferior to those used in that country, we should instantly change the form of those agricultural instruments, and adopt the model from abroad. But here is a tool that is not merely used by our agricultural labourers in cultivating the land; in every family in the United Kingdom it is in daily use; it offers facilities for saving one-half the time in arithmetical education, and one-third or one-fourth of the time spent in all the transactions in which you are to make use of this tool—and yet there is a difficulty set up in adopting it. Its adoption is resisted by the *vis inertiæ* of the country. It is recommended by all the highest authorities amongst those who have had occasion to use it. It is recommended by Sir Rowland Hill, because it is most desirable for the arrangement of his postage. It has been recommended by Dr. Farr, the head of the Statistical Department of the Register of Deaths, Births, and

Marriages. It is recommended by Mr. Anderson, the head of your gun factory at Woolwich, and by Mr. Graham the Master of the Mint. It is stated that Mr. Whitworth finds the decimal system necessary for minute computation and admeasurement. The metric system has been petitioned for by the Associated Chambers of Commerce. All the bodies and classes most likely to be served by using this instrument have petitioned to be allowed to use it; and are we to meet them with the argument that the old system answers very well— we will go on in the ancient way—we object to take anything from the French? Are the whole interests of the country to stand still on that account? If we were satisfied with things as they are, I could understand why we should be indifferent to a change, but what places us completely in the wrong is that we are all agreed that our present system of weights and measures is unsatisfactory. I have been asked whether the French people have universally adopted the metric system, and I say no. They have, in remote country districts, persons who still estimate the extent of their land by the old measurement; but there is this difference between France and England. The French have no idea of abandoning their new system, which is being rapidly adopted by the other nations of the continent, and only waits our adoption to become the system of the civilised world; all they want is time to make those poor people who adhere to the old method better acquainted with the new one, whereas, though we are dissatisfied with our system, we are still looking about for the means of remedying it. Our weights and measures are supposed to be a part of Magna Charta, and to be founded upon a declaration of the Barons at Runnymede, more than 600 years ago, who said there should be only one standard in England; but we have actually about 150 measures, which, though illegal, are constantly being used in defiance of the law. We have also penalties to compel the use of legal weights and measures, but they are not inflicted. What is the reason why we have never had one uniform system of weights and measures? It is that we have never presented to the public a motive for uniformity. We have passed a law that the Winchester bushel should be abolished and the Imperial bushel used in its stead, but the Imperial bushel offered no more facilities in measurement and calculations than the Winchester bushel. So in other cases. But the distinctive merit of the present proposal is that it promises a great economy of time and labour in the adoption of the decimal and metric system. Above all, it appeals to the youth of the country, which I consider a point of vast importance. It has been said that there can be no immortality for authors unless their books are read by the young. So it might be said in this case, that the greatest hope of success from the adoption of the decimal and metric system is founded upon the appeal made to the sympathy and interest of every young person in the country. The logical sequence with which the decimals in the French metric system follow one another afford satisfaction to the reasoning faculties; it gives a constant triumph to the reason; but we have nothing of the sort in our illogical, inconsistent, and dislocated system. I might compare the distinction between the

two systems to the difference between mining in a country full of "faults," and mining in a district where there is one continuous vein. The French are generally considered a more logical people than the English. I believe they are so, and I am sometimes disposed to attribute the fact to their having this decimal system of calculation. I admit that we should have considerable difficulty in the transition, but think that those difficulties might be successfully encountered by the Board of Trade, under the guidance of my right hon. friend the member for Ashton, who has a mind peculiarly suited for dealing with such a question. At the very outset the Board of Trade would have to prepare and issue a table of equivalents in order that the people might know by comparison with the past what they were buying. Such a table could be produced with the greatest ease, and in a very short time there would be no occasion for its use at all. It was in evidence that an English workman going to Paris mastered the French system in a month, and one witness has stated that a man of superior intelligence might master it in two days. Now that our old disputes as to financial and commercial questions are disposed of, I think the President of the Board of Trade could not do better than take this matter in hand. Lord Chesterfield endured in history as a great name very much from having been the means of introducing the Gregorian Calendar. I trust that the President of the Board of Trade, in addition to his successful labours in the cause of free trade in corn and free trade in newspapers, will do his utmost to obtain what certain boys who threatened to petition the House have called free trade in arithmetic.

Mr. FERRAND remarked that a small shopkeeper with a capital of £50, had probably spent £3, £4, or £5, in the purchase of weights and measures. It was now proposed to sweep away the whole of that property. He submitted that if the Bill was to be compulsory it ought to be compensatory also. (Hear, hear.) The hon. gentleman, amid cries of "Question," called attention to the large sums demanded from hawkers for licenses, and commended the subject to the attention of the Chancellor of the Exchequer.

Mr. M. GIBSON confessed that he did not feel very sanguine of being able to induce the people of this country to conform without great resistance to any considerable change in their weights and measures. (Hear, hear.) Such alterations if desirable could, of course, be effected, but they ought to be introduced in a cautious manner and by successive steps, so as to cause as small an amount of loss and inconvenience as possible. He had not a word to say against the decimal and metric system of France; on the contrary he thought it convenient, neat, and beneficial; but the question was whether the House would give its assent to a compulsory measure which enacted that, from and after a certain time named in the clauses, every person in the United Kingdom who did not use in transactions of trade, whether of an extensive or whether of a petty character, the metric system, should be liable

to a penalty of 40s. (Hear, hear.) Now, his own opinion was, that in such a case as this we must endeavour to fit matters a little to society, and must not expect that society would all at once adapt itself to new legislation unless some public conviction existed in its favour and unless the minds of the people were prepared to co-operate with the law. That was the opinion of the select committee, which, while recommending that the metric system should be rendered legal, declared that no compulsory measures should be resorted to unless they were sanctioned by the general conviction of the public. (Hear.) What evidence had we that such a change as that proposed by the hon. member for Rochdale was sanctioned by a general conviction of the public? None whatever. Many steps ought to be taken before we ventured upon compulsory legislation, which, if attempted prematurely, must have the effect of throwing back the change that many desired to see accomplished. Such has been the case in France, where 50 years expired after the premature decree of the National Assembly before the metric and decimal system was brought into general operation in the time of Louis Philippe. There could be no doubt of the advantage of the decimal system in all matters of accounts, but he contended that we could not make that system the only mode of division which persons should be compelled to use under a penalty. He had no objection to any Bill, if such should be thought necessary, which should legalize and license the use of the decimal division; but he should be sorry to see any measure passed to confine men exclusively to that system and prevent them from having recourse, if their convenience required it, to the binary system now in ordinary and daily use. Uniformity in weights and measures, they would all agree, was most desirable; but what was their experience of previous attempts to enforce it? We had now established by law two simple and primary units, the standard yard for length and the avoirdupois pound for weight; and from these all our other legal weights and measures were derived. The 5th and 6th of William IV., cap. 63, enacted that any person using any weight or measure other than those authorised by that Act should be subject to a penalty not exceeding £5, and also that all contracts made in other measures or weights should be null and void. Yet there was, no doubt, at present a great number of local and customary measures and weights in use in this country, in Wales, and in Scotland, contrary to that statute, although common informers had power to sue for the penalty which it imposed. Why then was the law not enforced? He could not give any other reason than that it was found an extremely difficult thing to enforce, in any brief space of time, any great change in weights and measures throughout the country, and that in many districts public opinion would not sanction the prosecution of persons for adhering to usages with which they had been accustomed to conduct their business with convenience and safety. In the metropolis and other large towns no infractions of this law, perhaps, took place, and the introduction of railways and other changes had a tendency to lead to the voluntary adoption of uniformity in weights and measures on account of its superior convenience. It was

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better, therefore, to trust to the gradual appreciation of the advantages of an improved system, than to seek, by the rough and compulsory expedient of legal penalties, to bring about a change all at once. He agreed with the hon. member for Rochdale that it was the duty of all who approved the decimal and metric system to do what in them lay to prepare the public mind for receiving it. But he was convinced that, although those persons, comparatively few in number, who were engaged in the foreign trade, and whose transactions were generally on an extensive scale, might be favourable to this change, yet, from the innumerable petty traders and shopkeepers scattered throughout the country, any sudden attempt to make it compulsory would meet with a general resistance. He could not, therefore, assent to a compulsory enactment, nor could he see his way, if passed, to its practical enforcement. On such a subject they must proceed by single steps, and if the hon. member for Dumfries would withdraw this bill, and introduce another of a merely permissive character, that might by degrees familiarize the public mind to the idea of the proposed change, and pave the way for further advances in the same direction hereafter. Although himself in favour of the theory of the metric system, all the scientific witnesses examined before the committee did not support it. Professor De Morgan, while strongly advocating the decimal system for account keeping, regarded the metre as not a good unit of length. Professor Airey also thought that uniformity and harmony with the system of foreign countries might be purchased at too high a price. Still, of the practical difficulties of introducing into trade a new system, the scientific men were not such good judges as the Chambers of Commerce. But it would not be fair to let the House suppose that there had been unanimity among the philosophers, and even at the present moment several of them inclined to the opinion that it was not desirable to adopt the metre as our unit. With regard to a question which had been put to him as to the testing of the standards, the Act provided that the local standards should be compared with the standards in London, but it contained no provision for the periodical verification of the working standards in London by comparison with the primary standards kept in a stone box, which were the units and constants upon which all our weights and measures were by law to depend. He presumed, however, that the authority of the Government would be sufficient to warrant that comparison being made; and, as the matter was one of great importance, it would not fail to receive the attention it deserved. The International Statistical Congress which sat in London two years ago appointed a committee to inquire into the best means of overcoming the obstacles which prevented the adoption of the metric system in various countries. He would suggest, therefore, that it would be well for the hon. member for Dumfries to wait till that committee had presented its report to the next meeting of the Congress before seeking to legislate on this subject. He saw that Portugal, after ten years of hard preparatory work, had just arrived at the stage for compulsorily introducing the metric system. He was quite willing to help individually

as a pioneer in paving the way for the adoption of that change in this country, but he believed that if he were to attempt, by a sort of surprise, to compel people by law in all parts of the country to throw away their present weights and measures, and to provide themselves with new ones based on wholly novel principles, he would require the assistance of a body of police of no ordinary magnitude.

Mr. BAZLEY thought the President of the Board of Tra..e, in his very plausible speech, had conjured up imaginary difficulties. In the departments of the Customs and Excise the decimal system was already largely used; and where would be the difficulty of applying the same principle to the transactions of the general public? Many of the working men of Lancashire were now in the habit of computing upon the decimal system in the discharge of their ordinary duty. (Hear, hear.) He should support the Bill, because it would materially economize time and promote the wealth of the country.

Mr. ROEBUCK said the right hon. gentleman had recommended the hon. member for Dumfries to withdraw the Bill and bring in another of a permissive nature. He would suggest that the House should agree to the second reading before the Bill was withdrawn (hear, hear)—because by that course they would at least have affirmed its principle.

The CHANCELLOR of the EXCHEQUER said that unhappily compulsion was a vital portion of the measure, and could not be separated from its principle. (Hear, hear.) To compulsion in this matter the Government were not prepared to accede, and they would be only deluding the House if they for a moment assented to the second reading of a measure involving compulsion as a means of giving effect to the decimal system.

Mr. R. HODGSON said that the compulsory power was not the principle of the Bill, but only the means by which it was to be carried out. The hon. member for Dumfries should state, before they divided on the second reading, whether he would agree to change the compulsory provision into a permissive one, and in that case, after the second reading, the Bill might be committed *pro formâ*, and altered and printed, and circulated for consideration by the country during the recess.

Mr. J. B. SMITH said that he was of opinion, with the hon. member for Tynemouth, that the Bill should be read a second time, because the principle of the Bill was the adoption of the metric system of weights and measures. Whether its adoption was to be enforced or permissive was a matter of detail, and might be dealt with in Committee on the Bill. The President of the Board of Trade had observed that the philosophers were not agreed on the metric system. It was true that there were two philosophers examined before the committee on weights and measures, who were opposed to the metric system. One was in

favour of the decimalization of our existing weights and measures; the other, the Astronomer Royal, was opposed to any change at all. Now, he knew that the House had great respect for the opinions of philosophers; he was, therefore, desirous of reading the evidence of the Astronomer Royal before the Committee, from which they would be able to judge of the practical value of his opinions on this subject. This learned gentleman was asked, "In the case of a Railway Company having hundreds of charges to make every day for the carriage of goods, which may be of every conceivable weight from a pound up to 100 tons, in such a case having cwts. and lbs. as part of the weight, do you suppose that any table could be devised that would aid their calculations." Answer—"I never had to send goods by railway, and therefore I cannot say." Q.—"Then I tell you that they charge tons, cwts. and lbs. Do you not think that in France, where a railway has 1,000 kilogrammes for transmission, they would find their calculations greatly facilitated by dividing the 1,000 kilogrammes by 10?" A. "Yes." Q. "Is not a large amount of the business of the country the railway carriage of the country? A. No: it is a good deal, but it depends—that is, the convenience or inconvenience depends—entirely on the extent to which large measures or weights, and small ones, are used at the same time." Q. "Of course it does?" A. "Generally speaking in all business I have any acquaintance with, they are not used much together." Q. "You do not dispute that the railway companies charge the weight by the ton, cwt., qrs., and lbs.? I do not know how far they go, but I should think they would not go below the quarters. It would depend entirely upon the extent to which the small weights are combined with the large weights." Q. "Assuming that the railway companies charge below the quarters, then do you think the adoption of the decimal system would be an economy of time? A. "Yes; but it scarcely would if they do not go below the quarters." No doubt the opinions of so distinguished a philosopher as the Astronomer Royal on questions connected with his own pursuits is entitled to great deference; but so much of his life is spent among the stars that he appears to have little practical acquaintance with what is passing in the world below. There was however another philosopher examined before the Committee, Professor Miller, of Cambridge, no less distinguished than the others, but possessing the advantage over them of a practical acquaintance with the subject of weights and measures. Professor Miller was one of the members of the Committee for the restoration of the lost standard, and to him was entrusted the restoration of the standard of weight. He is of opinion that the metric system should be adopted in the place of our present system of weights and measures, because it is a perfect system, and because it is now adopted by a very large portion of the world. He was asked by the hon. member for Staffordshire, "Do you find in the course of your learned pursuits that our present system of weights and measures interferes with scientific investigation in any way?" He answered, "Not in the least: they are so complicated it is quite impossible to use them. The balance makers provide balances made for accurate purposes with decimal weights

of some kind." It appears, then, that scientific men cannot use our present system of weights and measures; the Astronomer Royal himself never uses them in his calculations; there has been no reason urged why the public should be condemned to use them except that any change would be attended with temporary inconvenience and would be especially distasteful to old women. He (Mr. Smith) did not believe that the English people were less intelligent than the Dutch, Swiss, Spanish, or those of any other country which had adopted the metric system with so much public advantage, and he therefore hoped the House would allow the Bill to be read a second time.

Mr. GRIFFITH was ready to support that part of the measure relating to decimal computation, but was unwilling to pledge himself to the adoption of the metric standard.

Colonel SYKES said, as a member of the Committee on Weights and Measures, and concurring entirely in the recommendations of the committee, he might not have risen after the conclusive statements that had been made; but some observations of the right hon. member for Oxfordshire needed remark. The right hon. gentleman said that the metric system in France had originated in the Revolution, when there was a mania to abolish every previous institution, and its adoption had been abrogated by Napoleon the First. The fact was that as early as the 8th May, 1790, a commission of the Academy of France was ordered by the Constituent Assembly, upon which sat academicians and mathematicians whose names have taken a place for ever in science. The commission at first thought of adopting the length of a pendulum vibrating seconds in the meridian of Paris as the basis or standard; but as gravity is not uniform throughout the globe, the plan was given up, and an immutable standard of the ten-millionth part of the quarter of a meridian was adopted. On the 26th March, 1791, the recommendation of the Commission of the Academy was sanctioned; but it was not until the 1st August, 1793, that the new system, with its decimal notation, became law, and it was slightly altered in 1795. It continued in operation until 1801, when some relaxation took place owing to Napoleon's opposition to the system; and in 1812, when Emperor, he let the people substitute the old terms; but under Louis Philippe it was found that such confusion had ensued, that the Chambers restored the metric system, which has continued in operation ever since. The argument of the right hon. gentleman, therefore, told against himself, for so far from the metric system being abandoned because it would not work, it was in fact restored because of the confusion consequent on its abandonment. The right hon. gentleman said also, that the majority of the European nations had not adopted the metric system, but this was not the fact; Russia, European Turkey, and Wallachia, were the only European countries where there had not been a movement in its favour. The three Scandinavian nations, Sweden, Norway, and Denmark, had recently passed resolutions in its favour, and even in Russia the thin end

of the wedge was being inserted. Surely, therefore, his right hon. friend would not wish to have England left in the same category with Turkey and Wallachia. England had a great commercial interest in the metric question; for the value of her trade annually in those countries where the metric system prevailed was 55 millions sterling, while in those countries in which the metric system did not exist, the value of the trade was only 24 millions per annum. A practical illustration of the economy of time and figures, by the use of decimals in arithmetical calculations, had not been given by the speakers who had preceded him, and he would offer one from a paper he had in his hand. It was the determination of the value of 5760 yards of calico at 3¾d. per yard, by compound multiplication, by the rule of three, by practice, and by the aid of a decimal table; the answer of course was the same, viz., £93, by each mode; but compound multiplication required 43 figures; the rule of three, 44 figures; practice, 33 figures; and by the aid of the decimal table only 14 figures were required. This was conclusive. Great stress had been laid upon the difficulties attending the introduction of the metric system, particularly in respect to the prejudices against the Græco-Latin terms to be used. But these terms might be dispensed with, and our own old and familiar monosyllabic "ton," "pound," "ounce," "quart," "pint," &c., be retained, the present quantities of each designation only being altered, to make them correspond with the terms and quantities in the metric system. The objections to the Bill on account of its penal clauses have no force, for every "Weights and Measures Bill" already passed has its penal clauses, which are constantly put into operation. Moreover, with respect to all the difficulties alleged, every nation which has adopted the metric system equally experienced them, and it cannot be believed that England would fail to do what other countries had succeeded in doing. He would therefore heartily vote for the second reading of the Bill.

Mr. W. EWART, in reply, said he was willing to accept the Government proposition if they would undertake to use their endeavours to prepare the country for the change by introducing the metric system into schools, and in any other manner that might be open to them.

Mr. GIBSON said he could not offhand pledge the Government to any particular course, nor could he speak for the Committee of Privy Council.

The SOLICITOR-GENERAL pointed out that the Bill was essentially a compulsory measure, for it spoke throughout of the unity of weight and of capacity, and did not say that persons might use that unity or not as they pleased.

The House then divided, when the numbers were:—

For the second reading	110
Against	75
Majority	—35

WEIGHTS AND MEASURES (METRIC SYSTEM) BILL.

Order for Second Reading read. Motion made and Question put, "That the Bill be now read a second time." The House divided:—Ayes, 110; Noes, 75.

Ayes.

Adam, William Patrick
Addeley, Rt. Hon. Charles Bowyer
Agnew, Sir Andrew
Baines, Edward
Barnes, Thomas
Bazley, Thomas
Blake, John
Browne, Lord John Thos. (Mayo)
Buchanan, Walter
Buckley, General
Buller, James Wentworth (Devon, N.)
Caird, James
Cave, Stephen
Churchill, Lord Alfred Spencer
Clay, James
Clifford, Colonel (Hereford)
Coningham, William
Corry, Rt. Hon. Henry Lowry
Dalglish, Robert
Davie, Colonel Ferguson (Barnstaple)
Du Pre, C. George
East, Sir James Buller
Edwards, Colonel
Elphinstone, Sir Jas. Dalrymple
Enfield, Viscount
Ewart, Joseph Christopher (Liverpool)
Ewing, Humphry Ewing Crum
Fane, Col. John William
Farquhar, Sir Minto
Fenwick, Henry
Finlay, Alexander Struthers
Fitzwilliam, Hon. C. W. W.
Foley, Henry W.
Forster, Wm. Edw. (Bradford)
Gard, Richard Sommers
Gore, Jno. Ralph Ormsby (Salop N.)
Goschen, George Joachim
Gower, Hon. F. Leveson (Bodmin)
Grenfell, Henry R. (Stoke)
Greville, Colonel Fulke
Gurney, Samuel (Penryn)
Hadfield, George
Hankey, Thomson
Hassard, Michael
Hay, Sir John Charles Dalrymple
Hennessey, John Pope
Hervey, Lord Alfred
Hibberd, John Tomlinson
Hodgkinson, Grosvenor
Hodgson, Richard (Tynemouth)
Holland, Edward
Hood, Sir Alexander Acland
Horstall, Thomas Berry
Ingestre, Viscount
Jackson, William
Jervoise, Sir Jervoise Clarke
Jolliffe, Rt. Hon. Sir W. J. H. (Petersfield)
King, James King (Hertfordshire)
Laird, John (Birkenhead)
Leatham, Edward A.
Lefroy, Anthony
Lewis, Harvey
Liddell, Hon. Henry George
Lindsay, Wm. Schaw (Sunderland)
Locke, John
Lyall, George
Mackinnon, Wm. Alexander (Lymington)
Maguire, John Francis
Manners, Lord George J. (Camb. Co.)
Martin, Phil. Wykeham (Rochester)
Massey, William Nathaniel
Mildmay, Humphrey Francis
Morrison, Walter
Nicol, William
Ogilvy, Sir John
Padmore, Richard
Paget, Chas. (Nottingham)
Pakington, Right Hon. Sir John
Patten, Colonel Wilson
Pender, John
Pennant, Hon. Colonel
Pilkington, James
Pollard Urquhart, William
Ponsonby, Hon. Ashley
Potter, Edmund
Pugh, David
Puller, C. W. Giles
Ramsden, Sir John William
Raynham, Viscount
Repton, George William
Roebuck, John Arthur
Scholefield, William
Seeley, Charles
Sheridan, Henry B. (Dudley)
Smith, John Benjamin (Stockport)
Smith, Abel (Herts.)
Somes, Joseph
Steel, John
Sturt, Hen. Gerard (Dorset)
Sykes, Colonel Wm. Henry
Taylor, Colonel (Dublin Co.)
Tite, William
Tottenham, Lieut.-Colonel Charles George
Trefawny, Sir Jno. Salusbury
Warner, Edward
Watkins, Colonel Lloyd
Weguelin, Thomas Matthias
Whalley, George Hammond
Whitmore, Henry
Williams, Wm. (Lambeth)

Tellers for the Ayes, Mr. William Ewart and Mr. Cobden.

Noes.

Addington, Rt. Hon. Wm. Wells
Arbuthnot, Major General
Atherton, William
Ayrton, Acton Smee
Baillie, Hugh (Inverness-
[illegible] rge W. P. st)
[illegible] Cavendish
[illegible] ter
[illegible] John
[illegible] (Malton)
Bruce, [illegible] Austin (Mer-[illegible])
Ch[illegible] ugh Culling Eardley
Cholmondeley, Sir Montague John
Cowper, Right Hon. Wm. F.
[illegible] x William
[illegible]avie, Sir I. R. Ferguson (Hadding[illegible]shire)
Duff, Mount Elph. Grant (Elgin)
Dundas, Right Hon. Sir D. (Sutherland)
Egerton, Sir Philip Grey (Cheshire S.)
Evans, [illegible] Lacy (Westminst[illegible])
Farrer, James
Fellowes, [illegible]ward
Foster[illegible], Orme (Staffordsh[illegible]S.)
[illegible]
Galway, Viscount
Gavin, Major
Gibson, Right Hon. Thomas Milner
Gilpin, Charles (Northampton)
Gladstone, Rt. Hon. Wm.
Gregson, Samuel
Griffith, Christopher Darby
Henley, Right Hon. Joseph Warner
Henley, Lord
Herbert, Rt. Hon. Henry A.
Holmesdale, Viscount
Hotham, Lord
Hubbard, John Gillibrand
Humberston, Philip Stapleton
Hutt, Rt. Hon. William
Johnstone, Sir Jno. (Scarboro)
Kekewich, Sam. Trehawke
Knatchbull, W. Francis (Somerset E.)
Knatchbull, Hugessen E. (Sandwich)
Layard, Austin Henry (Southwark)
Marjoribanks, Dudley Coutts
Mills Arthur (Taunton)
Mitford, William Townley
Moncrieff, Rt. Hon. James
Morris, David
Mowbray, Rt. Hon. John Robert
Murray, William
North, Colonel (Oxfordshire)
Paget, Lord Clarence (Sandwich)
Palmer, Sir Roundell (Richmond)
Parker, Major Windsor
Peel, Rt. Hon. Frederick (Bury)
Ridley, Sir Matthew White
Robartes, Thomas James Agar
Rowley, Hon. Richard Thos.
Russell, Arthur (Tavistock)
Salomons, Mr. Alderman
Shelley, Sir John Villiers
Smith, Augustus (Truro)
Smollett, Patrick Boyle
Stansfeld, James
Sullivan, Michael
Tollemache, John (Cheshire S.)
Trevor, Lord Arthur Edwin Hill
Turner, Charles (Lancashire S.)
Vandeleur, Colonel
Vernon, Harry Foley
Villiers, Rt. Hon. C. Pelham
Wallcott, Admiral
Walter, John
White, Luke (Kidderminster)
Wynn, Charles Watkin (Montgomeryshire)

Tellers for the Noes, Mr. Bland and Sir William Dunbar.

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* *Tracts so marked are nearly exhausted and out of print.*

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DEBATES

IN BOTH HOUSES OF PARLIAMENT

ON THE

METRIC WEIGHTS & MEASURES BILL.

SESSION 1864.

LONDON:
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1864.
Price Threepence.

DEBATES IN BOTH HOUSES OF PARLIAMENT

ON THE

METRIC WEIGHTS AND MEASURES BILL.

SESSION, 1864.

After the second reading of the Metric Weights and Measures Bill, on the 1st July, 1863, by a majority of 110 to 75, Mr. Ewart and his friends, having regard to the lateness of the season, deemed it desirable to take no further steps during that Session, but gave notice to introduce a Permissive Bill early in the following Session. The change from a Compulsory to a Permissive Bill was suggested from the circumstance, 1st, that the nation did not seem prepared for a compulsory measure; 2nd, that many members who had voted for the second reading of the Bill last Session had expressed a desire that it should be remodelled into a permissive measure; and 3rd, that it was better to secure success by a tentative measure in the first instance, than to endanger the Bill by proposing the total change of our weights and measures within any definite period. A Permissive Bill was accordingly prepared and brought in by Mr. Ewart, Mr. Cobden, the Right Hon. C. B. Adderley, and Mr. Finlay, on the 18th February, 1864, which, having been read a first time on the same day, was appointed to be read a second time on the 10th March, 1864. This Bill proposed to take as a standard the metre in the possession of the Royal Society. It defined the metre and other units; provided that copies and models should be made and deposited in certain places; authorised customs duties to be collected by metric weights and measures; and supplied a table of equivalents whereby to compare the metric with the imperial weights and measures.

In moving the second reading of the Bill, Mr. EWART referred to the debate in the previous Session, and to the events which had since taken place in relation to the object, such as the resolutions of the International Statistical Congress held in Berlin, the address of Sir W. Armstrong at the meeting of the British Association for the Advancement of Science, held in Newcastle, and the resolutions again passed by

the Association of Chambers of Commerce at their annual meeting in London. Mr. Ewart again referred to the unanimity which had prevailed among the witnesses in their evidence before the Committee of the House of Commons, and expressed an opinion that if the Bill passed the system would work its way gradually into the commercial and manufacturing trades of the country.

Mr. LOCKE, Q.C., seconded the motion. He was convinced that nothing but advantage would arise from an assimilation of our weights and measures to those of foreign countries. In his opinion some analogy should exist also between the weights and measures and the coinage; he showed the advantage of a decimal system for educational purposes over the present tables, and dwelt on the importance of rendering the standards generally accessible.

Mr. MILNER GIBSON stated that there was no need of an Act of Parliament for introducing a decimal system, since secondary weights and measures could be adopted through the medium of an Order in Council, decimalizing the divisions already in use. He objected to introducing another standard in addition to those in force; and also to the sending copies of the metric standard throughout the United Kingdom. What might be done was to remove the obstructions to the use of the metric system by making it simply legal. He had no objection to legalizing contracts made on the metric system, but he objected to provide new standards.

Mr. HENLEY opposed the motion, objecting to having two modes of buying and selling, and to change the weights and measures without establishing any relation with our coinage. He threw ridicule upon the idea of taking the bar of platinum in the possession of the Royal Society as a standard, when it had not been verified for so long a time; and concluded by repeating, that, in his opinion, a measure of this kind ought to be brought forward, if at all, by the Government.

Mr. ADDERLEY showed the immense advantage of a simple and uniform system of weights and measures for our domestic and foreign trade. He was convinced that philosophy and science would likewise be benefited by it. He compared the simplicity of the metric system with the confusion of the weights and measures in use, there not being a single term in it which had not twenty or thirty different meanings; and urged that the Education Committee of the Privy Council might introduce the system into all the schools under their control.

Mr. HANKEY regretted that the promoters of the Bill had received no encouragement from the Government, yet it was necessary that something should be done. Although the Bill was made permissive, there was no doubt that after a time, when the country had got used to the change, it would be rendered compulsory.

Mr. WALTER opposed the Bill, because it was inexpedient. He objected to the Bill partly because it was a permissive one, though he would have objected to it had it been compulsory. As it was, the Bill would throw the trade of the country into a state of confusion. He objected to it because it was a revolutionary measure, and it introduced a

foreign nomenclature likely to cause great perplexity. There was no need of such a change. The metre was not nearly so handy as our yard. The attempt to decimalise the coinage had proved a failure, and he concluded by moving that the Bill be read the second time that day six months.

Mr. J. B. SMITH referred to the early intention of the Legislature, from Magna Charta downward, that there should be one system of weights and measures throughout the country, and showed that English names might be used for metric weights and measures if it was thought necessary. He supported the Bill.

Colonel SYKES thought it a disgrace to this country, that it should be found lagging behind the rest of the civilized world in the matter. In his opinion it was the duty of the Government to bring in a measure, and if they did so the intelligence of the country would in a few years gradually come over to it.

Mr. BUXTON urged upon the President of the Board of Trade to assist in the adoption of this measure. Nothing could cause greater confusion than any mere half-and-half change in such a matter.

Colonel BARTELLOT said that though some of our traders would accept such a measure, in the agricultural districts it would be viewed with great distrust.

Mr. BAINES protested against supposing that this country, with its intelligence, was not not able to appreciate and understand one of the most striking and important of modern improvements.

The House then divided, and then voted

For the second reading	90
Against it	52
Majority	—38

The division list was as follows:—

AYES.

Adair, Hugh Edward	Clifton, Sir Robert Juckes	Gavin, Major
Adderley, Rt. Hon. Chas. Bowyer	Cobbold, John Chevallier	Gibson, Rt. Hon. Thomas Milner
Ayrton, Acton Smee	Crawford, Robert Wygram (London)	Goddard, Ambrose Lethbridge
Baines, Edward	Crossley, Sir Francis	Grecnall, Gilbert
Barnes, Thomas	Cubitt, George	Greene, John
Bazley, Thomas	Dent, John Dent	Gurdon, Brampton
Beaumont, Somerset A. (Newcastle)	Duff, Mount. Elph. Grant (Elgin)	Hamilton, Major (Linlithgow)
Beecroft, George Skirrow	Dunbar, Sir William	Hankey, Thomson
Blake, John	Du Pre, C. George	Henderson, John
Bruce, Henry Austin (Merthyr T.)	Enfield, Viscount	Heygate, William Unwin (Leicester)
Buchanan, Walter	Evans, Thomas William (Derby S.)	Hibbert, John Tomlinson
Buller, James Wentworth (Dev. N.)	Ewart, Joseph Christopher (Liverpool)	Hodgson, Richard (Tynemouth)
Buxton, Charles	Fergusson, Sir James	Holland, Edward
Caird, James	Forster, Charles (Walsall)	Hood, Sir Alex. Acland
Clay, James	Gaid, Richard Sommers	

Hornby, William Henry
Hunt, George Ward
Hutt, Rt. Hon. William
Jervoise, Sir Jervoise Clarke
Johnstone, Sir John (Scarboro')
Jolliffe, Hedworth Hylton (Wells)
Leatham, Edward A.
Lee, William (Maidstone)
Lewis, Harvey
Locke, John
Mackie, James
Moffatt, George
Morrison, Walter
O'Hagan, Rt. Hn. Thomas
Onslow, Guildford
Packe, Charles William (Leic. S.)
Packe, Col. (Lincolnsh. S.)
Padmore, Richard
Paget, Charles (Nottingham)
Patten, Col. Wilson
Paxton, Sir Joseph
Pilkington, James
Pollard-Urquhart, William
Ponsonby, Hon. Ashley
Potter, Edmund
Russell, Hastings (Beds)
Russell, Arthur (Tavistock)
Russell, Fras. W. (Limerick)
St. Aubyn, John
Sheridan, Richard Brinsley (Dorchester)
Sheridan, Henry B. (Dudley)
Smith, John B. (Stockp.)
Stuart, Lieut.-Col. William (Bedford)
Sullivan, Michael
Sykes, Colonel Wm. Henry
Talbot, Hon. Walter Cecil (Waterford)
Tollemache, Hn. Fred. Jas.
Tracy, Hon. Chas. R. D. Hanbury
Turner, James Aspinall (Manchester)
Vernon, Harry Foley
Watkins, Colonel Lloyd
Whitbread, Samuel
White, James (Brighton)
White, L. (Kidderminster)
Wickham, Henry Wickham
Winnington, Sir Thomas Edward

Tellers for the Ayes, Mr. William Ewart and Mr. W. Gore Langton.

NOES.

Archdall, Captain Mervyn
Baillie, Henry J. (Inverness-sh.)
Barrow, William Hodgson
Bartellot, Colonel
Bridges, Sir Brooke William
Bruce, Sir H. Hervey (Colemaine)
Burghley, Lord
Copeland, Mr. Alderman
Cox, William
Davey, Richard (Cornwall, W.)
Edwards, Colonel
Egerton, Hon. Alg. Fulke (Lancashire S.)
Egerton, Ed.. C. (Macclesfield)
Elphinstone, Sir James Dalrymple
Farrer, James
Fellowes, Edward
Ferrand, William
Flower, John
Gilpin, Colonel (Beds)
Harvey, Robert Bateson
Heathcote, Sir Wm. (Oxford University)
Hevgate, Sir Frederick W.
Holford, Robert Stayner
Humberston, Pp. Stapleton
Kekewich, Saml. Trehawke
Knatchbull, W. Francis (Som. E.)
Knight, Frederick Winn
Lacon, Sir Edmund
Laird, John (Birkenhead)
Leslie, William (Aberdeenshire)
Longfield, Robert
Lovaine, Lord
Lygon, Hon. Frederick
Malcolm, John Wingfield
Miles, Sir William
Montgomery, Sir Graham
Morris, David
Murray, William
Neate, Charles
Parker, Major Windsor
Peacocke, George Montagu Warren
Phillips, George Lort
Ridley, Sir Matthew White
Scourfield, John Henry
Selwyn, Charles Jasper
Smith, Augustus (Truro)
Smyth, Colonel (York City
Stewart, Sir Michael R. S. (Renfrew)
Sturt, H. Gerard (Dorset)
Vandeleur, Colonel
Verner, Edward Wingfield (Lisburn)
Walker, James Robert

Tellers for the Noes, Mr. Henley and Mr. Walter.

In comparing the division of 1864 with that of 1863, it will be found that the following members, who opposed the Bill on the previous session, now vote for it, viz.:—Mr. Ayrton, Mr. Henry Austin Bruce, Mr. Mount. Elph. Grant Duff, Right Hon. T. M. Gibson, Right Hon. William Hutt, Sir John Johnstone, Mr. Arthur Russell, Mr. Michael Sullivan, Mr. Harry Foley Vernon, and Mr. Luke White.

COMMITTEE.

The Bill having thus passed a second reading,

Mr. EWART moved the order of the day for going into Committee on this Bill on the 4th May.

After some preliminary objections by Mr. HUMBERSTON and Mr. GRIFFITH, which were answered by Mr. ADDERLEY, the House went into Committee.

On Clause 1, Mr. M. GIBSON objected to the clause as involving the establishment of a new standard, for which the Government was not prepared. They could not proceed in reference to the national standards by mere enactment. They had, first of all, a Commission of competent men to ascertain, and in fact to make, the standard. There was no metre in this country which they could take as authoritative without careful examination by a competent commission. The metre in the hands of the Royal Society was not ascertained to be correct, and great changes always take place in metallic substances. He suggested that the Bill should be confined to enacting that contracts should not be deemed invalid on the ground that the weights and measures therein referred to were metric weights and measures.

Mr. AYRTON suggested that the Bill should state what are the equivalents between the metric system and the present recognised standards.

Mr. BLAKE, from his experience of the working of the metric system in France, was convinced of its great advantages, from its simplicity and the ease with which even uneducated persons could make their calculations based upon it.

Mr. BURKE approved of the metric system, which would be a great convenience to farmers in their corn transactions.

Mr. LOCKE could not conceive the difficulty of establishing what a metre was, since the Board of Trade could easily procure a set of weights and measures from France.

Lord GALWAY was of opinion that the Bill, as a permissive measure, would create much more confusion than at present existed.

Mr. URQUHART thought the simplification of our weights and measures was very much required.

Mr. EWART complained that the President of the Board of Trade had not given him notice of the views with which he regarded this Bill, or of his intention to oppose it. He asked whether the Government was prepared to appoint a Commission for the purpose of determining a good standard, and whether Mr. Gibson was prepared to bring in a Bill giving validity to the metric system, because if he would do so, he would be ready to withdraw the Bill now under discussion, believing that the Government would be enabled to bring forward a better measure than any which could be introduced by an individual member of the House.

Mr. GIBSON stated that he should propose a clause rendering invalid any objection urged against a contract on account of its being

concluded according to the metric system of weights and measures, and a table of equivalents by which the imperial and metric systems could be compared. If Mr. Ewart would defer the Bill until he had submitted his own proposal to the House, Mr. Ewart would see whether that proposal was in accordance with his views.

Mr. AYRTON thought Mr. Ewart's object would be attained if he accepted the proposal of the President of the Board of Trade.

Mr. COBDEN said that if Mr. Gibson could satisfy Mr. Ewart that he really intended to lay before the House the table of equivalents which had been mentioned, and if he really intended to frame the Bill in a manner which would effect the object desired by Mr. Ewart, he should advise him to allow Mr. Gibson's Bill to be brought in. He believed that by thus arranging Mr. Ewart would be perfectly satisfied by the end of the session, and Mr. Gibson would receive all the responsibility as well as the advantage of being the author of the Bill.

Mr. EWART, upon the understanding that Mr. Gibson was prepared to undertake what he had proposed to the House, would move that the Chairman report progress.

Mr. AYRTON seconded Mr. Ewart's motion, as Mr. Gibson had agreed to bring in a clause legalising the employment of the metric system, and had undertaken to prepare the true equivalents between the metric system and the imperial standards in use in this country.

Committee.

On the 22nd June the House again resolved into Committe on the Bill.

Clause 1 agreed to.

On Clause 2 being read,

Mr. EWART stated that he was ready to adopt the amendment suggested by the President of the Board of Trade, and moved that this clause be omitted, with a view to substitute in its place an amended clause.

Mr. ROEBUCK was not in favour of a Permissive Bill, because, so long as it was permissive only, different weights and measures would still be used in different parts of the country.

Mr. HUBBARD did not see any necessity for a Permissive Bill, and did not believe the working classes would adopt the decimal system.

Mr. ADDERLEY said that though the metric system was in use at present, it was not legally so.

Mr. HANKEY adverted to the fact that when the Bank of England found it convenient to divide the pound troy decimally, an Act of Parliament was obtained for the purpose.

Mr. EWART then moved the following clause :—"Notwithstanding anything contained in any Act of Parliament to the contrary, no contract or dealing shall be deemed to be invalid or open to objection on the

ground that the weights or measures expressed or referred to in such contract or dealing are weights or measures of the metric system."

Mr. MILNER GIBSON said that by passing the second reading of the Bill of last Session, the House undoubtedly gave its sanction to the introduction of the metric system into this country. Mr. Ewart had, however, agreed not to press the compulsory Bill and to substitute a permissive one. He voted for the second reading of the new Bill; and the clauses which Mr. Ewart had put on the papers exactly met his views on the subject. The first of the new clauses was simply to the effect that if a contract were expressed in the terms of the metric system, neither party should escape from it upon the plea that it was expressed in terms not sanctioned by law;--that got rid of the difficulty that by the existing law a contract in such terms as those proposed in the Bill was not deemed binding. On a former stage of the Bill, the inquiry was very properly raised, What was a metre? That question was now answered by stating the relative relations between the metric weights and measures and the imperial ones. There was thus no interference with any uniformity which now prevailed. The present lawful standards were left untouched, while facilities were given for the voluntary use of the metric system, which was rendered necessary by the great extent of our foreign trade. Of course, if a large number of persons were to insist on making their contracts in accordance with the metric system, there would be a considerable change in the existing practice, but no degree of compulsion would be used in the matter. Public feeling would be allowed to form itself freely on the subject. The Astronomer Royal had given a good deal of time and attention to the schedule, and it was submitted with his approbation. As to the question which had been asked in regard to the metre, the use of the metric system would be entirely voluntary, and neither party to a transaction would be enabled to force the other to adopt the metric terms against his will.

Mr. EWART then moved the 3rd Clause :—"The table in the Schedule hereto annexed shall be deemed to set forth in terms of the legal weights and measures in force in this country, the equivalent of the weights and measures expressed in terms of the metric system; and such tables may be lawfully used for computing, determining, or expressing, in legal weights and measures, weights and measures of the metric system."

Mr. AYRTON argued that the calculations should be carried to the utmost possible point of scientific accuracy. He regretted that in the schedule the measure of length was carried to only four places of decimals, whilst the weights were carried as low as the 10,000,000th part of a dram.

The schedule was then agreed to, and the Bill ordered to be reported. The Bill was accordingly reported to the House, and on the 29th June it was read a third time in the House of Commons, and passed without a division.

House of Lords.

The Metric Weights and Measures Bill was brought from the House of Commons, and introduced in the House of Lords by Earl Fortescue, and having been read a first time, the Bill stood for the second reading on the 21st July, when it was moved as follows :—

Earl FORTESCUE, after presenting a petition in favour of this Bill from the Associated Chambers of Commerce, comprising most of the great towns of the United Kingdom, said that the measure had an hereditary claim upon his support, because he whose place he so unworthily filled succeeded in carrying through the other House of Parliament many years ago a measure establishing the system of weights and measures now the law of the land. (Hear, hear.) After twenty years experience of the working of the present system, however, his late father was so convinced of the superiority of the metric system that he was one of the first to give his adhesion to the introduction, in a permissive shape, of the metric system into this country. (Hear, hear.) The former Act was brought in, in pursuance of the report of a committee, and the present Bill was equally the result of the unanimous recommendation of a committee of the other House composed of men of all parties. It was unnecessary to remark that the present, being a permissive Bill, must necessarily remain a dead letter unless it were adopted by the free will of those engaged in trade, manufactures, and science. It was not, however, likely that a Bill for which the Chambers of Commerce, that is the representatives of the commercial classes in most of the large towns of this country, petitioned, would remain a dead letter. Nothing could be more confused or unsatisfactory than the present system, or rather want of system, with regard to weights and measures in this country. There were eleven legal sets of weights and measures, troy weight, apothecaries weight, avoirdupois weight, wool weight, dry measure, liquid measure, and so on; but besides that, in some counties the bushel of wheat contained 62 lbs., whilst in others it varied from 60 to 70 lbs. Sometimes it was sold by weight, sometimes by the "hobbet,"—there being several kinds of "hobbet;" and in some places by the stone—there being several kinds of stones. The same observations applied to wine measures and beer measures, which varied considerably in different parts of the country. The mode of measuring distances and areas also varied considerably. There were English and Irish as well as nautical miles; two or three different kinds of fathoms; and English, Scotch, and Irish acres. Their lordships must be fully aware that a great variety of measures of grain, wine, and beer prevailed in different parts of the country. The adoption of the metric system would cure this want of uniformity, and would substitute for that which was inconvenient and difficult to learn a system which was simple and easy to be acquired. Notwithstanding the marvellous rapidity of our accountants, and the many modes of shortening calculations suggested by experience in different branches of

trade it was stated on good authority, that the adoption of this system would save our merchants and men of business half the time which was at present occupied in making calculations and keeping accounts. The very strongest evidence had been given in its favour by practical men. Among those who recommended its introduction, and some of whom employed it in the transaction of their own business, were the late Mr. Locke, the engineer, Mr. Wise (Mr. Brassey's right-hand man), Mr. Whitworth, Mr. Robinson, of the Atlas Works, Mr. Crossley, Mr. Anderson, superintendent of the gun factory at Woolwich, Sir R. Hill, and Professor Graham, the master of the Mint. Scientific men were equally favourable to the metric system. The jurors of the International Exhibitions of London and Paris said that a great part of the benefit which might have arisen from the exhibition of raw produce and manufactures of various countries was lost to thousands of persons in consequence of the difficulty of comparing the weights and measures and the moneys of one country with those of another. Professor Hoffman, in his report as juror of the Exhibition of 1862, referred to the confusion and discordance which existed in the systems of weights and measures of different countries as a grievous impediment to science, especially chemical science, as well as trade, and mentioned that in an admirable work published at Brussels on the weights and measures of all nations, twenty-two pages were taken up by the different kinds of weights, corresponding to the livre or pound, and almost as many under the head of pied or foot and so on; and Professor Owen had testified to the injury resulting to comparative anatomy and natural history from the same cause. The fact was that this confusion was so great, and so much time and labour were consumed in converting the weights and measures of one country into their equivalents in a foreign system, that practically the knowledge of one nation was to a great degree a sealed book to the scientific men of others. As to the facility with which the system could be learnt there was the most conclusive testimony. Mr. Wise and Mr. Whitworth spoke of their workmen easily learing it in a month or six weeks, and Professor Leone Levi summed up its general result to be that a boy could make the same progress in arithmetic taught according to the metric system in ten months as would, according to the existing method, take him two years and ten months to accomplish. Considering the value of youthful labour and the short time which could be spared to education by the children of the poor, this was a matter of some importance. He entreated their lordships not to take any steps which would impose upon the children of future generations two years of useless labour, and tend permanently to prevent the free interchange of the manufactures and commodities as well as of the knowledge and information of all the people of the world. The noble lord concluded by moving that the Bill should be read a second time.

Lord DONOUGHMORE hoped that the Government would state their opinion upon the noble earl's Bill. They were responsible for the national system of weights and measures. The country had a right to expect that they should have a distinct and intelligible policy on the

subject. The greater part of the noble earl's speech was an argument for the compulsory adoption of the metric system. He (Lord D.) was not prepared to say that if this country had just passed through a crisis similar to that which occurred in France in 1789, and we had a "tabula rasa" to deal with, it might not be desirable to adopt the metric system. But that was not the question. The noble earl did not propose to make his Bill compulsory, and its effect would be only to add another to the too numerous modes of weighing and measuring in this country, and making the present confusion "worse confounded." Perhaps the noble Earl looked upon the his Bill as the "narrow end of the wedge," by which he hoped in time to force the metric system upon a reluctant people. He (Lord D.) thought he would be disappointed. He acknowledged that the French system was more symmetrical than our own, but national liberty and customs are stubborn things, and he thought the people of this country would never willingly give up the modes of weighing and measuring to which they are accustomed.

The Marquis of SALISBURY opposed the second reading. He admitted the confusion which existed in the present system of weights and measures, but he did not see how this would be removed by passing a bill to authorise the use of the metric system. On the contrary, it appeared to him that this would rather increase the confusion. At all events, such a bill ought not to be passed at a period of the Session when it was impossible that the subject should receive any adequate consideration in their lordships' House. He would move that the Bill should be read a second time that day six months.

The Duke of ARGYLL would vote in favour of the bill, for he had heard no argument against it. The Chambers of Commerce of the kingdom were unanimously in favour of the bill, which proved conclusively that mercantile men thought they could use the metric system with advantage. It was said the measure would make confusion worse confounded, but this was impossible. Nothing could increase the inconvenience arising from the multiplicity of weights and measures at present in use. He believed that the metric system would come into extensive use in foreign transactions; but even if the bill did become a dead letter, no harm would be done by passing it, since no one would be obliged to buy or sell by the metric system of weights and measures unless they chose.

Lord HARROWBY was not one of those who had taken a part in promoting the adoption of the decimal metric system, nor was he very sanguine that it would be very widely adopted. Still less, knowing the difficulty in such matters of superseding old habits, did he expect that it would supersede the existing system, and thus put us into harmony with France and other countries which had followed her example. Nor indeed, if we had already one uniform system prevailing among us, with all the advantages of such uniformity, would he have consented to a measure which should authorise the introduction of any variation from it. But seeing that the reverse was the present state of things, that we had weights and measures varying in almost every

market town in the country, he could not see the likelihood of any inconvenience to arise from the introduction of one system more one which avowedly was a good and convenient one in itself, which would bring us, as far as it was employed, into harmony with other countries, and which, one could not but suppose, from the petitions in favour of the measure, which had proceeded from many Chambers of Commerce, was likely to be employed in commercial intercourse with different foreign countries, if not in our own domestic transactions. Under these circumstances he thought it would be ungracious in replying to such petitions, and without the statement of any inconvenience to arise from giving the permission required, to withhold assent from this merely permissive measure, merely sanctioning contracts entered into voluntarily by these parties, enforcing their adoption upon no one.

Lord BROUGHAM looked upon the bill as an important though not a very great, step in the right direction, and hoped to see the decimal and metric system universal in this country. He spoke of the system not only in regard to its convenience in mercantile transactions and in intercourse with other nations, but as the friend of education. The half-time system, which was one of the greatest improvements of the day, had reduced the time and expense of education, besides having a most wholesome effect both on the mental and bodily faculties of scholars; and it was stated by Mr. Chadwick, to whom this great improvement was owing, that the decimal and metric system would save one-half the time now required in teaching arithmetic, and that all the elementary school teachers whom he had met with were favourable to its introduction. He had still fresh in his mind the account given by Mr. Mosely, teacher of the National School in Bethnal Green, that the waste of time in teaching arithmetic was more than one-third of the 45 minutes usually employed in that lesson. This was a step in the right direction, and he trusted it would lead to much greater extension of the principle in this country.

Lord CARNARVON would not have risen to take part in this discussion but for what had fallen from the previous speaker. It was a mistake to suppose that noble Lords on that side of the House were opposed to the metric system as such: but their objection to this present Bill rested on this, that a measure of such great and debatable importance should be introduced at the close of the Session, when from other business it was absolutely impossible to do justice to it. He agreed with the noble and learned Lord (Lord Brougham) that the measure was a most important one; but obviously great in proportion to its importance was the necessity of full inquiry and careful discussion. It could not even be pretended that the measure was in a safe or well considered form. It was a crude and imperfect Bill. When the Select Committee of the House of Commons, two or three years since, reported on the whole subject, they recommended that there should be an exact and most carefully arranged system of inspection for the verification and maintenance of the new weights and measures, and that a central depart-

ment should be established for preserving a control over it. There was not in this Bill a syllable to show that these recommendations had even been attended to, nor did her Majesty's Government throw any light upon them. Again within the last week or two a memorandum drawn up by the Astronomer Royal had been laid on the table, in which he expressed himself distinctly adverse to the scheme now under consideration. Even the argument that the Bill is a permissive one, so much insisted on by the noble Lord who introduced the measure, so far from being an argument in its favour was an argument against it, for if it was right that all the weights and measures in the country should be equalised, it would be both more logical and in the long run probably more convenient to secure this by a clear and distinct enactment. A mere Permissive Bill, a mere disguise of legislative weakness and uncertainty, was but adding one more element of confusion to the confusion already existing. It was a measure which especially belonged to the Government, and not one which ought to be made dependent on a private member of either House: and either the Government ought to take it up and carry it on on their own responsibility, fearlessly avowing that they did so, or there ought to be a Select Committee next Session to consider the whole question; but it would not be for the credit of the Government or the House to allow the Bill to pass in its present shape.

Earl FORTESCUE, in reply, said that in all the countries in which the system had been introduced, its simplicity had caused its adoption to be accompanied with an absence of friction and opposition which had surprised even its admirers, and exceeded their most sanguine hopes. The evidence of Baron Cœrnig especially was conclusive upon that point.

The House divided, when there were—

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Westminster, M.	Brougham and Vaux, L.	Saye and Sele, L.
Chichester, E.	Camoys, L. [*Teller.*]	Seymour, L. (*E. St. Maur.*)
Clarendon, E.	Churchill, L.	Somerhill, L. (*M. Clanricarde.*)
Effingham, E.	Dartrey, L. (*L. Cremorne.*)	Strathedeu, L.
Fortescue, E. [*Teller.*]	De Mauley, L.	Sundridge, L. (*D. Argyll*)
Harrowby, E.	De Tabley, L.	Taunton, L.
Shaftesbury, E.	Ebury, L.	Wensleydale, L.
Wicklow, E.	Foley, L.	
Falmouth, V.	Houghton, L.	

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Bath, M.	Nelson, E.	Dinevor, L.
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Carnarvon, E.	Hutchinson, V. (*E. Donoughmore.*) [*Teller.*]	Redesdale, L.
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	Colchester, L.	Wynford, L.

CAP. CXVII.

An Act to render Permissive the Use of the Metric System of Weights and Measures.

29th July, 1864.

WHEREAS, for the Promotion and Extension of our internal as well as our foreign Trade, and for the Advancement of Science, it is expedient to legalise the Use of the Metric System of Weights and Measures: Be it enacted by the Queen's most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, as follows:—

Short Title.

1. This Act may be cited as the "Metric Weights and Measures Act, 1864."

Contracts may be made in the terms of the Metric system.

2. Notwithstanding anything contained in any Act of Parliament to the contrary, no Contract or Dealing shall be deemed to be invalid or open to Objection on the Ground that the Weights or Measures expressed or referred to in such Contract or Dealing are Weights or Measures of the Metric System, or on the Ground that Decimal Subdivisions of legal Weights and Measures, whether Metric or otherwise, are used in such Contract or Dealing.

Equivalents of Metric Weights and Measures in Terms of Weights and Measures.

3. The Table in the Schedule hereto annexed shall be deemed to set forth, in Terms of the Weights and Measures in force in this Country, the Equivalents of the Weights and Measures therein expressed in Terms of the Metric System, and such Table may be lawfully used for computing, determining, and expressing, in Weights and Measures, Weights and Measures of the Metric System.

SCHEDULE TO WHICH THIS ACT REFERS:—

Schedule of Tables of the Values of the principal Denominations of Measures and Weights on the Metric System expressed by means of the legalized Denominations of Measures and Weights in Great Britain and Ireland.

MEASURES OF LENGTH.

Metric Denominations and Values.	Equivalents in British Denominations.			
	Metres.	Miles.	Yards.	Feet.	Ins. Dec.
Myriametre	10,000	6	376	0	11·9
		or	10,936	0	11·9
Kilometre	1,000		1,093	1	10·76
Hectometre	100		109	1	1·079
Dekametre	10		10	2	9·7079
Metre	1		1	0	3·3708
Decimetre	$\frac{1}{10}$				3·9371
Centimetre	$\frac{1}{100}$				0·3937
Milimetre	$\frac{1}{1000}$				0·0394

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MEASURES OF SURFACE.

Metric Denominations and Values.	Square Metres.	Equivalents in British Denominations. Acres.	Square Yards.	Decimals.
Hectare, *i.e.*, 100 Ares	10,000	2		2,280·3326
Dekare, *i.e.*, 10 Ares	1,000	or		11,960·3326
Are	100			1,196·0333
Centiare, *i.e.*, $\frac{1}{100}$ Are	1			119·6033
				1·1960

MEASURES OF CAPACITY.

Metric Denominations and Values	Cubic Metres.	Equivalents in British Denominations. Quarters.	Bushels.	Pecks.	Gallons.	Quarts.	Pints.	Decimals.
Kilolitre. *i.e.* 1000 Litres	1	3	3	2	0	0		0·77
Hectolitre, *i.e.* 100 Litres	$\frac{1}{10}$		2	3	0	0		0·077
Dekalitre, *i.e.* 10 Litres	$\frac{1}{100}$			1	0	0		1·6077
Litre	$\frac{1}{1000}$							1·76077
Decilitre, *i.e.* $\frac{1}{10}$ Litre	$\frac{1}{10000}$							0·176077
Centilitre, *i.e.* $\frac{1}{100}$ Litre.	$\frac{1}{100000}$							0·0176077

WEIGHTS.

Metric Denominations and Values.	Grams.	Eqivalents in British Denominations. Cwts.	Stones.	Pounds.	Ounces.	Drams.	Decimals.
Millier	1,000,000	19	5	6	9		15·04
Quintal	100,000	1	7	10	7		6·304
Myriagram	10,000		1	8	0		11·8304
Kilogram	1,000			2	3		4·3830
Hectogram	100	(or 15432·3487 grains)					
Dekagram	10				3		8·4383
Gram	1						5·6438
Decigram	$\frac{1}{10}$						0·56438
Centigram	$\frac{1}{100}$						0·056438
Milligram	$\frac{1}{1000}$						0·0056438
							0·00056438

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INTERNATIONAL ASSOCIATION

FOR OBTAINING A

UNIFORM DECIMAL SYSTEM OF MEASURES, WEIGHTS, AND COINS.

British Branch.

TENTH

REPORT OF THE COUNCIL,

ADOPTED AT THE

GENERAL MEETING

HELD ON THE 29TH JANUARY, 1868.

LONDON:

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TENTH ANNUAL REPORT OF THE COUNCIL.

It must be gratifying to the Members of the International Decimal Association to know, that the object which they endeavour to achieve is constantly growing in importance and public appreciation. Uniformity in the Weights and Measures of all countries, and an international system of Coinage, are wants which an advancing civilization and an extending commerce daily render more apparent: time only is wanted to bring about a realization of the object. Meanwhile much remains to be done, and your Council have much pleasure in reporting the result of their labours during the past year.

The project, which emanated from this Association and the Metric Committee of the British Association, of having a special exhibition of the Weights, Measures, and Coins of all countries at the Paris Universal Exhibition, with conferences on the subject, has been productive of great results. The Pavilion constructed and arranged with so much care and nicety, and placed in the very centre of the Exhibition, formed a leading object of attraction; the tracts, largely distributed to inquiring visitors, showed the nature and utility of such an exhibition; whilst the conferences which have been held under the presidency of a personage so high

as His Imperial Highness Prince Napoleon, and the semi-official recognition given to them by so many Governments, have produced a remarkable effect on public opinion. The success which has attended the suggestion made by your Council is a remarkable evidence of the utility of our Association. From the very commencement, our action has exercised a weighty influence over the world, and we trust that if we continue to pursue our task with the same calm circumspection, yet with energy and vigour, we cannot fail to attain success.

It will be observed from the proceedings of the Conference, that on the able Report prepared by the learned M. Jacobi, the Conference has unreservedly recommended the universal adoption of the Metric System of Weights and Measures, and that in a meeting comprising delegates from numerous nations of both hemispheres, not a voice was raised in objection to the Metric System, or in favour of any other system. According to the Report, the Metric System of Weights and Measures has already been adopted, and rendered obligatory, in the following countries:

	Population.
France, with Algeria	40,500,000
Belgium	5,000,000
Netherlands, with Colonies	23,000,000
Italy	24,000,000
Roman States	700,000
Spain and Colonies	21,000,000
Portugal, with Colonies	8,000,000
Greece	1,200,000
Mexico	8,200,000

	Population.
Chili	1,600,000
Brazil	8,000,000
New Grenada	2,200,000
Republics of South America	3,000,000
	146,400,000

In other countries the Metric System has been partially adopted. Thus Switzerland has adopted as a unit of measure the 30 centimetres, and as a unit of weight the 500 grams. Baden has done the same. Prussia, Bavaria, Wurtemberg, Denmark, and Austria, have introduced the unit of weight in the pound of 500 grams. The population of these is as follows:

Switzerland	2,500,000
Baden	1,400,000
Prussia	18,000,000
Bavaria	4,500,000
Wurtemberg	2,200,000
Denmark	3,000,000
Austria	37,000,000
	68,600,000

The Metric System is moreover permissive in

The United Kingdom	29,000,000
The United States	31,000,000
	60,000,000

Giving a total of population in

Countries where it is obligatory	146,400,000
„ where it is partially obligatory	68,600,000.
„ where it is permissive	60,000,000
	275,000,000*

* The real value of the total imports and exports of merchandise, including British and foreign and colonial produce exported, with countries where the Metric System is obligatory, was in 1866 £152,000,000; and with countries where the same is partially obligatory, £12,500,000; and with the United States, where it is permissive, £79,000,000; making in all £243,500,000 in a total of £534,000,000.

The states, whose Weights and Measures have no connection whatever with the Metric System, are Norway, Russia, Turkey, Morocco, and Tunis, to say nothing of Eastern countries.

But public opinion is decidedly in favour of the Metric System, and your Council are convinced that the decision arrived at by the Paris Conference will bear early fruit, especially throughout Germany, which has long been ripe for legislation. For the North of Europe, much will depend upon Prussia, and still more on the action of this country. And for the East, the Indian Government has the question very much in its own hands.

Since the Conference, the International Statistical Congress has held its Sixth Session at Florence, and in conformity with its previous decisions, resolved, in reference to the subject of Weights and Measures, as follows:

"The Congress of Florence, in accordance with the opinion emitted by all the previous Statistical Congresses, recommend the universal adoption of a uniform system of Weights and Measures, founded on the Metric Decimal System.

"It invites the Members of Congress belonging to countries which have not yet adopted the Metric System, to form Associations for the purpose of promoting, by every means, the uniformity of Weights and Measures among all nations.

"Such Associations should put themselves in relation with the British Branch of the International Association, which will receive the materials for a Report to be made to the next Congress on the progress of the uniform system of Weights and Measures, and on the difficulties met with in the application of the same.

"The Congress expresses the wish that the knowledge of the

Metric Decimal System be spread as much as possible, and with a view to that object it recommends the teaching of the same in all primary schools, the use of publications adapted to the intelligence of the greatest number, and the adoption of all the means of instruction proposed in the Report by M. Jacobi."

As regards the introduction of the Metric System in this country, your Council regret to say that no further progress has been made since the passing of the Permissive Bill; the history of which it may be important to recall at this moment. The Association will remember, that after the Report of the Committee of the House of Commons in 1862, recommending the introduction of the Metric System, Mr. Ewart introduced a Bill in the House of Commons in 1863, which provided for the compulsory introduction of Metric Weights and Measures three years after the passing of the law. That Bill passed a second reading in the House of Commons by a majority of 110 to 75, on the understanding, however, that it would afterwards be converted into a Permissive Bill. It being late in the season, the Bill was withdrawn; but in 1864, Mr. Ewart introduced a Permissive Bill, which also passed a second reading of the House of Commons by a majority of 90 to 52. Upon such a firm expression by the House of Commons, the Government took the matter into their own hands, and the Bill, which contained numerous clauses defining the Metric Weights and Measures, and providing for the establishment and maintenance of Metric Standards, was converted, by Mr. Milner Gibson, into a Bill of two clauses, removing

the illegality of making contracts by Metric Weights and Measures, and giving tables of comparison between the Standard and the Metric Weights and Measures. In this form the Bill became Law. It was soon found, however, that the measure, though valuable as the first step in the introduction of the Metric System in this country, was in many respects most insufficient and even defective. It cannot be said that the Metric Weights and Measures Act, 1864, had sufficient influence to induce merchants and tradesmen to make the necessary preparations for the introduction of Metric Weights and Measures, or that it gave much encouragement to teachers and schools to commence in earnest to teach it. In the uncertainty whether the change would be enforced in ten or twenty years, no one will incur the expense and trouble of buying new weights and measures; and so long as the old tables must be taught, the teacher has not much inducement to teach another system of Weights and Measures, nor would he have time for it.

By making, moreover, no provision for Metric Standards, or for the verification of Metric Weights and Measures, the use of such was materially hindered in actual practice, and, in fact, a trader who used them was brought before a magistrate, as guilty of a breach of the Law, thus shewing the anomalous fact, that notwithstanding the removal of the illegality by one Act of Parliament, the use of the same is still illegal by another Act. A representation on the subject was made by your Council to Mr. Milner Gibson, the President of the Board of Trade of the late Government, and he promised to bring in a Bill to remedy the defect; but whilst the Reform Bill so exclusively engrossed public attention, scarcely any other measure could be introduced. Nevertheless, an administrative change of some importance was made in the transfer of the keeping and maintenance of the Standards, in accordance with the recommendation of Mr. Ewart's Committee, to a Department of Weights and Measures in connection with the Board of Trade. And a Commission has also been appointed to report on the state of the Standards, but we scarcely expect that they will in their Report make any suggestions for the introduction of correct Metric Standards in this country. In the present anomalous state of the law, your Council are convinced that we must persist with greater energy than ever in promoting the use of the Metric System, and we trust that this country will no longer hesitate to concur in the general agreement on this subject with almost every civilized nation.

In February last your Council, in connection with the Metric Committee of the British Association, had a conference with the Deputies of the Chambers of Commerce of the United Kingdom, when it was unanimously resolved as follows:

"That the permissive use of Metric Weights and Measures in the United Kingdom, without corresponding powers for legalizing authorized standards of the same, and the stamping of Metric Weights and Measures in use, is calculated to cause much inconvenience in trade, and to frustrate the practical adoption of the system;

and that it is therefore desirable that the Department of the Board of Trade charged with the custody of Imperial Weights and Measures, be also authorized to provide and maintain the Standards of Metric Weights and Measures, and stamp and verify those in general use.

"That, in order to facilitate the use of the Metric System, it is desirable that the same be introduced into the public departments, especially in the Post Office and the Customs, by the official preparation of the Tariff in Metric equivalents, with authority to levy duty according to the same, and the publication of the principal results of the statistics of the Board of Trade in Metric and Imperial values.

"That this Conference recommend the Chambers of Commerce of the United Kingdom to use means for promoting the voluntary use of the Metric System among merchants, manufacturers, and tradesmen, such as the preparation of special tables available in the various trades for converting prices and quantities from the Metric into the Imperial System, and vice versâ; and the exhibition of Mural Standards of the Metre in public places in the principal ports and market towns."

Soon after the Conferences in Paris, the Council, in August last, upon a review of the state of the question, passed unanimously the following resolutions:

"That the attention of the Board of Trade and the Standard Commissioners be called to the necessity of obtaining from the French Government copies of the legal Standards of the Metre, the Litre, and the Kilogram, to be henceforth declared as the Metric Standards of the United Kingdom, in conformity with the Metric Weights and Measures Act, 1864, and of passing a Law applying all the provisions regarding the maintenance and inspection of Imperial Standards to the Metric Standards.

"That the serious anomaly of the present state of the law, that notwithstanding the provisions of the Metric Act, a person using material Metric Weights and Measures is liable to have them seized,

and to conviction and forfeiture of the Weights, under the Act 5 and 6 Will. IV. c. 63, requires immediate amendment.

"That a Bill be speedily introduced in Parliament, providing that, after a given time, the use of Metric Weights and Measures shall become compulsory throughout the United Kingdom."

The expediency of introducing a compulsory Bill is rendered necessary in order to remove the supineness which now exists on the subject, it being quite evident that, during the present unsatisfactory state of the law, not much progress can be expected. Your Council think that, even should we be unsuccessful in passing a compulsory Bill this session, no harm can possibly accrue from the attempt, whilst the discussion that will arise from it cannot fail to be highly beneficial. It was never meant that we should rest satisfied with a permissive legislation. Four years have nearly elapsed from the passing of the Permissive Act, and if five years, or even a more lengthened period, were given as a term of grace, it will be as if ten years' notice had been given of the contemplated change. Your Council trust that our esteemed friend Mr. Ewart, to whose wisdom and success we owe the Report of the Committee of the House of Commons and the Permissive Act, will now undertake the bringing in of this new measure, and they will spare no effort to secure for him and his friends the utmost support in and out of Parliament.

Passing from this country to India, your Council have much pleasure in reporting, that an opportunity is now afforded for introducing the Metric System into

that vast Empire. From information received from many sources, it appears that the Weights and Measures in use in the different parts of India are in the greatest possible confusion, and that the most pressing want exists for a complete and thorough reform. Mr. Charles Gover, of Madras, a Corresponding Member of this Association, in two valuable works on the subject, has explained the grievous anomalies and glaring defects of the present method, and has shewn that in the event of any change being made in the law in India, the Metric System should certainly be introduced, since the same difficulty would be experienced by adopting any other plan as by the introduction of the Metric System. Your Council sent a Memorial on the subject to the Government of India in 1866, and we have been informed that, together with other documents, it was remitted to a special Central Committee. Finding, however, that the instructions given to that Committee recommended special attention to some method for introducing a system in accordance with the Weights and Measures now in force in this country, a Deputation from your Council and the Metric Committee of the British Association waited upon the Secretary of State for India last December, showing the advantage of at once introducing the Metric System, and we trust the observations made by the Deputation, the substance of which was transmitted to the Government of India, may have a wholesome effect in their deliberation on the subject. We are happy to find that Colonel Strachey, F.R.S., President of the Indian Committee

on Weights and Measures, recommends the entire and exclusive adoption of the Metric System, and that also very definite are the recommendations of the Government of Bengal in favour of the Metric System. On the occasion of Mr. Yates Thompson's visit to India, we have desired him, as a member of the Council, to represent this Association, and where practicable to explain the views we entertain respecting the comprehension of that vast Empire in the bonds which we trust will soon bind together all civilized states.

The necessity of taking steps for the introduction of Metric Weights and Measures in the colonies and dependencies of the United Kingdom is very great, especially as regards those which are in close contact with nations having the Metric System, and it is most desirable that the permissive legislation of the country should be extended to them all. Your Council will speedily call the attention of the Secretary of State for the Colonies to the subject.

Your Council have taken further means for promoting the knowledge of the system in this country. The Mural Standard, on which so much care has been bestowed, is now complete. Mr. Casella, the well-known maker of instruments of precision, has executed a copy of this Mural Standard, showing the Metre and the Yard placed in juxta-position, which may most conveniently be fixed in public places, and your Council would be glad to find that the Chambers of Commerce and Town Corporations are taking steps to secure copies of the same. A School Metre has also been procured, which

is very useful for educational purposes, and, with a series of questions and answers, it may be obtained at a low price from Messrs. Philip, of Liverpool. At a time when the necessity for extending education, and making it more practical and scientific, is being urged on all sides, it is well to give prominence to the fact that, by the introduction of the Metric System, the time employed for teaching arithmetic might be shortened by one-third or one-half. Many hours a day now spent in studies which are as perplexing as they are distasteful, might be devoted much more usefully and pleasantly to the study of natural or experimental science. The educational advantages of a Decimal System of Money, Weights, and Measures, were ably brought out in a paper read by the Rev. J. Scott Porter, before the Educational Department of the Social Science Association at its last meeting in Belfast.

To the subject of Coinage your Council have given much attention during the year. The Association are well aware that at the end of the year 1865, a Monetary Convention was concluded between France, Belgium, Italy, and Switzerland, with a view to effect a more perfect harmony in their monetary legislation, and that by that Convention these countries, which had already adopted the same system of coinage, agreed to render their respective coins interchangeable in all the States. Other countries have since acceded to the treaty, and considerable efforts have been made by M. De Parieu, the President of the Council of State of France, to induce all nations to enter into the principles of that Convention.

At the Conference already alluded to with the Chambers of Commerce, it was unanimously resolved:

"That in the opinion of this Meeting the International Monetary Convention lately entered into by France, Italy, Belgium, and Switzerland, for the purpose of giving a common weight, fineness, and currency, to their standard coins, is deserving approbation, as a measure calculated to facilitate and extend the commercial, banking, and exchange operations between those nations themselves and foreign countries having dealings with them.

"That this Meeting is further of opinion that the conditions of the International Monetary Convention, so far as they may be found applicable to the Metallic Currency System of the United Kingdom, are well worthy of the attentive consideration and support of all who are interested in the progress of and intercommunication between nations."

And in anticipation of the discussion of the subject at the Conference in Paris, your Council have maturely considered the different points, and have come to the following conclusions:

"That it is advisable for international purposes that a single standard for Coins should be adopted in all countries, and that the standard should be gold.

"That for facilities of exchange, the degree of fineness in the standard should in all countries be nine-tenths.

"That considering the extensive and growing use of the Decimal System, and the time and labour which it saves in computations of money values and in all commercial transactions, the unit of money value in every country should be decimally subdivided.

"That it is the opinion of the Council, that the greatest advantages would result to this country, if Great Britain were to join the Monetary Convention concluded the 23rd December, 1865, between France, Italy, Switzerland, and Belgium, by Art. 12 of which Convention the right of accession is, under certain conditions, reserved for other States.

"That in the opinion of the Council, if, in order to make the Sovereign international, it should be found necessary to reduce it to the value of 25 francs in gold, the commercial and monetary advantages attending such a step are sufficiently great to be more than equivalent to the consequences of the slight diminution in the weight of the pure gold contained in the Sovereign."

The labours of the Conferences in Paris on the subject possessed high importance and influence, especially in consequence of the holding of another International Monetary Conference at the same time at the Ministry of Foreign Affairs, under the Presidency of His Imperial Highness Prince Napoleon. At the Conference in which this Association had more direct part, the International Commission prepared the following distinct propositions for discussion, viz.

"Whereas the adoption of a uniform system of coinage presents evident advantages as regards convenience and economy in the settlement of international exchanges, and recommends itself to the attention of all enlightened Governments:

"Whereas, on the other hand, such a desideratum cannot be realized unless several nations are prepared to sacrifice their old and habitual instruments of traffic, whilst it is important that the change may be effected in a gradual and continuous manner, and that the mode of effecting this change should be as simple as possible and free from all incidental complication:

"1. It is necessary in the first instance that the different Governments interested in this question should agree as to the same unit in the issue of their gold coins.

"2. It is desirable that this coin be everywhere coined of the same fineness of nine-tenths fine.

"3. It is desirable that each Government should introduce among its gold coins one piece at least of a value equal to that of one of the coins in use among the other Governments interested, so that

there may be among all the systems a point of common contact, from which each nation may afterwards advance in gradually assimilating its system of coinage to that which may be chosen as a uniform basis.

"4. The series of gold coins now in use in France, being adopted by a great part of the population of Europe, is recommended as a basis of the uniform system.

"5. Whereas, in consequence of accidental and happy circumstances, the most important monetary units may be adapted to the piece of five francs in gold by means of very small changes, this piece seems the most convenient to serve as a basis of a monetary system; and the coins issued upon such a basis may become, as soon as the convenience of the nations interested permit, multiples of this unit.

"6. It is desirable that the different Governments should decide that the coins issued by each nation in conformity with the uniform system proposed and agreed upon, should have legal currency in all other countries.

"7. It is very desirable that the system of double standards be abandoned wherever it yet exists.

"8. It is very desirable that the system of decimal numeration be universally adopted, and that the money of all nations be of the same fineness and the same form.

"9. It is desirable that the Governments should come to an understanding for adopting common measures of control, so as to guarantee the integrity of the coinage both when issued and whilst in circulation."

These propositions were received by the Conference with decided approbation, and, except as regards that on the double standards, which was controverted warmly and with great ability by M. Wolowski, the discussion showed a considerable accord among all parties interested in the uniformity of coinage.

The International Monetary Conference entered into

the deliberations with no previously formed plan, yet arrived at conclusions essentially the same. The decisions of that Conference were as follows:

It was unanimously agreed:

"That the monetary unification may more easily be realized by the mutual co-ordination of the existing systems, taking into account the scientific advantages of certain types, and the number of people who have already adopted them, than by the creation of a new system altogether independent of the existing system.

"That for that purpose the system agreed on by the Monetary Convention of 1865 should be taken principally into consideration, subject to any improvements of which it may be capable."

It was agreed by all, except the representatives from the Netherlands,—

"That it is not possible to attain such identity, or even a partial coincidence, in such monetary types in an extended area, on the basis and on condition of the exclusive adoption of a silver standard; but that it is possible to attain it on the basis of a gold standard, allowing each State to preserve the silver standard in a transitory manner."

It was agreed by all, except the representatives from Russia and the United States,—

"That the advantage of internationality, which the coinage of the metal taken for a common standard would possess, is not a sufficient guarantee for its being maintained in circulation in all the States, but that it is necessary to stipulate that in the countries which continue to use the silver standard only, and in those which have a double standard, the relation between the value of gold and silver should not be established on too low a footing, so as to give due facility for the practical introduction of the gold coinage."

It was unanimously agreed,—

"That for the success of the Monetary unification, it is necessary

to fix types having a common denominator for the weight of the gold coin, with an identical fineness of nine-tenths fine."

The proposal that the common denominator should be the piece of five francs was adopted by a majority of 13 votes against 2, the representatives from England and Sweden having voted against, those from Prussia, Bavaria, Baden, Wurtemberg, and Belgium, having abstained from voting.

It was then unanimously agreed,—

"That the gold coin of the common denominator of 5 francs should have legal course in all the States which are mutually bound by the Monetary Convention."

It was agreed by all, except the representatives from Prussia, Baden, and Wurtemberg, who abstained from voting,—

"That it would be useful that the types of coinage determined by the Monetary Convention of 23rd December, 1865, should be, in the interest of unification, and consequently of reciprocity, completed by new types, for example, of 25 francs."

But for the proposal that a piece of 15 francs be also added, the representatives of seven countries voted in favour, those of seven voted against, and those of six, including Great Britain, abstained from voting.

It was unanimously agreed,—

"The Conference expresses the wish that the measures which may be adopted by the Governments of the different States in order to modify their respective monetary systems in accordance with the bases indicated by the Conference, should be made as much as possible the subject of diplomatic conventions."

And it was unanimously agreed,—

"That soon after the reception of the answers which may be given by the different States to the official communication which will be made to them of the labours of the Conference by the French Government, that Government may, if necessary, call a new Conference."

But on the question as to the time when such answers should be given, ten countries voted for before the 15th February prox.; five voted for the 1st October, 1867; the United States for the 15th May, 1868; and Great Britain for the 1st June, 1868. France and Spain abstained.

Since these Conferences, the International Statistical Congress, in the same spirit and with the same interest as at the previous meetings, resolved unanimously as respects international coinage:

"The Congress being satisfied with the tendencies manifested by the Convention of the 23rd December, 1865, gives its vote for all measures which may have for their object the bringing to a common or to analogous types capable of an easy co-ordination and comparison, on the basis of the Decimal System, the different monetary systems now in use."

Your Council record with much gratification these expressions, which have emanated from persons of experience and learning of all countries, in favour of an international system, and they are most anxious to suggest some plan whereby the English coinage may, in an easy and yet permanent manner, be brought into harmony with the system now in use in so many States. When we consider how great is the influence of the monetary system of this country upon that of all nations in consequence of the large amount of British

trade, the great financial operations carried on by British capitalists abroad, and the extent of exchange and banking transactions which centre themselves in London, it is evident that it is extremely important that this country should in some mode take part in the general arrangement. Two plans have been suggested for the purpose. The first is to diminish the quantity of gold in the sovereign in order to render it equivalent to twenty-five francs, and to divide the sovereign into a thousand mils; the second is to take the ten-franc piece as a unit of a hundred pence. Your Council will give to these and other plans their most earnest consideration. Meanwhile we hope that Her Majesty's Government, in accordance with the agreement entered into with the Monetary Conference, will institute a special inquiry on the decisions of the Conference, either by the issue of a Royal Commission or the nomination of a Committee of either House of Parliament, and we trust that it may be entered into in a liberal and comprehensive spirit, and in a manner in harmony with the spirit of the age in which we live.

One important result of the Conferences held in Paris was a great extension of the activity of the International Association. The International Commission on Weights, Measures, and Coins, organized by the Imperial Commissioners for the Universal Exhibition, having exercised so much influence in the deliberations on the subject, a proposal has been made to render its labours more permanent, and to constitute it

the Central Branch of our Association. And in December last, M. Mathieu, as Chairman of that Commission, sent us a project of general regulations for the organization of the same. Your Council have received M. Mathieu's letter, with the documents, and they anticipate the greatest advantage from the constitution of an energetic and influential Branch in Paris.

The International Association has now been in existence for upwards of twelve years. It has had seven General Meetings; the first, second and third, in Paris, in 1855, under the presidency of Baron de Rothschild and Count d'Avila; the fourth, in Bradford, in 1859, under the presidency of M. Michel Chevalier; the fifth, in London, in 1860, under the presidency of Earl Fortescue; the sixth, in Berlin, in 1863, under the presidency of the Marquis d'Avila; and the seventh, in Florence, in 1867, under the presidency of M. Wolowski. At the last General Meeting of the Association in Florence, His Imperial Highness Prince Napoleon was unanimously and by acclamation elected President of the Association, and resolutions were passed recommending the formation of Branch Associations in all countries.

The International Association may well look back with gratification at its past labours. As for the British Branch, its labours have been incessant ever since its formation, and it has pursued the task with the greatest energy. In its efforts to propagate this System, it has laboured perseveringly both at home

and abroad. In the United Kingdom it has addressed itself to the general public by issuing papers and reports, by public meetings and lectures, and by conferences with teachers and chambers of commerce. It presented a memorial to the Chancellor of the Exchequer, and had deputations to the President of the Board of Trade and the President of the Committee of Council on Education; it petitioned the House of Commons, and having succeeded, through the efforts of William Ewart, Esq., M.P., in obtaining a Committee of that House to inquire into the question, its labours were rewarded by the passing of a Bill legalizing the use of the Metric System in the United Kingdom. In India the Association is endeavouring to present the Metric System as a remedy for the confused state of the multifarious weights and measures in use. Abroad, the Association addressed itself to the Academies of Science of France and Russia; it appointed one of its officers to assist at the Conference held in Frankfort for promoting the uniformity of Weights, Measures, and Coins, in all Germany; it sent a deputation to the Statistical Congresses held in Berlin and Florence; it influenced in a direct manner the Congress of the United States in legalizing the Metric System; and one of its most important measures was the suggestion of the Special Exhibition of Money, Weights and Measures of all nations at the Paris Universal Exhibition. A considerable impulse has been given by the International Association to the question of uniformity in these instruments of exchange. Public opinion has

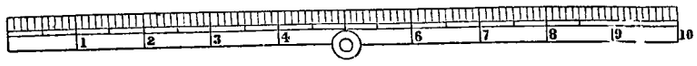
been assisted by the papers and addresses published on the subject; and we trust that the Conferences held during the Universal Exhibition will greatly accelerate the realization of the desideratum, which will do much to advance peace, civilization, and progress in all countries.

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THE SYSTEM OF WEIGHTS AND MEASURES LEGALIZED BY

"THE METRIC WEIGHTS & MEASURES ACT, 1864,"

IS FOUNDED ON THE METRE.



THE DECI-METRE.

UNITS.

LENGTH - The UNIT OF LENGTH is the **METRE**, and is derived from the measurement of the Quadrant of a Meridian of the Earth.

SURFACE - The UNIT OF SURFACE is the **ARE**, which is the Square of Ten Metres.

CAPACITY The UNIT OF CAPACITY is the **LITRE**, which is the Cube of a Tenth Part of a Metre.

WEIGHT - The UNIT OF WEIGHT is the **GRAM**, which is the Weight of that quantity of Distilled Water at its Maximum Density, which fills a Cube of the One-hundredth part of the Metre.

TABLE.

N.B.—Multiples are denoted by the Greek words, "Deka," *Ten,* "Hecto," *Hundred,* "Kilo," *Thousand.*

Subdivisions, by the Latin words, "Deci," *One-tenth,* "Centi," *One-hundredth,* "Milli," *One-thousandth.*

QUANTITIES.	LENGTH.	SURFACE.	CAPACITY.	WEIGHT.
1000	Kilo-metre	.....	Kilo-litre	Kilo-gram
100	Hecto-metre	Hectare	Hecto-litre	Hecto-gram
10	Deka-metre	.....	Deka-litre	Deka-gram
1 (Units)	**METRE**	**ARE**	**LITRE**	**GRAM**
·1	Deci-metre	.....	Deci-litre	Deci-gram
·01	Centi-metre	Centiare	Centi-litre	Centi-gram
·001	Milli-metre	.....	Milli-litre	Milligram

These Units and Table, comprising the entire System of Weights and Measures, are all that are essential to be learnt in lieu of the numerous and complicated Tables hitherto in use.

I.

INTERNATIONAL ASSOCIATION

FOR OBTAINING A

UNIFORM DECIMAL SYSTEM OF MEASURES, WEIGHTS, AND COINS.

CONCISE NARRATIVE OF ITS ORIGIN AND PROGRESS.

THE establishment of Universal Exhibitions, inaugurated by that of London in 1851, is an epoch in the history of the world.

Among the multitudes, which the "*Exposition Universelle*" drew to Paris in 1855, were many of the most enlightened men of every country, who had long regarded international uniformity in measures, weights, and coins, as one of the most imperious necessities of advancing civilization.

In comparing the products of various countries sent to the Universal Exhibition in Paris, an important element was the prices, at which they might be produced; but very great inconvenience arose from the diversity of moneys, measures, and weights, in which information of this character was given. The inconvenience thus experienced induced the Jurymen and Commissioners of the Exhibition to draw up the following declaration:—

The undersigned, members of the International Jury of the Universal Exhibition in Paris, or Commissioners sent by their respective Governments to this Exhibition, declare it to be their deliberate opinion, that one of the methods best adapted to accelerate that happy movement, which brings all nations together in the paths of their industry, would be the adoption of a universal system of weights and measures. Such a system would resemble a common language, spoken and understood in all parts of the world.

Considering each country by itself, they are of opinion that a large portion of valuable time would be saved to all persons engaged in industrial occupations, such as the heads of commercial houses and other establishments, engineers, clerks, and workmen, if this

uniform system were decimal, the multiples and divisions of the units being formed by multiplying or dividing each other by ten.

This system of time would be still greater, if the different units denoting length, surface, bulk, weight, and money, were deducible from each other according to decimal relations between their elementary constituents.

They think that the practice established in each country of denoting the units of weight and measure by names of long standing would be no obstacle; since in the greater number of cases nothing would prevent the application of these ancient names to the new units.

They consequently deem it their duty earnestly to recommend to the consideration of their respective Governments and of enlightened individuals, friends of civilization and advocates for peace and harmony throughout the world, the adoption of a uniform system of weights and measures, computed decimally, both in regard to its multiples and divisions, and also in regard to the elements of all the different units.

And the same was signed by 200 persons, including the following subjects of Great Britain: Marquis of Hertford, Lord Ashburton, Sir William Jackson Hooker, Professor Wheatstone; and many other distinguished men from all countries.

The subject had previously engaged the attention of the Statistical Congress, and strong resolutions in favour of international uniformity were passed at its two Great Meetings, in Brussels in 1853, and in Paris in September, 1855; such Congresses being sanctioned and assisted in every way by the Governments of those countries, and attended by official, scientific, and commercial representatives from nearly every civilized nation.

After the breaking up of the Statistical Congress in September, 1855, it was resolved to hold a meeting to consider the means of devising, if possible, such a decimal system of measures, weights, and coins, as would ultimately secure cosmopolitan uniformity. Prince Napoleon and the Imperial Commissioners offered the *Salle de l'Empereur* of the Palais d'Industrie as a place of meeting, and Baron James de Rothschild having consented to preside, the meeting was held on the 24th of September, when it was unanimously resolved as follows:—

Taking into consideration,

1st. The Resolution adopted in 1853 by the International Statistical Congress held at Brussels, in the following terms:

"That in the statistical tables prepared in the countries where the *système métrique* does not exist, a column, indicating the metrical reduction of the weights and measures, should be added:"

2nd. That expressed in 1855 by the International Statistical Congress held at Paris, in the following terms:

"The Congress, considering how much the adoption of a uniform system of money, weights, and measures, would facilitate the comparative study of the statistics of different countries, resolves that it is desirable to put such a system into energetic practice:"

3rd. The Address signed by members of the International Jury, and by the Commissioners of various Governments at the Universal Exhibition in Paris, as well as by the principal traders, artificers, and manufacturers, in favour of uniformity in money, weights, and measures:

4th. The Memorial presented to the Congress of the United States by the American Geographical and Statistical Society, ending thus:

"Your memorialists therefore humbly pray your Honourable Bodies to take into early consideration the propriety of a thorough revision of our National Weights and Measures, and the expediency of endeavouring, by inviting other nations to unite in a Scientific Congress, or by such other means as to your wisdom shall seem meet, to procure the adoption of international standards for common reference:"

5th. The efforts made by several great nations, principally by the Zollverein of Germany, to arrive at a uniform system of money, weights, and measures;—

The undersigned, in order to co-operate actively for the realization of these desires and efforts, have, subject to the approbation of their Governments, determined to form an International Association, composed of members chosen from the different civilized nations, who shall engage to devote themselves, each in his own country, by means of committees appointed for this purpose, and corresponding with one another, to the establishment, in all civilized countries, of a uniform decimal system of weights and measures, and, as far as possible, of moneys.

It was the design of the constitution of the International Association thus established, that a branch of the same should be formed in each country; but from the commencement the

most active has been the British. This branch has pursued the task with great energy. Its attention was first addressed to the choice of the best unit of length, and having decided, after mature deliberation, that the Mètre, with its Decimal System, had the highest claim, it gave itself energetically to the introduction of that System. In its efforts to propagate this System, that branch has laboured perseveringly both at home and abroad. In the United Kingdom it has addressed itself to the general public by issuing papers and reports, by public meetings and lectures, and by conferences with teachers and chambers of commerce. It presented a memorial to the Chancellor of the Exchequer, and had deputations to the President of the Board of Trade and the President of the Committee of Council on Education; it petitioned the House of Commons, and having succeeded, through the efforts of William Ewart, Esq., M.P., in obtaining a Committee of that House to inquire into the question, its labours were rewarded by the passing of a Bill legalizing the use of the Metric System in the United Kingdom. Abroad, the Association addressed itself to the Academies of Science of France and Russia; it appointed one of its officers to assist at the Conference held in Frankfort for promoting the uniformity of weights, measures, and coins, in all Germany; it sent a deputation to the Statistical Congress held in Berlin, and one of its most important measures was the suggestion of the Special Exhibition of moneys, weights, and measures of all nations at the Paris Universal Exhibition.* A considerable impulse has been given by the International Association to the question of uniformity in these instruments of exchange. Public opinion has been assisted by the papers and addresses it has published on the subject; and there is reason to hope that the plan adopted at this Universal Exhibition will greatly accelerate the realization of the desideratum, which we trust will do much to advance peace, civilization, and progress in all countries.

LEONE LEVI, SECRETARY.

FARRAR'S BUILDINGS, TEMPLE, LONDON, *April* 24, 1867.

* A collection of Measures and Weights manufactured in England on the Metric System, and of the books, tables, and appliances of various kinds, intended to be used in education and in extending an accurate knowledge of the System, is contained in the Special Exhibition.

II.

INTERNATIONAL ASSOCIATION

FOR OBTAINING A

UNIFORM DECIMAL SYSTEM OF MEASURES, WEIGHTS, AND COINS.

ADOPTION OF THE METRIC SYSTEM.

AT the First Annual Meeting of the British Branch, held February 26th, 1857, the following Resolutions were adopted:

That this Meeting regards as the first essential step towards arriving at a uniform system of Measures, Weights, and Coins, which shall be International as well as Decimal, the adoption of THE BEST UNITS OF LENGTH AND OF WEIGHT.

That the Council be requested to make inquiries and to collect information on these two subjects, with a view to the attainment of useful, definite, and practical results.

And that, if the Council and the Members of the British Branch Association in general are able to arrive at a conclusion on either of these points, they be authorized to request the General Officers of the Association to summon a Fourth General Meeting of the Central Association, and to obtain for it the concurrence of Her Majesty's Government and of the principal commercial nations of the world; and that the object of this General Meeting be to consider the adoption of any plan, which may be recommended either by this Branch Association or by those of other countries.

In order to comply with this request, a set of questions was printed and circulated, with a view to obtain all desirable information relative to the BEST UNIT OF LENGTH, the question of the Unit of Weight being postponed until the preliminary inquiry had been finished.

A considerable number of answers were received; and as soon as the Council were able to reduce their deliberations and researches to a sufficiently definite form, they proceeded to call Meetings of the Members of the Association resident in London, and invited to these Meetings all persons who were known to be friendly to the general objects of the Association, and who were supposed to be interested in the subject and able to give valuable advice. Hence, both by letters received, and by the kind personal attendance of various gentlemen of scientific eminence and great practical experience, the Council have been enabled to arrive at a conclusion, which they can

with full confidence recommend to the general body of the Association.

The first question was, whether they should adopt some new Unit, or fix upon a Unit already in use. No less than thirteen new Units, suggested either in published works or in letters to Members of the Council, came under review, in general evincing great ingenuity, diligence, and research, on the part of their inventors. It did not however appear, that any one of these had ever been applied in practice. The Council therefore decided to recommend some Unit, which was already in use, and which might be the best adapted to promote the general reception and permanent establishment of a uniform Decimal and International System.

On similar grounds they found themselves obliged to pass over the second's pendulum, the claims of which to preference were fully discussed. Notwithstanding the numerous experiments made in different parts of the globe by philosophers of the highest ability, the exact length of the second's pendulum either under the Equator, or in any latitude N. or S. of the Equator, is still undetermined; nor does it appear that, since the proposal of Mr. Locke in 1679 to use the third part of the length of a reputed second's pendulum as a unit of linear measure, it has ever been adopted by any one for this purpose. No pendulum now exists which is proved and generally supposed to beat seconds with the requisite accuracy.

In consequence of the real or presumed relation of the linear measures of all ages and nations to the dimensions of the human body, the Council thought it right to inquire, what influence this consideration ought to have on their decision. Although they did not deem it advisable to fix upon the length or circuit of any portion of the human body, they adopted conclusions distinctly referring to its structure and functions. They thought it eminently desirable, that the Unit should be of such a length as might be adapted to measure the greatest variety of objects, and in the most numerous cases, which are likely to occur in daily life; that it should be visible at a glance of the eye, and easily carried about and manipulated by those who use it. It appeared that for these purposes an inch or a foot, much more any subdivision of these quantities, would be too short; that a fathom would be too long; but that the required conditions would be best fulfilled by any measure about the same with the ell, the metre, the second's pendulum, or the yard.

In relation to another much-controverted subject, the Council thought it requisite, in conformity with the aim of an International Association, to avoid the appearance of undue partiality to English habits, and that a natural standard, adapted as far as possible to the ideas of all countries throughout the world, ought to be preferred to any, which has been employed from merely traditional, arbitrary, or accidental causes. Indeed, it appeared that, even if the English yard were chosen, very little benefit would ensue, because no decimal multiples or divisions of the yard are anywhere in use, and consequently a set of linear measures must be devised entirely new, with the single exception of the yard itself.

The Council were thus brought of necessity to the special consideration of the claims of the metre.

They first examined at length the objections to the metre on the ground of its supposed inaccuracy. They found that some of these objections are entirely without foundation, and that others are insufficient to justify its rejection. The advance of science, the improvements in astronomical instruments, and the repetition of attempts to measure meridians, although they may lead to some minute alterations in the length of the metre, or in its assigned standard temperature, tend on the whole to establish its accuracy. It is impossible to measure with perfect exactness any material object. We ought to aim at the utmost attainable perfection, but still to allow a degree of latitude, so that a measurement may not be condemned because it may differ by the hundred thousandth part from the real truth.

The attention of the Council was also called to certain alleged defects in the construction and preservation of THE METRE, meaning hereby the bar of platinum, which became the prototype in 1799, and which is still preserved in its original depositary at Paris. It is hoped that, if the metre is finally adopted by this country as its unit of length, provision will be made for the due correction of any minute, accidental, or unintentional defects.

The Council were of opinion, that, if by any accident the prototype should be lost or destroyed, the metre might be restored, not by a new measurement of a meridian, but by a reference to the numerous authorized copies dispersed over the world.

On proceeding to consider the metre with more especial reference to practice, the Council found that it has every quality which can be desired in a unit, which is to be employed as the basis of a Decimal and International System. Its binary divisions go as far as can ever be wanted. Its subdivisions and its multiples are superior in utility and ease of application to those of any other system.

The Council concluded, that the adoption of the metre was

advisable, not only as the means of securing great political, social, and commercial advantages to the United Kingdom, but as a demonstration of a becoming desire to co-operate with other enlightened and powerful nations in the accomplishment of a generous design, which is urged upon public attention by the strongest appeals of reason and science, of patriotism and of philanthropy.

The Council presented their Report at the Second Annual Meeting of the British Branch, held Feb. 25, 1858. The Report was adopted, the Council being requested to pursue their inquiries by obtaining information respecting Weights and Measures of Capacity, with a view to the completion of a Decimal and International System founded on the Metre.

A pamphlet was soon afterwards published giving in detail the facts and considerations, which had guided the Council in the formation of their opinion, with the title, "What is the Best Unit of Length?" This pamphlet has been long out of print. It is hoped that it will soon appear in a second edition with additions coming down to the present time.

The task imposed on the Council at the last Annual Meeting was easily accomplished. The Metre, the Litre, and the Gram, are so intimately connected with each other as parts of the same harmonious and beautiful system, that no hesitation was experienced in passing from the first to the second and the third. By the very title of our Association we are instructed to devise a *system* of measures and weights, not *a combination of systems*, and his system must be founded on the metre.

This conclusion having been conveyed to the Third Annual Meeting of the British Branch in March, 1859, and having been cordially accepted, the operations of the Society were brought to assume a much more definite and practical form; so that it was thought expedient without further delay to convene a meeting of the entire Association, and a favourable opportunity of so doing was presented by the preparation for another great meeting with partly similar objects at Bradford. Our very distinguished Vice-President, M. Michel Chevalier, occupied the chair, and read a very eloquent inaugural address. This meeting, being the Fourth General Meeting of the entire Association, was attended by many persons of great eminence from various foreign countries. By the speeches, which they delivered and the resolutions which they supported, the Metric System of Measures and Weights was finally adopted, and its promotion has thus become the great aim of the Association.

LEONE LEVI, SECRETARY.

FARRAR'S BUILDINGS, TEMPLE, LONDON, *April* 24, 1867.

III.

INTERNATIONAL ASSOCIATION

FOR OBTAINING A

UNIFORM DECIMAL SYSTEM OF MEASURES, WEIGHTS, AND COINS.

MEASURES AND WEIGHTS OF THE METRIC SYSTEM.

THE Metric System of Measures and Weights was intended to be international and universal. All nations were invited to join in its formation. Many having responded, it is now established by law in the following countries:

EUROPE.

France, since January 1, 1840.
Belgium, since June 18, 1836.
Holland, since January 1, 1821.
Greece, since 1836.
Spain, since 1859.
Portugal, since January 1, 1863.
Italy, commencing at various periods in different parts.
Switzerland, with modifications.
Germany, with various modifications.
Denmark, partially.
Roumania, since 1866.

AFRICA.

Algeria.
Colonies of Portugal.

EAST AND WEST INDIES.

Colonies of Spain, France, and Portugal.

AMERICA.

Mexico.
Chili.
Peru.
New Granada.
Ecuador, since 1866.
Bolivia.
Venezuela.
French and Dutch Guiana.

The same system, though not enforced by law, is much used for scientific, statistical, and engineering purposes in Great Britain, Sweden, Norway, and Russia.

The Commissioners who were appointed to construct this system thought that they were most likely to escape all suspicion of partiality, and to obtain the co-operation of the world at large, by avoiding the use of any measures or weights which were already in existence; and that the earth itself presented the most suitable basis for a method which was intended to be used by all its inhabitants, and to measure and weigh all natural and artificial products upon its surface. Having proceeded thus far, they found that their choice of a fundamental linear measure lay between the pendulum vibrating seconds at a certain latitude, and the length of a certain portion of the earth. Also, after they had given up the pendulum, they found it necessary to decide whether it would be better to take a portion of the earth's axis, a portion of its circumference calculated at the equator, or a portion of one of its meridians. They resolved upon taking the ten-millionth part of the quadrant of a meridian, measured by calculation from the north pole to the equator. This quadrant, therefore, is the commencement of the system, and its length is reputed to be ONE THOUSAND MYRIAMETRES. The term *Myriametre* will be easily understood to mean a *Myriad of Metres*, and it must be borne in mind that *Metre*, meaning *measure*, is the name of that fundamental unit of length which is the basis of the system. From this circumstance it is called THE METRIC SYSTEM.

The metre is itself decimally divided into 10 decimetres, each decimetre into 10 centimetres, and each centimetre into 10 millimetres. A metre is thus equal to 10 decimetres, 100 centimetres, and 1000 millimetres.

The equivalent of the metre in English feet and inches is 3 feet, 3 inches, and $\frac{3}{8}$ths of an inch. In the drapers shops of London this quantity is expressed by calling a metre *three threes*. More accurately the metre is determined by the law of France to be the length of the bar of platinum, which was deposited by the authority of the government in the French archives on the 22nd of June, 1799, and which has been kept there ever since. An accurate copy of this original

standard, also of platinum, belongs to the Royal Society, and was used by the Royal Commissioners for the purpose of obtaining an accurate computation of the length of the metre in English inches. In July, 1820, these Commissioners gave in their report to the House of Commons. They stated the metre to be 39 37079 inches, and this statement has been generally accepted ever since.

It is important to observe that in the Metric System each of the main decimal divisions, both in measures and in weights, has its half and its double. Thus there are the *Half Metre* and the *Double Metre*, and we may call them the *Cubit* and the *Fathom* of the Metric System, since these terms have always been used with considerable latitude, but never so as to exclude the application here proposed.

From the most remote antiquity to the present day, the human fore-arm has been used in Eastern countries as a linear measure. On Egyptian monuments a fore-arm is the hieroglyphic for this measure. All over India it only requires the *fiat* of the British Government to make the Metre and Half Metre the uniform expressions for the *Guz* and *Hauth*, and thus to extinguish the confusion which now attends the use of these terms for a vast variety of lengths, some a little greater, others a little less. Mr. Charles Gover, of Madras, makes the following observations in his valuable work, lately published, entitled, "Indian Weights and Measures, their Condition and Remedy."

"Beyond all question the popular unit of length is the Guz. Everywhere its use is habitual. It will probably be seen that it is not only the unit of length, but is intimately connected with the units of weight and capacity. It is the base of all other measures in India, and is destined to play a large part in any future arrangement of our metrical system. There is, however, a smaller measure, the cubit or hauth, almost equally common. Although its variations are confined within tolerably narrow limits, they are as numerous and as confusing as those of any other unit. Most writers assume it to be exactly eighteen inches, yet it would be difficult to find many places where that is its accepted value; and there can be no doubt that just as the guz, from its similarity to a yard, has been assumed to be 36 inches by writers having no special interest in the sub-

ject, so the small difference between half a yard and the Indian cubit has led to the latter being estimated at 18 inches. It may be anything between 15 and 30 inches, but is in nineteen cases out of twenty, between 18½ and 21 inches" (p. 17).

Mr. Gover then proceeds to shew the infinite variety that prevails in the use both of the guz and the hauth, whilst the guz keeps everywhere within a moderate distance of the length of the metre and the hauth within a moderate distance of the length of the half metre. He finds the average length of the cubit or hauth to be 19·48 inches (p. 25), whilst that of the half metre is 19·685 inches, and that the hauth approaches still closer to the half metre, if some of the hauths of very rare occurrence are omitted.

The most important *Land Measure* of the Metric System is the *Double Dekametre* or *Chain*. It is only about one two-hundredth part less than the English chain,* the inconvenience of which is strongly insisted on by the Commissioners, who reported in 1841 on the restoration of the Standards of Weights and Measures. See their Report, § VII. The "anomaly" to which they object will be entirely removed, if the Metric System be adopted.

The following table exhibits at one glance the whole Metric System:

ELEMENTS OF THE SYSTEM.

Length.	Surface.	Capacity.	Weight.	Notation.
			Ton.	1,000,000·
			Quintal.	100,000·
Myriametre.			Myriagram.	10,000·
Kilometre.		Kilolitre.	Kilogram.	1000·
Hectometre.	Hectare.	Hectolitre.	Hectogram.	100·
Dekametre.	Dekare.	Dekalitre.	Dekagram.	10·
METRE.	ARE.	LITRE.	GRAM.	1·
Decimetre.		Decilitre.	Decigram.	·1
Centimetre.	Centiare.	Centilitre.	Centigram.	·01
Millimetre.		Millilitre.	Milligram.	·001

The fundamental elements are the four UNITS—viz.:

The METRE, for measures of Length.
The ARE, for measures of Surface.
The LITRE, for measures of Capacity.
The GRAM, for Weights.

* The English chain of 4 poles, or 22 yards, is 20·11644 metres.

In many countries the Metric System provides another unit, called the STERE. It is the cube of a metre, and is useful where wood is burnt for fuel, as in France. But it is omitted in the present table, because the English habit of burning coal, which is sold by weight, makes it superfluous. The *Cubic Metre* suffices to describe and calculate large masses of earth, clay, gravel, and other solid substances.

The four units are multiplied and divided decimally, the four multiples being denoted by *Myria, Kilo, Hecto, Deka,* and the divisions by three familiar Latin terms, *Deci, Centi, Milli.* These seven terms are prefixed to the four names denoting the units in such a manner that a little reflection shews the relation of any one measure or weight to all the rest. It is remarkable that the same method has been adopted to a small extent in Great Britain. By the Weights and Measures Act, 5 George IV. c. 74, the Gallon is the "Unit of Capacity," and its "Fourth Part" *(pars quarta)* is declared to be "a Quart." Thus far, viz., in using a Latin term to express a division of the unit, our legislators copied France without knowing it.

In the manner now explained, the metre gives origin to the following multiples:

The Myriametre.
The Half Myriametre, or League.
The Kilometre, being the Mile, or principal itinerary measure of the Metric System.
The Double Hectometre, or Furlong.
The Hectometre.
The Double Dekametre, or Chain.
The Dekametre.
The Half Dekametre, or Pole.
The Double Metre, or Fathom.

And in the descending scale to the following divisions:

The Half Metre, or Cubit.
The Double Decimetre, or Link.
The Decimetre, or Hand.
The Centimetre, or Size.
The Double Millimetre, or Line.
The Millimetre, or Mil.

The ARE is the unit of land and superficial measure. It is the square of a dekametre. It consequently contains 100 square

metres, so that a square metre may, according to the systematic nomenclature, be called a *Centiare*. On the other hand, 100 ares is a *Hectare*. This is commonly used in describing landed estates, or other large portions of the earth's surface. The *Dekare* being, as the term implies, 10 ares, is a very little less than an English rood, and consequently a *Double Dekare* is a very little short of an English statute half acre.

The next unit is the LITRE. It is the capacity of a cubic decimetre, and is the fundamental measure for all fluids, and for solids, which are computed in moderately small masses or quantities. The following decimal divisions and multiples, with their doubles and halves, are in use:

DENOMINATIONS.

1000·	Kilolitre, or Tun.
500·	Half Kilolitre, Pipe, or Butt.
100·	Hectolitre, or Sack for Corn.
50·	Half Hectolitre.
20·	Double Dekalitre.
10·	Dekalitre, or Peck.
5·	Half Dekalitre, or Gallon.
2·	Double Litre.
1·	LITRE.
·5	Half Litre, or Pint.
·2	Double Decilitre.
·1	Decilitre.
·05	Half Decilitre.
·02	Double Centilitre.
·01	Centilitre.
·005	Half Centilitre.

The smallest of these measures are necessary in chemistry and pharmacy, the largest in the corn-trade, and in selling and preserving wine. The intermediate measures are used everywhere in the shops and markets for retail trade, as well as in domestic economy. The kilolitre has the capacity of a cubic metre. The dekalitre and its half are important on account of their near approach to the English peck and gallon.

The unit of weight is the GRAM, being the weight of the quantity of distilled water, which at the temperature of its greatest density fills a cubic centimetre. Its divisions are the decigram, centigram, and milligram; its multiples, the dekagram, hectogram, kilogram, and myriagram. Of these the

most important is the kilogram, called by abbreviation the kilo, being something more than 2-lb. avoidupois, and consequently adapted to weigh articles in the shops, such as groceries. At a proportionate distance we come to the ton, a weight never made in one mass, but calculated in figures, and equal to 1000 kilograms. This is continually used in the ports and in estimating the cargoes of ships. It is almost identical with the English ton. Thus the weights arrange themselves in three sets, depending upon three cardinal weights—viz., the gram for chemistry, pharmacy, metallurgy, jewellery, &c.; the kilo for the shops and markets; the ton for the ports and warehouses. The heaviest weight which a man can lift is that of 50 kilos, being something less than one hundredweight English, so that on this system we may, by the use of one complete set of weights with scales, or other machinery, weigh in regular decimal steps any quantity from 5 myriagrams to half a milligram, *i.e.*, from 50,000 grams to ·0005 gram.

It is remarkable, that the English *Tun*, which is a measure of capacity, and *Ton*, which is a weight, shew their relation conspicuously in the Metric System.

Tun = 1 kilolitre, or 1000 litres, being the capacity of a Cubic Metre.

Ton = 1000 kilograms, being the weight of water in a Cubic Metre.

Whilst England was involved in war with France, the first exposition of the principles and grounds of the system was published under the title of *Base du Système Métrique* by the great mathematicians, Delambre and Méchain, who had been principally concerned in measuring the arc, deriving from it the necessary conclusions, and determining all the arrangements for the construction of the system. The first advocate of the Metric System in Great Britain was Professor John Playfair, who then occupied the chair of Natural Philosophy in the University of Edinburgh. He had long devoted his attention to the great problems of the measurement of the earth, and the rectification of measures and weights; and as the successive publications which related to these subjects were issued under the authority either of England or of France, he wrote articles in the *Edinburgh Review*, which will always remain

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monuments, not only of his great eminence as a mathematician, but of his candour as a philosopher, and his admirable taste and elevated moral sense.* In discussing the Metric System, he takes into consideration its supposed defects as well as its excellences, but his inference from the whole is a decided approbation of the grand and generous attempt of its authors. He enunciates this opinion in the following paragraph, which is the conclusion of his most important essay (A.D. 1807) on the subject:

"We cannot finish our account of these scientific operations without expressing our wish that the uniformity of measures and weights were introduced into our own, and into every other civilized country. The difficulty is not so great as we are apt to think, when we consider the matter at a distance; *and to effect it requires in reality nothing but for the Legislature to say it shall be done.* As to the standard to be adopted, though we think the pendulum would have afforded the most convenient, yet when one has been actually fixed on and determined, that circumstance must greatly outweigh every other consideration. The system adopted by the French, if not absolutely the best, is so very near it, that the difference is of no account. In one point it is very unexceptionable. It involves nothing that savours of the peculiarities of any country, insomuch, as the Commissioners observe, that if all the history which we have been considering were forgotten, and the results of the operations only preserved, it would be impossible to tell with what nation this system had originated. The wisest measure, therefore, for the other nations of Europe is certainly to adopt the Metrical System. . . . It would not be necessary to adopt their names, which might not assort very well with the sounds that compose the language of other nations. But *the Metre*, by whatever name it may be called, *ought to be adopted as the unit of length*, and all the other measures of linear extension derived from it by decimal multiplication and division."

JAMES YATES, Vice-President.

Lauderdale House, Highgate, near London,
24th April, 1867.

* These articles may be found entire in Professor Playfair's collected Works, published after his death in 4 vols. 8vo.

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INTERNATIONAL ASSOCIATION FOR OBTAINING A UNIFORM DECIMAL SYSTEM OF MEASURES, WEIGHTS, AND COINS.

DEBATE

ON THE

WEIGHTS AND MEASURES (METRIC SYSTEM) BILL.

IN THE HOUSE OF COMMONS,

WEDNESDAY, MAY 13, 1868.

Extracted from
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INTRODUCTION.

Soon after the passing of the "Act to render permissive the use of the Metric System of Weights and Measures," it was found that the use of the system was practically hindered by the fact that, notwithstanding the removal of the illegality, no means were provided for the verification and stamping of the Metric Weights and Measures in use. A representation of the anomalous state of the law was made to the Right Hon. T. Milner Gibson, late President of the Board of Trade, and the expediency of an Amendment was admitted, but political reasons prevented the introduction of any measure to remedy the defect. Since then public opinion has expressed itself more decidedly in favour of a compulsory introduction of the Metric Weights and Measures at no distant period; and, with the entire concurrence of the Council of the British Branch of the International Decimal Association and the Metric Committee of the British Association for the Advancement of Science, Mr. Ewart kindly undertook the presentation of another Bill on the subject.

The "Bill to establish the Metric System of Weights and Measures" was accordingly introduced in the House of Commons by Mr. Ewart, Mr. Bazley, Mr. Baines, Mr. John Benjamin Smith, and Mr. Graves, and it was read the first time on the 24th February, 1868. The Second Reading of the Bill was appointed for Wednesday, 13th May, and previous to it Petitions were presented in favour of the same from the following places and bodies:—

The Halifax Chamber of Commerce,
The Exeter Chamber of Commerce,
Batley and other places,
The Council of the British Branch of the International Decimal Association,
Merchants, Traders, Clerks, and others of the City of London,
The Liverpool Chamber of Commerce,
Inhabitants and Schoolmasters of Highgate,
Engineers, Millwrights, and others,
The Chamber of Commerce of Wakefield,
The Northampton and Northamptonshire Chamber of Commerce.

The Association of Chambers of Commerce; the Chambers of Commerce of Huddersfield, Birmingham, Leeds, Bradford, Hull, Wolverhampton, Sheffield, and other places had petitioned in favour of the Bill on the previous occasion.

On the day appointed, Mr. Ewart moved the Second Reading of the Bill, and after a vigorous discussion the same was carried by a majority of 217 against 65. The Bill was then put down for Committee on the 1st July, but with the immense Business before the House previous to the Dissolution, the Bill was necessarily withdrawn.

The following is the text of the Petition of the Council of the British Branch of the International Decimal Association:—

To the Honourable the Commons of the United Kingdom in Parliament Assembled.

The humble Petition of the Council of the British Branch of the International Association for promoting a Uniform System of Measures, Weights, and Coins,

Sheweth,

That the Weights and Measures in general use in the United Kingdom, with their cumbrous tables and different and varying subdivisions, are defective in principle, inconvenient to trade, injurious to the interests of science, and obstructive to the progress of education: whilst by their use this country is placed in a position of isolation from the leading European nations.

That with the increasing commercial, social, and scientific intercourse between all countries, much practical benefit would arise from the general adoption of one common system of Weights and Measures.

That already much progress has been made in this direction. As many as thirteen countries, including France, Belgium, the Netherlands, Italy, the Roman States, Spain, Portugal, Greece, Mexico, Chili, Brazil, New Grenada, and other South American Republics, with an aggregate population of upwards of 146,000,000, have established one uniform Decimal System founded on the Metre. Seven more countries, with an aggregate population of 68,000,000, have also adopted parts of the same; whilst this country and the United States, having together 60,000,000, have introduced the same in a permissive manner. And in India the Government of the Bengal Presidency recommended the adoption of the Metric System as the best means for introducing simplicity and unity in the Weights and Measures of that vast Empire.

That at a Conference held in June last in Paris, of Representatives and others from most of the civilized States of the world, many of which still possess most discordant systems, a Report was unanimously adopted recommending the introduction of the Metric System, to the exclusion of all other legal or customary Weights and Measures in use.

That the Committee of your Honourable House appointed in 1862 to consider the practicability of adopting a simple and uniform system of Weights and Measures, came to the unanimous conclusion that the best course is cautiously, but steadily, to introduce the Metric System into this country.

That the Metric Weights and Measures Act, 1864, passed in furtherance of the recommendation of the said Committee, permitted the use of the Metric System, but is defective in not providing means for procuring and maintaining standards of such Metric Weights and Measures, and in not making provision for verifying and stamping those in use under the same Act.

That public opinion, as evidenced by the proceedings of Chambers of Commerce and Scientific Associations, by resolutions at public meetings, and by the introduction of the Metric System into scholastic instruction, has been sufficiently expressed in favour of that System to justify its absolute introduction in this country.

That a Bill having been introduced to that effect in your Honourable House, your Petitioners pray that the same may be passed into law, and that the time allowed to expire before the said Metric Weights and Measures shall become compulsory throughout the United Kingdom be as brief as possible, in order to stimulate immediate action on the part of teachers and others in diffusing information, and with a view to the speedy accomplishment of the change.

And your Petitioners will ever pray.

A BILL TO

ESTABLISH THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

Whereas it is desirable that the Weights and Measures of the United Kingdom should be decimalized, and made to correspond with those of other Countries: And whereas the Use of Metric Weights and Measures is now legal, but no Provision has been made for procuring the Standards of said Metric Weights and Measures, and for verifying and stamping those in use under the said Act:

Be it enacted by the Queen's most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, as follows:

1. From and after the Expiration of Years after the passing of this Act, the Length of the Metre to be prepared under the Authority of the Privy Council for Trade, verified by Comparison with the original Standard in Paris, having the Words and Figures "Standard Metre, 1868," engraved upon it, and kept in the Custody of the Warden of the Standards, shall be and is hereby declared to be the Unit or only Standard Measure of lineal Extension, wherefrom or whereby all other Measures of Extension whatsoever, whether the same be lineal, superficial, or of Capacity, shall be derived, computed, and ascertained, and all such Measures shall be taken in Decimal Multiples or Decimal Parts of their respective Units.

2. The Unit of the Measure of Surface shall be the Square of Ten Metres, which shall be and is hereby denominated the "Are."

3. The Unit of the Measure of Capacity, as well for Liquids as for Dry Goods, shall be the Cube of a Tenth of the Metre, and the same shall be and is hereby denominated the "Litre."

4. The Unit of Weight shall be and is hereby denominated the "Gram." A Thousand Grams shall be and is hereby denominated the "Kilogram." A Standard of the Kilogram shall be prepared under the Authority of the Privy Council for Trade, verified by Comparison with the original Standards in Paris, and have the Words "Standard Kilogram, 1868," engraved upon it, and the same shall be kept in the Custody of the Warden of the Standards.

5. For the more convenient Use of Metric Weights and Measures, it shall be lawful to take the Double and the Half of all the said Units, and their Decimal Multiples and Decimal Parts.

6. The said Weights and Measures hereby established shall be and are hereby denominated the Standard Metric Weights and Measures, as shown in the Table hereto annexed.

7. Copies and Models of the same Standard Metre and Kilogram shall be sent to the Lords Mayors of London and Dublin, to the Lord Provost of Edinburgh, and to all Counties, Shires, Stewartries, Ridings, Divisions, Cities, Towns, Liberties, and Places in which by Law Copies and Models of the Standard Imperial Weights and Measures are required to be kept, and to such other Places and Persons as the President of the Committee of the Privy Council for Trade may from Time to Time direct.

8. All Judges, Magistrates, and other Person or Persons who now are or shall hereafter be authorized by Law to order or provide Copies of the present Imperial Standard Weights and Measures shall at all Times hereafter have like Power and Authority in every respect to order or provide Copies of the Standard Metric Weights and Measures, and to charge the Expenses thereof upon the Fund or Funds, Money or Monies, that would have been liable in case it had been Copies of Imperial Weights and Measures that had been ordered or provided.

9. All and every the Provisions and Provision which are by Law in force with respect to the Inspection, Verification, Reverification, stamping, counterfeiting, and Modes of Conviction, with the Penalty or Penalties relating thereto, of the present Imperial Standard Weights and Measures, shall apply to and be in force with regard to the Standard Metric Weights and Measures in every respect as if the said Standard Metric Weights and Measures were comprised in and designated by the Imperial Weights and Measures in the Acts relating to such Inspection, Verification, Reverification, stamping, counterfeiting, and Modes of Conviction, and the Penalty or Penalties relating thereto as aforesaid.

10. From and after the Expiration of Years from the passing of this Act, the Imperial and all local or customary Weights and Measures shall be abolished, and every Person who shall sell by any Denomination of Weights and Measures other than those of the Standard Metric Weights and Measures, or such Decimal Multiples or Decimal Parts thereof as are authorized by this Act, shall on Conviction be liable to a Penalty not exceeding the Sum of Forty Shillings for every such Sale.

11. From and after the Expiration of Years after the passing of this Act, if any Person or Persons shall print, or if the Clerk of any Market or other Person shall make any Return, Price List, Price Current, or any Journal or other Paper containing Price List or Price Current, in which the Denomination of Weights and Measures quoted or referred to shall denote or imply a greater or less Weight or Measure than is denoted or implied by the same Denomination of the Metric Weights and Measures under and according to the Provisions of this Act, such Person or Persons or Clerk of the Market shall forfeit and pay any Sum not exceeding Ten Shillings for every Copy of every such Return, Price List, Price Current, Journal, or other Paper which he or they shall publish.

12. As soon as conveniently may be after the passing of this Act, accurate Tables shall be prepared and published, under the Authority of the Committee of Privy Council for Trade, showing the Proportions between the Imperial Weights and Measures heretofore in use and the Standard Metric Weights and Measures hereby established, with such other Conversions of Weights and Measures as the said Committee of the Privy Council for Trade may deem necessary, and after the Publication of such Tables all future Payments to be made shall be regulated according to such Tables.

13. And whereas the Weights and Measures by which the Rates and Duties of the Customs and Excise and other Her Majesty's Revenue have been heretofore collected are different from the Metric Weights and Measures directed by this Act to be used: It is hereby enacted, That so soon as conveniently may be after the passing of this Act accurate Tables shall be prepared and published under the Direction of the said Committee of the Privy Council for Trade, in order that the several Rates and Duties of Customs and Excise and other Her Majesty's Revenue may be adjusted and made payable according to the respective Quantities of the Standard Metric Weights and Measures directed by this Act to be used, and that on the Expiration of Years after the passing of this Act the several Rates and Duties thereafter to be collected by any of the Officers of Her Majesty's Customs or Excise, or other Her Majesty's Revenues, shall be collected and taken according to the Calculations in the Tables to be prepared as aforesaid.

14. From and after the passing of this Act, and until the Use of the Metric Weights and Measures shall be made compulsory, the said Metric Weights and Measures shall be deemed and taken to be legal Weights and Measures, and as such may be used for all Purposes whatsoever.

15. As soon as conveniently may be after the passing of this Act, the Metric Standards to be provided under this Act shall be placed in the Custody of the Warden of the Standards, and the Committee of the Privy Council for Trade shall cause the Metric Weights and Measures in use under the present Act to be verified and stamped in the same Manner as the Imperial Weights and Measures are now required to be.

16. From and after the passing of this Act the "Metric Weights and Measures Act, 1864," shall be and is hereby repealed.

Table of Standard Metric Weights and Measures.

Measure of Length.

Systematic Names.	Metres.	Value.
Myriametre	10,000	Ten thousand Metres.
Kilometre	1,000	One thousand Metres.
Hectometre	100	One hundred Metres.
Dekametre	10	Ten Metres.
Metre	1	Unit of Measure of Length.
Decimetre	·1	The Tenth of a Metre.
Centimetre	·01	The Hundredth of a Metre.
Millimetre	·001	The Thousandth of a Metre.

Measure of Surface.

	Square Metres.	
Hectare	10,000	One hundred Ares, Ten thousand Square Metres.
Are	100	Unit of Measure of Surface.
Centiare	1	One-Hundredth of the Are.

Measure of Capacity.

	Cubic Decimetres.	
Kilolitre	1,000	One thousand Litres.
Hectolitre	100	One hundred Litres.
Dekalitre	10	Ten Litres.
Litre	1	Unit of Measure of Capacity.
Decilitre	·1	The Tenth of a Litre.
Centilitre	·01	The Hundredth of a Litre.

Measure of Weight.

	Grams.	
Millier or Ton	1,000,000	One thousand Kilograms, the Weight of the Cubic Metre of Water and of the Ton.
Quintal	100,000	One hundred Kilograms.
Myriagram	10,000	Ten Kilograms.
Kilogram	1,000	One thousand Grams.
Hectogram	100	One hundred Grams.
Dekagram	10	Ten Grams.
Gram	1	Unit of Weight.
Decigram	·1	The Tenth of a Gram.
Centigram	·01	The Hundredth of a Gram.
Milligram	·001	The Thousandth of a Gram.

DEBATE.

HOUSE OF COMMONS,

Wednesday, May 13, 1868.

WEIGHTS AND MEASURES (METRIC SYSTEM) BILL—[Bill 44.]

(*Mr. Ewart, Mr. Bazley, Mr. Baines, Mr. John Benjamin Smith, Mr. Graves*).

SECOND READING.

Order for Second Reading read.

Mr. EWART, in moving the second reading of this Bill, said, he would shortly state the progress of the system. It was well known that it arose in France towards the close of the great Revolution, and was the production of some of the most scientific minds of that period in France. It encountered great opposition; and the practical philosophers sent on a mission to measure a quadrant of the meridian were often in danger from the partizans of the Revolution. The first Napoleon, who was hostile to new ideas in general, was also hostile to the metric system. He therefore restored the old system of weights and measures concurrently with the new one, and created a spurious system which was denominated the *système usuel*. It was not till a much later period —the year 1837—that Louis Philippe fixed a term, within which it was enacted that the metric system should be compulsorily adopted as the system of France. That term was the year 1840. Such compulsory enactment was the only practical way of securing the introduction of the measure. During all this length of time —a period of between forty and fifty years —the metric system was comparatively unknown in England. On the important subject of a uniform system of weights and measures, the country seems to have gone to sleep, nor was it awakened till the period of the Great Exhibition of 1851. It was then found difficult to ascertain the comparative weights and values of articles sent from countries whose weights and measures were at variance with each other, and the first steps began to be taken in favour of a reform of the system in this country. In the year 1862—the year of the Great International Exhibition—advantage was taken of the presence of many distinguished and learned foreigners to conduct an inquiry into the effects of introducing the metric system into foreign countries. A Committee of the House of Commons was moved for, of which he (Mr. Ewart) had the honour to be the Chairman. Many foreign witnesses were examined, English engineers, manufacturers, and workmen, some of whom had resided abroad, and all of whom gave concurrent testimony in favour of the success of the metric system wherever it had been tried throughout the world. A Report was drawn up to the same intent, embodying Resolutions for the gradual introduction of the metric system into this country, and the formation of a public Department for weights and measures. The Report was sanctioned by the unanimous approval of the Committee. A Bill founded on this Report was introduced, making the adoption of the metric system compulsory in this country. The second reading of that Bill was carried by a majority of 35. It was understood that the Government, though they opposed this first Bill, because it was compulsory, would not oppose a Permissive Bill. Accordingly, in the following year (1863), he (Mr. Ewart), or rather the Government introduced and passed a Permissive Bill, legalizing the use of the metric system. Unfortunately, it did not legalize the metric standards; and the Act became inoperative. We were therefore in as bad a state as ever; and the following words of Professor Leone Levi, which, six years ago, described our weights and measures, describe them now:—

"For measures of length, we have the ordinary inch, foot, and yard. In cloth measure, we have yards, nails, and ells. There are four different sorts of ells. For nautical purposes, we have fathoms, knots, leagues, and geographical miles, differing from the common mile. The fathom of a man-of-war is 6 feet; of a merchant vessel, 5½ feet; of a fishing smack, 5 feet. We have also the Scotch and Irish mile, and the Scotch and Irish acre. There are several sorts of acres in the United Kingdom, and there are a great variety of roods. We have in almost every trade measures of length specially used in those trades. For the measurement of horses we have the hand; shoemakers use sizes; and we are compelled to adopt guages where the French use the millimetre. The guages are entirely arbitrary. The

custom of the trade is the only thing which would decide the question in case of dispute. For measures of capacity we have twenty different bushels. We can scarcely tell what the hogshead means. For ale, it is 54 gallons; for wine, 63. Pipes of wine vary in many ways; each sort of wine seems to claim the privilege of a different sort of pipe. For measures of weight, we have ten different stones. A stone of wool in Darlington is 8 lbs.; a stone of flax at Downpatrick is 24 lbs.; a stone of flax at Belfast, 16½ lbs.; but it is also at Belfast 24½ lbs., having in one place two values. The hundredweight may mean 100 lbs., 112 lbs., or 120 lbs. If you buy an ounce or a pound of anything, you must inquire if it belongs to Dutch, Troy, or Avoirdupois weight."

Yet, while we stood still, other nations, whom we deemed less enlightened than ourselves, had advanced. Spain, Portugal, Italy, Belgium, Switzerland, Greece, had followed in the footsteps of France. It had been recently calculated that a population of not less than 265,000,000 enjoyed the blessings of the metric system. Our trade with that population amounted to about £307,000,000—about half the total trade of the country. Other nations were beginning to follow the example of those above cited; among them the United States of America, who had passed a Permissive Bill exactly resembling the one passed in this country, except that it was valid, while the Bill we passed was inoperative. The Bill was introduced in the Senate of the United States by that illustrious man Mr. Sumner; and the celebrated M. Jacobi, in his Report to the International Conference at Paris, in 1867, in the presence of some of the most eminent philosophers in the world, said "that there is reason to hope that the day is not far distant to the complete adoption of the metric system in the United States of America." The Americans have therefore got the start of us already. But the question was gaining ground even in our own possessions. A Commission in Bengal had already reported in favour of the adoption of the metric system; and a Committee had been appointed from the different Presidencies to report upon the whole subject. In the Report of the Committee to the Government of Bengal, he (Mr. Ewart) found the following statement:—

> "It is, then, our deliberate conviction that the simplest, the most efficacious, and the most convenient course which can be adopted will be to legalize the French decimal system of weights and measures, called the metric system; to put forth the whole strength of the Government in every practical direction, in order to familiarize the public with that system; and finally, after a convenient period, to render the use of it compulsory by penal enactments."

The only course for our Government to adopt is to fix a term of years within which the system shall take effect, and to work up to that object, lengthening or shortening the term according to the circumstances of the case, and the educational progress of the nation. As we proceeded, difficulties would vanish, as they did in France and Portugal under the determined perseverance of the rulers of those countries; and the simplicity of the system would become more and more apparent. In the Report of M. Jacobi, which he could not sufficiently recommend to the attention of the House, the results of the metric system for the promotion of education, trade, and manufactures were exhibited in a striking manner. The fact is, the metric system is the complement and corollary of Free Trade. By adopting it, we shall extend the commerce of England and the commerce of the world.

MR. GRAVES: Sir, when my hon. Friend invited me to support the principle of the Bill which he has just submitted to the House, I felt some hesitation in acceding to his request, from the fact, that though long convinced of the necessity of a uniform system of weights and measures, I had not given that serious consideration to the precise character of the change which its importance deserved; it was, however, a question which, as representing a large commercial community, I could not shirk, and with the full consciousness of the responsibility attaching to such representation, I entered upon the consideration of the proposal, and I am bound to say the more I examined into it, the more was I satisfied of the inconvenience attending our intricate systems, and the greater appeared to be the necessity for adopting in lieu of them the metric and decimal, which is simplicity itself, and has the advantage of being extensively used in many of the commercial nations of the world. There is, no doubt, always a great difficulty in altering a system which has become interwoven with the daily and hourly avocations of a people, and the older the country the stronger the difficulty. England has always shown herself averse to change; but, on the other hand, when once the public mind has become impressed with the necessity for change, it is remarkable with what facility it is accomplished. Let me recall the House to what took place in Ireland not many years since, when a change was made in the currency; it was urged then, as I dare say it will be

to-day, that confusion would result and great dissatisfaction arise, but happily wiser counsels prevailed; the currency was altered; some inconvenience was felt, but in twelve months it was all forgotten, and everyone was delighted with the change. Everyone in this House will probably admit that the introduction of one uniform system throughout the whole country would be an immense improvement. Now, let me ask hon. Members to consider whether the inconvenience which must attend the securing of uniformity would be much increased by taking one step more, and making the change a perfect one? I think it would not, and that it will be wiser not to involve the country in any new system, till it is prepared for one which will meet our own wants, and which will bring us into communion with other nations. It is hardly necessary for me to dwell on the variety which exists in our present system, or the endless trouble and confusion which grows out of it; everyone is more or less cognizant of it. It is a heritage derived from the union of countries possessing different standards of weights and measures, each preserving its own to the disadvantage of the whole. We have, for instance, the English mile, 1,760 yards; the Irish mile, 2,240 yards; and the Scotch mile, 1,980 yards; and there is the English acre, 4,840 yards; the Irish acre, 7,840 yards; and the Scotch acre 1,980 yards, all differing in quantities. Then there is the stone of meat, 8 lbs.; of cheese, 16 lbs.; hemp, 32 lbs.; flax, 16½ lbs., and many others which I could name. And there are the hundredweights, sometimes taken at 112 lbs., 120 lbs., and 140 lbs., in fact, putting aside all local customs, there are eleven systems of weights and measures, all well known and extensively used in the British Islands, and which are all sanctioned either by Act of Parliament or usage. The hon. Member for Dumfries (Mr. Ewart) has traced very succinctly the history of this question up to the present, and has shown that in any inquiry which has been instituted, there has been a large, if not a unanimous opinion expressed in favour of the abandonment of our present methods, and the adoption of a metric one, founded on the principle of decimal subdivision. The Bank of England, it would appear, some years since obtained an Act authorizing the decimal multiples and division of the Troy ounce for weighing bullion. In the year 1838 a Royal Commission was appointed, the Chairman of which was the Astronomer Royal, Mr. Airy, for the purpose of replacing the standards that were lost by the burning of the Houses of Parliament. This Commission presented their Report in 1841. I will merely give one extract from it—

> "The decimal scale, however, appears to us to be by far the most convenient for all transactions which become the subject of written accounts, and for all transactions of whatever kind in which great numbers of weights and measures are combined by addition or multiplication."

In the year 1862 a Select Committee was appointed by the House of Commons in these terms—

> "That a Select Committee be appointed to consider the practicability of adopting a simple and uniform system of Weights and Measures, with a view not only to the benefit of our internal Trade, but to facilitate our Trade and Intercourse with Foreign Countries."

The result of their deliberations was to recommend unanimously the adoption of the metric system. And, lastly, we have just issued to us the valuable Report of the International Conference, which took place last year at Paris, composed of over twenty nationalities, and amongst them will be found the great commercial countries of the New and Old World. Now what does this Congress unanimously recommend?—

> "First: That the decimal system, in accordance with the system of numeration universally employed, is best adapted to express multiples and sub-multiples of weights, measures, and coins.
>
> "Secondly: That the metric decimal system is best adapted for that purpose in consequence of the scientific principles on which it is founded, the homogeneity which exists in the relation of all its parts, and the simplicity and facility of its application, in science, art, industry, and commerce.
>
> "Thirdly: That the instruments of precision and the method employed to obtain copies of prototype weights and measures have attained such a perfection that the exactitude of these copies answers to the wants of industry and commerce, and also to the exigencies of science in its present state.
>
> "Fourthly: That as every economy of labour, whether material or intellectual, is equivalent to a real increase of wealth, the adoption of the metric system, which ranges itself in the same order of ideas as machines and tools, railways and telegraphs, and tables of logarithms, recommends itself particularly in an economic point of view."

And as a means towards an end, the Conference advise the nations wishing to adopt its Report—

> "1. To prescribe the study of the metric system in all the schools, and to exact the knowledge of it in all public competition.
>
> "2. To introduce its exclusive use in scientific publications, in public statistics, in the Post-

office, in the Custom-house, in public works, and in such other branches of the Administration as the Government may think desirable.

"The Commission hopes that the competent authorities of different nations may give heed to the wishes of science and the manifestation of public opinion."

If we had our home trade alone to consult, it would no doubt be more convenient to decimalise our familiar units of the pound, the yard, and the gallon; but we have to consult our commerce with other countries, and with this most important necessity in view, our object should be to adopt such a system as would receive the assent of other nations, and by an assimilation of standards facilitate the mutual exchange of our respective products; indeed, the advantages which would follow the adoption by the commercial nations of the world of a uniform system of weights and measures, is one of the most attractive aspects which this question can assume. Already the metric system is in use in about twenty countries, including France, Belgium, the Netherlands, Italy, Spain, Portugal, Brazil, and partially in use in Prussia and Austria — the whole representing some 200,000,000 of people, with £230,000,000 of trade. And the United States, notwithstanding that it possesses a decimal system, has recently introduced the use of the metric system into the Post Office, and has passed a Permissive Bill, providing at the same time for the issue of standards to every State in the Union, and the teaching of the metric system in all the National Schools. Exceptions have been taken to the metric system, and substitute schemes unheard of by other countries have been put forward by high authorities in the scientific world; but with such an indication of national will we may dispel from our minds every idea that any proposal but the metric has the most remote chance of becoming International. The importance of decimalising our present standards instead of accepting at once the metric system in its integrity, and thus bringing ourselves into communion with the civilized nations of the world, is well illustrated by the case of Sweden, which country replaced some ten years since its confused system of weights and measures by a decimal system, in which their old standards were retained and decimally divided. The change was scarcely made when the mistake was discovered, and in 1863 a Congress, consisting of near five hundred Swedish, Norwegian and Danish Members of the three Parliaments and others adopted this resolution—

"It is expedient to adopt the French metric system, with attendant subdivisions and denominations, for weights and measures in the three Scandinavian countries."

The difference between our ton and hundredweight, in which nearly all the external trade of this country is conducted, and the metric ton and cental is happily so small that it could not derange our ideas for long. The present ton of 2,240 lbs. would only exceed the metric ton of 1000 kilogrammes or 2,205 lbs. by 1½ per cent, while the hundred weight of 112 lbs. would only exceed the metric cental of 110¼ lbs. by 1¾ lbs.; while, by a similar accident, the practical standard of land measure in this country—namely, the surveyor's chain of 66 feet—does not differ from the metric chain of 20 metres by more than 4½ inches. Coincidences so fortunate as those between our principal measures and those of the metric system render its adoption much easier to us than any other that has been proposed. It may possibly be urged as an objection to making the system compulsory, that it has been tried permissively and failed; that if it promised all the advantages its advocates claim of it, public opinion would have seized hold of it, and we should to-day witness its formal adoption; but the fact is, that no provision has been made for the standards, and consequently there is no means of verifying those in use. Indeed, I may mention as a fact, that a firm in London, having foreign trade, weighed goods with metric weights, and were summoned for using a metre which was not stamped, for the simple reason that there was no stamp to verify and stamp it by. It would, no doubt, be more in consonance with our practice to rely solely on permissive powers, and make good this oversight in the Act; but I fear we should only be adding to the existing complication, and that it must be obligatory to use as well as disuse. But before this could be done it will be necessary to educate the young, and prepare the public mind for the change before it would be prudent or desirable to introduce it. My honorable Friend has wisely, I think, left a blank when the Act would come into operation, and there is no part of the Bill which will need more careful consideration at our hands than passing the number of years which should elapse before compulsion would attach.

Now, Sir, I will say a few words on the educational aspect of this question, for it is an important one in its consideration. The House of Commons objected to make the metric system compulsory, very much on the ground that the people were not sufficiently educated in it. Well, Sir, as soon as the Permissive Bill was passed, a deputation from the Metric Committee of the British Association for the Advancement of Science, and the Council of the International Decimal Association waited on the President of the Committee of Council for Education to ask that the metric system might be taught in the national schools; and what was the reply? "No; we cannot undertake to teach the metric system, unless it is made compulsory, because there is not time for teaching both systems." Now, let me dwell for a moment on this want of time, for it has a strong bearing on my argument, and it is admitted on all hands that a large amount of scientific instruction must be introduced into our schools. A Committee is now occupied upstairs considering how this can best be done, and the want of time will form no small difficulty in the desired introduction of science. The period devoted to education is not likely to be extended, and it can only be by economizing the primary branches that it will be possible to embrace science to any extent. The evidence was taken before the Committee on Weights and Measures of 1862 as to the probable saving of time which would be effected by a substitution of the metric and decimal systems, and I will merely quote the reply of one witness, the Rev. A. Barrett, D.D.—

"(1778) How much do you think the boys' education would be shortened by the adoption of the decimal system?—Two years at least.

"(1779.) And would the learning of the decimal system be more agreeable?—Yes, I think so, and more complete."

I can well believe that a large saving of time will be effected. Many of us will remember the difficulty we had in mastering the cumbrous "Table Book," and when acquired how difficult to retain; while the simplicity of the metric system is such that the youngest child can learn it; and, once impressed on the mind, will never leave it. It has been said by that large class of persons who dislike innovations, and will not take the trouble of thinking for themselves, that the proposed change is a theoretical one, and only advocated for purposes of science. This is a great mistake. There is scarcely a Chamber of Commerce in this country which has not urged its adoption. The Liverpool Chamber of Commerce has, in a petition just laid on the table, demanded it for the second or third time, in the interest of the educator, the merchant, the dealer, and the working man, alleging that it would simplify all commercial and trading calculations, bringing them within the capacity of the humblest trader. The enormous increase in our foreign trade, the new markets annually opening up—especially in the Eastern world—all making England the great centre round which commerce radiates, has brought to those who are engaged in it an increasing strain both mentally and physically; and it would be a great boon if, by some easy and uniform system, the calculations of trade could be so simplified as to insure a saving of time, thought, and trouble. Let anyone take up the price currents in a merchant's office, and he will be clever indeed who could in one month reduce the weights and measures by which each commodity is sold to one common standard. In fact, if human ingenuity were to be set at work to devise a scheme for embarrassment, confusion, and trouble, nothing more effectual could be proposed than the batch of systems by which the commerce of the world is being carried on. Few in general business understand the quotations of articles in which they are interested without having reference to tables of comparison. Trade has made some efforts to remedy the evil, and with success where tried. The great grain trade of Liverpool has introduced a decimal system of weights and measures, and the cental of 100 lbs. is now the only standard by which wheat is there bought or sold. All approve of the change, and I think it likely ere long it will be introduced to other of the cereals. Government also, I am told, has adopted it in their grain purchases, tenders being now made by the 100 lbs. Thus we see the advantages of the simpler system gradually growing in favour and use. Our decision is watched with interest. Other countries are watching and waiting. We have seen by her Permissive Bill how close America follows us. Russia, through her delegates in 1860, said—"If Great Britain would only take the lead, Russia was prepared to follow, and wholly adopt the metric system." Let us, then, begin to lead, and to-day prepare the way to so desirable a change. Telegraphic communication has broken down the barriers of isolation, and has brought the trading community of the world into hourly

communication. We cannot speak with a common language; but we may have a common basis on which the commodities of commerce shall be interchanged, and the wants of industry made known, without having recourse to tedious calculations or tables of comparison, not always at hand. Economy of labour, whether material or intellectual, is an increase of national wealth; and, though it may be a work of time, I am persuaded we shall see the metric and decimal systems the law of England, and that those who come after us—on whom will devolve the duty of upholding the commercial and industrial greatness of our common country—will bless the man who devised and carried its adoption.

Motion made, and Question proposed, "That the Bill be now read a second time."—(*Mr. Ewart.*)

MR. BERESFORD HOPE said:* Sir, in rising to move that this Bill be read a second time this day six months, I must congratulate my hon. Friends who have preceded me upon the manner in which they have conducted the debate. From first to last there has been on their part an admirable assumption of the whole question. From first to last the House has not been favoured with any clear definition of what this metrical system is which we are now asked in this sudden manner to force upon the people of the land. "Metricalisation"—I should have hesitated to use the uncouth word, only I have found it in the blue book of 1862, of the hon. Member for Dumfries, in which his case lies—is one thing, while decimalisation is a totally different thing; and yet nine-tenths of the arguments which they have used to induce the House to accept a change from the one system to the other are founded upon the assumption that they are one and the same thing. Decimalisation is a process of calculation for the benefit of the calculator. Metricalisation is not a process, but a system of measures, so called from its unit or base, which happens accidentally to be facilitated by the ease with which its details may be worked out through means of the decimal notation. The metrical system in itself is an abstruse and philosophic one, founded upon the fancy of some French men of science at the time of the Revolution, who adopted as the starting-point of the system the measurement of the earth's circumference, and by way of a unit, measured the 10,000,000th part of a quadrant of a meridian through Paris (about 39$\frac{3}{10}$ inches) which they termed a "metre." No doubt those multiples and aliquot parts of the metre which form the French measures of length are adjusted to meet the decimal system, as are also the measures of area, capacity, and weight, which are by a further process built upon the metre. But decimal notation is equally applicable for the man who finds that it helps his calculations whenever he has to work out his sum in our own old weights and measures; for decimals are really not a system, but, as I said, a process for easily reaching a certain practical result, like logarithms or algebraical symbols. I grant all the advantages which their friends urge in behalf of decimals for the purpose of calculation; but it requires no Act of Parliament to enable those who appreciate them to make their own calculations by way of decimals. Least of all, is legislation needed for the merchant princes—the men of enormous means and gigantic transactions—whose advocate my hon. Friend the Member for Liverpool (Mr. Graves) has made himself. They have but to keep a calculating clerk—an employé whose one duty is to manipulate the decimals—and they have got what they want. The sufferers will be the little people—the small buyers and sellers, the hucksters and the marketers—who will be compelled under the penalties of a compulsory Act of Parliament, to learn and to use a system which is, in its outward type, as non-natural as it is novel. I will, in order to prove my point, take the most familiar instance, and show that although a great deal has been said about the advantages of the French subdivisions, yet, after all, our subdivisions are more natural for the ordinary purposes of life. If a boy has to divide an apple, does he ever think anything about the circumference of the earth and its aliquot parts, or about the decimal system and its unrivalled facilities for calculation? No; but he takes his apple, and cuts it into two parts if he wants to halve it, and those halves into quarters if he wants to make four parts of it. In the same way, if a housewife has to cut up the loaf for her family, she divides it into two, into four, into eight, or into sixteen parts, and the sixteen people share their bread naturally. Supposing the loaf to weigh originally a pound, each of these sixteen divisions comes out an ounce. Such is the *rationale* of our system of measuring—the binary system so-called—founded on continual

halving, and proved, by the common sense of mankind, before the great era of enlightenment inaugurated in 1789, to be the most convenient and natural one. But I may be told—Halve away, but then express your halvings in decimals. This is very easy for the merchant prince to do when he is totting up his large transactions in "centals," or for the Chancellor of the Exchequer when dealing with a nation's finances; but how will it suit the little transactions of daily life? I come back to my loaf. How are ordinary people to represent halves and quarters by decimal points? The symbol of a half is the figure "five," with a dot to its left hand; the symbol of half that quantity, that is of a quarter, is the sum twenty-five, also with a dot to its left hand. Arithmeticians understand how this can come about, and the symbols have grown natural in their eyes; but in what—even the most infinitesimal—degree do they tell their own story to the unlearned? What palpable relations towards each other can be disentangled out of these most frequently recurring symbols? What is there in the nature of things to show that the dotted five means a half, and the dotted twenty-five a half of that half, and a quarter of the "one," with no dot on either side, which stands for unity? Decimal notation is then, after all, as I have been arguing, a process, and not a system. It is a process good for the schools, and good for the bustling counting-house and the large sum, but the poor man would be completely thrown out if he had to employ—under penal legislation, too—decimal points for the purpose of measuring his little purchases by halves and quarters. With permissive means, such as now exist, the system will come in where it is wanted, and be kept out where it is not wanted; but under a compulsory enactment it will intrude itself everywhere, and show itself in its real colours as nothing less than a public nuisance. But the more we examine the Bill of the hon. Member for Dumfries, the more inapplicable do its provisions seem for the purposes of practical life. I have touched upon the principles of the metric system, let me now call the attention of the House to the language in which (after the French model) it is proposed to clothe that system. The new unit of weight is to be the "gram" or "gramme," which is attained by providing a square vessel, whose capacity is the cube of the hundredth part of a metre ("centimetre" to wit), and then weighing the amount of water which it will hold at a certain temperature. One-tenth part of this gram is to be a *decigram*, and ten times a gram is to be a *dekagram*, for the reformers decreed that aliquot parts were to be named after the Latin, and multiples after the Greek numerals. How in the name of common sense can we make poor people understand that because there are the letters "ci" in the one word it means the tenth of a gram, and that because there are the letters "ka" in the other it means ten grams, or 100 decigrams? My hon. Friends the Member for Dumfries and the Member for Liverpool come to this House representing great commercial transactions; but I stand up for the poor man. Only imagine an honest housewife going into a shop and asking for a decigram of pepper, and a dekagram of tea; imagine, too, the milkmaid selling her fluid by the litre. The Member for Liverpool is a kind-hearted man; is he then prepared, with all the stringent force of a penal statute, to enact that when one of his youthful constituents may desire to effect a commercial transactions in a manufacture for which one portion of that great borough is famous, he should be bound to go to the shop and tender his "dime" for three decigrams of Everton toffee? Fancy the farmer who has been accustomed ever since he entered on his farm to cultivate the "ten" or the "twelve acre field," having to consult the steward about liming the seventeen *are* field, or be a criminal and a contemner of the laws of his country. Fancy the bumpkin who was prepared to boast that he was within a decimetre of catching the fox as he crept through a gap about a decametre from the white gate. If the theorists and the men of wealth—men of brains, it may be, but as certainly men of self-assurance—have worked out this system for themselves, there are poor men, who form the majority of mankind, for whom it will never answer, and there are men of brains at least equal who are decidedly opposed to its adoption. Is it not possible that our present system is only quite as convenient and useful as the metric system, but a little more philosophical also? Why should a standard founded on the quadrant of the earth's circumference passing through the meridian of Paris be a better one than ours? No doubt it looks very solemn, from the grand nomenclature with which it is propped, but all those odd names for the French weights and mea-

sures were adopted at the first heat of the great Revolution, when the pedantic aping after ancient Greek and Latin terms led to their being applied to everything novel and French—from the scanty proportions of a lady's dress to the most intricate principles of jurisprudence and moral philosophy. Moreover, they have taken root in nations whose vernacular languages are themselves derived from the old classical tongues. May it not, I repeat, be just possible that our unit is as good as that of the French, even upon the most abstract grounds? I have received from Sir John Herschel a letter which induced me to come prominently forward and propose the rejection of the present Bill, instead of giving the silent vote with which I should otherwise have been contented. It is dated the 6th of April, 1868, and is in the following terms :—

"Pray pardon me for calling your attention to this Bill of Messrs. Ewart and Co., in the hope that you will oppose it—at all events by vote, and perhaps by word. It is most uncalled for and violent, and is supported, I believe, mainly by the chemists among men of science, whose reading and experimental practice bring them frequently into contact with the French weights and measures, and such engineers as have foreign contracts to execute. As respects a reference of our fundamental units to a natural standard, our national system is anything but the haphazard, indefensible thing it is usually represented to be. The polar axis of the earth is a much better natural unit than the quadrant of a meridian through Paris, and, dividing this into 500,000,000 inches, our actual imperial foot comes within a 1,000th part of twelve such inches, or a geometrical foot. I have by me two foot-rules—one by a good optician, the other purchased at a good shop, and none the worse for wear, which differ from each other by more than that quantity. Taking for the definition of our ounce the weight in air of 1-1,000th part of such a geometrical cubic foot of distilled water at 62° Fahrenheit (our standard temperature), according to the rate declared in the Act 5 *Geo.* IV., our actual imperial ounce differs from such geometrical ounce by only 1-7,000th part. But if, as some later experiments seem to have shown, that rate is slightly incorrect, then, according to these experiments—that is, according to the best of our actual knowledge —the weight of that bulk of water *in vacuo* at a temperature of 72° in place of 62° is, with absolute precision, identical with our actual imperial ounce also weighed *in vacuo*. As for our measures of capacity, our half-pint is the measure of ten ounces of water. Were it worth while to legislate for the correction of such trifling deviations, our system would stand on a footing every way more scientific, as concerns its units, than the French—to say nothing of the actual deviations of the latter from its own theoretical basis, which are by no means insignificant. As to the expediency of sweeping away our national system, and the probability that our shopkeepers will ever be got by such dragooning to buy and sell by the metre, litre, and kilogramme, or our farmers and landowners to measure their land by the hectare, and alter the title-deeds of their estates in accordance, &c., these are matters of statesmanship of which you are a much better judge than I profess to be. For my own part, I do not believe it; but the attempt would create the most extreme disgust and resistance."

I may parenthetically notice the astuteness with which the promoters of the change have kept in the background the portion of their scheme which refers to the alteration in the measure of area. The inconveniences hinted at by Sir John Herschel give reason enough for their prudent reticence. I shall now quote the opinion of another man of science, who, as it will be seen, approaches the question in a direction different from that by which Sir John Herschel travels to it. Professor De Morgan, who, as he himself says, is not only Professor of Mathematics at University College, but practices as an actuary, was one of the witnesses examined before the Committee of 1862, and came under the intellectual thumbscrew of the Chairman, the hon. Member for Dumfries. Being pressed (Q. 2331) upon the "metrical units," he answered—

"With regard to the metrical system, I should distinguish between two distinct things. Decimalisation and metricalisation are two things which are often confounded; persons imagine that they must go together, which is not the case. Any system may be made decimal. I am as much for decimal division as any person can be; I believe that the decimal division of units might be introduced very easily; and I believe that it would coexist perfectly well with the binary division, which I am satisfied must always be used by the common people, so far as halves and quarters are concerned. The halves and quarters are easily converted into decimal fractions. The decimal system, therefore, if fully established throughout the country, might go on and thrive, consistently with the habit of dividing all units into halves and quarters in common life.

"(2332.) Then you draw a distinction between the decimal system and the metrical system?—The metrical system is the decimal system with the units of the French system superadded. I object to the introduction of the French units into this country. I object to it upon a balance of convenience and inconvenience. I admit that the change might be convenient to our foreign commerce; but I believe that it would create such an immense amount of confusion throughout the country that the inconvenience would far more than counterbalance the advantage we should derive in our foreign commercial relations."

After submitting to a good deal of pressing about the experience of foreign countries, Professor De Morgan roundly stated (Answer 2338)—

"What I mean is, that there would be no advantage commensurate with the disadvantage

The advantage is in foreign commerce, and the disadvantage would be in the internal transactions of the country."

This led to the point-blank question (2339) "What are they?" And I particularly direct the attention of the House to the answer—

"In the first place, change is in itself a disadvantage, and a great change is a great disadvantage. I must first have it distinctly proved to me that there are advantages which would more than counterbalance the disadvantages I foresee in other respects. I take an objection to the metre. It arose from a mere fanciful connection with the quarter of the meridian, which I think of no practical importance to any man alive. You might just as well try to subdivide the distance from the earth to the moon. The metre is, of course, too long to be the common measure; it is a little longer than a yard. In decimal division the next thing would be the decimetre, which would be too short to take the place of our foot. The same thing applies very much to the other measures. I not only have a general objection to their size as compared with ours, but I think it would be necessary that a very strong case should be made out in their favour before any such change is effected."

The House will observe that Professor De Morgan approaches the consideration of the desirability of the unit having a direct commensurable relation to the great mundane dimensions in a different spirit from Sir John Herschel. The latter accepts the theoretical desirability of the relation, and then shows that our unit fulfils the law more perfectly than the French. Professor de Morgan assumes the practical attitude of a man of the world, and makes light of the necessity. But wide apart as these two men of science are in their premises, they meet in their practical conclusion, and equally condemn the penal enactment in our realm of the metrical system. I will only trouble the House with one more quotation from Professor De Morgan's evidence, as throwing a light upon the frame of mind in which the theorists of France took up the innovation—

"(2408.) The metre, you think, is fanciful?—It was obtained in a fanciful way. It was the ten millionth part of the quarter of the meridian."

"(2409.) Why do you consider that fanciful?—Because it was of no use to anybody, and among the reasons why it was adopted were such as this; that it would be a very pleasant thing for a small proprietor to say, 'I am lord of exactly such a fraction of the whole surface of the earth.' Now, I do not suppose that any little proprietor ever troubled his head with the fraction he held since the time when Adam began to delve the land."

The next witness whom I shall summon is one whom I heard with exceeding astonishment brought forward by the hon. Member for Liverpool as an advocate for the decimal system, namely—the Astronomer Royal, Mr. Airy, who also appeared before the Committee.

"(Q. 1950.) *Chairman.* What do you consider the conveniences or the inconveniences of the existing scales to be?—I do not think there is much inconvenience." . . . (He then describes the gradual growth of different standards.) "This has given rise to apparent anomalies in the form of the existing scale, but these do not, I believe, produce much inconvenience in practice."

Mr. Airy next explains the comparative ease of the change of weights and measures in France, from the antecedent separation of provinces under which there was no one system for the whole kingdom, from the confusion of the Revolution, and from the meddling with the details of education on the part of the Government, which enabled it to force its will upon the people in a way which would create tumult in our own free land.

"(Q. 1964) *Chairman.* Do you not think that, as the trade of this country continues to increase, it would be of great advantage to the nations to meet together as it were under a common principle and a common system of weights and measures?—I do not think the advantage is worth mentioning in comparison with the extreme difficulty of introducing it; the number of persons is so small, and the daily transactions in foreign trade are very small in comparison with our domestic transactions.

"(Q. 1965.) Do you not think that these transactions must increase?—I suppose they must; but whether they increase faster than our domestic transactions I am not in a position to state. I think our domestic trade is far more active than it used to be.

"(Q. 1966.) Would our domestic trade be seriously inconvenienced by the introduction of the decimal system?—By the act of introducing it, it would. I am not remarking on the merits of the decimal system, but the trouble of the change would be inconceivably greater.

"(Q. 1967.) But if the change could be made *per saltum*, and you could be transferred from your present state into the decimal system, do you not think the change would be advantageous?—No."

I beg to direct my hon. Friend the Member for Liverpool's particular attention to this brief and decisive answer, It pretty conclusively disposes of Mr. Airy's advocacy of the decimal system.

"(Q. 1968.) Then do you think that the present system is a perfect system?—If I had a new nation to create, with a new system of weights and measures, I would give them the binary scale throughout. That, I conceive, would be nearest perfection; the binary scale, with means to enable us to use decimal multiples or submultiples."

This scale is further characterized in the next answer as—

"The subdivision that has been adopted by the consent of mankind, and is undoubtedly the most convenient for the purpose."

In Answer 1970, Mr. Airy says the decimal would "scarcely at all" be the means of facilitating calculations in this country. "In coinage it would; but scarcely in anything else." In 1979, those who want the decimal system "introduce it themselves without any difficulty," while—

"As a practical test, the inch is divided in almost every scale into eighths and tenths; but there are very few working men who ever use the tenth. They use the half, the quarter, the eighth, and even go do down to the sixteenth, and they call the next after that the half of the sixteenth."

In Answer 1980, Mr. Airy does—

"Not think it of the least consequence that there should be a corresponding and uniform system between different countries."

The House will allow me briefly to recapitulate my evidence as far as it has yet gone in reference to the compulsory application both of metricalisation and decimalisation. Sir John Herschel has proved that our scale is more philosophical in its unit than the metrical one. The Astronomer Royal has shown that the binary system of division, which is ours, is the "nearest perfection." Professor De Morgan has exposed the pedantic absurdity which lay at the bottom of the revolutionary change in France. But I have yet another witness to call, a gentleman for whom I hope the hon. Member for Dumfries will feel some respect, a teacher at whose feet he may not be ashamed to learn wisdom. It is the Chairman himself of the Committee of 1862, Mr. William Ewart, whose sagacious views I desire to offer for the consideration of the Member for Dumfries. The first witness called before that Committee as a leading advocate for the metrical system was Professor Leone Levi, and among the questions which the Chairman put to him I find the following:—

"Do you not think it was an act of indiscretion on the part of the French Legislature to introduce Greek and Latin terms?"

"People utterly ignorant of Greek and Latin must have found great difficulty in understanding the terms used?"

"Is there not this objection also to the use of Greek and Latin terms, that all nations appear, for the sake of brevity, to have adopted very short terms for their weights and measures? In England, for instance, we adopt the ounce, pound, ell, yard, and so on, almost all of the words being monosyllables; then in France, the *toise*, the *aune*, &c., almost all of which are monosyllables. Is it not, in your judgment, more consistent with experience to follow that common usage of mankind, rather than the more elaborate system of Greek and Latin terms?"—[Questions 74, 75, 76.]

I will not trouble the House with Mr. Levi's replies at length, as I think the questions themselves amount to a condemnation of the proposed system. The witness sums up—

"If you have two difficulties to encounter, one to introduce a new system, and another to learn a new language, the difficulty of introducing it" (the system) "is immensely increased."

Only let me entreat my hon. Friend not to be too proud to own himself wrong now, and return to a better mind. Mr. Airy has not been above doing so on this very question, for I find that he printed, in 1862, *Notes for the Committee on Weights and Measures*, referred to in his evidence, in which these paragraphs occurred—

"I once recommended the substitution of a measure of 2,000 yards instead of the mile of 1,760 yards; not only because it is decimal, but also because it approaches very near to one minute of a degree on the earth's surface, because it corresponds to the nautical mile, and because the Government possess the power (through the turnpike roads and the railways) of exhibiting the material symbols of the measure. But the inconvenience arising from the circumstance that 2,000 yards cannot be measured by the ordinary land chain of twenty-two yards would be so great, that I now doubt the expediency of such a course. I also once recommended the substitution of a weight of 100 lbs. instead of 112 lbs.; and I think that, in certain cases (as at the Custom House, where the duty on large weights of tea, &c., is charged not by the cwt. but by the lb.) it might be convenient. But, viewing the small connection which really exists between the use of the cwt and the use of the lb., I now doubt the expediency of that substitution."

Such is the Bill which we are asked to pass. Its merits, such as they are, are compressed into the small compass of the facility of decimal notation for a certain class of sums, and the convenience of a common scale by which English and foreign merchants can compare their invoices, and chemists can conduct their experiments. All these advantages already lie within the compass of an easy option; and those who clamour most loudly for the change, are those most easily able to purchase the convenience for themselves. Its disadvantages I have recapitulated. If the Bill is to become not only an Act, but an Act which shall be in deed, and not in name only, law—an Act which shall not be a mockery and an incubus to the statute book—it must be weighted with heavy penalties, inexorably inflicted. Last year several of the English papers expressed

deserved sympathy for an unlucky Belgian editor, who, in describing a great flood, innocently remarked that the river rose a certain number of toises. For this the unhappy man was dragged to the bar of justice as a criminal; he had violated the law of his land; he had brought the Belgian statute book into contempt; he had rebelled against authority; and so his doom was fine and imprisonment. This is what we shall have to come to in England, if the hon. Members for Dumfries and Liverpool and Stockport are to make their law and use their law. I have read the language in which the Mover of the Bill exposes the inconveniences of his own proposal. I have also brought to the Bar of the House men of the highest scientific eminence—Herschel and Airy and De Morgan—as witnesses against the Bill; but in asking the House to reject it, I do not rely upon their testimony. I speak in the name of the poor honest people of the country, traders and buyers, who will suffer infinite inconvenience and embarrassment, and who in their perplexity will have their small incomes cruelly mulcted, if this extraordinary measure becomes the law of the land.

Amendment proposed, to leave out the word "now," and at the end of the Question to add the words "upon this day six months."—(*Mr. Beresford Hope.*)

MR. POLLARD-URQUHART said, he was sorry to find his hon. Friend, who held the position of Member for a scientific University where they had both been educated—a position in which he (Mr. Pollard-Urquhart) had assisted to place him—should sneer at a system of notation that was desired by so many eminent men, and by all the great merchants of the day. His hon. Friend had told a pitiful tale of what would happen to the small tradesmen, and the fruitwomen, if this Bill were passed. But did his hon. Friend never buy an apple from a woman in France or in Switzerland? The system prevailed in the retail trade of those countries, without any of the inconveniences which his hon. Friend had conjured up. It might be said that France was a highly centralized country, where the people were bound above all things to obey orders proceeding from head-quarters. But that was not true of such countries as Switzerland or Holland, where the people had as much social independence as in this country. Yet the system prevailed there, and the change had been made there. There were two things to be considered in this matter: the one was, whether the proposed system was advantageous; the other was, whether the advantage was worth the trouble of change. Now he thought the speech of the hon. Member for Liverpool (Mr. Graves) was a sufficient answer to those who said that there was no practical advantage in the change. The hon. Member well knew the evils that arose from our system being different from that of all the rest of the world. He might also refer to the evidence of the late Sir William Brown in favour of this system, who said there would be a large saving in the management of his own business if it were adopted. This was not merely a great merchant's question; there was no class more interested in the adoption of this system than the working men who had to earn their daily bread; for it was only by adopting every possible economy, not only in manufactures but also in keeping accounts, that our country could make head against the competition of other countries. He might also refer to the case of a gentleman who said that his firm had often lost a post by the necessity of translating the system of weights and measures from that of our country into that of the Continent. He thought these were strong arguments in favour of the change, and they all came from practical men. Then came the question whether the change was worth the trouble. He believed that the inconvenience attending it would be so slight as to be unworthy of consideration. It had been made on the Continent without difficulty. It had been found to work well in countries where the small retail trade bore a much greater ratio to the wholesale foreign trade than it did with us. He himself was old enough to remember the introduction of the British currency into Ireland in 1825, and how rapidly after that alteration what were called the Irish fivepenny pieces and the sixpence-halfpennies of the old system were forgotten. He saw no reason to doubt that the other changes to which he had referred would be as easily carried out. The difficulties must be overcome sooner or later, and the sooner, he thought, the better. They had abandoned at a great expense the old methods of warfare, because the safety of the Empire required it. The preservation of the trade and commerce of the country, for which these changes were advocated, was of equally high importance.

If we did not adopt this system, which was rapidly becoming the commercial notation of the world, we should be left as much in the lurch as those who, in the present day, crossed the Atlantic in sailing vessels, or those who went out shooting with muzzle-loading fowling-pieces. He should support the Bill.

MR. GORST said, he was sorry to disagree with his hon. Friend the Member for the University of Cambridge (Mr. Beresford Hope); but as he had come to the conclusion that the change would be of great advantage to the country he had no alternative but to support this Bill. He was in favour of decimalisation, even though they went no farther; but if they adopted decimalisation he thought it would be foolish if they did not go a step further and adopt metricalisation also. If we were the only nation in the world, and were about to consider the unit which ought to be adopted, he would accept the evidence of Sir John Herschel or Professor Airy as conclusive. But they were not choosing a unit. A unit had already been chosen, and was in use throughout the other countries of Western Europe, and though it might not be scientifically the best, they would be foolish if they did not choose the unit that was already in use among so many nations. He thought the learned men to whom the hon. Member for the University of Cambridge had referred were asked about things which they did not know much about. If they had been asked what was the proper scientific unit he would have had the greatest respect for their opinions; but when it came to be a question of the best mode of keeping accounts he would rather take the opinion of the hon. Member for the City of London (Mr. Goschen) than that of all the professors in the world. The rest of his hon. Friend's argument only amounted to an abuse of strange new-fangled names of the system. But that had nothing to do with the system itself. The real question was whether the adoption of that system would be advantageous to the trade and commerce of the country. He believed it would be of great advantage to adopt the decimal system in their coinage; but if they adopted the metrical system—which was the decimal applied to a unit of measure—it would be still more advantageous. He was bound to say that one argument which was used in favour of this measure did not commend itself to him—the argument that it would be of advantage to the cause of education. Now, if education was to be considered merely as the teaching of an art of ciphering, that might be true; but if by education was meant instruction in the science of calculation, then the present system of arithmetic was much to be preferred. He wished to say one word on the subject of the compulsory nature of this Bill. A Permissive Bill would aggravate the inconveniences involved in the change. If it were made at all, that must be done by a compulsory measure, the operation of which the Government could facilitate, as the Austrian Government had facilitated the change in the coinage of North Italy, by printing tables and distributing them among the people. It was admitted on all hands that the change would cause inconvenience, and the quicker and sooner the change was made the less would the inconvenience be. They had a Permissive Bill already, but no one adopted the system, in fact, no individual merchant or trader would adopt it till the adoption was made general over the country. Suppose a Government were to adopt the decimal and the metrical system in their taxation and tariff, while the rest of the country adhered to the present system, one could easily see what a scene of confusion would ensue. Against the authorities cited he would quote that of Mr. Cobden, who, speaking of his residence in France, when he was negotiating the Treaty of Commerce, said—

"I was engaged for, I believe, six months in the constant study and conversion of English weights, measures, and prices into French weights, measures, and prices, and so much did I feel the disadvantages of our system as compared with that of France, that to say I felt mystified and annoyed would not express my feelings at the time; I felt humiliated. The one is simple, symmetrical, logical, and consistent; the other dislocated, complicated, uncouth, and incoherent."

MR. J. B. SMITH said, when this question was last discussed in 1864 they witnessed the anomaly of Mr. Cobden supporting the metric system as a means of facilitating the growing intercourse between nations, created by the adoption of Free Trade, while the Free Trade Ministers—the right hon. Gentleman the Member for South Lancashire (Mr. Gladstone) and the Member for Ashton (Mr. Milner Gibson)—voted against it. The Government, however, were defeated by a large majority, and then engaged to take charge of the Bill. But what a Bill it had proved to be! According to the Report of the Warden of the Standards one of the Inspectors of weights

and measures had seized some weights in a tradesman's shop as being illegal, and brought the culprit before the magistrates. The simple-minded man took the Act of Parliament in his hand as his defence against the charge, and the magistrates dismissed the information, observing however that the Act was so loosely drawn they believed he was liable to a penalty. The Law Officers being consulted gave it as their opinion that, though it was lawful to use metric measures, anyone having them in his possession was liable to be prosecuted! It was absolutely necessary that a Bill should be brought forward to correct the blunders of the existing Act; and his hon. Friend the Member for Dumfries (Mr. Ewart) now proposed the second reading of a Bill for the compulsory use, after a limited time, of the metric system of weights and measures. He (Mr. J. B. Smith) hoped that we should not now witness another anomaly—namely, the Government opposing this Bill, while in 1864 five of its present Members supported the metric system. The extraordinary progress which this system had made in other countries was sufficient evidence of its superiority to the old systems. It was now in use by 150,000,000 of people, and its use was permitted among upwards of 120,000,000 other people. The United States adopted it last year. A Royal Commission in India had recommended its adoption in the province of Bengal, and another Commission is now sitting to consider its adoption by all India. Last year the representatives of twenty nations assembled at Paris and recommended its adoption by all nations. M. Matthieu, the President of this assembly, in an admirable opening speech, observed—

"The establishment of railways and electric telegraphs, those great instruments of progress and civilization, has, so to say, changed the face of the world. Communications are now so easy and so rapid that the different countries are now in a condition in which they were not before, of being rather provinces of the same empire. We cannot now limit ourselves to attempting some simplification: we are led by the force of circumstances to extended reforms. This is the only mode for facilitating social transactions and commercial operations in the entire world."

No less than 61 per cent of our exports go to countries using the metric system, and the time is arrived when we should no longer delay its adoption and thus facilitate our growing intercourse with all the world. The hon. Member for the University of Cambridge is opposed to this Bill, and has read us a letter from Sir John Herschel condemning the metric system, and suggesting a better, but it is too late to attempt to persuade half the world to change a system which they have found so easy and convenient, that no nation has ever shown any desire to abandon it in favour of any other. The late Master of the Mint (Sir John Herschel) is no doubt a high scientific authority, but we have the distinguished authority of the present Master of the Mint (Professor Graham), who was examined before the Weights and Measures Committee, and who recommended the immediate and compulsory adoption of the metric system. We have also the authority of one of the hon. Member's constituents (Professor W. H. Miller of Cambridge), who was one of the members of the Committee for the restoration of the lost standards, and to whom was intrusted the restoration of the standard of weight, no mean authority, who says—

"The great advantages of the metrical system are having convenient units, and the enormous advantage also of having decimal subdivision."

Then we have the authority of three men, who probably combine more scientific knowledge with practical experience than any other men of any age. Professor Fairbairn says, "the metric system is of all I know the best," and Sir William Armstrong and Mr. Whitworth bear similar testimony. With such overwhelming authority in favour of the metric system it were a waste of time to say another word. In these days of rapid advancement when orders for cotton were sent to America by the electric telegraph and replies received —as in a case he (Mr. J. B. Smith) had heard of—dated half an hour before the date of the order, it was impossible to stand still—we are the first commercial nation in the world, we must maintain our position—to stand still is to be left behind; let us press on then until an international language is established by the use of the same pound weight, the same yard measure, the same gallon, and the same money throughout the world.

MR. HUBBARD said, he must oppose the Bill. Decimal coins and decimal weights and measures were so closely connected that it was unfair to test one apart from the other; because they worked so much more easily and naturally together. Notwithstanding their advantages, his conviction was that neither change would be for the general advantage of the great interests of the country. He admitted the

essential value of the decimal system upon which sales of bullion at the Bank of England were conducted under a special Act of Parliament; but there was a much larger question beyond upon which he felt bound to make a stand. On scientific grounds and for the convenience of large commercial interests, and perhaps with regard to very delicate machinery, it might be an advantage to introduce the decimal system; but it was one thing to state that for certain purposes a system was the more perfect of the two, and quite another thing to say, "You shall subvert an existing widely accepted system in favour of another simply because it is more perfect." Let the Committee look at the possible consequences of this measure before committing themselves to it. They were discussing not a Permissive, but a Compulsory Bill, and not the less compulsory because its operation was to be postponed for some years. The hon. Member for the University of Cambridge (Mr. Beresford Hope) had not at all over-rated what would be the absurd if they were not the grievous hardships that the system would impose upon the people. Supposing that the foreign trade of the country was as important as the hon. Member for Stockport (Mr. J. B. Smith) said it was, still it was to be remembered that this trade was carried on on a large scale, commodities being dealt with in shiploads, and thousands of pounds worth included in a single invoice, and therefore the operations connected with them could be dispatched with comparative ease. But it was a different thing when they followed the domestic and distributed trade of this country through all its manipulations till they found their way into the small retail shops in the New-cut of Lambeth. On the poor the Bill would inflict the greatest possible inconvenience. ["Why?"] Why? because it would be a long time, if ever, before the poor of this country adopted the new system of weights and the foreign names which were attached to them. We could not substitute from a foreign vocabulary any expressions so convenient in quantity as the pound and the ounce. ["Why not?"] Because, as a matter of fact, the commodities which were the staple of their purchases were bought most conveniently in the quantities indicated by those weights. It had taken fifty years of arbitrary and despotic rule in France to obtain for the metric system its present position; and it was far from being general in Paris and still further in the provinces. He might refer to a remarkable illustration of this fact which prevailed in the retail trade of Paris at the present day. A person going into a chandler's shop would ask for a livre or pound of candles, and the shopman would hand over a packet containing 485 *grammes*, or a pound, thus showing how completely the old system kept its hold on the mass of the population in France even though the new system had been introduced by a Revolution, and had been in use for half a century. He did not think the working men, still less the wives of the working men of England more likely to adopt the new system than the same class of people in France. Were Englishmen and Englishwomen to be driven out of their customs and into the adoption of a foreign nomenclature? At least, it was not worth while to go through a Revolution, as the French had done, for the sake of the decimal system. Our present arithmetical system was defensible as an intellectual exercise which developed the minds of scholars, and the decimal system would not be an advance from an educational point of view. Besides the change which had taken place in the corn trade proved that, consistently with the present system, the metric system might be introduced wherever it was considered convenient, whether with regard to weights or measures. The conclusion to which he had come was that, however convenient the metric system might be for the purposes of scientific investigation or engineering, it would be, as regarded the people of England, a grievous inconvenience to have a system introduced which was to be brought into compulsory action—to force upon them a system strange to them by name; of which they had a very imperfect comprehension; to which they could attach no definite idea; and which he believed would never take root in this country. The great diversity that still prevailed in measures of capacity, notwithstanding the efforts that had been made to obtain uniformity, showed the strength of custom in these matters and the difficulty of setting it aside, and the moral he would draw was, "Do not attempt to introduce a change still more at variance with the national taste and feelings, but endeavour to simplify our present system, and bring it into universal acceptance."

MR. MORRISON said, he opposed the Bill on different grounds. He concurred in the arguments for a decimal and uniform system, and particularly one that was international as well as national; but he could not ignore the fact that all the strength of a Government in the full favour of revolutionary change in France had failed as yet to secure the entire acceptance of the metric system there, and he questioned whether the cause was advanced by trying to pass this measure in the last Session of a middle class Parliament, to be followed by one in which the working classes would be more perfectly represented. It would be one of the most unpopular measures ever passed by a House of Commons. A cry was sure to be raised against the middle class if the Bill passed; and this would increase the difficulty of putting it into practical working when the time fixed for doing so came. He, therefore, put it to the promoter of the Bill whether it was worth while putting his supporters into a false position by forcing a division. He was in favour of the principle of the Bill; but he could not vote for it in the last Session of an unreformed Parliament. He would urge his hon. Friend to be content with the discussion which he had elicited.

MR. STEPHEN CAVE said, it seemed to him that this question might be regarded in two ways; first, with reference to this country alone; and, secondly, with regard to our communications with other countries. If this were merely a question regarding ourselves, he, for one, would hesitate very much before assenting to a change, even for the better, in an old country, with a vast population, accustomed to certain ways, a departure from which must necessarily involve very considerable confusion and annoyance. He admitted the inconvenience arising from the present system. Those who suffered the most from it, were those who were scarcely able to judge for themselves; and looking to this country alone, he certainly would be inclined to adopt the advice given by some hon. Members—namely, to endeavour to simplify and bring to one point the weights and measures which exist in this country, although he admitted there was very great difficulty in doing this. He himself attached no importance to the educational argument on the present system. He certainly was not one of those who would advocate unnecessary difficulty in learning for the sake of strengthening the mind. When everything had been made as easy as possible, there would assuredly be difficulty enough left to secure this object. There was quite enough labour in running the race of life, without carrying lead in one's shoes. As Sydney Smith said, life had been distressingly abridged since the Flood, and anyone might be regarded as a benefactor who shortened the time requisite for the attainment of any branch of learning. He had heard, indeed, difficulty in calculation defended by a great authority the other day, on the ground that Frankfort, where, it seemed, the currency was extremely intricate, had produced the greatest dealers in exchanges. For his part, he was willing to leave her that pre-eminence; nor would he enter upon the deeply scientific question of the origin of the two systems. There were many who had argued with great ability that our system should be adopted by the rest of the world. He thought, however, that whatever might be their opinions on this point, all who had tried a decimal system must feel that it was more easily mastered, and more rapid than the present. But, in reference to the second point, there could be no doubt that the progress of opinion in this and other countries as to an international system of weights and measures, as well as of coinage, within the last few years had been remarkable. It might be dated from the Great Exhibition of 1851, and had received enormous impulse from the increased facility of locomotion and the growth of telegraphic as well as postal communication between the nations of the world. The French metric system had already been adopted as an international system in several countries of Europe, and by the United States of America. Its introduction into British India in substitution for the existing complicated system was, as the hon. Member had said, now in contemplation. There could be no question as to the advantage to all persons engaged in transactions with foreign countries involving weights and measures in such an international system, and, considering the great advantages of the simplicity of its decimal scale, and of the relation of the measures of length, weight, and capacity to each other, as well as the adaptation of all these to the coinage, and the fact of its having been already adopted by several countries as an international system, it must be admitted that if a new system was to be adopted in this country, it could be none other than the metric system as established in France. But if the view were adopted of establishing the metric system in Great Britain as an international system, the questions

would arise — 1. Was it to be established with reference to international transactions, and concurrently with the existing Imperial system for home transactions? 2. Or was it to be, as by the present Bill, exclusively adopted for both foreign and home transactions, and compulsorily enforced after a specified period, in substitution for the present system? The consideration of the second question involved many points, the discussion of which time did not allow. It would be scarcely possible, at the present time, that such a course could be practically carried out, when it was considered that from 15,000,000 to 20,000,000 of Imperial weights and measures existed in Great Britain, without considering the gas standards and measures. If any step was now to be taken for immediately introducing an international system of weights and measures, it could only be the permissive use of the metric system, as recommended by the Committee of 1862, concurrently with the Imperial system, should it be considered that the advantages to be gained by now establishing an international system were sufficient to counterbalance the evident disadvantages of two concurrent systems of weights and measures, and of abandoning the principle of uniformity which had always been deemed so important. As the hon. Member for Dumfries (Mr. Ewart) had said, the attempt to combine two systems had turned out very unsatisfactorily in France. At the same time the hon. Member was, he thought, impatient, when he expected great effects from a Bill only passed three years ago. The hon. Member for Liverpool, indeed, said trade was already feeling its way in this matter, and it was clear that so great a change could only make its way very gradually in any country. The Astronomer Royal had said, as to a portion of this Bill—

"With reference to the commercial value of an authorized Exchequer standard on the metrical system it is important to consider the present state of the British law. Contracts made in terms of the metrical system are legal; the values of the metrical units being ascertained, not by reference to an Exchequer standard, but by a table of equivalents, that is of proportions of these units to the units of British measure, of which there are Exchequer standards. As affecting transactions with foreigners, this system leaves nothing to be desired. Contracts with foreigners are always on a large scale, and the verification of such contracts by means of the British standards is as easy as by means of the standards of the foreign country (metrical or otherwise). If it is required to verify a contract for 1,000 metres of French silk, it is only necessary for the merchant to refer to the table hung on the wall or desk of the counting-house, and he will at once see the number of yards, admitting of verification by a legal standard, which ought to be represented in the measure of the silk furnished to him. As affecting domestic transactions, the considerations are of a different class. If the use of the metre standard as a material measure, and not a tabular equivalent, be in any way made legal, it will be in the power of a single person here and there to require that all tradesmen with whom he may deal to verify their asserted measures by exhibition of, and reference to, a material and metrical standard. And, in a district where not one inhabitant in 10,000 cares about the metrical system, a troublesome person may compel many tradesmen to keep, by the side of the yard measure of 36 inches, a metre measure of 39⅜ inches. The evils of a double standard must be great under any circumstances, but in no case can they be so great as when the two standards are sufficiently near to be occasionally confounded, and sufficiently different to alter every price by 9 per cent. It would be a very great misfortune for the country to be exposed to such an inconvenience."

One of the points referred to the Standards Commission was to inquire and report whether any and what additions to the existing official standards of weights and measures were now required, and under this head was involved the expression of their opinion as to the establishment of the metric system in this country. With the view of placing before the Commission the fullest information upon the whole subject of the metric system in France, the mode in which it was established, and its practical working at the present time, the Warden of the Standards had been in communication with the head of the French Department of Weights and Measures, and had received from him copies of the laws, ordinances, and official instructions relating to the metric system, which would enable him officially to lay the requisite information before the Commission for their consideration. Such information had not hitherto been afforded in this country, and it would enable the Commission not only to form a better opinion as to the actual working of the metric system in France, but to contrast it with the working of the Imperial system in this country. It was suggested, therefore, that until such information should have been laid also before the Government and Parliament, together with the Report of the Standards Commission, any legislation to authorize the introduction of the metric system into this country would be premature. But it appeared to him, with all deference to the opinion which that House had expressed more than once, and to the general feeling of the commercial classes as interpreted by the Chambers of Commerce throughout the country, that

the Bill should be read a second time for the purpose of assenting to its principle, on the understanding that it should not be proceeded with in Committee until the Report of the Commission had been received, which would not be during the present year. It had also been suggested by the hon. Member who had last spoken, that it should be left to a new Parliament, like many other questions, inasmuch as that new Parliament would be better able to express the views of the large body of people who would be affected by the change. Sooner or later the country would in all probability adopt the metric system, but he did not at present see any prospect of carrying a compulsory measure, without causing serious, and even perilous dissatisfaction.

MR. MILNER GIBSON said, he was glad to hear from the Government that they would support the second reading of the Bill; at the same time, he was not quite sure that it was a Parliamentary course to read a Bill a second time merely for the purpose of sanctioning the principle on the understanding that the measure was to go no further. He wished to correct a misapprehension of his hon. Friend the Member for Stockport (Mr. J. B. Smith), who had represented him as being an opponent of the metric system. That was erroneous. He had been always of opinion that of all systems of weights and measures now existing in the world the metric system of France was the most complete and most useful in all dealings between men and between nations. This Bill was founded on two principles. The first was that this country having already sanctioned the use of the metric system by Act of Parliament, the Government should be authorized to construct metric standards so that people might have an opportunity of verifying the metric measures in use, and having their accuracy guaranteed by the Government stamp. The second principle was that after a certain number of years our present measures should be abolished and those of the metric system substituted. With regard to the first part of the Bill he was prepared to accede to it. As they had passed a measure the Preamble of which stated that it was expedient to legalize the metric system of weights and measures, the natural consequence was that they should pass another to enable that system to be brought into operation; and at a future time it might be necessary to compel its adoption. If, however, they were to go too far at first they might defeat the object they had in view. He thought that at present the United States had not gone beyond this—namely, the authorization of the construction of those metric standards which would enable tradesmen to use measures with the Government stamp thereon as a guarantee of their accuracy. He hoped the Commission to which the right hon. Gentleman had referred had power to inquire into the desirableness of such a proposal. He did not think it quite clear that the proposal came within the Order of Reference. He should vote for the second reading, reserving to himself the power, should the Bill go into Committee, of dealing with the compulsory clause as he might think most advisable.

MR. EWART said, that there was something so fair in the suggestion of the right hon. Gentleman the Vice President of the Board of Trade that he would willingly accept it.

Question put, "That the word 'now' stand part of the Question."

The House *divided*:—Ayes 217; Noes 65: Majority 152.

Main Question put, and *agreed to*.

Bill read a second time, and *committed* for *Wednesday* 1st July.

AYES.

Adam, W. P.	Baring, H. B.	Bright, Sir C. T.	Cavendish, Lord G.
Agnew, Sir A.	Barron, Sir H. W.	Bright, J. (Manchester)	Cheetham, J.
Akroyd, E.	Bass, A.	Browne, Lord J. T.	Clinton, Lord A. P.
Allen, W. S.	Bass, M. T.	Bruce, rt. hon. H. A.	Clinton, Lord E. P.
Amberley, Viscount	Baxter, W. E.	Buller, Sir A. W.	Cochrane, A.D.R.W.B.
Anstruther, Sir R.	Bazley, T.	Buxton, C.	Coleridge, J. D.
Armstrong, R.	Beach, W. W. B.	Buxton, Sir T. F.	Collier, Sir R. P.
Baggallay, R.	Beaumont, H. F.	Candlish, J.	Corrance, F. S.
Bagwell, J.	Blake, J. A.	Carington, hn. W. H. P.	Cowen, J.
Baines, E.	Blennerhassett, Sir R.	Carter, S.	Cox, W. T.
Barclay, A. C.	Bowen, J. B.	Cave, rt. hon. S.	Crossley, Sir F.
		Cave, T.	Dalglish, R.

Davey, R.
Davie, Sir H. R. F.
De La Poer, E.
Denman, hon. G.
Dering, Sir E. C.
Dilke, Sir W.
Dillwyn, L. L.
Dixon, G.
Dodson, J. G.
Du Cane, C.
Duff, M. E. G.
Dunlop, A. C. S. M.
Du Pre, C. G.
Eckersley, N.
Edwards, C.
Edwards, Sir H.
Ellice, E.
Ewing, H. E. Crum-
Eykyn, R.
Fawcett, H.
Fitzwilliam, hn. C.W.W.
Forster, C.
Forster, W. E.
French, rt. hon. Colonel
Gaselee, Serjeant S.
Gaskell, J. M.
Gavin, Major
Gibson, rt. hon. T. M.
Gilpin, C.
Glyn, G. C.
Glyn, G. G.
Goodson, J.
Gordon, rt. hon. E. S.
Gorst, J. E.
Gray, Lieut.-Colonel
Greenall, G.
Grenfell, H. R.
Greville-Nugent, Col.
Grey, hon. T. de
Grosvenor, Earl
Gurney, S.
Hadfield, G.
Hankey, T.
Harris, J. D.
Hartopp, E. B.
Hay, Sir J. C. D.
Hayter, A. D.
Headlam, rt. hon. T. E.
Henley, Lord
Herbert, H. A.
Herbert, rt. hn. Gen. P.
Hodgson, K. D.
Holden, I.
Hornby, W. H.
Horsman, rt. hon. E.
Howes, E.
Huddleston, J. W.
Hughes, W. B.
Hurst, R. H.
Hutt, rt. hon. Sir W.
Ingham, R.
Jervoise, Sir J. C.
Karslake, Sir J. B.
Keown, W.
King, hon. P. J. L.
Kinglake, A. W.
Kinglake, J. A.
Labouchere, H.
Lacon, Sir E.
Laird, J.
Lamont, J.
Lanyon, Sir C.
Lawson, rt. hon. J. A.
Layard, A. H.
Leatham, E. A.
Leatham, W. H.
Leeman, G.
Lewis, H.
Locke, J.
Lopes, Sir M.
MacEvoy, E.
Maguire, J. F.
M'Lagan, P.
M'Laren, D.
Manners, Lord G. J.
Martin, P. W.
Maxwell, W. H.
Melly, G.
Milbank, F. A.
Mill, J. S.
Mitchell, T. A.
Moffatt, G.
Monk, C. J
Monsell, rt. hon. W.
Montagu, rt. hn. Lord R.
Montgomery, Sir G.
Moore, C.
Morrison, W.
Mowbray, rt. hn. J. R.
Noel, hon. G. J.
North, Colonel
Norwood, C. M.
O'Brien, Sir P.
O'Donoghue, The
Ogilvy, Sir J.
Onslow, G.
Packe, Colonel
Paget, T. T.
Parry, T.
Pease, J. W.
Pelham, Lord
Pemberton, E. L.
Philips, R. N.
Pim, J.
Platt, J.
Pollard-Urquhart, W.
Potter, E.
Potter, T. B.
Price, W. P.
Pritchard, J.
Pugh, D.
Ramsay, J.
Rawlinson, Sir H.
Read, C. S.
Rebow, J. G.
Roebuck, J. A.
Russell, A.
Russell, H.
St. Aubyn, J.
Samuelson, B.
Saunderson, E.
Scott, Sir W.
Seely, C.
Selwin-Ibbetson, H. J.
Severne, J. E.
Seymour, G. H.
Shafto, R. D.
Sheridan, H. B.
Sherriff, A. C.
Simeon, Sir J.
Simonds, W. B.
Smith, A.
Smith, J.
Smith, J. B.
Somerset, E. A.
Speirs, A. A.
Stacpoole, W.
Stone, W. H.
Stuart, Col. Crichton-
Surtees, C. F.
Surtees, H. E.
Synan, E. J.
Taylor, P. A.
Thompson, M. W.
Tollemache, J.
Tottenham, Lt.-Col. C. G.
Trevelyan, G. O.
Vanderbyl, P.
Verner, Sir W.
Villiers, rt. hon. C. P.
Vivian, Capt. hn. J. C. W.
Waldegrave-Leslie, hon. G.
Walpole, rt. hon. S. H.
Walrond, J. W.
Waterhouse, S.
Watkin, E. W.
Western, Sir T. B.
Whitmore, H.
Williamson, Sir H.
Woods, H.
Wyndham, hon. P.

TELLERS.
Ewart, W.
Graves, S. R.

NOES.

Bailey, Sir J. R.
Barnett, H.
Barrington, Viscount
Bentinck, G. C.
Benyon, R.
Booth, Sir R. G.
Briscoe, J. I.
Bruce, Major C.
Cecil, Lord E. H. B. G.
Clive, Lt.-Col. hn. G.W.
Cooper, E. H.
Davenport, W. B.
Dawson, R. P.
Dimsdale, R.
Duncombe, hon. Admi.
Egerton, hon. W.
Erskine, Vice. Ad. J. E.
Fane, Colonel J. W.
Feilden, J.
Fellowes, E.
Finch, G. H.
Floyer, J.
Forde, Colonel
Goldney, G.
Gore, J. R. O.
Griffith, C. D.
Gwyn, H.
Hamilton, Lord C. J.
Hartley, J.
Heathcote, Sir W.
Hervey, Lord A. H. C.
Hogg, Lt.-Colonel J. M.
Hotham, Lord
Hubbard, J. G.
Jolliffe, hon. H. H.
Kavanagh, A.
Kendall, N.
Langton, W. G.
Liddell, hon. H. G.
Lindsay, Col. R. L.
Long, R. P.
Lowther, J.
Marsh, M. H.
Miles, J. W.
Mordaunt, Sir C.
Morgan, hon. Major
Morgan, O.
Neville-Grenville, R.
O'Loghlen, Sir C. M.
Parker, Major W.
Robertson, P. F.
Schreiber, C.
Scourfield, J. H.
Smith, S. G.
Smollett, P. B.
Stopford, S. G.
Sykes, C.
Torrens, R.
Turner, C.
Vance, J.
Welby, W. E.
Wise, H. C.
Wynn, C. W. W.
Wynne, W. R. M.
Yorke, J. R.

TELLERS.
Hope, A. J. B. B.
Hardcastle, J. A.

METRIC WEIGHTS AND MEASURES,

BY PROFESSOR LEONE LEVI.

Extracted from "The Daily Telegraph," May 14, 1868.

MR. EWART'S Weights and Measures Bill was the subject of an animated debate in the House of Commons yesterday afternoon. The feeling of the Members on both sides was manifestly in its favour; and the grotesque benevolence with which Mr. BERESFORD HOPE opposed it, on the ground that the metrical system would puzzle the poor housewife when on her marketing errands, failed to do more than amuse the House. Nor did the testimony of the high scientific authorities whose words he cited throw much light on the subject. As Mr. GORST said in his sensible speech, the question at issue belongs to the domain, not of science but of practice, and practical men are pretty well agreed as to the inconvenience of the present system. After a long debate, Mr. CAVE, in the name of the Government, proposed that the Bill should be read a second time, and that, before going farther, Mr. EWART should await the Report of the Commission which is investigating the subject. The Member for Dumfriesshire accepted the suggestion, and with it, of course, the consequence of postponing legislation for another Session. But, determined to protest against the second reading, the opponents of the Bill insisted on a division, and the result was that Mr. EWART had 217 votes in his favour, and only 65 against him. So decisive a victory is highly satisfactory, for there is something essentially wrong in our English weights and measures. What is their present condition? The standards are admitted to be in a most defective state. The want of uniformity throughout the kingdom has become a source of grave inconvenience. Ten systems are now legally in use, and very numerous are the local weights and measures which custom still maintains intact. The system of numeration is, moreover, absurdly complicated, and hosts of persons are every year convicted of defective weights and measures; while the law and practice as regards verification and stamping are in a most hopeless confusion. It is not that the law is indifferent or insufficient. There is no lack of Acts enacting, declaring, repeating that there shall be but one uniform weight and measure throughout the kingdom, and inflicting penalties for any deviation from the exact quantities contained in the principal units. The real cause of mischief is, that we have not a sound basis, and that, not having a system adapted to the manifold requirements of society and commerce, every one is compelled to use the first expedient that is ready to his hand.

An effectual remedy for the long felt evil is offered by Mr. EWART's Bill to reform our metric system. That system has one great merit—it is exceedingly simple, easy to be learnt, easily applied. First of all, it is founded on a natural and invariable unit, the ascertained portion of the fourth of the terrestrial meridian. Were we to renew the operation now, indeed, we might find some difference in the measurement; but that fact forms no objection of practical value, since the unit is permanently embodied in the metre at the Archives; a bar of platinum preserved with as much care as the standard yard buried within the walls of Westminster Palace. Our present English weights and measures have no possible relation with one another. Each branch stands independently, with methods of its own. Not so with the metric. Upon the metre, which is the fundamental measure, three other units have been established. The Are, the unit for the measure of surface, is equal to 100 square metres; the Litre, the unit for the measure of capacity, is a cubic decimetre; and the Gram, the unit for the measure of weight, is the weight of a cubic centimetre of distilled water. These units have decimal multiples and sub-multiples, and by connecting the words Deca (ten), Hecto (hundred), Kilo (a thousand), and Myria (ten thousand), or Deci (for the tenth), Centi (for the hundredth), and Milli (for the thousandth), with the respective units, we have a nomenclature at once expressing each different kind of measure, and the quantity to be indicated. Can anything be more simple? Compare this with our tables of weights and measures. Rivers of tears have been shed by millions of youngsters in learning the mere figures, and, after all, they are utterly unable to retain the idea in their minds. It is an absolute fact that, by the adoption of the metric decimal system, two-thirds of the time now spent in teaching arithmetic may be economized—to be employed, say, in those higher studies of natural and experimental sciences which ought to be introduced into schools. In reality, the metric system stands in the same position as a labour-saving machine, and in so far it is an instrument of no small value in the production of wealth. Besides its intrinsic merit, however, the great recommendation of the system is, that it is fast becoming universal. At this moment it is in force in an obligatory manner among 146,000,000 persons, in part only among 69,000,000, and in a permissive manner among 60,000,000; so that it is more or less recognized by 275,000,000 persons—a fact of great significance in these days of railways and telegraphs, of universal exhibitions and great international competitions. With the enormous intercourse which happily exists among nations, it is absolutely necessary to remove those obstacles which prevent our understanding one another. They are stones in the way, and the sooner they are thrown aside the better. Already the countries with which we have the largest trade have adopted the metric system. France, which stands first among our customers, is of course its birthplace, but even the United States are ahead of us in this matter. In fact, in the year 1866 the amount of our trade with countries using the metric system was not less than £307,000,000, or in the proportion of 57 per cent of the whole trade of the country. If we continue any longer inactive, we, who boast of having been the first to inaugurate the great principle of free trade, shall remain isolated and obstructive.

But how do we stand as regards our legislation? In 1862 a Committee of the House of Commons instituted a careful inquiry into the whole question through a Committee composed of Members taken from both sides of the House. They examined a number of witnesses, and the result was a unanimous Report recommending the immediate enactment of the metric system, the use of it in the tariff, in the schools,

in the Post Office, and in public contracts. In accordance with these recommendations, Mr. EWART introduced a Bill in 1863, which provided that, after a given time, the proposed system should be compulsorily enforced, and the second reading was carried by a majority of 110 to 75, the majority including Mr. CAVE, Mr. ADDERLEY, Sir JOHN PAKINGTON, and Lord JOHN MANNERS, Members of the present Government. Nothing more was done that Session, but, in consequence of a subsequent arrangement, Mr. EWART re-introduced the Bill in 1864 in a permissive form, and again the second reading was carried by a majority of 90 to 52. In Committee, Mr. MILNER GIBSON, the President of the Board of Trade, offered a compromise; and the result was the passing of the Law as it stands, which, in effect, only modifies the law of contracts by excluding the plea of illegality, if the weights and measures expressed or referred to should be those of the new system. At the time even that was a step in advance; but it soon became evident that we could not stop there; for although the mode of measurement was rendered lawful, no provision was made for the introduction of the appropriate standards, and no power was given to verify and stamp the novel sort of weights and measures if they should be used. In fact, quite recently, as Mr. J. B. SMITH remarked in the debate of yesterday, a person was taken before the magistrate for using that which the law had declared to be lawful.

After these repeated discussions, no one can deny that the House of Commons has given its sanction to the introduction of the metric system into this country. Why, then, hesitate any longer? The sooner we put our hands to work and enter in good earnest to make the change the better. The experience of France and other countries is, that a very short time is sufficient for diffusing the necessary information on the subject. So long as there is any uncertainty as to its becoming the law of the country, few, comparatively, will use the plan, and even teachers will abstain from introducing it into the schools. But let it be known that in a few years the rule will become compulsory, and it will at once be taken up and learnt in every nook and corner of the land. There is no need of any further inquiry on the subject. What is wanted is the passing of a simple measure, enacting that in five or ten years the metric system shall be obligatory; and the Bill before the House wisely leaves the number of years blank to be filled up in Committee. In a matter of this kind the Chambers of Commerce have a right to be heard, and they have pronounced strongly in favour of the measure. The Metric Committee of the British Association for the advancement of Science has also expressed itself in favour of the system, and public opinion has been manifested in every way in the same direction. A little more boldness, and a desire for thoroughness in our legislation, would save us a world of time and much useless disputation.

Extracted from "The Daily Telegraph," July 2, 1868.

AFTER the last division on the Metric Weights and Measures Bill, which pronounced so definitively in favour of changing our present system of weights and measures for an international and decimal system founded on the metre, it is well if we devote ourselves to the whole subject, and, instead of affecting indifference or offering a vain opposition, do our best to render the change as little irksome as possible. It were premature, perhaps, to sing the requiem to our present uncouth practice, but it has evidently received a universal condemnation, and its

adopt a similar method side by side with its proper nomenclature, at least until custom familiarizes us with the altered measures. This was, in fact, the principle of the Bill which passed a second reading in 1863; and if we could adopt some plain English names to express the same quantities, it would materially facilitate the popularizing of the new plan throughout the country. As a matter of fact, the substantial change will be no more than this:—the yard of about 39 inches, decimally divided, will be substituted for the yard of 36 inches, divided into 3 feet; a new pound double the weight, will take the place of the present pound; and so with the measures of liquid and surface. Let us not encumber the subject more than we need. And as for the multiples and sub-multiples, there is nothing to hinder our using the words ten, hundred, and thousand, for deka, hecto, and kilo; and tenth, hundredth, and thousandth for deci, centi, and milli; unless the public should actually prefer the more closely welded form adopted by our neighbours. The preparation of the standards is an easy matter. The standard of the metre has already been prepared with sufficient accuracy by the Ordnance Survey Department, and the standard of the kilogram is in the hands of the Board of Trade. Let the powers of the Standard Commission be at once enlarged, and, instead of their spending time and money in improving the standards of the yard, let them at once procure the necessary standards of the metric system. Much may be done by the Government in preparing the public for the reform; and whether the measure, at this late season, is advanced a farther step or withdrawn, we hope we shall gain wisdom by all that has been done and said on the subject for the last ten years, so that a Government Bill may, in due time, be introduced, to provide for the change in a complete and satisfactory manner.

LONDON: CORNELIUS BUCK, PRINTER, 23, PATERNOSTER ROW.

Reasons in favour of the Bill to establish the Metric System of Weights and Measures,

WHICH STANDS FOR A SECOND READING ON WEDNESDAY, MAY 13, 1868.

1. There is at present no uniformity whatever in the Weights and Measures in use; and it is evident that we do *not* possess a system adequate to the requirements of Trade, and adapted to the wants of daily intercourse and to the purposes of Science.

2. The Metric System of Weights and Measures is universally admitted to fulfil the conditions of a sound and convenient system. It is clear and simple, easy to learn, and most complete in all its parts.

3. Whilst strictly decimal in their numeration, the Metric System of Weights and Measures admits of binary divisions.

4. Extensive inquiries have proved that the introduction of the System will secure an immense saving of time in education.

5. The Metric System is now in use in an obligatory manner among 146,000,000 persons; in a partial manner, among 68,000,000; and in a permissive manner, among 60,000,000 more, making a total of 275,000,000 persons.

6. The Trade of the United Kingdom with countries recognizing and using the Metric Weights and Measures, amounted in 1866 to £307,000,000, or 57 per cent. of the whole Trade of the country. (See the Table annexed, with statistics from the Board of Trade accounts.)

7. By the introduction of the Metric System we best pave the way for the introduction of an international Coinage.

8. The adoption of the Metric Weights System was decidedly and unanimously recommended by the Committee of the House of Commons in 1862, after most careful inquiry and discussion.

9. The Second Reading of the Metric Weights and Measures Bill was carried by Mr. Ewart in 1863 by 110 to 75; and in 1864, by 90 to 52; and the present Permissive Act, 27 & 28 Vict. c. 117, was supported by Mr. Milner Gibson, then President of the Board of Trade.

10. The Permissive Act is most deficient. It does not provide for the maintenance of Standards of Metric Weights and Measures whereby to stamp those in use, and whilst it makes it lawful to any one to use them, it leaves it unlawful to possess them unstamped.

11. If we wish Metric Weights and Measures to be practically introduced in Commerce and taught in Schools, the time must be fixed when their use shall be made compulsory, be it in five or ten years. This is the experience of all the States which have introduced them.

12. The Associated Chambers of Commerce of the United Kingdom have passed a resolution in favour of the Bill.

2

Rec: 854

From 28 April 16 g Ans 2 5-82

70

Inv 854 Jn order

This letter from the Retire Committee of the British Association shows that the Retire System is in a much more forward position in England than Ireland at present.

Do the Govt deem it necessary to issue any order on the letter, or are we to rest satisfied with the last Rep. taken by the Govt of India on the recent Committee report?

I should like to have a Memorandum of the Report of the Irish Committee & the Letter suggesting Govt to issue for perusal at Council.

A.J.A.

I do not see that any thing remains to be done by this Govt, the entire subject having been dealt before

Recd Despatch

Dated

the S of State by this
Sup: Govt in their
Despatch dated the 6th
Nov last-

W.D.M.

A.J.

71 3

Revl Department

No 1147.

Proceedings of the Madras Government

Under date the 28th April 1869.

Read the following
letter from the Metric Com
=mittee of the British
Association.

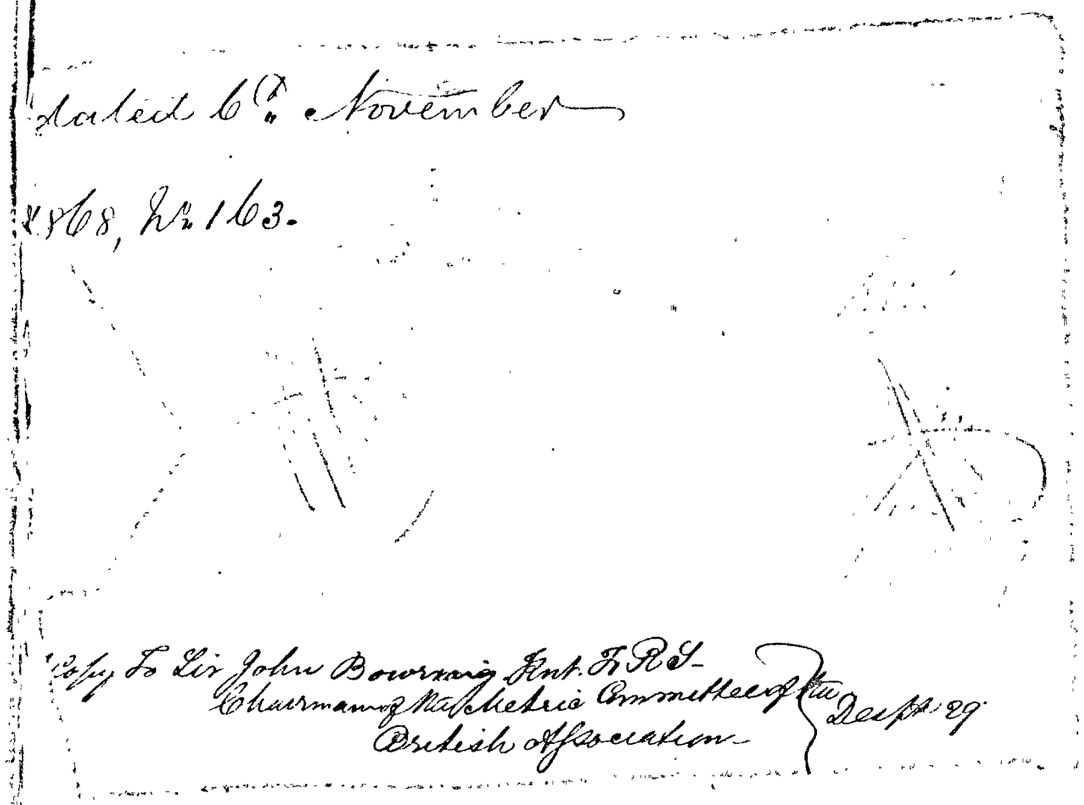
Forwarding papers &c.
regarding the Metric System
of Weights and Measures and
recommending its adoption in
this Presidency.

(No. 25 Dated 1st Jany 1869)

Ordered to be recorded
the entire correspondence
connected with the weights
and measures of India have
been laid before the Secretary
of State by the Govern.
=ment of India, with
their Despatch
dated

Dated 6th November

1868, No. 163.



Copy to Sir John Bowring Knt. F.R.S.
Chairman of Mathematical Committee of the British Association
Dec. 29

