

EAST INDIA (COAL FIELDS).

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COPY of Dr. *McClelland's* REPORT on the  
FIELDS of *India*.

(*Mr. Alcock.*)

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*Ordered, by The House of Commons, to be*  
*19 June 1863.*

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[*Price 5 s.*]

372.

*Under 2s*

EAST INDIA (WEIGHTS AND MEASURES).

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RETURN to an Address of the Honourable The House of Commons,  
dated 13 May 1867;—for,

“ COPY of the REPORT from the COMMITTEE of WEIGHTS and MEASURES to  
the SECRETARY to the GOVERNMENT of BENGAL, dated the 25th day of  
July 1866;” with other PAPERS on the same subject.

India Office, }  
26 November 1867. }

H. L. ANDERSON,  
Secretary, Public Department.

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(*Mr. John Benjamin Smith.*)

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Ordered, by The House of Commons, to be Printed,  
29 November 1867.

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COPY of the REPORT from the COMMITTEE of WEIGHTS and MEASURES to the SECRETARY to the GOVERNMENT of BENGAL, dated the 25th day of July 1866 ; with other PAPERS on the same subject.

— No. 1. —

(Home Department.—Public.—No. 127 of 1867.)

To the Right Honourable Sir *Stafford H. Northcote*, Bart., Secretary of State for India.

Sir,

Simla, 11 July 1867.

IN compliance with the requisition made in your Despatch, No. 67, dated the 31st May last, we transmit herewith a copy of the "Report from the Committee of Weights and Measures to the Secretary to the Government of Bengal, dated the 25th July 1866."

Letter from Government of Bengal, No. 1673T., dated 23rd August 1866, and Enclosure.

2. We beg at the same time to draw your attention to our Despatch of this date, No. 126.

We have, &c.

(signed) *John Lawrence.*  
*W. Mansfield.*  
*H. S. Maine.*  
*G. N. Taylor.*  
*W. N. Massey.*  
*H. M. Durand.*  
*G. U. Yule.*

— No. 2. —

From the Honourable *A. Eden*, Secretary to the Government of Bengal, to *A. M. Montcauth*, Esq., Under Secretary to the Government of India, Simla (No. 1673 T.) ; dated Darjeeling, 23 August 1866.

IN continuation of my letter, No. 3445, dated the 14th ultimo, and previous correspondence, I am directed to forward herewith, for the information of His Excellency the Governor General in Council, a copy of the Report\* of the Committee appointed to consider the question of a uniform system of weights and measures throughout British India.

\*Dated 25th ultimo.

2. The Report is, in the Lieutenant Governor's opinion, a very admirable and well-considered one. There is no doubt that the changes which the Committee propose are of a sweeping and startling nature, but there is immense truth in that they urge in support of such changes—"that while a spirit of stolid passive opposition may be expected to be evoked by any attempt to change the methods of weighing and measuring, there is no reason to suppose that a sweeping change would meet with more opposition than a slight one."

3. As the desirability of a change of system is universally admitted, it is obviously better, since a sweeping or a modified change would be equally distasteful at first to the people in the interior of the country, that the change should be a thorough and efficient one, and not merely a tentative adoption to the English system, to be followed perhaps by further disturbing changes a few years later. There is, in the Lieutenant Governor's opinion, no doubt that the metric system is the best, the most scientific, the easiest to acquire, and, in fact, the only uniform system applicable to all India which it seems possible to adopt; and his Honor accordingly desires to recommend the propositions of the Committee for the favourable consideration of the Government of India.

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— No. 3. —

REPORT from the Committee of Weights and Measures to the Secretary to the Government of Bengal; dated 25 July 1866.

WE, the undersigned, having been appointed to serve on a Committee for the revision of weights and measures, desire to report as follows:—

1. We have made inquiries (by no means exhaustive, but, as we consider, sufficient for our purpose) into the actual weights and measures of Bengal; we have had before us the report of the Madras Committee on this subject, dated 29th July 1839, with a number of papers accompanying it; a series of works illustrative of the French metrical system; a series of papers laid before Parliament, including the reports of several Committees of the House of Commons, furnished us by the kindness of Sir John Herschel; several pamphlets by Sir John Herschel himself; and lastly, a Report made in 1864 by a Committee appointed by the British Association.

2. We shall first consider what it is that we have to deal with, and what is the actual state of weights and measures of the country.

3. Very little has ever been done in the way of a systematic inquiry into the various systems of weights and measures prevalent in India. A work by Captain Jervis, of the Bombay army, entitled, "Indian Metrology," and published in 1836, appeared from its title to promise the Committee some valuable information on this subject; but this work, we regret to say, proves, on examination, to be a collection of unclassified facts and of baseless assumptions, which do not require further remark. We merely refer to it as the only attempt which has been made, and that far from successful, to give the Indian measures a value *per se*, apart from that bestowed by long and general usage. We consider it to be demonstrable that these measures sprang up in the country itself, most of them among cultivators of the soil and other uneducated persons; and that the diversity of tribes and occupations gave rise to a proportionate diversity of weights and measures, the various tribes choosing, as standards of comparison, various articles of common use, or parts of the human frame, as fancy or convenience dictated. Thus, in long measure, we find the barleycorn, the width of the finger, the length of a joint, the span, the cubit or forearm, the length of the foot, the length of a pace, the length of an ordinary walking stick, used as standards; and all these standards are clearly independent, though in many cases rough attempts have been made to adjust one to another. Square measure may be based on long measure, or on the amount an ox can plough, or the amount for which a definite measure of seed will suffice. Weights are based on different grains and seeds, as barley, millet, husked rice, the seed of the *Abrus precatorius*, and so on.

4. It may be inferred from this, that in so large and rich a country as India, embracing every variety of surface and every variety of industry, and including tribes of the most various origin, who have settled, for centuries back, in the places which they now inhabit; in a country, moreover, where the inter-communication between province and province, even between village and village, has always been unusually slight, every village having its local objects of worship, its local hât or bazar, and local interests far surpassing in importance any  
general

general ones, a very large number of standards of weight and measure must have come into use, and a very large number of systems been founded, each upon one or more of these standards. Such is undoubtedly the case, as must be well known to Government, and as will be further seen from the several facts which we are about to bring forward, and which are mainly taken from the reports furnished to the Board of Revenue, Lower Provinces, in 1853, which have been carefully collected and analysed by Mr. Geoghegan, one of our members.

5. In *long measure* all the natural standards used in Bengal are adapted to the hâth, but by different scales in different districts. The hâth itself varies from pergunnah to pergunnah. In measuring English cotton goods a hâth of 18 inches, or half a yard, is naturally adopted; but native cloth being manufactured in lengths ready for wear, in the simple form of dhoti or sâri, the people have never felt the want of an accurately divided cloth measure. Where a hâth is required, it is generally the distance between the elbow and the tip of the middle finger of the seller. The gaj is a measure very frequently used; and, where it seems necessary to adapt it to the hâth, consists of two hâths, but it is generally independent. As a foundation for land measure the hâth and gaj are both used, but their extreme variation may be seen in the reports from a single district, Furreedpore, where two systems of land measure exist side by side, the bigah system and the khada system: the bigah depends on the length of a russee, and there are nine russees used apparently in different pergunnahs; five of these are based on the gaj of various lengths:— $25\frac{1}{2}$ ,  $33\frac{1}{2}$ , 34,  $37\frac{1}{2}$ , and 38 inches respectively; and four on the hâth, viz., one of 80 hâths of  $22\frac{1}{2}$  inches, one of 80 hâths of 23 inches, one of 81 hâths of the same length, and one of 150 hâths of  $18\frac{1}{4}$  inches. Again, the khada is determined by the length of the nul, or measuring rods, of which there are three species, the Satore nul of 11 hâths of  $22\frac{1}{2}$  inches, the Shahjadpore nul of 15 hâths of  $18\frac{1}{4}$  inches, and the Nuldee nul of 22  $\frac{11}{12}$  hâths of 33 inches. Thus the hâth varies in a single district from  $18\frac{1}{4}$  inches to 33, and the gaj from  $25\frac{1}{2}$  to 38. The district of Furreedpore is not in any way an exceptional one, as may be seen by reference to the tables of land measure published by the Board of Revenue, Bengal; and the facts we have stated can give but a very slight idea of the diversities prevailing throughout Bengal. On measures of distance we have very few details; a coss is the most variable measure existing; there is no popular standard whatever; and the distances between villages are generally given by a sort of tradition, while the popular way of defining distances is by a stone's throw, or a tir (arrow flight), or a dâk (distance at which a shout can be heard), or the number of "pâns" which a man would chew in going from one place to the other.

6. In other parts of India the differences are not less striking, and here the useful tables of the weights and measures in the North West Provinces (much more full than those furnished from Bengal) may be consulted with advantage. In Hissar there are eight values for the gaj, from 21 to 38 inches. In Bareilly there are 47 values for the gaj, from 19.5 to 82.75 inches; and in Benares the diversities are as striking. Moreover, the descending sub-divisions vary everywhere, even where the gaj is of uniform size. Papers, pp. 179-212.

7. *Land measure* has been to some extent considered in the above; three systems appear to be in use. The ordinary one is that in which the bigah of 20 fathoms square, the fathom being always four hâths, is the most important measure. The hâth, however, varies exceedingly, as we have seen. The *katha* is one-twentieth of this bigah, the conception of it being a long strip one fathom by 20. The katha again contains 20 dhurs or square fathoms. In some places, however, the katha is sub-divided into 16 instead of 20 parts; and under this sub-division the bigah would seem to be regarded not as a square 80 cubits by 80, but as a rectangle 100 cubits by 64.

In several districts (Pubna, Furreedpore, &c.) side by side with the bigah exists a measure called the khada, divided into 16 pâkhis. The pâkhi again is 30 kanis, the kani being a square nul or fathom. In Chittagong, Tipperah, Bulloah, and Sylhet, a scale of kanis and druns is in use, the drun containing 16 kanis. "The size of the kani varies not only in every pergunnah, but often in the same village, according to the nature of the tenure to be measured. This is Papers, &c., p. 110, "Tipperah."

simply the result of the difference in the length of the háth or cubit used, and in the number of the cubits to the nul or measuring rod. The nuls vary from 7 to 14 háths in length, and the cubits from 18 to about 22 inches. The kani varies in size from 1 rood 18 yards to 3 acres 2 roods 12 poles 2 yards." In Chota Nagpore the kani is also used; but here it is the lowest term of the series, and is as much land as is supposed to be capable of being sown with a certain amount of paddy, varying in different places from  $1\frac{1}{2}$  to 5 *khandis*. Lastly, in Cuttack, the *man* or bigah is divided into 25 "ghunts," the fourth part of the kahun or side of a ghunt being a podika or measuring rod of a length which varies greatly in different localities. In the North West Provinces the measurement is almost exclusively by bigahs, of which the tables, professedly giving only a selection, contain 53 different values, from a bigah of 445 feet in Kumaon to a bigah of 14,641 feet in Pergunnah Sonah of Goorgaon.

8. We now proceed to *measures of capacity*, which, by the way, are little used in Bengal compared with their prevalence in Madras. Mr. Geoghegan remarks—"Here there is no uniformity whatever. Even where the names of the measures are the same in two districts, they do not stand in the same relation in both places. In the 24 pergunnahs we have kunkis, kuntis, and raiks; in Burdwan, Hooghly, Nuddea, and several other districts, kátás, aris, pális, and solis prevail; though while in Nuddea there are 16 pális in one ari, in Hooghly there are two aris in one páli. In Bancoorah we have mautis, chautis, and panyis; and in the Cuttack and Chota Nagpore divisions numerous local standards and scales which it is useless to recapitulate." All these are dry measures, and are believed to be, for the most part, heaped, not struck. They are based on weight, and no use is made of the very obvious connection between cubical content and linear measure.

9. *Avoirdupois weight* :—

5 sikkis	=	1 kachá.
4 kachás	=	1 chhaták (chittack).
4 chhatáks	=	1 páo.
4 páos	=	1 ser (seer).
5 seers	=	1 panseri.
8 panseris	=	1 man (maund).

"This table, with the occasional omission of intermediate weights, such as the páo, or panseri (weights, as their names show, not originally part of the scale), will be found to prevail almost without variation throughout the lower provinces. The weight of the ser varies from 40 to 120 tolabs, the tolah or rupee weight of 180 grains being thus the ultimate unit of reference. In Sylhet there is said to be a ser of a fraction less than three tolabs, used for weighing milk, ghee, &c., but this is probably an error. In most districts the weight of the ser varies according to the product to be weighed; thus in Cachar there is a special ser of cotton; and in Moorshedabad one ser is used in the weightment of raw silk, and another in that of manufactured silk.

"In the Behar Province the ser varies in weight from pergunnah to pergunnah; and it is probable that similar local variations occur within the Bengal districts, though the table does not notice them.

"But there are few traces of that variance in the relations of the several weights of the scale which is so common in England. Thus, whatever the ser may weigh, there are generally 40 seers in the man, no more and no less. In Dacca, however, it is stated that a table is used in the weightment of safflower, where the man contains 10 panseris or 50 seers. Still more curiously, in Sarun, Gya, and Hazareebagh, the panseri is said to vary in value from five to eight seers. I should like to see this statement more fully verified.

"I have failed to discover the rationale of such eccentric values for the ser as  $82\frac{1}{2}$  tolabs, though these values recur frequently and in districts widely separated.

"Throughout Bengal the prevalent cutcha weight is 60 tolabs to the ser.

"The variations in value of the ser seem more irregular in Behar than in Bengal proper.

"In the wild parts of Chota Nagpore they substitute the Goruckpore pice or the Mudhoosahce pice, also called dheboon (?) for the rupee as the tolah weight."

We may add that the table gives no less than 36 values to the seer in tolahs or rupee weights, there being often 11 or 12 different values in a single district. The tables from the North Western Provinces give 96 values to the seer, varying between 10 oz. 10 dwt. in the sale of opium wholesale in Baitool, to the seer of 4 lbs. 1 oz. 2 dwt. 12 grains used in Goruckpore city in the sale of grain.

10. The Bengal table of troy weight is well established; its base is 4, thus:—

4 pankhs	=	1 dhan.
4 dhans	=	1 rati.
[4 ratis	=	1 china.]
8 ratis	=	2 chinas = 1 masha.

In this table the absolute value of the weights varies; the masha being sometimes 1-10th, sometimes 1-12th, sometimes 2-25ths of a tolah. There are traces of separate tables of weights, as apothecaries', jewellers', and whitesmiths'; but these are local only.

11. We are now in a position to lay down definite propositions with regard to the weights and measures of Bengal; and we conclude from the facts recited—

That the existing weights and measures are of accidental and local origin, and that they do not form part of any comprehensive scheme.

That they show no special preference for any one scale, most of the series combining a decimal scale, with one of which four is the base; while such bases as three, &c., are not uncommon.

That certain terms, such as the hâth, the bigah, and the ser, are of pretty general use; and that the two latter are each terms in a series which is tolerably constant in the relations of its members.

That, however, each of these three quantities is indefinitely variable in its absolute value, differing not only in different districts and different pergunnahs of the same district, but (in the case of the hâth and ser) in different bazars, and (in the same bazar) in dealings with different kinds of articles.

That in two important departments—cubical measure whether dry or liquid, and linear measure above the hâth—no system prevails whatever.

That cubical measure is always based upon weight, but that weight bears no relation to linear measure.

That, in fact, the hâth and the seer are the recognised units of measure and weight respectively, all others being either expressible in terms of, or forced into relation with, one or other of these two.

That while a spirit of stolid passive opposition may be expected to be evoked by any attempt to change the methods of weighing and measuring, there is no reason to suppose that a sweeping change would meet with more opposition than a slight one.

That the tolah or rupee weight is an arbitrary quantity as regards the ser; and that therefore there is no absolute connection between the monetary and the ponderary systems of the country, the seer of 80 tolahs not having been by any means generally adopted.

That there exists an infinity of local usages, which must be injurious to commerce and prejudicial to the buyer.

12. We now proceed to consider the suggestions that have hitherto been made for dealing with this subject,—all of which are contained in the series of papers collected by the Home Office, with which the Committee has been supplied by Government.

13. The Governor of Bombay, Sir Robert Grant, appears to attach considerable weight to Captain Jervis's plan of fixing the length of the hâth by reference to that of the seconds pendulum, though he thinks that it would be more practicable to declare the hâth equal to half the English yard, which bears a fixed relation to the pendulum, than to fix it independently. The ser, he thinks, might be declared equal to the English pound, "and, on these bases, an entire system of weights

Minute, dated 12th  
June 1837, Papers,  
pp. 81-83.



weights and measures for India might be framed." He also proposes (paragraph 17) to make the rupee a basis of weight; while in paragraph 13 he deprecates violent interference with existing weights and measures.

14. These observations do not appear to the Committee to be consistent with one another. Any alteration must be an interference with existing weights and measures, which display as little system and as much variation in Bombay as here; while the two systems suggested, that based on the English pound and that based on the rupee or tolah, cannot be made to fit into one another. As we shall show hereafter, the question is as unsettled in England as it is here, while public opinion tends there strongly towards the metric system, which is already legalized; and if we adopt English weights and measures in their present unsettled state, we may very probably find ourselves deserted by England herself with a system which has no single advantage to compensate for the inevitable drawbacks of change. The advantage of the English system is considered by Sir R. Grant, writing in 1837, to consist in the fact that the standard of that system being given in terms of the length of the seconds pendulum,\* it was a natural and recoverable standard. But this, as a matter of fact, is no longer the case. On the burning of the Houses of Parliament the old standard yard was destroyed and a new one constructed, "not," says Sir J. Herschel,† "by any measurement of the length of the pendulum (for in the 10 years elapsed since 1826 very grave doubts had been raised, or rather very serious sources of error pointed out, in the processes used for the purpose on the former occasion), but by an assemblage and most careful comparison of all the scales and standards of any authority which could be got together. The Act, moreover (of 1855), which constituted that one our legal yard, and named the others in a certain order as its successors, in the event of its destruction or loss, omitted the clause identifying its length with any numerical multiple of the pendulum. In fact, then, our yard is a purely individual material object, multiplied and perpetuated by careful copying, and from which all reference to a natural origin is studiously excluded, as much as if it had dropped from the clouds." The supposed advantage, therefore, in adopting the English yard, from the possibility of recovery in case of the loss of the standard by scientific process, is illusory; and men of science are, we believe, now generally agreed that the pendulum cannot form the basis of a really scientific standard. If the pendulum varied only with the latitude and height of the station above the sea level, it would be easy to find a law by which we might ascertain the length of a normal or ideal pendulum, swinging seconds at the pole; but this is rendered impossible "by reason of the local deviations of the intensity of gravity due to the nature of the soil, and the configuration of the ground immediately beneath and round the places of observation;" and the length can only be obtained *approximately* by a complicated astronomical calculation, having the length of the earth's diameter (pre-supposing the knowledge of the length of the metre) as one of its elements. The pendulum is, therefore, in Sir J. Herschel's opinion, "unfit to be received as the ultimate scientific basis of a universal standard;" and this applies both to the approximation suggested by the Governor of Bombay, and to any independent attempt to regulate Indian measures of length by the pendulum.

Herschel, p. 13.

Papers, &c. pp. 86-92, dated 29th July 1839.

15. The next document of importance in the order of time, bearing upon our subject, is the Report of a Committee on Weights and Measures in the Madras Presidency. The recommendations of this Committee are based upon purely local considerations (indeed much breadth of view could hardly have been expected on this subject in 1839). It is sufficient to observe that they deal only with measures of capacity and with weights; that they ignore the tolah or Indian Government system (which cannot be made to fit into their scheme); that the two scales have no sort of connection with one another; and that the nomenclature and relations of their terms are strictly local. In 1841 the scale of weights was again corrected to introduce the tolah, which was done by making the pollam

\* The English Act of 1824 declared that the standard yard consists of 36 inches of such length that 39·13029 of them are equal to the length of a pendulum vibrating seconds *in vacuo* and at the sea-level in the latitude of London. It may be observed that this definition is not precise, as a rigorous definition requires not merely the latitude, but the latitude and longitude of London, *i.e.*, London itself.

† The yard, the pendulum, and the metre, p. 11.

pollam or lowest term equal to 3 tolahs or 1 oz. 2·5 dwt. Even after this modification, it is clear that we, as a committee sitting in Bengal, are not called upon to criticise a system whose sole advantage is admitted to be that it differs very little from the system which was found in actual use at Madras. We must advocate either a Bengal or an Imperial system, and the Madras system has no claim for consideration out of that presidency. We may note, in passing, that the Madras Chamber of Commerce, even at that early period, expressed an opinion that a uniform scale, passed upon the decimal principle, would be the simplest, as well as the most useful, which could be adopted,—though the committee, while recording their dissent from this opinion as a practical solution of the question, do not appear to have thought it worth a serious refutation.

16. The Madras scheme having been modified, at the request of the Government of India, to introduce the tolah as a standard of weight, in accordance with the Bengal Regulation VII. of 1833, this appears to be a suitable place for remarking on the advantages and disadvantages of a system of weights founded on the tolah. The obvious advantages are the connection on the one side with English troy, and on the other side with the coinage, with which its connection is so direct, that the rupee, the eight-anna piece, the four-anna piece, can all be used as actual practical weights. The objections are—1st, that the connection with English weights is with troy not avoirdupois, *i. e.*, with the less used and the less useful of the two English systems; so that if the maund weighs 100 lbs. troy, it weighs 82·2857142857 lbs. avoirdupois, and, therefore, this connection is of little or no practical value; 2ndly, that there is no connection between this system and any system of measure,—and although it is easy to base a system of weight on one of measure, it would be next to impossible to work backwards and base cubical measure on weight, superficial measure on cubical, and linear measure on superficial; 3rdly, that the system has not proved of any practical advantage, as is shown by the facts which we have already brought forward regarding the diversity of weights obtaining. The seer of 80 rupees is of little use for petty shopkeepers, who seldom have that sum by them, and it has never been able to hold its own against the diversities of local sers sanctioned by immemorial usage in every village and bazar. Lastly, if the tolah is the universal unit of weight, and if the rupee be ever altered in value so as to become the 10th part of an English pound sterling, the whole system of weights would require modification; this is pointed out by Sir William Denison, in a Minute accompanying the letter of the Government of Fort St. George to Government of India, No. 834, dated 13th May 1863. We have no doubt that we shall be able to show, in the concluding portion of this report, that the advantages which the decimal system possesses are such as far to outweigh the advantages of a system in which the tolah is the unit of weight, and that the one advantage which it undeniably possesses in its connection with the coinage could be equally secured under the decimal system by a slight alteration in alloy so as to affect the weight without affecting the value of the rupee.

“As regards the 140,000 square miles contained in the Madras Presidency, not a single bazar man has altered his weights one grain, in consequence of the Calcutta Notification.” Bayley, para. 20.

17. One other proposition remains to be considered, that of Mr. W. H. Bayley, of the Madras Civil Service, in a pamphlet entitled—“Suggestions for a uniform System of Weights and Measures throughout India.” His scheme may be thus described in as few words as possible:—

(I.) There is no existing absolute unit of long measure in India; therefore adopt the English yard and foot, perhaps with decimal subdivisions.

(II.) For the same reason the English acre should be adopted with decimal subdivisions, as in the records of the British Ordnance Survey.

(III.) The best ser weight is one of 77½ tolahs, which is five grains short of 2 lbs. avoirdupois, which would give the advantage of a coinage equivalent, as well as that of a connection, with the English table of weight; the subdivision should be into sixteenths.

(IV.) The best ser measure is one exactly equivalent to an imperial quart, which would contain 80 tolahs of mixed grain, when struck (and heaped measure should not be permitted); and 97 tolahs of water at 84° Fahrenheit. The diameter should be to the depth as three to four; a sotee of 100 seers might be used, and an athee of the eighth of a seer.

18. This proposition is undoubtedly the most carefully considered that has been made, and it has several points of excellence; but the changes advocated

16.

B

are,

are, in our opinion, too great and too cumbrous to be adopted, except for exceedingly good reasons. It is a fallacy, as we have observed, to seek for a close approximate with English weights and measures, at a time when English weights and measures are on the brink of a tremendous change. When the rest of the world has adopted, or is about to adopt, the metre as its unit of length, it would be a retrograde step to adopt the English foot. Mr. Bayley himself admits that he would advocate a decimal system for England, and his opinion is shared in by almost every man of eminence, and by a large number of practical men: the days of the foot, acre, and pound are in all probability numbered. But this is a subject to which we shall revert. Again, Mr. Bayley's measure of capacity is based on his weight in an abstruse and cumbrous way, for his seer measure would contain neither a seer of water nor a seer of grain. In a natural system the measure of capacity would clearly be based on the linear measure. Lastly, his weight is neither true to the pound, nor to the tolah, nor to practical usage, though it ingeniously combines an approximation to all three.

19. The result to which our inquiries into propositions actually made for the establishment of uniform standards of weights and measures have led us may be summed up as follows:—

All these propositions involve a considerable change in the value and relations of the terms of weight and measure in use.

None of them in any degree simplify calculation.

The only foreign system to which any of them tend to approximate the Indian weights and measures is the English one, which is in an unsettled state, and will probably be superseded by the metrical.

They do not possess any scientific advantage, as referring to an ascertainable standard; nor do they possess the practical advantage of a clear and intelligible connection between weight and the various measures.

And we believe that the same disadvantages would accompany any system except the one we are about to propose.

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

21. The committee fully feel the importance and seriousness of the change they advocate. To abolish the use of weights and measures which have been customary in the country from the dawn of its civilisation—an era previous to authentic history; and that over so immense a tract of country, occupied by so many different races engaged in the greatest variety of occupations—to introduce a new and unknown nomenclature, alike into the most complicated mercantile transactions and into the simple details of domestic life,—to press change upon a people less addicted to change and more immutable in their customs and habits than any people that exists; this is not a task to be taken up lightly, nor should the proposition be made, without a full conviction that the advantages to be attained by it may considerably exceed the temporary, though perhaps inevitable, evils of change. We therefore feel that we require no excuse for stating at length the grounds of our conviction.

22. The basis of the metric system is the metre, the unit of length. This was supposed to be one ten-millionth part of the quadrant of the meridian between the pole and the equator, according to a measurement made by MM. Mechain and Delambre in the last decade of the eighteenth century. A slight error has been discovered in their measurement of the meridian; and the true length has not to this day been ascertained with precision. Indeed, recent scientific observations have demonstrated the fact that there exist irregularities in the earth's form which were not previously suspected, and that the equator is not an exact circle, from which it will follow that the length of the meridian varies in different longitudes. On these grounds an objection has been made to the use of the metre; but it appears evident that there is no reason, in the nature of things

things, why the unit of measurement should bear a fixed proportion to the size of the earth or to any other cosmical property, It is enough if the unit be distinctly fixed and easily recoverable; two qualities which the metre without doubt possesses.

23. The system may be simply described thus—taking the metre as unit, the measures of length are the decametre (10 metres), hectometre (100 metres), kilometre (1,000 metres), myriametre (10,000 metres) upwards; in all which it will be observed that the prefix is derived from the Greek. Downwards we get the decimetre (1-10th of a metre), centimetre (1-100th), and millimetre (1-1000th), with prefixes derived from the Latin. For superficial measure the squares of the metre, &c., are used, and the square of a decametre forms a unit, which is called the *are*, and which contains 100 square metres. One hundred square ares form the hectare. The cube of the decimetre or 1-10th of a metre gives the litre, or unit of cubical measure; the multiples and sub-multiples of which are framed on the same principle. The cube of the centimetre or hundredth part of a metre of distilled water at its maximum of density, that is, at a temperature of 4° of the centigrade thermometer, equivalent to 39·2° Fahrenheit, forms the gramme or unit of weight; the multiples of which are the dekagramme, hectogramme, and kelogramme, and the subdivisions are the decigramme, centigramme, and miligramme. Finally, the French coinage is regulated by the decimal system, and its unit, the silver franc, weighs five grammes.

24. Now it is obvious, in the first instance, that the system is extremely easy to learn, and could be mastered by a school-boy in a few lessons; and in the second instance that it simplifies calculation to a wonderful degree. Take an amount such as three maunds five seers and eight chittacks; to express such an amount in terms of maunds, seers, and chittacks respectively would require three separate and complicated sums. If the amount consisted of three kilogrammes, five hectogrammes, six decagrammes, and seven grammes, it might be expressed in terms of either quantity by a mere shifting of the decimal point, thus—

$$\begin{aligned} & 3\cdot567 \text{ kilogrammes.} \\ = & 35\cdot67 \text{ hectogrammes.} \\ = & 356\cdot7 \text{ decagrammes.} \\ = & 3567 \text{ grammes.} \end{aligned}$$

And in the more complicated operations of trade the value of a simple notation becomes still more evident. To find the price of 36 yards 3 feet 9 inches, at one and three pence half-penny a yard, requires time even to the most expert; and expertness implies both time and trouble in education. To find the price of three dekametres, five metres, nine decimetres, at 11 francs 72 cents a metre, requires merely simple multiplication and the management of the decimal point, thus—

$$\begin{array}{r} 35\cdot9 \\ 11\cdot72 \\ \hline \phantom{35}\cdot718 \\ 25\cdot13 \\ 35\cdot9 \\ 359 \\ \hline 420\cdot748 \end{array}$$

*i. e.*, 420 francs, 74 cents, and 4-5ths.

25. On this point, the evidence taken by Mr. Ewart's Committee of 1862, is conclusive; and we quote two paragraphs from the Report, proving—First, the immense educational advantage of the decimal system; and, secondly, the saving of labour in mercantile establishments.

“ Economy of time in education is one of the beneficial results of the metric system; while the study of English weights and measures is laborious and repulsive to both teacher and pupil, anyone can easily master the metric system. ‘Comparing the English system of calculation with the decimal,’ says M. Lor-

sont, 'I think the difficulty of the English system is as great as it would be to make a calculation in the old Roman figures.' The metric system is soon learnt; 'any person,' says Mr. Fellows, 'in a quarter or in half an hour would be able to master the whole metric system.' The time which the use of a decimal system would save in education has been generally stated (on the authority of schoolmasters) to be at least a year. Mr. Mumford, late certificated master of the British School at Highgate, describes the readiness and interest with which children have acquired it. Dr. Ihne, of the University of Bonn, conductor of a large school at Liverpool, finds his pupils, 'especially foreign boys, repelled and annoyed' by the English system of weights and measures, and his teachers also; he states that it appears to require considerably more time to learn, so that a boy is prevented from ever attaining the higher position of knowledge, which he might otherwise reach, by this preliminary barrier of arithmetic. 'The waste of time,' says the Reverend Alfred Barrett (a clergyman extensively engaged in education), 'to junior pupils in learning the tables of weights and measures is immense.' He describes the work of education in the French military academies as 'much higher, and more forward than ours,' and traces the cause to the time of juvenile pupils being lost in their wanderings through the mazes of our arithmetical system. That eminent mathematician, Professor De Morgan, thinks that 'the whole time devoted to arithmetical education might, by adopting the decimal system, be reduced by one-half, or probably more.' 'Its adoption,' says Dr. Farr (Superintendent of the Statistical Department in the General Register Office), 'would get rid of all compound rules of arithmetic; it would make calculations simple and mechanical. Decimal logarithms are calculated and printed by machinery; with the vulgar fractions of our common arithmetic this could not be done.' Your Committee examined, on this part of the subject, more than one working man. There is abundant testimony to the ease with which working men acquire the metric system. Mr. Dickson, already referred to, says, 'In the works I carry on (at Dunkirk), I employ about 1,000 persons. I have had frequently a great many overseers from Scotland; they come not knowing the French language, far less the weights and measures or the money, but they very soon get acquainted with the metric system.' Mr. Richard Wyse has been in the employment of Mr. Brassey as a mechanic 25 years; he has been engaged on railways in France, Belgium, and Savoy. He states that he very soon understood the metric scale, and found it much easier to comprehend than the English scale of yards, feet and inches. 'The English workmen,' he says, 'get the weights very quickly!' He is asked, 'How long do you think it would take them?' His answer is, 'A fortnight, or a month at farthest. All the workmen I ever had anything to do with prefer the French method to the English.'

"A saving of labour is effected by the use of the metric system in mercantile establishments. Mr. Dickson, a witness already cited, says, that 'under the metric system' (which he considers 'one of the greatest blessings ever conferred on France') he can carry on his trade with fewer clerks than he could under the English system. M. Lorsche, a merchant and manufacturer in Belgium, France, and England, says that 'if the metric system existed in England, he could conduct his business with a considerably diminished number of clerks, and prevent a great deal of error. An English office is made up of ready reckoners and *vade mecums*, things utterly unknown abroad.' 'Under the metric system,' he adds, 'it is much easier and shorter to make the calculations yourself.' The evidence of Mr. Bass, M. P., tends to the same result."

26. In connection with this subject, we may remark that the introduction of the metric system in this country to Government Offices of Account, the Commissariat, &c., would enormously reduce the amount of calculations, and consequently the cost of establishments.

27. In regard to operations of a more scientific character, we may quote from the Report of a Committee of the British Association in 1864, the following statements:—

"The English workmen engaged in building trades, such as carpenters, masons and bricklayers, Professor Donaldson considers to be generally very intelligent; and whatever would afford to them facility in calculation would be acceptable as soon as it had been explained to them.

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“ In railway operations, a civil engineer ascertains weight by computation of measure ; he cannot take scales and beams, and weigh pieces of iron of 20 tons and upwards ; he knows the specific gravity of the iron, and he ascertains by the measurement the weight of a given quantity of that metal. The metric system aids in all calculations relating to specific gravity.”

Mr. W. Crossley, c. e., stated to the Committee of the House of Commons on weights and measures, that he believes the decimal system is extending itself very much, especially for scientific purposes ; and amongst professional men “ it is extending itself among them very considerably, without any law whatever.”

Chemists, pursuing important researches, employ generally metric weights and measures. Thus, in the Royal Institution of Great Britain, in Albemarle-street, the operations of the laboratory are carried on with the aid of the metric system ; and Dr. Frankland, one of the chemists of that society, finds the metric weights and measures particularly valuable in his experimental investigations respecting gases. The gramme, with its multiples and minute subdivisions, is a popular weight with chemists.

In the practical business of a druggist the metric system of weights and measures, if generally adopted, would, in the opinion of Mr. Squire, save a great deal of labour to the rising generation. In the metric system, Mr. Squire observes, as the divisions and multiplications are all by ten, the subject and the calculations would be much simplified.\*

A meeting, held in June 1863, of the Pharmaceutical Society of Great Britain, adopted a petition to the House of Commons, in which they recommend an assimilation of the weights and measures of all nations as likely “ to tend greatly to the convenience of pharmacutists † and the safety of the public.”

The Pharmaceutical Society of Great Britain felt assured that a “ very few years would familiarise both prescribers and dispensers with the new weights and measures, and that the easy multiplications or division of them by the decimal system, universally applied, would afford such facilities of computation as to recommend it strongly to the adoption of medical men and chemists ; and they are strengthened in this opinion by the invariable practice of English and all other analytical chemists already to state the results of investigations in decimals.”

28. Such being the advantages offered by the metrical system, it is not surprising that many nations have already availed themselves of that system. It was made compulsory in France in 1840 ; and has since been adopted by Italy, Spain, Portugal, Belgium, and Holland. It has been partially adopted in Austria and Switzerland ; and the Zollverein have declared their assent to the principle. The Imperial Academy of Sciences in St. Petersburg have recommended its adoption in Russia, which is only waiting for England to take the lead. In 1862, 40 per cent. of the total tonnage of Great Britain was carried to or from countries using the kilogramme. Turning to America, Mexico, Chili, Peru, New Granada, Bolivia, Venezuela, and French and Dutch Guiana have adopted the metrical system, and the United States have (according to accounts which have reached us since the commencement of this Report) permitted its introduction into any State desiring it.

29. It thus appears that, for purposes of international trade, the use of the metric system in India would be desirable on many grounds, even if it were not likely to be adopted in England. The probability of such adoption increases its desirability by an immense ratio. That probability may, we think, be fairly assumed from the two reports already quoted. In 1862 a Committee of the House of Commons, under the presidency of Mr. Ewart, and containing Messrs. Hume, Cobden, Adderley, and others, most strongly recommended the introduction of the metric system. In 1861 the Associated Chambers of Commerce of the United Kingdom, resolved unanimously, that “ it is highly desirable to adopt the metric system, which has been introduced into many European countries with great advantage to the saving of time in trading and other accounts.” In 1864 the Committee of the British Association, from a scientific point of view, recommended its adoption. In that year it was legalised by 27 & 28 of Vict.

c. 117.

\* Pharmaceutical Journal, July 1863, p. 8.

† Ibid, p. 9.

c. 117. But it had previously been adopted in many scientific professions, and by many machine-makers, &c., by the Registrar General, and in the Statistical Department of the Board of Trade.

30. The advantages, then, of the metrical system may be thus summed up:— It is a complete, clear, and simple system, connecting weight with measure, and money with weight, by simple and intelligible relations. It is easy to learn, and it simplifies the labour of calculation (especially when combined with a decimal coinage) to an extraordinary degree. It has been adopted by nearly half of the civilized world, and will probably be soon adopted, at all events in commercial and international transactions, by England; and its adoption here would do more than anything could do to bring India into relation with the higher civilization of Europe. To anticipate the arguments which will probably be urged on the other side (for as yet the question has never been put before the public), it may be said that a decimal system is not suited to the people of India, who prefer counting by fours and sixteens; that the change is too vast and sudden; that the people will never give up their old weights and measures; that the names of the various measures and weights are not suitable to India; that the adoption of the system would involve an immense expenditure in standard measures and weights and in verification offices; and that the change to a decimal coinage, which is admitted to be necessary in order to secure completely the advantages of the system, is impracticable in this country. These are all the objections with which we are required to deal, for the argument that the metrical system is not based upon a sound and ascertained scientific basis is not likely to be brought in this country, and has been already disposed of; and the argument that an English Government ought not to support a French system may be left to itself.

31. It is quite true that the native of this country has a tendency to group things into four, or to divide things by four, and there is something captivating and symmetrical in the arrangement. Sixteen is better divided than 10; but there is this great objection to the quaternary system, that it has no suitable notation. The decimal notation, which was, it is believed, invented in this country, is always used for expressing mere numbers; so that, in the most universal idea of all, the idea of abstract quantity, the people are familiarised with that notation. If a native has occasion to write *Rs. 3,425. 8. 3.*, he uses the decimal notation to express the number of rupees, though not to express the fractions of a rupee. Again, if the division into fourths and sixteenths was universal, something might be said for retaining it; but all that can be shown is that there is a tendency to use it in fractionizing certain units, such as the seer and rupee, though the division by four is often missing or mixed up in the same series with other divisions.

32. It may be said that, even if the decimal system were adopted, the bases should be such as to correspond with recognised Indian standards. Considering the uncertain and changeable character of the best known measures and weights, that their differences are to be counted up by hundreds, that the hath fluctuates in one district from 18 to 33 inches, the gaj in another district from 19 to 82 inches, that a bigah means in one place 400 square feet, and a 100 miles away 14,000 square feet, that the ser may weigh 10 ounces or four pounds,—considering, in short, that there are no universal fixed standards in India, and that, if we fix the measure of one district as the standard for all, the prejudices of the other 99 districts would be as much shocked as if we chose an entirely new standard, we have come to the conclusion that it would be most advantageous to use the experience of other countries, and adopt the standards which are ready made to our hands. Moreover, one strong argument for the decimal system is the facility offered to international trade, which, it is obvious, requires not merely a decimal system, but *the* system which prevails elsewhere.

33. The greatness of the change, coupled with the incapacity for change of the people of India, is an argument against change at all; for nothing but a sweeping reform would meet the evil. It is clear that anything is better than the confusion and uncertainty which now prevail, and the change we propose has the advantage of being a final one. We deprecate hurry; we would put the system before the people in many ways; we would recommend its adoption in  
government.

government offices, and by the railways; or wherever, in fact, the orders or influence of government could avail; we would teach it in schools, and let a generation of young men grow up thoroughly versed in the system; we would make the verification of weights and measures as simple, as public, and as inexpensive as possible; and at the end of 18 or 20, or even 25 years, we would prohibit the use of all other weights and measures. That the change is a vast one, and that the people dislike change, is a reason why it should be made with circumspection, not a reason why it should not be made.

34. As to the names of weights and measures, it is not clear to the committee that the French names are in any way objectionable otherwise than as new. With a slight change in the termination of some, they would run well in Bengali as গ্রাম, কিলোগ্রাম, আৰ, হেক্টাৰ, মেণ্ডা, ডাশিমেন্ডা, লিহা, ডেকালিহা, or in Urdu as گرام کلگرام آر هيكتار ميتره ڈسميتره لثره ڈيكالثره and the significance of the prefixes would be appreciated at all events by the better educated class of the population. But in order to familiarise the public more rapidly with the new weights and measures, it might be advisable to allow the alternative use of some of the old names for the weights and measures to which they approach nearest. Thus the metre might be called the gaj; the demi-metre, or five decimetres, the háth; and in weights again, the kilogramme might be called *ser*; the hectogramme, chittack; and the dekagramme, tolah. The gramme might be called dahim, a word pretty generally understood to mean a tenth.

35. Lastly, we may observe that a decimal system of weights and measures does not necessarily imply a decimal coinage, although the latter is indispensable for procuring the *maximum* of advantage from the former. As this matter must be determined separately, and from a professional point of view, we can merely suggest how, in our opinion, the change may be carried out. We have then two propositions to make, which may be taken either together or separately:—1st. Alteration of the weight of the rupee. The rupee weighs 11·3508 grammes; by an addition of 1·1492 grammes, or about ·0908 of its weight (in alloy so as not to increase its actual value\*), it would weigh 12·25 grammes, or exactly the 80th part of the kilogramme or new seer, which would give ample connection with the currency and enable rupees to be used, as they are now occasionally used, for weights. 2nd. Decimalization. All we want is a gold coin representing 10 rupees, and a cent or pie (copper) representing  $\frac{1}{100}$  of a rupee; the four-anna piece of 25 cents, and the eight-anna piece of 50 cents, should be kept in circulation; while the two-anna piece of 12½ cents might be thrown out or replaced by a silver "dahim" of 10 cents. It is to be remembered that, by increasing the alloy, the size of the silver pieces would be increased by one-tenth and one-fifth, so that such a dahim would be very little smaller than the actual two-anna piece.

36. We close our report with a series of practical propositions, the adoption of which will, we are convinced, tend to bring about the uniformity which has been so long desired, and to facilitate every branch of trade and commerce, both internal and foreign.

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\* With regard to the proposition to alter the alloy, we quote as follows from M. Herve's *Manual des Alliages*. Encycl. Roret:—"Ces deux métaux s'allient avec beaucoup de facilité et en toutes proportions. Ce composé est plus dur, plus élastique, plus sonore et presque aussi tenace que l'argent; il conserve la couleur blanche, selon quelques chimistes, lors même que le cuivre y entre pour plus de moitié suivant M. Berzélius, parties égales de cuivre et d'argent donnent déjà un alliage jaune, semblable au lait. Toujours est il que l'addition d'une trop grande quantité de cuivre rend l'argent rougeâtre; mais le couleur de ces alliages n'est jamais aussi belle que celle de l'argent pur, lors même qu'ils n'en contiennent que quelques centièmes de cuivre. Mais l'alliage reste ductile, quelle que soit la quantité réciproque des deux métaux, seulement il l'est plus ou moins, selon les proportions de ceux-ci.

La dureté de cet alliage est au maximum, d'après M. Thomson lorsque la proportion du cuivre s'élève à 1·5.

Pour la fabrication de la monnaie. M. Hatchett considère un alliage de parties égales d'argent et de cuivre comme celui qui convient le mieux, et le cuivre seul comme préférable à l'argent seul."

How variable the alloys used for coinage are, may be seen from the following Table:—

	Copper per cent.		Copper per cent.
England	- - - 7·5	Portugal	- - - 11
Holland	- - - 8	Denmark	- - - 12
France	- - - 9	Switzerland	- - - 21
Austria	- - - 9·5	Russia	- - - 24
Sardinia	- - - 9·5	Hamburgh	- - - 50
Spain	- - - 10·5 to 15·5		



1st. A short law should at once be passed, similar to the English Act, which will be found in our Appendix, legalising the use of the metric system in all kinds of transactions.

2ndly. Application should at once be made to the Bureau du Ministère de l'Intérieur at Paris, through the authorised channels, for a complete set of carefully verified weights and measures.

3rdly. A permanent committee should be appointed, with a paid secretary, to carry out the measures determined upon, to draw up tables, keep and verify standards, superintend inspectors, and take measures for increasing the use and improving the knowledge of the system among the people. The committee should include at least one member nominated by the Chamber of Commerce, one nominated by the British Indian Association, one of the management of the East Indian Railway, the Surveyor General, the Mint Master, one officer representing the Financial Department, and one representing the Educational Department, with others; and, for the first season at all events, should include a member nominated by each of the Presidencies of Bombay and Madras (who might be the representatives of those Presidencies in the Legislative Council). It should be under the orders of the Government of India, in the Home Department, to which all Reports should be made.

4thly. Government should, as early as possible, introduce the system into the Public Works Department, the Customs, the Commissariat, the Account Departments, the Survey and all other departments; and the railways should be earnestly requested to pursue the same plan.

5thly. Offices of verification should be established in every district and large town, and supplied with standard weights and measures bearing the stamp of the permanent committee.

6thly. Tables should be prepared and widely circulated, showing the metric expressions for the ser of 80 tolahs and its multiples and subdivisions, and so for bigahs, &c.

7thly. The metrical system should be taught in all Government and aided schools,\* and a knowledge of it should be required at the entrance examinations in the universities, and from all candidates for public employment.

\*We have a collection of French Educational Works on the subject.

We have, &c.  
(signed) *J. E. Gastrell*, President.  
(a)  
*J. Geoghegan.*  
*H. F. Blanford.*  
*Digumber Mittfr.*  
*W. L. Heeley*, Secretary.

## APPENDIX.

### CAP. CXVII.

#### *An Act to render Permissive the use of the Metric System of Weights and Measures.*

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 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.

3. The

(a) Mr. Sandeman has expressed his concurrence in this Report, but is unable to sign it owing to absence from India.

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 of the metric system.

Equivalents of metric weights and measures in terms of weights and measures.

## 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.	Inches.	Decimals.
Myriametre - - - -	10,000	6	376	-	11.9	
		or -	10,936	-	11.9	
Kilometre - - - -	1,000	-	1,093	1	10.79	
Hectometre - - - -	100	-	109	1	1.079	
Dekametre - - - -	10	-	10	2	9.7079	
Metre - - - -	1	-	1	-	3.3708	
Decimetre - - - -	$\frac{1}{10}$	-	-	-	3.9371	
Centimetre - - - -	$\frac{1}{100}$	-	-	-	0.3937	
Millimetre - - - -	$\frac{1}{1000}$	-	-	-	0.0394	

## MEASURE OF SURFACE.

Metric Denominations and Values.		Equivalents in British Denominations.	
	Square Metres.	Acres.	Sq. Yards. Decimals.
Hectare, <i>i. e.</i> , 100 ares - -	10,000	2	2280.3326
		or -	11960.3326
Dekare „ 10 ares - -	1,000	-	1196.0333
Are - - - -	100	-	119.6033
Centiare, <i>i. e.</i> , $\frac{1}{100}$ are - -	1	-	1.1960

## MEASURES OF CAPACITY.

Metric Denominations and Values.		Equivalents in British Denominations.					
	Cubic Metres.	Qtrs.	Bhls.	Pecks.	Gals.	Quarts.	Pts. Decs.
Kilolitre, <i>i. e.</i> , 1,000 litres - -	1	3	3	2	-	-	0.77
Hectolitre „ 100 litres - -	$\frac{1}{10}$	-	2	3	-	-	0.077
Dekalitre „ 10 litres - -	$\frac{1}{100}$	-	-	1	-	-	1.6077
Litre - - - -	$\frac{1}{1000}$	-	-	-	-	-	1.76077
Decilitre, <i>i. e.</i> , $\frac{1}{10}$ litre - -	$\frac{1}{10000}$	-	-	-	-	-	0.176077
Centilitre „ $\frac{1}{100}$ litre - -	$\frac{1}{100000}$	-	-	-	-	-	0.0176077

## WEIGHTS.

Metric Denominations and Values.		Equivalents in British Denominations.				
	Grams.	Cwt.	Stones.	Pounds.	Ozs.	Drams. Decimals.
Millier - - - - -	1,000,000	19	5	6	9	15.034
Quintal - - - - -	100,000	1	7	10	7	6.304
Myriagram - - - - -	10,000	-	1	8	-	11.8304
Kilogram - - - - -	1,000	{	-	2	3	4.3830
			(or 15432.3487 grains.)			
Hectogram - - - - -	100	-	-	-	3	8.4383
Dekagram - - - - -	10	-	-	-	-	5.6438
Gram - - - - -	1	-	-	-	-	0.56438
Decigram - - - - -	$\frac{1}{10}$	-	-	-	-	0.056438
Centigram - - - - -	$\frac{1}{100}$	-	-	-	-	0.0056438
Milligram - - - - -	$\frac{1}{1000}$	-	-	-	-	0.00056438

— No. 4. —

HOME DEPARTMENT.—Public.—No. 126 of 1867.

To the Right Honourable Sir *Stafford H. Northcote*, Bart.,  
Secretary of State for India.

Sir,

Simla, 11 July 1867.

REFERRING to the Despatches noted on the margin, on the subject of reforming the system of weights and measures in India, we transmit herewith for your information a copy of our Resolution No. 1728, dated the 25th ultimo, together with copies of the reports of the local governments and administrations, and other papers cited at the commencement thereof.

From Secretary of State, No. 29, dated 9th March 1864.  
To " " " 46, " 29th July 1864.  
From " " " 1, " 7th January 1865.

2. For the consideration of the various proposals made in the reports of the local governments and administrations, and the preparation of a well-digested scheme of weights and measures which shall be applicable to all India, together with a draft Bill on the subject, we have appointed a central committee, which will meet in Calcutta on the 15th November 1867. This committee, of which Colonel R. Strachey, R.E., will be president, has, you will observe, been so constituted as to represent the interests and opinions of the official, mercantile, and native communities of the three Presidencies. The committee will report within three months from the date of assembling, and on receipt of its report, the instructions communicated in the second paragraph of Sir Charles Wood's Despatch of the 7th January 1865, No. 1, will be duly carried out.

We have, &amp;c.

(signed) *John Lawrence.*  
*W. Mansfield.*  
*H. S. Maine.*  
*G. N. Taylor.*  
*W. N. Massey.*  
*H. M. Durand.*  
*G. U. Yule.*

— No. 5. —

(No. 1728.)

EXTRACT from the PROCEEDINGS of the Government of India in the Home Department, under date Simla, 25th June 1867.

READ again the Resolution of the Home Department, Nos. 3835-3840, dated 20th June 1864, and the papers referred to therein, on the subject of reforming the system of weights and measures in India.

Read also the following correspondence with the Secretary of State :—

To the Secretary of State, No. 46, dated 29th July 1864.  
From                   "                   "                   1, dated 7th January 1865.

Read the following reports having reference to the Resolution of 20th June 1864 :—

From the Government of Madras, No. 2334, dated 27th September 1865, 1 enclosure.  
"                   "                   Bombay   "   2008, dated 4th November 1865.  
"                   "                   "                   "   609, dated 24th March 1866.  
"                   "                   Bengal   "   1673 T., dated 23rd August 1866.  
"                   "                   "                   "   87, dated 4th January 1867.  
"                   "                   North Western Provinces, No. 3380A., dated 27th Oct. 1864.  
"                   "                   Punjab, No. 2310, dated 20th November 1866.  
From the Chief Commissioner, Oudh, No. 3080, dated 3rd September 1866.  
From the Chief Commissioner, Central Provinces, No. 358-4278, dated 27th Nov. 1865.  
From the Chief Commissioner, British Burmah, No. 294-2003, dated 13th Sept. 1866.  
From the Commissioner, Mysore, No. 4420-50, dated 28th December 1865.  
From the Resident, Hyderabad, No. 29, dated 18th July 1866, 1 enclosure.

Read also the following papers :—

From the Financial Department, No. 1874, dated 9th August 1866, containing addresses delivered by Earl Fortescue, President of the International Decimal Association, and Sir John Bowring, Chairman of the Metric Committee of the British Association, on the subject of metric weights and measures.

Memorandum by the Honourable Mr. Shaw Stewart, dated 7th February 1867, submitting a draft Bill.

#### REMARKS.

ON the 13th May 1863, the Government of Madras drew attention to the importance of steps being taken for a reform of the various systems of weights and measures in use in British India, and suggested the appointment of a committee, consisting of properly qualified persons, one from each Presidency, to consider and report on the system which, in their opinion, it would be desirable to adopt for all India. "The Government," it was suggested, "would instruct the committee to limit their inquiries and suggestions to the substitution for the present numerous and contradictory scales of weights and measures, of such a simple form as would, while it reduced the alteration in the existing scales to a minimum, and disturbed the present nomenclature as little as possible, make the Indian system universal throughout British India, and place it in a simple relation with that now existing in England. Without a restriction of this nature," it was added, "the committee might enter on the very broad question of the theoretically best system, and the result might be the suggestion of a scheme which, however perfect in theory, would be attended with such disturbance of existing relations as to render its adoption impracticable. On the other hand, the Government would not confine the committee to any particular standard or unit of weight."

2. The Calcutta Trades Association also, on the 10th July 1863, addressed the Government of India on the same subject, and proposed that a mixed com-

mission should be appointed to inquire into the existing system of weights and measures, and to adjust the same to one Imperial standard, and that the revised system should be enforced by legislation.

3. The question of revising the Indian metrical system had engaged the attention of the Government of India at various periods since the year 1837, but the information available had always been found insufficient for a decision as to the scale which it was most expedient to adopt.

4. Accordingly, when the proposals of the Madras Government and the Calcutta Trades Association were laid before the Governor General in Council, his Excellency observed that a uniform system of weights and measures for all India would doubtless be of great advantage, but that the difficulties in the way of attaining so useful an object were grave and numerous. There was much to be done before a practicable scheme for general adoption could be discovered, and it was anticipated that, when discovered, it would be better introduced by indirect means than by penal legislation.

5. The mode of dealing with the subject which most recommended itself to His Excellency in Council, was to constitute a separate committee of well-selected persons for each presidency and province, each committee to consist of three or five members (for preference three, viz., a civil servant, a merchant, and an engineer officer), who should meet together in the chief city of such presidency or province, and deliberate on the subject, reporting the result of their labours to the local government or administration, for submission to the Government of India, with any further remarks which the local authorities might deem necessary.

6. For a central committee for all India, as proposed by the Madras Government, there was not at that time sufficient information available, and His Excellency in Council therefore believed that, as a preliminary measure at any rate, local committees would be more useful, besides being far less expensive.

7. In accordance with these views, a resolution was passed on the 20th June 1864, and was communicated to the local governments for information and guidance, together with a selection in a pamphlet form of all the more important portions of the correspondence on this subject which had, from time to time, been addressed to the Government of India.

8. The Secretary of State, on the 7th January 1865, approved of the decision of the Government of India, and observed as follows:—

“It is obvious that great care and circumspection will be required in dealing with a question so closely connected with the interests and habits of the people; and I have to request that I may be placed in full possession of the proposals of your government, together with the reports of the committees and the recommendations of the local governments, before any measures involving authoritative interference with the existing systems of weights and measures are brought into operation.”

9. The replies of the local governments and administrations, reporting the steps taken by them to carry out the views expressed by the Government of India in the resolution of the 20th June 1864, have now been all received, and the Governor General in Council has given his attentive consideration to the several proposals made therein.

10. These differ greatly in the modes which they propose to adopt, and His Excellency considers that the best method of arriving at any definite result will be to submit the entire question to the decision of a well-selected central committee to meet at Calcutta.

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Resolution.—The Governor General in Council is accordingly pleased to resolve that a committee be assembled at Calcutta on the 15th November 1867, constituted as follows :—

President :—COLONEL STRACHEY, R.E.

Members :

The Master of the Calcutta Mint for the time being.

The Comptroller General of Accounts, Mr. E. F. Harrison.

Two members to be nominated by the Chamber of Commerce at Calcutta.

A member of the Bengal Civil Service (Mr. R. B. Chapman).

A member of the Bombay Civil Service (the Honourable Mr. J. Shaw Stewart).

A member of the Madras Civil Service (to be nominated by the Madras Government).

Three native members to be appointed by the Government of Bengal.

2. Any gentlemen, natives of Bombay and Madras, who being in Calcutta may be recommended by their respective Governments and may be willing to serve on the committee.

3. The committee will have power to add to its members any gentlemen present in Calcutta, whose assistance they may desire to obtain, and who may be available for the duty and willing to undertake it.

4. The committee will submit its report within three months from the date of assembling. A selection of the correspondence which has passed will be sent to each member when nominated.

5. It will be sufficient instruction to the committee to accept generally the views of the Government of Madras expressed in their letter of the 13th May 1863, and already quoted above. Although the Governor General in Council does not wish entirely to preclude the committee from examining what may be theoretically the best system of weights and measures, His Excellency desires that they may be guided in their selection of any system rather by considerations of its practical convenience for adoption in India generally, and its capability of being placed in easy relation with that now existing in England. Nor does the Governor General in Council consider it expedient that the committee should narrow their inquiries by the arbitrary adoption of any particular standard unit from any existing system of measurement or weight.

6. The entire correspondence which has passed on this subject, and the reports of the local committees, will be laid before the general committee, and the Governor General in Council trusts that these materials will enable them to construct such a system of weights and measures as will give general satisfaction, and to submit a bill for giving effect to their recommendation which the legislature may be able to adopt without objection.

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Copy forwarded to the Government of Bombay.

Copies forwarded also to the Governments of Madras and Bengal, with the request that the services of a qualified civil servant may be nominated from the former Presidency, and that the Lieutenant-Governor of Bengal will be good enough to lend the services of Mr. R. B. Chapman, and to nominate three selected native members to sit on the committee, including, if available in Calcutta, a member of the up-country mercantile body and of the Parsee community.

Copy forwarded also to the Secretary to the Chamber of Commerce, with a request that the Chamber will be good enough to nominate two gentlemen of experience willing to sit on the committee.

Copy forwarded also to the Department of Public Works and Financial Department, with the request that the services of Colonel Strachey, of Mr. E. F. Harrison, and of the Mint Master of Calcutta, may be made available for the duty in question.

Copy of the resolution, with a selection of the correspondence referred to, forwarded to the President of the Committee and to each of the members already appointed; copies to be forwarded hereafter to the other members as they are appointed.

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— No. 6. —

M A D R A S.

From *W. Hudleston, Esq.*, Acting Secretary to the Government of Fort St. George, to *E. C. Bayley, Esq.*, Secretary to the Government of India.—  
(No. 2334); dated 27th September 1865.

REFERRING to the extract proceedings of the Right Honourable the Governor General in Council, dated 20th June 1864, No. 3835, on the proposed reform of the weights and measures of the country, I am directed to forward, for his Excellency's consideration, the accompanying Report of the Committee appointed in this Presidency to consider the subject, together with the minutes recorded by the members of this Government on perusal of the report.

2. I am to add that Mr. Tolputt, late Chairman of the Chamber of Commerce, was appointed a member of the Committee, with the Mint Master, Colonel Carpendale, R.E., and Mr. Sim, the Revenue Secretary to Government, but that gentleman quitted India before the report was sent in.

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— No. 7. —

REPORT by the Committee for Weights and Measures, to the Secretary to the Government of Fort St. George; dated— April 1865.

WE have the honour to submit our views on the subject of remodelling the weights and measures of this Presidency, which duty was assigned to us in General Order dated 7th September last.

2. After much consideration we have come to the conclusion that the system proposed by Mr. W. H. Bayley in 1857, though it be not scientifically the most perfect, is practically the best in the present circumstances of this Presidency; and, with one modification, we recommend its adoption, as promising the greatest advantages, and causing the least inconvenience to the people.

3. As regards weights, we considered it advisable to ascertain the opinions of several gentlemen as to the expediency of retaining the tola or rupee of 180 grains troy as the unit of weight. The majority of the gentlemen whom we consulted are, as will be seen from their replies herewith submitted, in favour of abandoning the tola of 180 grains as the unit of weight, and of assimilating the weights of India to the avoirdupois weights of England. In these opinions we entirely concur.

4. If the tola of 180 grains be retained, it is impossible to assimilate the weights of India to those of England, which we consider a matter of the first importance. There is, no doubt, a certain degree of convenience and advantage in having weights which correspond with current coins, within such limits as admit of the former being tested by the latter; but for this purpose exact correspondence is not necessary, new coins are not always procurable, nor even with them can exact accuracy be attained. Practically, we believe that the test by coin is rarely restored to, and there are very cogent objections to basing the weights of a country on its currency, when that currency is liable to change, and open to improvement.

5. The English avoirdupois pound, which there is little doubt will be retained for many years to come, whatever changes may be made in its multiples and sub-multiples, contains 7,000 grains troy, and a fortieth part of it would give a  
tola

tola of 175 grains, being only five grains less than the present rupee, a difference too small to vitiate the test by coins worn by use, as these average only 178 grains. The only advantages of having weights corresponding with the currency would thus be attained within limits of accuracy sufficient for all practical purposes. Differing on this point from Mr. Bayley, we would make the total unit of weight, as distinguished from the tola of currency, equal to 175 grains; and starting with this, we would adopt Mr. Bayley's proposal of having a seer of 2 lbs. avoirdupois, sub-divided by sixteenths, with a maund of 100 lbs. and a candy of 2,000 lbs. as the higher denominations.

6. The present standard weights of the Madras Government do not recognise the "seer;" but there can be no doubt that, as observed by Mr. Bayley, it is very generally known throughout India, and that its most general equivalent is 80 tolas.

7. The binary scale is one with which the people of this country are most familiar; and as the facility of introducing any new system of weights depends very materially on the degree in which it adapts itself to the convenience, the usage, and education of the people in their ordinary transactions, it is desirable that the seer should be sub-divided on the binary principle. In large mercantile transactions, on the other hand, the decimal system is undoubtedly the most convenient; and as there is some probability of its being adopted in England, it would, we think, be well to make the maund and candy equal to 100 lbs. and 2,000 lbs. respectively, and thus escape the chance of another change being rendered necessary before long.

8. The following Table shows the different weights which we now beg to recommend:—

1 tola	=	175 grains.		
80 tolas	= 1 seer	= 14,000 „	=	2 lbs.
50 seers	= 1 maund	= 700,000 „	=	100 „
20 maunds	=	1 ton	=	2,000 „

The seer would be sub-divided into—

$\frac{1}{2}$ seer	= 7,000 grains	= 1 lb.	= 40 tolas.
$\frac{1}{4}$ „	= 3,500 „	= $\frac{1}{2}$ „	= 20 „
$\frac{1}{8}$ „	= 1,750 „	= $\frac{1}{4}$ „	= 10 „
$\frac{1}{16}$ „	= 850 „	= 2 oz.	= 5 „
$\frac{1}{32}$ „	= 425 „	= 1 oz.	= 2 $\frac{1}{2}$ „

In like manner the maund would be sub-divided into the—

$\frac{1}{2}$ maund	= 50 lbs.
$\frac{1}{4}$ „	= 25 „ (the present Madras mercantile maund).

If, however, it be considered desirable to follow the avoirdupois system closely, then the maund might be made equal to 56 seers, or 112 lbs., the quarter and half maund being respectively 28 lbs. and 56 lbs., while 20 such maunds would be the present ton of 2,240 lbs. The maund and candy we propose, though not corresponding with the present cwt. and ton of England, are easily convertible into them.

*Linear Measure.*—We concur with Mr. Bayley that the English yard and foot should be adopted, with, however, the present English sub-divisions. The English linear measures are now largely followed by the people, and are exclusively used in the extensive transactions of the Public Works Department and mercantile firms.

*Land Measure.*—In the Revenue survey, which is now in rapid progress, and is to be carried out in every district of the Presidency, the English acre, with decimal sub-divisions, is solely used. We recommend, therefore, that the imperial acre, decimally sub-divided, be adopted by Government.

*Measures of Capacity.*—We consider Mr. Bayley's arguments in favour of a seer exactly equivalent to an imperial quart to be conclusive, and we recommend the adoption of this measure, sub-divided by eighths with a multiple of 100 seers, as proposed by him. Heaped measures should not be recognised, and we would recommend that the dimensions of the measures should be defined by law.



We have not thought it necessary to trouble Government with a lengthened statement of the reasons which have led us to recommend the adoption of Mr. Bayley's scheme, which, we may remark, has met with very general approval, and was pressed on the Government of India six years ago by the Government of Madras.

For the introduction of new weights and measures a legislative enactment is undoubtedly necessary, but the change should be restricted at the outset to the chief towns of the Presidency,—time being allowed, and facilities afforded, for the purchase and alterations of the weights and measures in use at as little expense and trouble as possible. The new system would of course be adopted, after sufficient notice in all Government transactions, on the railways, in the Salt, Customs, and other Departments.

*J. Carpendale*, Colonel, R. E.  
*J. D. Sim.*

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— No. 8. —

MINUTE by the Honourable the President.

I HAVE read the Report of the Committee appointed to consider the best mode of remodelling the weights and measures of this Presidency.

2. The following is the substance of the recommendations contained in this Report:—

A tola, or rupee of 175 grains, instead of 180, is to be the unit of weight.

80 tolas = 1 seer, or 2 lbs. avoirdupois.

50 seers = 1 maund, or 100 lbs.

20 maunds = 1 candy, or 2,000 lbs.

3. The seer would be sub-divided into  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ,  $\frac{1}{12}$ ,  $\frac{1}{36}$  parts, equal respectively to 40 tolas, 20 tolas, 10 tolas, 5 tolas, and  $2\frac{1}{2}$  tolas.

4. In like manner, the maund would be divided into  $\frac{1}{2}$  maund = 50 lbs.,  $\frac{1}{3}$  maund = 25 lbs., which is equal to the Madras mercantile maund.

5. As regards measures of length, the Committee propose to adopt the English yard and foot. For land measure they recommend the acre, divided decimally; for measures of capacity they adopt Mr. Bailey's recommendation of a seer, equivalent to an imperial quart, and this they propose to divide into eighths for lesser measures, and to multiply it by 100 for larger measures.

6. The Committee, in point of fact, adopt generally the recommendations of Mr. Bayley, and save themselves the trouble of making specific recommendations by referring to the report of that gentleman.

7. And now as regards the particular recommendations submitted: The Committee, while they point out the absence of all necessary connection between the standard of weight and the current coins of the country, are disposed to maintain the tola as the unit of weight; but they propose to retain the name only, and to separate altogether the coin from the unit of weight by making the latter 175 grains; while the coin, at all events for the present, will retain its standard weight of 180 grains.

8. I am disposed to believe that this will be the simplest mode of getting over a difficulty without running too much counter to Native ideas, fancies, or prejudices. The change, however, will make the present rupee utterly useless as a weight, unless the Act also says that a given number of rupees, say 35, shall be equal to 36 tolas.

9. If, as stated, the seer is well known, and used as an equivalent to 80 tolas, it would certainly be advisable to retain an established weight at its nominal value of 80 tolas or 2 lbs. avoirdupois, and to start from this fixed point both upwards and downwards. Experience, however, has shown that it would be advisable

advisable to have a name for each division of the scale, and I should think it would be well to start from the tola as below :—

1 tola	=	175 grains.
5 tolas	=	2 oz.
10 tolas	=	4 oz., or whatever name may be considered expedient.
20 tolas	=	8 oz. = $\frac{1}{2}$ lb.
40 tolas	=	16 oz. = 1 lb.
80 tolas	=	1 seer = 2 lb.

I do not think that it would be desirable to jump at once from one seer, or 2 lbs., to 56 seers, or 1 cwt.; on the contrary, I should prefer to maintain the maund at its present, or nearly its present value, and say—

14 seers, or 28 lbs.	=	1 maund.
4 maunds	=	1 cwt.
20 cwt.	=	1 ton.

Or if it be desirable to maintain the candy as a weight, the Table might stand—

5 cwt., or 20 maunds	=	1 candy.
4 candies	=	1 ton.

10. The great object, I believe to be, is to make as little change as possible, either in the weights or their nomenclature, subject, of course, to the condition that the name shall be general as well as the weight, and that the weight will be easily assimilated to the English standards.

11. The linear measures and the land measures have been practically anglicized; the yard with its multiples and sub-multiples is taken as the standard for length; and the acre is the standard land measure. I have my doubts, however, whether it would be wise to divide the acre decimally without giving names to certain of the sub-divisions. Land is sold in towns, or at all events in Madras, by the *ground*; it would be as well to have some divisions of the acre assimilating these to local divisions, and calling them by local names.

12. As regards measures of capacity, I am rather afraid that we shall attempt too much if we insist not only on the adoption of different measures to those in common use, but also compel the adoption of the struck instead of the heaped measure; even in England potatoes are sold by the heaped bushel, as are coals, when they are sold by measure. All that we can do, I think, is to establish measures as nearly approximating to those now in existence as possible; to define the height and diameter of the cylinder which will contain the quantity, and leave it to the seller and buyer to fight out the question of heaped or stricken measure.

13. Whatever may be decided on as the unit, I think that specific names, as I have before stated, should be given to the multiples and sub-multiples, and I do not think that we should jump at once from one measure or seer to 100 measures.

*W. T. Denison.*

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— No. 9. —

MINUTE by the Honourable *T. Pycroft*, dated 8th May 1865.

THE Committee consider the system of weights and measures, proposed by Mr. W. H. Bayley in 1857, although not scientifically the most perfect, to be practically the best in the present circumstances of this Presidency; and with one modification, that of taking as the unit of weight a tola of 175 grains, they recommend the adoption of this system, as promising the greatest advantages, and causing the least inconvenience to the people.

2. They state shortly the nature of this system, but do not enter into details which,

which, as it seems to me, was unnecessary, inasmuch as Mr. Bayley has in his pamphlet described his proposed system with a fullness and clearness, which leave nothing to be desired.

3. For linear measure the Committee recommend, as did Mr. Bayley, that the English yard and foot be adopted. Mr. Bayley left the question of the sub-division of the yard and foot open till it should be settled in England, observing, however, that both Parliamentary Committees that reported on the subject of English weights and measures in 1841 and 1854, had recommended a decimal sub-division, and that it had already been adopted, as regards the *foot*, by English architects and surveyors. The Committee advise the present English sub-divisions by inches, and I am disposed to agree with them.

4. For superficial measurement, Mr. Bayley and the Committee would take the English imperial acre with decimal sub-divisions. I concur with them. This measure so sub-divided is that solely in use in the Madras Revenue Survey.

5. For weight Mr. Bayley proposed a seer of  $77\frac{1}{2}$  tolas (each of 180 grains), which would be only five grains short of a double pound of 2 lbs. avoirdupois. He proposed that this seer be sub-divided into 16ths, as the present seer (of 80 tolas) is. For multiple he recommended a mun or maund weight of 50 seers, or exactly\* the cwt. of 100 lbs.

\* NOTE.—Not exactly, if the seer be 5 grains short of 2 lbs. the maund of 50 seers would fall short of the cwt. by  $5 \times 50 = 250$  grains about  $1\frac{1}{2}$  tola—a quantity, however, practically inappreciable.

6. The Committee adopt the seer of *exactly* 2 lbs. avoirdupois, but take for their unit a tola of 175 grains, 80 of such tolas being equal to one seer.

7. This is the point on which they differ from Mr. Bayley, and I cannot say that this part of their scheme seems to me an improvement upon his. It would, it appears to me, be inconvenient to have two tolas, one of weight of 175 grains, and one of currency at 180. There may be some advantage, although I do not think there is much, † in having weights adjusted to a given currency; but I do not perceive the benefit of making a new weight for the purpose of testing or forming a sub-multiple of one already well known. It would be better, I think, to start with the 2 lb. seer‡ as the unit, and to sub-divide it by the binary scale down to 16ths or perhaps 32nds (1 oz.)

† For example, a bazarman or ryot who wished to test his seer would seldom have 80 or  $77\frac{1}{2}$  rupees by him to serve as the test.

‡ That is, a seer *exactly* 2 pounds avoirdupois, not 5 grains short.

8. In fact I do not see why we should not commence at once with the pound avoirdupois or half seer, sub-divided into ounces (16). The difficulty of introducing this, as indeed all English weights and measures, I believe to be much over stated.

9. The first multiple of the seer (or pound) might be the mun or maund of 50 seers or 100 lbs.; but if the English cwt. is ever reduced to 100 lbs., that name should be substituted for the maund or mun. The maund or cwt. should be sub-divided into halves and quarters.

10. Mr. Bayley does not go beyond the maund, but the Committee suggest a candy = 20 maunds or one ton of 2,000 lbs. The objection to this seems to be that the term candy is not like that of seer, known all over India, and that, where it is known, it is only equal to about 500 or 600 lbs., or greatly below the value which would be assigned it in the Committee's scale. When the ton is reduced to 2,000 lbs., it may properly be introduced into Indian meteorology as = 20 cwt. For the present, perhaps, we may end as Mr. Bayley does, at the maund.

11. For measures of capacity, dry and liquid, the Committee and Mr. Bayley recommend the imperial quart, sub-divided by eighths, and with a multiple of 100 seers. The quart as a *liquid* measure, I may remark, is already recognised by our Abkarry Acts and Cantonment Act.

12. With the few modifications above noted, the scheme recommended by the Committee might, in my opinion, be adopted. In substance it amounts to the introduction of English weights and measures into British India, a matter of very great importance. As to the mode of introducing the new system, it must I consider, be effected by a legislative enactment; but its introduction should

should be carried out gradually, after fair notice and due facilities for procuring the new standards. We should commence with the Presidency cities, large towns, and cantonments, and thence proceed to the smaller places and rural population. When the uniform system has once been decided on, and authoritatively laid down, it will rapidly make its way. Government, in their many transactions, in the Abkarry salt sales, Commissariat, Public Works, and Ordnance contracts, and at the sea custom-house, the railway companies, and commercial community will all co-operate towards the good end.

*T. Pycroft.*

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— No. 10. —

MINUTE by the Honourable *H. D. Phillips*, dated 29th June 1865.

THIS is a subject on which I do not feel competent to offer an opinion that is likely to be of much, if any value. My perusal of the Committee's Report and consideration of the other papers, together with my recollection of the inconveniences which I have felt and observed during a long career in this Presidency, have, however, satisfied me that great general advantage must result from the introduction of a system based on the clear and simple suggestions of the Committee, and slightly modified in the manner proposed by the Honourable Mr. Pycroft.

*H. D. Phillips.*

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— No. 11. —

B O M B A Y.

From *H. Birdwood*, Esq., Under Secretary to the Government of Bombay, to *A. P. Howell*, Esq., Under Secretary to the Government of India (No. 2008); dated 4 November 1865.

I AM directed to inform you, in reply to your letter, No. 3836, dated 20th June 1864, that, on its receipt, his Excellency the Governor in Council appointed a Committee, composed of Mr. A. F. Bellasis, Commissioner of Customs; Colonel DeLisle, R. E.; and Mr. Andrew Grant, one of the leading members of the mercantile community of Bombay, to consider the question of the possibility and the best method of introducing a uniform system of weights and measures into this country. After a careful inquiry, the Committee submitted a Report, which, together with the Minutes of the several members, I am directed to append.

2. It will be seen that the Committee pronounce in favour (1), of a decimal system of multiples and sub-multiples on the basis; (2), of the English pound and gallon; which latter unit they would apply to all measures of capacity, whether for liquids or dry goods. For linear measure the Committee recommend the adoption of the English inch, foot, yard, and mile; and for the measurement of area, the English acre decimally divided.

3. The Committee do not enter upon any discussion of the theoretical advantages and disadvantages of the decimal system under different circumstances, or of the practical difficulties that would attend its introduction (and especially, perhaps, its partial introduction) into India. Nor do they attempt to establish any simple integral relation between one class of measures and the others. These appear to his Excellency the Governor in Council to be somewhat serious defects in the scheme they propose, while the relation also of any system which it is intended to enforce by authority to the present or proposed unit of value and its divisions, affords another subject for the most careful consideration.

4. On a review of the whole subject, in the light of previous investigations by many able officers as well as of the present Report, it appears to his Excellency in Council that the points which we should seek to attain in any systematic re-adjustment of the weights and measures of India may be classed under the heads of (1), definiteness; (2), convenience, including especially facility of calculation; and (3) assimilation or adaptation to existing systems.

5. Nothing would promote the first object more certainly or more immediately than the adoption of some fixed unit of linear measure, whence might be deduced fixed units of cubical capacity of weight and of value.

6. Whether the English units, under these several heads, should be adopted, is a question that may be discussed from many distinct points of view. The French system, based on the ascertained dimensions of an arc of the meridian, has been extensively adopted; and its introduction into England has been advocated by men of great scientific reputation. But serious practical difficulties lie in the way, difficulties so serious that there is little prospect of any radical change in the present generation. At the same time, it seems certain that no Indian unit can be adopted which shall either correspond precisely (and none but a precise correspondence would answer the purpose) with that of any system in general use, or which, through the various senses attached in different places to the same word, would not cause perhaps greater perplexity, and afford greater openings for fraud than the assumption of the English unit of linear measurement; and if this is to be adopted, it would be vain to wait for the chance of its being settled on a different basis from that on which it now rests. Hence his Excellency the Governor in Council thinks the English foot, or the English yard, might be adopted as the basis of the Indian scheme, with all the advantages of complete definiteness and with a minimum of inconvenience. Both measures are generally known throughout India, and already used by the more intelligent Natives in preference to their own vague and varying measures.

7. It appears far more likely that the measurement of area should eventually be built upon the linear unit than that the latter should be derived by an inverse process from the former. If, therefore, it be thought desirable to carry out the system of measurements with scientific accuracy and completeness, it will be necessary to adopt as the unit of "square" measure the square foot or the square yard, rather than to deduce from the acre a convenient sub-multiple square, one side of which shall furnish a definition for the unit of linear dimension. Whether the maximum defined measure of area should consist of the number of square feet or square yards contained in an acre, or of some other number, is a question to be determined by considerations partly of the comparative advantages and disadvantages of the decimal system, and partly of the inconvenience of disturbing a system already in extensive use.

8. The unit of measure of capacity should, from a scientific point of view, be the cube, as that of the measure of area should be the square, of the linear unit. The measure for grains need not differ from that for liquids. If a linear unit should be definitely adopted, the introduction of a cubical measure, bearing a simple relation to it, ought, sooner or later, to follow as of course; and therefore, perhaps, the sooner the better. In this process the English measures of capacity would be discarded; and this might occasion some temporary inconvenience, until the English measures were reformed, as eventually they must be, on a similar principle.

9. The unit of weight should, theoretically, be a definite bulk of liquid of uniform density at a particular temperature, and this bulk should bear a simple relation to the linear unit. The English pound has not this advantage; but it is in such general use, and approaches so nearly to the half of the popular unit, the seer, that it should probably be adopted, on grounds of convenience, as the standard unit of weight. One hundred pounds might be termed a *sotee* or (*pucka*) "maund," and 10 maunds a *candy*, if it were thought desirable to retain the two latter names. If the English cwt. should be reduced to 100 lbs., as seems not unlikely, there would be at once a practical identity between the two systems.

10. Facility

10. Facility of calculation would be promoted if, along with a decimal division of the monetary scale, a universally decimal system of weights and measures could be introduced. Otherwise, greater inconvenience than advantage would follow through the prices of any but integral quantities of goods often running off into endless decimal fractions. At present, the divisions of money, depending on the prime numbers two and three, correspond to the actual (which are also the simplest) divisions of measurement and weight. It has been doubted whether, even on theoretical grounds, the adoption of a decimal system is to be desired; but it is certainly not to be desired, unless adopted simultaneously for money, and for the measurement of all things in which men ordinarily deal.

11. The question of assimilation resolves itself practically into that of assimilation or adaptation to the English standard. The views of his Excellency in Council on the adoption of the English units of weight and measurement have already been expressed. The adoption of the English scales of multiples and sub-multiples of these units does not seem necessary or desirable. They are based on no uniform or consistent principles, and all authorities on the subject demand their re-adjustment. The adoption of the units alone supplies the means of assimilation to any extent at a future time, and to proceed further at present would almost certainly entail the necessity for fresh disturbance hereafter.

12. His Excellency the Governor in Council thinks, therefore, that while the English pound and the English foot as the units of weight and of length or area, and perhaps a cubic foot, or some simple sub-division of a cubic foot, as a unit of capacity, might be introduced with advantage, nothing more should be attempted at present. To decimal multiples of the unit, with specific names, there could perhaps be no serious objection; but the sub-multiples should be allowed to proceed by popular method of sub-division into annas, or  $\frac{1}{16}$ ths, as they will do naturally, unless some other method be prescribed. Complete definiteness and adaptability to the English standards when put on a permanent footing would thus be secured, together with facility of accurate calculation, at as little sacrifice of general convenience as is compatible with the attainment of those important ends.

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— No. 12. —

From the President and Members of the Committee for Weights and Measures, to the Chief Secretary to the Government of Bombay (No. 2305); dated 26th August 1865.

IN reply to your letter as per margin, appointing the Commissioner of Customs, Lieutenant Colonel A. DeLisle, and Mr. Andrew Grant, a Committee to deliberate on the best mode of attaining a uniform system of weights and measures for all India, we have now the honour to submit the following report.

No. 2240, dated  
24 December 1864,  
General Department.

2. Having given this subject their best consideration, the Committee would beg to lay before his Excellency in Council the following suggestions relative to a uniform system of weights and measures for all India:—

I.—WEIGHTS.

3. The Committee are in favour of a decimal system of weights with the English pound avoirdupois as a unit. Should a decimal system of weights be introduced at home, it seems probable that the familiar weight of a pound avoirdupois will be chosen as the unit, and the two systems at home and in India would thus be brought into harmony; while the desirable object of having some check for weights of easy access by the public, such as a certain number of the current coin which exactly corresponds to the unit of weight, is provided for by the selection of the Committee, as the pound avoirdupois exactly corre-

sponds in weight with 70 of the copper pice in general use. The scale would stand thus, with its decimal multiples and sub-multiples—

		A pound. A pound.					
		A tenth of a pound.	1 lb.	lb. 1	A decade.		
		A hundredth of a pound.	1	lb. $\frac{1}{10}$	lb. 10	2	A cental.
		A thousand of a pound.	1	$\frac{1}{10}$	lb. $\frac{1}{100}$	lb. 100	10
1	$\frac{1}{10}$	$\frac{1}{100}$	lb. $\frac{1}{1000}$	lb. 1,000	100	10	1
						A millard.	

4. Names would have to be given to the different weights; and it is suggested that these should be indicative of the decimal division; thus, for the multiples of a pound the English names might be—the unit, one pound; a decade, 10 lbs.; a cental, 100 lbs.; millard, 1,000 lbs. The Hindoostanee names might be—the unit, ek pound; ek duskee, 10 lbs.; ek sotee, 100 lbs.; ek hazaree, 1,000 lbs. In like manner, for the sub-multiples of a pound, the English names might be—the unit, one pound.

a	-	-	-	-	-	-	-	-	$\frac{1}{10}$ of a lb.
a	-	-	-	-	-	-	-	-	$\frac{1}{100}$ "
a	-	-	-	-	-	-	-	-	$\frac{1}{1000}$ "

The Hindoostanee names might be—

The unit, ek pound.										
Ek dus ounsh pound	-	-	-	-	-	-	-	-	-	$\frac{1}{10}$ of a lb.
Ek shut ounsh pound	-	-	-	-	-	-	-	-	-	$\frac{1}{100}$ "
Ek hazar ounsh pound	-	-	-	-	-	-	-	-	-	$\frac{1}{1000}$ "

II.—LIQUID MEASURE.

5. As there seems to be no liquid measure widely adopted as a standard throughout India, the Committee think there would be little difficulty in introducing a measure having the English gallon holding 10 pound avoirdupois of distilled water at the temperature of 60 degrees Fahrenheit as the unit.

6. As in India, the water is usually at a higher temperature than 60 degrees Fahrenheit; and as distilled water is not easily procurable in every-day life, a gallon of clean water might be taken as weighing as nearly 10 lbs as is necessary, for ordinary purposes.

7. The scale, which need only consist of submultiples, would stand thus—

One gallon.	Deci-gallon.	
$\frac{1}{10}$ th of a gallon.	One.	Centi-gallon.
$\frac{1}{100}$ th of a gallon.	$\frac{1}{10}$ th.	One.

Names would also have to be given to the different divisions of the measure, as in

in the case of weights; thus the English names of the sub-multiples of a gallon might be—the unit, a gallon; a deci-gallon,  $\frac{1}{10}$  of a gallon; a centi-gallon,  $\frac{1}{100}$ th of a gallon. The Hindoostanee names might be—the unit, ek gallon; ek dus ounsh gallon,  $\frac{1}{10}$ th of a gallon; ek shut ounsh gallon,  $\frac{1}{100}$ th of a gallon.

### III.—DRY MEASURE.

8. The gallon might be taken as the unit here also, with a decimal scale, which need only consist of multiples. The scale would stand thus—

	Deci-gallon.	One gallon.	One gallon.	Dek-gallon.	
Centi-gallon.	1	$\frac{1}{10}$ of a gallon.	10 gallons.	One.	Cent-gallon.
1	$\frac{1}{10}$	$\frac{1}{100}$ of a gallon	100 gallons.	Ten.	One.

9. The English names to be given. The multiples might be—the unit, one gallon; a dek gallon, 10 gallons; a cent-gallon, 100 gallons; and the sub-multiples a gallon, a deci-gallon, and a centi-gallon; and the Hindoostanee names might be—the unit, ek gallon; ek dus gallon, 10 gallons; ekso gallon, 100 gallons; and for the sub-multiples ek gallon, ek dus ounsh gallon, and ek shut ounsh gallon.

### IV.—LINEAR MEASURE.

10. The Committee cannot recommend anything more convenient or useful than the English measures of an inch, foot, yard, and mile.

### V.—SQUARE OR LAND MEASURE.

11. The English acre as a unit, decimally divided, is what the Committee recommend for adoption.

12. Whatever may be the system of weights and measures eventually adopted by the Government of India, the Committee would strongly urge that, after reasonable notice by proclamation, the Act of Council legalising the new system should be imperatively enforced over all British India, and that Native States should be pressed to adopt a similar system.

13. As any suggestion on the subject in hand may turn out of some practical value, the Committee, in addition to their joint Report above, have given in an Appendix the written opinions of the individual members before they met for consultation.

*A. F. Bellasis*, President.  
*A. DeLisle*, Lieut. Col., R.E.,  
*A. Grant*,  
 } Members.

### MINUTES BY MEMBERS OF THE COMMITTEE.

MINUTE by Lieutenant Colonel A. DeLisle, R.E., dated 1st February 1865.

SOME years ago General Shortrede allowed me to take a note of his scheme for decimal coinage, on a principle which would admit of assimilating weights in India to the English system. Having nothing better to propose myself, I take this opportunity of bringing it forward.

The fundamental change made in this scheme is the reduction of the weight of the rupee or tola from 180 to 175 grains troy, whereby the Indian seer of



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80 tolas becomes  $80 \times 175 = 14,000$  grains = 2 lbs. exactly; and the kutchra seer  $40 \times 175 = 7,000$  grains = 1 lb. exactly; and the maund of 40 seers = 80 lbs exactly,—a number which would admit of more convenient reduction into English denominations than the present imperial maund of  $82\frac{2}{7}$  lbs.\* Should the cwt. ever be altered into the cental of 100 lbs., a consummation devoutly to be wished, the proposed maund would be exactly  $\frac{3}{4}$  cental.

Metal.	Present Rupee Coinage.	Decimal Rupee Coinage.	English Coinage.		Weight of proposed new Decimal Coinage.	—
			Present.	Decimal.		
Copper	Pies 0.06†	Cents $\frac{1}{2}$	- - -	Mil. $\frac{1}{2}$	Grains troy - 35	
	" 1.92	" 1	Farthing - 0.96	" 1	" - 70	
	" 3.84	" 2	Halfpenny - 0.96	" 2	" - 140	
	" 4.76	" 3	- - -	" 3	" -	
	" 5.68	" 4	Penny - 0.96	" 4	" - 280	
	" 7.6	" 5	- - -	" 5	" -	
Silver	Annas 1.6	Cents 10	- - -	Mil. 10	Grains - 17.5	
	" 3.2	" 20	- - -	" 20	" - 35	
	- - -	" 25	Sixpence - - -	- - -	" -	
	" 8	" 40	Tenpence or franc - - -	- - -	" -	
	" 16	" 100	Shilling - - -	Mil. 50	" - 87.5	
		Florin - - -	" 100	" 175		
Gold	- - -	500	Half sovereign - - -	- - -	Grains - 61.637	See note at end.
	- - -	1,000	Sovereign - - -	- - -	" - 123.274	

The English alloy is said to be 37 silver to 3 copper.

Indian alloy, 11 silver to 1 copper, or 33 silver to 3 copper.

The English florin weight 174.545 grains, a legal remedy of .727 grains, so that the proposed rupee of .175 grains would be within the remedy; and might, for practical purposes, be considered as identical.

	Grains, Silver.	Grains.
English florin contains - - -	161.645	12.9
" Indian alloy - - -	160.419	14.581
New rupee, English alloy - - -	161.874	13.126
Actual rupee, Indian alloy - - -	165.	15.

It is proposed that the new rupee have the English proportion of alloy, 37 silver to 3 copper; in which case its intrinsic value, according to the silver it contains, would be to that of the actual coin as  $165 : 161.874 : : 100 : 98.2$ , showing a loss in value of about 1.8 per cent.

The value of the new decimal rupee and of the English florin are so nearly alike that it ought not to affect the commercial relations of the two countries.

Taking the present rupee as a standard, the value of the new decimal rupee would be .43d. less, rather more than  $\frac{1}{2}$ d. and less than  $\frac{1}{10}$ d.

In India the intrinsic value of the decimal rupee, as proposed above, would be four pie less than that of the actual rupee of 180 grains.

*Weights.*

So far the Indian arrangement of—

80 tolas = 1 seer,  
40 seers = 1 maund,

has been adhered to; but I submit that, if any change is made at all, it would be very convenient to adopt the English pound as the standard, and use the cental instead of the maund, leaving the pound to be sub-divided into 16th or ounces.

The

\* Thirty-five and 72 are not convenient numbers for reduction.

† In the above table the small correction for the diminution in the value of the rupee has been neglected. The weight of the cent has been fixed at 70 grains troy, so that one rupee's weight of copper coin will equal 7,000 grains = 1 lb. avoirdupois. This makes the weight about six grains more than it would be in direct proportion to the old—

Coinage	Pies.	Grains.	Grains.
- - 3	- - 1.92	- - 100	- 6 $\frac{1}{2}$

but this disadvantage is necessary to give the means of easily checking the correctness of a pound weight.

The advantage of decimal division is most felt in dealing with large numbers, or the multiples of pounds; the sub-multiples are of less importance, and may be left in the binary scale.

Then 40 tolas	=	1 seer or pound.
100 pounds	=	1 cental.
20 centals	=	1 ton of 2,000 lbs.

All convenient numbers for calculation, and near to those at present in use in England, viz., the cwt. and ton of 2,240 lbs.

1 cental = 100 lbs.	cost rupees 17·27	80 lbs. cost 17·27.
1 pound	„ „ 0·175	1 lb. „ 1·737 = ·215.

In the first case we only have to shift the decimal point, in the second we must also divide by eight.

Or, if it is considered preferable to retain the seer of 80 tolas or 2 lbs., the scale might run thus—

80 tolas	=	1 seer	=	2 lbs.
100 seers	=	1 cental	=	200 lbs.
10 centals	=	1 ton	=	2,000 lbs.

The seer and cental and ton would then resemble the French kilo-kilogramme and myriagramme.

#### *Liquid Measure.*

The gallon (Imperial = 10 lbs. distilled water at 62° Fahrenheit seems to be the best unit to be adopted, as India has no liquid measure of her own. The gallon is already in use for all purchases of liquids by the Commissariat Department.

The scale might be as under—

4 gills	=	1 pint.	Cub. in. 8·365 to one gill.
2 pints	=	1 quart.	
4 quarts	=	1 gallon.	

The Bengal rek of 2·0571 pints is very nearly the same as the quart, and might be sub-divided thus—

4 chotanks	=	1 kunki or half-pint.	Cub. in. 4·332 to one chotank.
4 kunkis	=	1 quart or rek.	
4 reks	=	1 gallon or pali.	

Liquid measure need not extend beyond the gallon.

#### *Dry Measure.*

The Bengal mun of 8·2286 gallons is so nearly equal to the bushel of eight gallons that the latter might be adopted without inconvenience.

2 pali or gallons	=	1 phura or peck.
4 phuras	=	1 mun or bushel.
8 muns	=	1 khundi or quarter.

I think, however, it would be a better plan to introduce the system of selling grain by the pound cental instead of by measure.

#### *Measures of Length.*

The foot, yard, and mile are now so well understood in most parts of India that they may be adopted without much difficulty. It would be an improvement to make the mile 5,000 feet, or 50 chains of 100 feet each. This is not essential, however, as the mile can be easily sub-divided with the Gunter's chain, 80 to the mile.

#### *Square Measure.*

The acre and its sub-divisions are already introduced in the Bombay Revenue Survey.

*Note on proposed New Coinage.*

It will be observed that the quarter rupee is omitted in the list of new coins, for this reason: in the copper coinage it is more convenient to have 1-2-4 cent. pieces than to have a five-cent. piece; and if the quarter rupee of 25 cents is retained, the anna piece of 4 cents will not divide into it without a remainder, that is, it would take six annas and one cent. to pay the quarter rupee. It is also objectionable on account of its not being a coin of even tens, while the 20-cent. piece is useful and convenient, as two 20-cent. pieces would equal a franc at par, or tenpence, the present postage on overland letters *vid* Marseilles.

*A. DeLisle, Lieut. Colonel, R.E.*

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MINUTE by *J. D. Inverarity, Esq.*, dated 2nd February 1865.

I AGREE with Lieutenant Colonel DeLisle, and think he could not do better than send in a similar report to Government. A meeting of the members can be convened, if Mr. Grant desires it, for further discussion.

*J. D. Inverarity.*

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MINUTE by *A. Grant, Esq.*, dated 4th April 1865.

I DO not agree with the other members of Committee that Colonel Shortrede's plan is the best, seeing that his plan not only alters existing weights and measures, but also interferes with the currency, thereby causing an incalculable amount of change and confusion, and probably a proportional amount of additional opposition to its introduction and acceptance by the people.

Some of Mr. Bayley's proposals seem reasonable and desirable, while others do not recommend themselves so much.

His plan for linear measurement, taking the English yard as the basis with the already familiar divisions of feet and inches, I think might be adopted.

His plan for land measure, with the acres for a standard and decimal subdivisions, is also good.

His plan for a unit of weight I don't approve of. I think the English pound avoirdupois might be taken as one unit with decimal sub-divisions and multiples. The measure for capacity might be what holds a pound weight of distilled water at 60° Fahrenheit for a unit with decimal sub-divisions and multiples.

I would suggest a meeting of Committee.

*A. Grant.*

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MINUTE by *A. F. Bellasis, Esq.*, dated 17th June 1865.

I HAVE read Lieutenant Colonel DeLisle's Minute, and I so far concur with him that if a decimal system of weights and measures were in force in Great Britain, I would then adopt the same decimal system for India; but as I fear the introduction of a decimal system into England is very distant, and as I observe that, even since Mr. W. H. Bayley's pamphlet was published in 1857, two Parliamentary Committees have sat on the subject without coming to any definite result, it seems improbable that any radical change will be made for many years—perhaps not in this century.

2. This being so, I am of opinion that it will be the best to take the English weights as a standard, and to assimilate the current Indian weights to them as near as possible.

3. I would, therefore, take the English pound as a unit, and adopt the following table of weights:

*Weights.*

*Weights.*

Pds.	Qrs.	Cwt.	Ton.		Tolas.	$\frac{1}{2}$ Seer.	Seer.	Dhurras.	Maunds.	Khandy.
1				=	40	1				
2				=	80	2	1			
28	1			=	1,120	28	14	1		
112	4	1		=	4,480	112	56	4	1	
2,240	80	20	1	=	89,600	2,240	1,120	80	20	1

4. The above table has the advantage—

(1.)—That the English weights are retained intact.

(2.)—That the Native weights are retained with one exception, viz., that a maund is made to contain 56 seers instead of 40 seers.

(3.)—That 1 lb. contains 16 oz., and that one rupee or one tola contains 16 annas, sub-multiples useful in calculation.

(4.)—That all the totals are divisible by four and by ten, and that also most of the multiples are divisible by the same numbers.

(5.)—That the number of  $\frac{1}{2}$  seers in a khandy correspond with the number of lbs. in a ton. The number of dhurras in a khandy correspond with the number of quarters in a ton, and the number of maunds in a khandy with the number of cwts in a ton. Thus there is great uniformity, and very little change in either the English or Native scale of weights, and the familiar names of both are retained; the only exception being the number of seers in a maund, which has been altered from 40 to 56 to make a khandy correspond with a ton.

*Linear Measure.*

5. There being no real liquid measure in use in India, I would adopt the English measure, viz :—

Pint.	Quart.	Gallon.
1		
2	1	
8	4	1

and these would be easy of introduction, as they are simple, and are already in general use in large towns and military cantonments.

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*Dry Measure.*

6. This should be much the same as the table for weights; the measures being readily checked by their capacity to hold water.

Pounds.	Cwt.	Ton.	Khandy.	Maudor: Surra.	Seer.	Half seer.
1						1
2					1	2
112	1			1	56	112
2,240	20	1	1	20	1,120	2,240

*Liquid Measure.*

7. I would adopt the English standard of an inch, a foot, a yard, and a mile, which are already very generally known in India.

*Square Measure.*

8. Here I would use the acre with its sub-multiples, as divided by the Revenue Surveys, which now has become universally known by every ryot and owner of land, viz:—

Kater.	Goonta.	Acre.
1		
20	1	
400	20	1

9. I firmly believe that the above simple plan for the uniform adoption of English and Native measures might be very generally and advantageously adopted in India. All that is wanted is that Government should be bold enough to decide upon this or any other plan they may approve, and then to pass a short enactment stating that, from and after a fixed date, such approved weights and measures shall be in universal use throughout all India.

10. It was thus that the Emperor of the French re-modelled and introduced a uniform system of weights and measures, and a decimal coinage into France, after consulting all the savans of Europe. He decided for himself; and the Imperial edict went forth as law. Taking the globe for his model, and dividing the distance between the pole and the equator into ten millions of parts, he obtained a metre for the unit of length, and the sub-multiples and multiples of this metre for his linear measure, and so he despotically and authoritatively framed his other standards of weights, &c.

11. The Governor General of India, and he alone, can exercise like despotic power in India. His edict on the question once passed would command obedience, all imaginary difficulties would vanish, and in a few years the blessings of thousands would testify to the wisdom of Government in authoritatively determining a uniform system of weights and measures.

A. F. Bellais,  
Officiating Commissioner of Customs.

— No. 13. —

EXTRACT from the Proceedings of the Government of Bombay, in the General Department, No. 608; under date 24th March 1866.

READ the following Papers :—

From Major *R. H. Keatinge*, v.c., Political Agent, Kattewar, to *C. Gonne*, Esq., Secretary to the Government of Bombay, No. 26; dated 15th March 1866.

I HAVE the honour to acquaint you, for the information of Government that, at the request of some of the most influential chiefs in Kattewar, I convened a meeting of the representatives of the 26 principal states and talookas in the province to consider what should be done towards securing uniformity in weights and measures throughout Kattewar.

2. I previously addressed the Secretary of the Bombay Chamber of Commerce, and obtained from him any information it was in his power to give regarding the views of the mercantile community in Bombay on this subject.

3. The meeting took place on the 10th instant. Several Carbarees stated that, in consequence of the increasing trade and the closer communication established between the different talookas by the abolition of transit duty, the inconvenience arising from the want of fixed standards was more felt now than heretofore.

4. The present state of the question was then explained by me to the meeting, and it was advised to express its views for the information of Government, but not in the present unsettled state of the question to adopt any active measures.

5. It was then carried unanimously, that for weights either the English pound or the seer of 40 tolas could be adopted without difficulty; the former is already known in many talookas under the name of the "Ruttal," the latter is in very general use.

6. On putting to the assembly which weight was preferable as a unit, the votes were—

For the pound -	-	-	-	-	-	-	-	-	6
For the 40-tola seer -	-	-	-	-	-	-	-	-	19

but all were of opinion that either could be introduced.

7. For a measure of length it was unanimously voted that the English foot and yard were the most desirable units. They are well known.

8. The local beegah is exactly one-third of an acre.

9. The question of a measure of capacity was then considered.

A gallon measure and a cubic foot measure had been prepared, and were shown to the meeting; a committee was then appointed, consisting of—

Azum Shewaweelall Somejee, representative of Bhownuggur, President,	-	-	-	-	-	-	-	} Members.
Sewpursad Muddunjee of Joonaghur	-	-	-	-	-	-	-	
Moonshee Tricumlall of Palitana	-	-	-	-	-	-	-	
Nurbeheshunker of Gondul	-	-	-	-	-	-	-	
Shrewshunker of Dhroll	-	-	-	-	-	-	-	

to consider which of these measures is most adapted to the circumstances of the country. They were requested to report the result to the Political Agent.

10. It was then agreed by a unanimous vote that, in case any of the weights or measures which the meeting had approved should be sanctioned by Government as standards either for the Indian Empire or for the Presidency of Bombay, the chiefs should enforce their adoption in their respective talookas.

11. All the representatives present then expressed a wish that, as soon as the question was decided, the Political Agent should assist them in procuring a large quantity of cast-iron weights according to the new standard.

12. The assembly then broke up.

13. Subsequently the Committee alluded to in paragraph 9 above have reported unanimously that they prefer the gallon measure to the cubic foot as a unit measure of capacity.

14. In reporting these proceedings to Government, it is not necessary for me to point out that they indicate a very pressing want of some legislation on the subject.

15. The desire for uniformity throughout the Province is so great that, if no steps are taken in the matter by Government within our own territory, it is probable that a separate system for this Province will be adopted, and the inconvenience of such a measure will be sensibly felt in Bombay.

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MEMORANDUM, No. 780, dated 19th March 1866.

TRANSFERRED to the Revenue Department for consideration.

*C. Gonne,*  
Secretary to the Government of Bombay.

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RESOLUTION.—Copy to be submitted to the Government of India for early consideration, with reference to the correspondence ending with the letter from this Government, No. 2008, dated 4th November 1865.

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ORDERED, that copies of the above be forwarded to the Political Department of the Secretariat.

*F. S. Chapman,*  
Chief Secretary to the Government of Bombay.

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No. 609, dated Bombay, 24th March 1866.

SUBMITTED to the Government of India.

*F. S. Chapman,*  
Chief Secretary to the Government of Bombay.

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— No. 14. —

BHAUGULPORE.

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From *A. Mackenzie*, Esq., Under Secretary to the Government of Bengal to *E. C. Bayley*, Esq., Secretary to the Government of India (No. 87); dated 4th January 1867.

I AM directed to forward, for submission to the Government of India, the accompanying copy of a letter, No. 564, dated the 7th ultimo, from the Commissioner of the Sonthal Pergunnahs, reporting on the working of an order issued by him, enforcing a uniform standard of weights and measures in those pergunnahs. This report shows, the Lieutenant Governor thinks, the facility with which a change of weights and measures, tending to facilitate or simplify small dealings, may be introduced in this country.

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— No. 15. —

From *A. Money*, Esq., c. B., Commissioner of the Bhaugulpore Division, to the Secretary to the Government of Bengal (No. 564); dated 7th December 1866.

WITH reference to your call for a report on the working of the order enforcing uniformity of weights and measures throughout the Damin, I have the honour to state—

2. My order to the Assistant Commissioners, an extract from which is annexed in the margin, was issued on the 18th of March 1864.

3. I had observed, during my tours in the Damin, that, owing to the great variety of weights and especially of measures, the Sonthals were much cheated by the Bengalee traders, who bought with one measure, and sold with another.

4. The experiment has, on the whole, been successful. I did not anticipate entire success; for a measure of this kind, to give all the results which can be hoped for from it, must be a complete, not a partial, measure,—must apply to a whole country, not to a small province.

5. But as a rule now the authorised weight and measure are the medium of all dealings in the Damin, except perhaps in the Doomka part of it, where the Assistant Commissioner has not taken care to punish, as he should have done, infractions of my order.

6. There has never been occasion anywhere to punish much, but during the first year there were a few convictions. Now the necessity for punishment is rare.

7. No real opposition to the new system has existed, but what difficulties it had to contend with came from the Sonthals themselves, with whom, as with ignorance everywhere, a new thing is always an objectionable thing. Uniformity also is less easy to enforce, and violations of it more difficult to detect, where the usual mode of dealing is by measure, not by weight.

8. The Sonthals generally have, however, begun to appreciate the advantages of uniformity.

9. The Assistant Commissioner of Godda writes—“There is one thing which speaks favourably for the new system; there have never been any *complaints*; and if the Sonthals disliked it, or considered they were sufferers in any way from it, or that the mahajuns tried to over-reach them in consequence of their inability to reckon quickly, they would not be slow in making their grievances known; but I know of no instance, and this I think shows that they are beginning to understand the new system, and are not opposed to it, and before its introduction complaints as to the exactions of mahajuns in buying and selling grain were not uncommon.”

10. The Assistant Commissioner of Pakour says—“As I remarked above, the people have generally adopted the authorised weights and measures, and far from there (as far as has come under my notice) being any opposition to the new system, I think its benefits are now acknowledged by all parties.”

11. The Assistant Commissioner of Rajmehal states—“They do not object however, to the 80-sicca pie, but seem glad of opportunities to get their own corrected and verified.

“I have never found the slightest objection to the new weight, and it only requires attention and perseverance to ensure its complete introduction.”

12. Even in Doomka the Assistant Commissioner considers that—“The new weight and measures are decidedly being adopted gradually.”

13. I trust that ere long the measure introduced first in the Damin will be extended to all Bengal. It would be a boon to the whole country.

16.

E 4

14. The

“From the 1st of July next the seer of 80 tolahs will be the only lawful and recognised weight in the Damin. Persons using seers of any other weight will be liable to punishment. From the same date, the *pie* measure will be a measure containing half a seer (neither more nor less) of Arrowa rice, one season old. Persons using a *pie* measure of any capacity but this will be liable to punishment.

“The Deputy Commissioner and the Assistant Commissioner will at once cause the purport of these orders to be notified throughout the Damin. After the 1st of July the Assistants should, whenever out in the interior, examine the weights and *pies* by which the traders are buying or selling, and should be careful to punish every contravention of the orders now issued.”

*Note.*—Arrowa is rice from Dhan, which has been sun-dried, and is supposed to be uniform in weight.



14. The variety of weights and measures in districts is extraordinary. As a sample, I enclose a copy of one of the grain price lists of Bhaugulpore, which, since the famine, are sent weekly to the Revenue Board, and to which I got added the weights which prevail at each place.

MARKET PRICES as they stood on 8th July 1866.

	Rice, per Rupee.			Paddy, per Rupee.			Wheat, per Rupee.			Jannerah, per Rupee.			Gram, per Rupee.			Cullye, per Rupee.			Pens, per Rupee.				
	M.	S.	CH.	M.	S.	CH.	M.	S.	CH.	M.	S.	CH.	M.	S.	CH.	M.	S.	CH.	M.	S.	CH.		
Bhaugulpore - -	0	8	0	0	12	8	0	9	0	0	6	0	0	9	8	0	9	8	0	10	8	100 tolas to the seer.	
Lockmanpore - -	0	9	0	0	14	8	0	11	0	-	-	0	16	0	0	19	0	0	9	8	82	" "	
Kummergungo - -	0	9	0	0	14	0	0	11	0	-	-	0	11	0	0	11	0	0	13	0	84	" "	
Colgong - - -	0	7	0	0	12	0	0	10	0	0	6	0	0	9	0	0	10	0	0	12	0	105	" "
Mudehpoora - -	0	9	8	0	15	0	0	10	0	0	15	0	0	10	0	0	10	0	0	12	8	64	" "
Kissengungo - -	0	9	0	0	14	0	0	10	0	-	-	0	12	0	0	11	0	0	12	0	64	" "	
Bongong - - -	0	10	0	0	17	8	0	9	0	0	10	0	0	10	0	0	10	0	0	8	0	64	" "
Banka - - -	0	10	0	0	15	0	0	11	0	0	7	8	0	10	0	0	11	0	0	10	0	80	" "
Kuttoriah - - -	0	9	0	0	13	8	0	11	0	0	10	0	0	10	0	0	10	0	-	-	80	" "	
Ummerpore - - -	0	9	0	0	14	0	0	10	0	0	6	0	0	9	0	0	10	0	0	10	0	100	" "
Soopoul - - -	0	11	0	0	16	0	0	12	0	-	-	-	-	-	0	12	0	-	-	-	64	" "	
Pertabunge - -	0	11	0	0	18	0	0	12	0	-	-	-	0	12	0	0	12	0	0	12	0	64	" "

Bhaugulpore, 12 July 1866.

W. Campbell,  
Assistant Superintendent of Police.

— No. 16. —

NORTH WESTERN PROVINCES.

From *R. Simpson*, Esq., Secretary to the Government of the North Western Provinces, to *E. C. Bayley*, Esq., Secretary to the Government of India, (No. 3380 A); dated Nynee Tal, 27th October 1864.

WITH reference to Mr. Officiating Under Secretary Howell's endorsement, No. 3838, dated the 20th June last, with which was forwarded extract from the Proceedings of the Government of India, in the Home Department, with the copy of a resolution recorded by the Governor General in Council, regarding the introduction of one uniform system of weights and measures for British India, I am directed to forward, for submission to his Excellency the Viceroy in Council, the accompanying report, dated 1st ultimo, with enclosures, from Mr. R. Money, Captain F. W. Peile, and Mr. Middleton, who were requested to form themselves into a committee for these provinces to consider and report on the scheme, and to communicate the following remarks of His Honor the Lieutenant Governor on the subject.

2. As regards linear measure, there appears to be little practical difficulty. His Honor is of opinion that the *foot* will be the best and most convenient unit; its subdivision may for the present be left undetermined. The Lieutenant Governor agrees with the Committee that it is desirable to retain the Hindoostanee *hâth*, definitely fixing its length at half a yard; the yard measure being also retained.

3. The superficial measure is a more difficult question, from the enormous number of variations which occur all over India. Mr. Money says, that little violence would be done to the prejudices of the agriculturists if a *kutcha beegah*, equal exactly to one-fifth of an acre, or 968 square yards, were declared to be the

the standard for the North Western Provinces. This is no doubt quite correct; but after all, great as the improvement would be, it would apply only to a fraction of India. It might, however, be carried into effect for local convenience.

4. The Lieutenant Governor would advocate the English acre as the standard, using its decimal sub-divisions in all public records. For the rest, no interference, at present at least, should be exercised with local measures beyond the determination of the size of the North Western Provinces kutchah beegah.

5. In fixing the *weight standard*, his Honor thinks Mr. Bayley has failed; his standard, 77.75 tolahs to a seer, is a very awkward one, and besides the weak point, which he himself notices, there is the objection, which he seems to have treated too lightly, that though his seer would be five grains short of 2 lbs. avoirdupois, yet he would define the seer legally as equivalent to two avoirdupois pounds, and declare that a seer of 77.75 tolahs weight would not be condemned as short.

6. It is curious that, in the whole of the discussions that have taken place on the question of weights, the expedient suggested by the Allahabad committee appears never to have struck any one before. It is generally allowed that one of the standard coins of the country should give the unit of weight; and there is great advantage to be gained by having some easy means of referring the Indian to the English weights; but with the rupee as the unit, this is impracticable, as the system is founded on *troy* and not on avoirdupois weights, and the former is practically unknown in commerce. In this system the maund is taken as equal to 82 and 2-7ths lbs. avoirdupois, a most inconvenient measure. The suggestion of the majority of the Allahabad committee seems to meet all difficulties, and the only thing necessary to make it perfect is the coinage of quarter pice, a measure which has been often recommended, and which, in his Honor's opinion, is very necessary on other grounds.

7. Mr. Middleton well describes the difficulties attendant on any attempt to introduce a uniform system of weights; but in advocating the adoption of the Calcutta maund, the Lieutenant Governor thinks he overlooks the fact that *that* would involve as great a change in some parts of the country as the adoption of a maund of 50 seers each of 2 lbs. avoirdupois, while it would have serious defects, which the latter would not possess.

8. His Honor would, therefore, make the standard a 2 lbs. avoirdupois seer of 140 pice, taking care simply to avoid any violent and compulsory enforcement of it in parts of the country which are not yet prepared for the change; but this change cannot be introduced without the quarter-pice coin.

9. As regards the measure of capacity, his Honor does not think that any better proposal can be made than that of Mr. Bayley.

10. As to the mode of introducing these reforms, the remarks and suggestions contained in paragraphs 61 to 79 of Mr. Bayley's paper are very good; the Lieutenant Governor thinks that a year's notice should be given, or as much longer as may be necessary, to enable the mints to prepare standard measures; and, after the expiry of the time named, the change should be made compulsory in all military cantonments, and all towns to which the Municipal Act has been, or may hereafter be, extended. Further than this, his Honor does not think that any compulsory measures should be adopted, but all Government transactions should be in terms of the new system.

From *R. Money*, Esq., Junior Member of the Sudder Board of Revenue, North Western Provinces; Captain *F. W. Peile*, Superintending Engineer, Second Circle; and *J. R. Middleton*, Esq., Merchant, Allahabad; to *R. Simson*, Esq., Secretary to the Government of the North Western Provinces; dated Allahabad, 1st September 1864.

WE have the honour to acknowledge the receipt of the orders of Government, (No. 2170 A), dated 21 July last, with a copy of a Resolution by the Right Hon. the Governor General of India in Council (No. 3838), dated 20 June, and a selection of printed papers connected with a proposed reform of the system of weights and measures at present in use in British India, and desiring us to form ourselves into a committee for these provinces to consider and report on the scheme.

2. We beg to state in reply, for his Honor's information, that we have given the subject our careful consideration, of which the result is contained in the remarks. These will refer to memorandum drawn up by Messrs. Money and Middleton, of which copies are annexed.

3. Considering the divisions of the subject in the order in which they have been treated by Mr. Bayley, we concur unanimously in the proposal that the English yard and foot should be adopted as the standard of linear measure. The two modes of sub-division, namely, into feet, and either inches or decimals of a foot, and into sixteenths of a yard, should be maintained. The yard, divided into sixteenths, would be used for the measurement of textile fabrics, and generally of all articles now usually sold by the yard.

4. The foot measure will continue to be used in architectural operations; and Captain Peile suggests that its division should remain an open question, pending the decision of the British Legislature on the subject. If the decimal sub-division should be adopted in England, the same system might, with great advantage, be established in this country. Captain Peile states that it is now used by Captain Limond, who is superintending the erection of the public buildings at Allahabad, and very much facilitates all computations of measurement, whether linear, superficial, or solid. Messrs. Money and Middleton concur in the recommendation.

5. For land measure we unanimously recommend the acre standard, subdivided into beegahs for interior village or field measurements in the North Western Provinces and Bengal, as proposed in Mr. Money's memorandum.

6. In regard to the standard of weights we are not unanimous; Mr. Middleton adheres to the proposal contained in his memorandum that the unit should be a seer of 80 rupees. He is of opinion that there would be no advantage in assimilating the Indian to the English weights. He remarks that there is an enormous trade between England and almost all other countries, and although, with the exception only of the British Colonies, there is no similarity between the weights of other countries and those of England, no inconvenience is experienced. He has been employed in mercantile dealings for many years, and never found any inconvenience to arise from the difference between the Indian and British weights. He considers the first object to be the convenience of the community at large; and, therefore, that the scale to be adopted should be the one which would be most readily accepted by the natives of this country, and in that view he believes the seer of 80 rupees to be the best. If, however, the Legislature should not see fit to make this seer the legal standard, he would concur in recommending the adoption of the seer of 2 lbs. avoirdupois.

7. Captain Peile concurs unreservedly with Mr. Money in recommending the adoption of a seer of 140 pice, equal exactly to 2 lbs. avoirdupois. The sub-divisions of the seer, down to two chittacks, could be obtained with the present copper coinage; and we are all of opinion that a quarter pice (weighing 25 grains) might be coined, and made a legal tender with great advantage to the poorest class of the community. The pice is divided into two dhelas, four chidams, or eight dumrees; and purchases of salt, pepper, tobacco, and some other

other articles are constantly made to the extent of only one dumree, while the equivalent in cowries of a chidam, or quarter pice, is in much more frequent demand. If there were a coinage of quarter pice, we should have the chittack equal to  $8\frac{1}{4}$  pice, and the sub-division of the seer would be complete.

8. In regard to the measure of capacity, we are unanimously of opinion that no standard would be more appropriate than the seer, equal to one Imperial quart.

9. We would recommend that the standard weights should be used in all Government transactions so soon as the requisite number could be prepared and distributed; but Captain Peile urged the necessity of allowing some time to elapse before their use should be made compulsory even in cantonments and large stations, in all of which there are many small native dealers who should be permitted to become gradually accustomed to the change of system. Messrs. Money and Middleton now agree in his opinion; and the committee recommend that the use of the standard weights should be made compulsory in all the Presidency towns, cantonments, and civil stations after the lapse of one year from the date of the passing of the Act, and after the lapse of two years their use should be made compulsory throughout British India.

10. The printed papers which accompanied your letter are herewith returned.

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NOTE by *R. Money*, Esq., Junior Member of the Sudder Board of Revenue, North-Western Provinces, on proposed Reform of System of Weights and Measures; dated Allahabad, 29th August 1864.

IN regard to linear measure, I concur entirely in the proposal of Mr. Bayley that the English yard and foot, which are very generally known and extensively used throughout India, should be adopted as the standard. The length of the Indian guz is variable, but generally it does not differ much from the English yard, which, in accordance with native usage, might be divided into sixteenths, or "girahs" of  $2\frac{1}{4}$  inches.

The superficial measures for land vary so greatly in different parts of India (the kutchha beegah in the North-Western Provinces ranging from about 800 to 1,300 square yards; the Bengal beegah of 1,600; the pucka beegah the North-West from about 2,000 to 5,000;\* the Bombay beegah averaging about 2,900; and the Madras cownie of 6,400 to the vaylie of nearly 32,000), that no selection could be made from them of a standard from which the variations of the several measures now in use would not be as great as they are from the English acre. It may be confidently asserted that there is no one measure of land that is so extensively known by the people of India as the English acre, in which measurements have been made throughout the North-Western Provinces, and largely in the Presidencies of Madras and Bombay. I have, therefore, no hesitation in recommending the adoption of the acre of 4,840 square yards as the standard for land measure. \* Hissar 4,970.

The decimal sub-division might be conveniently adopted for Government purposes; but I would not immediately impose on the agricultural community the unrestricted obligation to use the acre and its decimal sub-divisions in all their transactions. In the North-Western Provinces, of which I can speak from long experience, although areas are officially recorded in "pucka beegahs," the "kutchha" beegah is used almost invariably for the measurement of fields and the assessment of rents. This kutchha beegah is generally one-third of the beegah called pucka. The pucka beegah that is most extensively used in these provinces, contains 3,025 square yards, and the corresponding kutchha beegah is 1,008. Little violence would be done to the prejudices of the agriculturists if a kutchha beegah, equal exactly to one-fifth of an acre, or 968 square yards, were declared to be the standard for the North-Western Provinces. The measure might be introduced without much difficulty, and the way would thus be prepared for bringing its multiple, the acre, into general use. For the present, at all events, I would allow the native sub-divisions of biswahs and biswansees to be retained. The conversion of beegah measurements into acres and decimals

would be very simple. The biswahs and biswansees can be converted into decimals at sight, and either multiplication by 2, and removal of the decimal point, or division by 5, will give the acres.

<i>e. g.</i>	Beegahs	37	17
	5) 37·85	or	37·85
			2
	7·57		7·570

In Bengal if the standard beegah were made one-third of an acre, or 1,613 $\frac{1}{2}$  square yards, it would differ very slightly from the measure now generally used in that province.

As a standard for weights, the advantages which would attend the adoption of a seer equal to 2 lbs. avoirdupois are so obvious as to outweigh all the arguments that can be adduced in favour of any other measure. I demur only to Mr. Bayley's proposal that the weight should be nominally equivalent to 77 $\frac{3}{4}$  tolahs, or 5 grains less than 2 lbs. I admit the discrepancy to be so small that it would be practically inappreciable; but the initiation and perpetuation of even so small an error would, at the least, be very unsatisfactory, if not also, as it appears to me, both inexpedient and unnecessary. The weights of the current copper coins are prescribed by law with the same exactness as those of the silver coinage. By Acts XXI., 1835; XI., 1854; and XIII., 1862, the weight of the copper pice is fixed at 100 grains troy; 140 pice are, therefore, exactly equal in weight to 2 lbs. avoirdupois, and I would declare the standard accordingly. The weight might also be declared to be 77 $\frac{3}{4}$  rupees and  $\frac{1}{2}$  masha (or 5 grains).—(See Section 4, Regulation VII., 1833).

By adopting the copper standard as the measure of the seer, the "weak point" adverted to in paragraph 36 of Mr. Bayley's memorandum would be eliminated, for we should have—

$\frac{1}{2}$ seer	=	70	pice.
$\frac{1}{4}$ "	=	35	"
$\frac{1}{8}$ "	=	17 $\frac{1}{2}$	"

the weight of the  $\frac{1}{4}$  pice being fixed at 50 grains by Acts XI., 1854, and XIII., 1862; and if a quarter pice were coined, we should have the one-sixteenth seer, or chittack, equal to 8 $\frac{3}{4}$  pice. The seer should further be legally defined as equivalent to 2 lbs. avoirdupois, and there would be no necessity for the declaration "that a seer of 77 $\frac{3}{4}$  tolahs weight would not be condemned as short."\*

\* Mr. Bayley's memorandum, paragraph 35.

As the maund of 50 seers will correspond exactly with the new English cwt. of 100 lbs., and 20 maunds equal the ton of 2,000 lbs., the exact assimilation to English weights which would be effected by the use of that multiple of the seer renders its adoption, in my opinion, most desirable.

I can suggest no improvement on Mr. Bayley's proposed quart measure of capacity, which is so nearly equivalent to a seer weight of grain.

I would concur with the Madras Board of Revenue in advocating the gradual introduction of the system, making its use compulsory in the first instance in large towns and cantonments only.

The adoption of a rupee weighing 175 grains, of which 80 would exactly equal the seer of 2 lbs. avoirdupois, would provide a most convenient unit of weight, and perfectly adapt the ponderary system to the silver coinage; but as the present intrinsic value of 165 grains pure silver must be retained, and the touch would be thereby raised to 924, that measure would, I suppose, be regarded as impracticable.

*R. Money, Junior Member.*

MEMORANDUM by *J. R. Middleton, Esq.*

THE appointing of a uniform system of weights and measures for all India is a most gigantic undertaking. From my having purchased cotton and other articles at Bombay many years ago for the China market, and again from the extensive purchases that I have made in cotton during the last two seasons at this part of India, viz., at Ragapore and many villages in Bundelcund, at Etawah and villages near there, and at Allyghur and villages near it, and also at Hatrass and Kashgunje and the villages near those places, purchasing each season to nearly the extent of 10 lakhs of rupees worth, I consider that, from my own personal experience, I should be able to form an opinion on the above subject. In every mart in India that I have had business in, although in some cases they were only 10 koss distant from each other, the maund weight differs, and not only does the difference exist in respect of one mart to another, but the weight of a maund by which each article is purchased at the same mart differs also; for instance, cotton, iron, linseed. Each is sold by a different maund. Each mart has, in general, either one or two market days per week, at which times the natives collect from far and near, from hill and dale, at the market places, with their goods; to change so many different sorts of weights at once would therefore cause much confusion. I would recommend to try and do it gradually, taking at first only two articles of general use, one of dry and one of liquid substance, say cotton and oil, including ghee; as those articles are valuable and produced largely in the three Presidencies. In establishing a uniform weight, a standard easily procurable all over India should also be provided for the purpose of checking the weights. I would, therefore, recommend the Calcutta bazar maund of the weight of 3,200 rupees, or tolaks, or 82 lbs., as the maund to be used all over British India, and to be named the "Imperial maund;" it could be divided into the same parts as it is at present, as such would save much confusion, viz. :—

Seers.	Rupees or Tolaks.
40 One Imperial maund, weighing 82 lbs., or	- - - 3,200
20 Half of adha - - - - - "	- - - 1,600
10 Quarter of pow - - - - - "	- - - 800
5 Eight or pussowrie - - - - - "	- - - 400
1 One seer - - - - - - - - -	- - - 80
$\frac{1}{2}$ Adha seer - - - - - - - - -	- - - 40
$\frac{1}{4}$ Pow seer - - - - - - - - -	- - - 20
$\frac{1}{8}$ Adha pow - - - - - - - - -	- - - 10
$\frac{1}{16}$ One chittack - - - - - - - -	- - - 5

Cotton at Bombay is generally sold by the candy of 300 lbs., but this differs in some places. I would recommend the candy to contain five Imperial maunds, or 410 lbs. weight, and the larger weights to be formed also of a certain number of Imperial maunds.

Liquids when sold wholesale, are sold by weight; but in retailing, they are generally sold by a seer or part of a seer measurement; this measurement seer varies on two principles: one as to the weight of the maund that it is usually sold by, each mart having its own maund; the other is according to its specific gravity, one description of liquid being of more or less specific gravity than another; as there is no Imperial or general measure for liquids in India, I would not establish one; but in retail business, where the measure of a seer is used, I would make that measure of each article coincide with the Imperial maund, that is, make a seer measure of each liquid weigh 80 rupees or tolaks. I do not include spirituous liquors, as such are measured by strength, and are, of course, under their own peculiar laws.

There should be a small fine put on after a certain time, say an anna per maund, on parties using other weights or measures.

After the foregoing was put into practice for a couple of years, the result would form a guide as to the practicability of bringing all other articles of commerce under the same rules.

*J. R. Middicton.*

Allahabad.

*P.S.*—In superficial or land measure, I can only remark that, if two beegahs were made equal to an acre, that is, 1,280 beegahs to a square mile, such would save the surveyors much trouble. In lineal measure I have not any experience.

*J. R. M.*

— No. 18. —

P U N J A B.

From *T. H. Thornton*, Esq., Secretary to the Government of Punjab, to *E. C. Bayley*, Esq., Secretary to the Government of India (No. 2310); dated Lahore, 20th November 1866.

WITH reference to the Resolution of the Supreme Government, dated 30th June 1864, regarding a uniform system of weights and measures

Letter from Financial Commissioner, No. 296, dated 6th May 1865, together with an abstract of current weights and measures prepared in this office.

Report of Lahore Committee, dated 29th January 1866.

Resumé of the opinions of the Municipal Committees of Delhi, Umritsur, and Lahore.

for British India, I am directed to forward copies of documents noted on the margin, and to express the Lieutenant Governor's regret that so much delay should have occurred in submitting the present report, owing to the printed volume of selected papers on this subject having been lost or not returned by the Lahore Committee, which necessitated an application to your office for a duplicate copy, which was only received on the 29th ultimo.

This province is, in some respects, unfavourably circumstanced for inquiries such as this, seeing that it has no seaport, and no considerable European capitalists engaged in trade. Hence, the importance of assimilating the weights and measures of this country to those of England is not practically felt here, unless, perhaps, in connection with the railway, and that but to a trifling extent as yet. It is, however, so uniformly urged or admitted in the correspondence circulated by Supreme Government that this is virtually a necessity; that, in the following remarks, the Lieutenant Governor assumes this to be an accepted fact; (1.) on the subject of the measure of length; and (2), superficial measure. Opinions here, as elsewhere, seem to be so nearly unanimous that little need be said.

2. As regards the former measure of length, the advisability of adopting the English yard, and making the cubit or *hâth* to represent one-half of it, is generally admitted. Colonel Lake considers that this would disturb the mode of calculating the ghumao or local measure of superficial area; but his Honor does not himself attach importance to this. Already the English yard is largely used in the Punjab by some classes exclusively, and the *hâth* employed by these is one-half of it; while carpenters and others coming much in contact with the English use no other measure than the inch, foot and yard, with their multiples. Mr. Purdon, Superintending Engineer of Lahore, and a member of the committee, state that, in the timber trade of this province, these measures have already virtually superseded the unsatisfactory and undefined local measures of Tassoo and Paswasi; and the Lieutenant Governor entertains himself no doubt whatever that an authoritative adoption of these standards would be accepted without difficulty, throughout the country. The matter is, in fact, one which does not in any way nearly affect the people in their social relations or dealings, so that it is a matter of comparative indifference to them what standard is adopted.

3. The latter question (*viz.*, that of superficial measure) is differently circumstanced in this respect; at all events, so far as regards land measure; but, nevertheless,

nevertheless, the English acre of 4,840 yards has already been largely introduced into the Punjab, and the people familiarised with its use. Our settlement operations necessarily penetrate into all the recesses of the agricultural population, and the standards which they adopt necessarily become familiarly known, not only to the village accountants, but to the more intelligent of the zemindars and influential chowdries, through whom the masses can be most readily operated upon. The marla, kimâl and ghumao are the measures which have generally prevailed throughout the Punjab; and these are still extensively used among the people. The biswansi, biswas, and bigha are also partially known, and here and there some other local measures are partially in use; but our official authorisation of the exclusive use of the acre, which in some places nearly corresponds with the local ghumao, would, his Honor feels sure, speedily prove effectual in superseding both the ghumao and bigha; though it might be a question whether the subdivision of the acre into the biswa and biswansi, or 1-20th parts, would not be preferable to the adoption of the poles and roods of the English system; these last being still almost wholly unknown even where the acre has been used, while the former terms are readily understood by all.

4. The remaining questions of (1.) weight, and (2.) measure of capacity, cannot be so easily disposed of, and considerable difference of opinion exists in regard to the former; on the decision of which the latter, in a great measure, depends.

5. The standard unit of weight proposed by Mr. Bayley is the tolah; and in regard to the suitability or necessity of this, all seem agreed. Indeed, as its adoption has been thus advocated by an officer of the Madras Presidency, in which this designation of weight does not appear to have been generally employed previous to its introduction by us, the expediency of retaining it can hardly be questioned in Northern India, where it is probably in universal use; so that the only really important and difficult point for determination is what number of grains shall be fixed for the standard tolah. Mr. Bayley has, the Lieutenant Governor thinks, in the 27th paragraph of his pamphlet, conclusively shown that the "avoirdupois" weights are those with which, for the purposes of commerce, it is essential that our Indian system of weights be brought, more or less, into accord. The Lahore Committee, it will be seen, prefers the "troy weight" solely, it would appear, because the "seer," if made to comprise 80 tolahs of 180 grains to the tolah, would exactly equal  $2\frac{1}{2}$  lbs. troy; but, although Mr. Bayley's pamphlet was before them, they give no reasons for thus dissenting from Mr. Bayley's opinion; his reasons for the adoption of which, as has been stated, appears to his Honor conclusive. His Honor feels constrained, therefore, to reject the proposal of the Lahore Committee.

6. Together with the adoption of the tolah as the unit, Mr. Bayley decidedly recommends that the "seer" be adopted as the standard of weight for commercial purposes; and in Northern India, at all events, where this designation is the universally accepted one, his recommendations will be at once seconded and approved. He considers it further to be essential that this "seer" corresponds exactly with 2 lbs. avoirdupois. The question, then, for determination is, how this shall be effected with the tolah as the unit of weight?

7. Mr. Bayley shows, that if the tolah were fixed at 175 grains, the seer containing 80 of these would exactly fulfil the above requirement; and he evidently regards it as a matter for regret that this was not fixed as the weight of the standard rupee, instead of 180 grains, the rupee being generally regarded by the community in most parts of India as the equivalent and representative of the tolah. He points out that 175 grains might, in the first instance, have been adopted quite as appropriately as 180 grains, for the rupee of pre-existing currencies varied greatly in weight and value, and Mr. Prinsep's "useful tables" showed that the average weight of some 300 varieties of rupees of native currencies was about 175 grains. The basis from which goldsmiths and others in Northern India calculate their weights is the *rutti*, eight of which are considered to go to a *masha*, or 12th part of a tolah; now, this *rutti* is a small red and black seed of a leguminous creeper, which is actually employed by goldsmiths to the present day for small weightments; so that it will be readily



understood how crude and variable must be a standard based on such a test as this, and how practicable it is, without in any way contravening existing usage, to select the weight of a standard unit within a considerable range.

8. The Government standard rupee having now, however, been established for upwards of 30 years, and superseded all others throughout British India, Mr. Bayley admits that its value cannot well be altered; while if its weight were reduced to 175 grains, without alteration of value, the alloy would be insufficient for durability. He proposes, therefore, to make the standard "seer" contain  $77\frac{1}{2}$  tolahs, instead of 80, which would thus be only five grains short of 2lbs. avoirdupois, and accordingly might practically be regarded, for all mercantile purposes, as the equivalent of that weight.

9. Captain Jacob, the Government Astronomer at Madras, strongly objects to the adoption of "so unwieldy a proportion as  $77\frac{1}{2}$ —a number incapable of any subdivision;" and in this objection the Lieutenant Governor entirely concurs. On the other hand, it was pointed out in the letter of Supreme Government to the Government of Fort St. George, No. 171, dated 30th January 1839, that retaining the seer of 80 tolahs, each to be weighing 180 grains, 35 such seers are the exact equivalent of 72lbs. avoirdupois; and it is added, "Through this adjustment of the Indian standard weights, those received from England are used with facility." His Honor very much doubts, however, whether this amount of approximation, or this method of adjustment, would satisfy the mercantile community.

10. The adoption of a tolah of 175 grains appears to his Honor to be the only expedient as yet pointed out, by which a satisfactory standard of comparison with the weights used in British commerce can be secured; and his Honor thinks, therefore, that, whatever difficulties may stand in the way, or whatever anomalies may be involved, this should be insisted on. The silver employed in the mint, his Honor believes, very generally contains a certain amount of gold; until this has been separated by scientific expedients, whether it would be allowable to raise the standard of the metal by allowing this gold to remain, or adding more if needful, his Honor cannot say. But if there be no valid objection to this, the standard rupee might be readily reduced to a weight of 175 grains. If this be not allowable, his Honor would be inclined to concur with Captain Jacob in the opinion that there would be "no longer any use in keeping up an imaginary connection with the coinage," and would fix the tolah at the above weight independently of the rupee. On the introduction of a gold coinage, which is probably not far distant, it might, in that case, be found possible to strike a gold coin corresponding with the tolah of 175 grains, which might then become the standard unit, as the pagoda appears heretofore to have been in Madras (*vide* note to paragraph 22 of Mr. Bayley's pamphlet).

11. The only remaining question is the determination of a standard "measure of capacity"; and in respect to this, there appears to be a very general assent to Mr. Bayley's proposal to adopt the English quart. His proposals on this point entirely approve themselves to his Honor's judgment, so that his Honor need not say anything further in regard to it in this place, save that he agrees with Mr. Bayley in thinking that for solids, *struck* measures only should be allowed; and that his Honor considers it desirable in every way to encourage the preference, already shown in some parts, to use weights rather than measures.

12. His Honor believes that, so soon as standards of weights and measures under the four aspects named by Mr. Bayley shall have been determined on, no serious difficulty will be experienced in most parts of this province in authoritatively enforcing their exclusive adoption, after a reasonable time shall have been allowed for the introduction of the change, more especially if the instrumentality of municipal committees, chowdries, zaildars, and other leading men, be largely employed for making the objects aimed at intelligible to the bulk of the people. Instances have been quoted in the foregoing remarks of the very general adoption of new standards without any occasion for the resort to coercive measures; and, from inquiries which have been made, it has been ascertained that the efforts to which Colonel Lake alludes, as  
having

having been made by him when Commissioner of the Jullunder division, have proved to a very great extent successful; still, the Lieutenant Governor is not prepared to advise that an introduction of fixed standards, to be exclusively adopted on pain of punishment, be authoritatively prescribed for all parts from any given date. But his Honor would leave a discretion to local governments to introduce them from time to time in such districts and from such dates as may appear to them expedient, though in all large towns and cantonments, as well as in all Government transactions, he considers that they might, with advantage, be almost immediately introduced, as recommended by Mr. Bayley in his admirable pamphlet.

13. Besides the question of adopting a single standard of each description, Mr. Bayley enters also into the question of the multiples and sub-divisions of each which will be most appropriate. The correspondence which has been circulated contains also remarks by other parties on his suggestions. But the Lieutenant Governor does not think it necessary here to enter on this part of the subject, beyond remarking that Mr. Bayley's proposals appear to his Honor to be in every case judicious, and they have evidently been considered by him with much care, caution, and research.

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From Lieutenant Colonel *E. Lake*, Financial Commissioner, Punjab, to *T. H. Thornton*, Esq., Secretary to the Government of Punjab (No. 296); dated Lahore, 6 May 1865.

I HAVE the honour to acknowledge the receipt of your Letter, No. 236, dated 4th November 1864, with enclosures, which are herewith returned, regarding the introduction of an uniform system of weights and measures.

2. Among the selection of papers which have been published on the subject, there is one at page 217, by W. H. Bayley, Esq., of the Madras Civil Service, which goes so fully into the matter, and the suggestions in which are so suitable to the circumstances of India, that it is quite unnecessary to travel over the same ground in the present communication merely to offer my opinion on the conclusions at which he has arrived; and which, at page 230, are detailed as follows:—

I. For linear measure, the English yard or foot.

II. For land measure, the acre, decimally sub-divided.

III. For weight, the seers of 2 lbs. avoirdupois, corresponding to  $77\frac{3}{4}$  rupee-weight, with a multiple of a *mun* of 50 seers (= 100 lbs.) and sub-multiples of annas, or 16 lbs. of seers.

IV. For measures of capacity, a seer measure identical with the English quart, and defined as containing 97 tolahs of water at a temperature of  $84^{\circ}$ , containing when struck about a seer weight of mixed grain, with a multiple of sotee, or 100 seers, and sub-multiples of *atees* or eighths.

3. I concur in the advisability of all these proposals, with the exception of the third, for fixing the weight of a seer at  $77\frac{3}{4}$  rupees. Admitting that the extension of railways and the growing trade with the sea-board renders it highly desirable that the Indian seer should be an exact multiple of the English pound avoirdupois, the people have become so accustomed to the seer, which is equal to 80 tolahs in weight, that any change in it now would cause much confusion and inconvenience; and, altogether, the objections to the modifications proposed appear to me greater than the advantages to be gained. Not only the present seer, but all its sub-multiples, can be readily tested by the current coin of the realm; whereas as a *chittack*, or the sub-multiple of Mr. Bayley's proposed seer, could not be thus tested.

4. As regards land measure, the British authorities in the Punjab have had virtually to fix the standard of the *ghumao* now in use in different districts. In some, like Seal-kote and Googaira, it has been made exactly an acre; in others, like Goordaspore and Umritsur, it is somewhat less. But there is a striking want of uniformity throughout the Punjab; I think this is very much to be regretted; and, when revised settlements are effected, the opportunity should be taken, if not for prescribing uniformity, certainly for assimilating the standards, so that if the *ghumao* were not an exact acre, it might always be a sub-multiple of that measure. The *háth*, or cubit, is the unit of land measure in the Punjab, and could not be fixed at half an English yard, as suggested in the correspondence, without deranging the superficial measures. At the same time, as in Madras, so in the Punjab, the English yard and foot are so well known, and so much used, that their adoption may be safely advocated.

5. Although native measures of capacity are largely in use in some parts of the Punjab for grain, I am not familiar with them; and the natives are becoming so familiar with the standard seer that they now often weigh grain in preference to measuring it. Thus in the Kangra District, where the out-turn of the harvest is always calculated by *topees*, *teemmus*, and *mancees*, the measures of capacity with which the people are most familiar when they sell their products, it is by a weight known under the local name *bhuttee*, which is exactly equal to two seers.

6. Here I would observe that in most parts of the Punjab the people recognise a pukka seer and a kutchra seer with all their multiples and sub-multiples. The pukka seer is the standard weight introduced by ourselves; the kutchra seer is the weight familiar to themselves; it varies in different localities, but in the Jullunder Doab, two and a half seers kutchra are equal to our standard seer.

7. Some years ago, I introduced an uniform system of weights throughout the Jullunder Division, requiring the people to supply themselves with iron weights, which were tested and stamped by the chowdrees of bazars and others. At the same time, I notified that there was no objection to the kutchra seer being used, provided it was of the standard weight; so that two and a half kutchra seers were equal to the standard seer.

8. It is true that the standard seer, or its sub-multiples, are not solely in use in the Jullunder Division, for with sugar and some other products it is the custom to buy according to one weight, and sell according to another; but I was requested to put an end to this practice; and I may safely add that the standard seer, or its sub-multiples (under which term I include the kutchra seer), are more largely in use than any other. At the same time it is hopeless to expect that the standard weights will solely be adopted until the use of all others is prohibited by authority.

9. From the absence of all opposition in the Jullunder Division to the measures I took for the introduction of standard weights, as well as from their being so largely in use in other parts of the Punjab, I believe the use of all other weights might be authoritatively prohibited without risk of any kind, and with great advantage to all parties concerned; this also appears from the reports of the municipalities of Lahore, Umritsur, and Delhi, who have now been consulted by the Lieutenant Governor.

10. It might be advisable to defer passing orders regarding measures of capacity until we are better informed regarding them; and it might be politic to exempt, in the first instance, the Trans-Indus Districts; but for the Punjab generally there would be no objection to the issue of a notification fixing a period after which a standard metrical system would be adopted, and after which the use of any other would be prohibited. This would be better than to gradually extend the system, as suggested by Mr. Bayley.

11. The records of this office show that, in 1860, information was called for from all districts as to the weights and measures in use. From these, statements have been compiled in this office, which are herewith submitted; but, as the information thus received does not appear to be very full or very reliable, I purposely abstain from commenting upon it.

## WEIGHTS.

Used by Goldsmiths and Bankers	-	-	Khas khas	-	-	-	( 8 = 1 chawal).
			Chawal or grains	-	-	-	( 8 = 1 rutti).
			Rutti	-	-	-	( 8 = 1 masha).
			Masha	-	-	-	(12 = 1 tolah).
			Tolah	-	-	-	( 5 = 1 chittack).
For general use	-	-	Chittack	-	-	-	(16 = 1 seer).
			Adh-pao	-	-	-	( 2 chittacks).
			Pao seer	-	-	-	( 4 " ).
			Adh-seer	-	-	-	( 8 " ).
			Seer	-	-	-	(16 " ).
			Dharri	-	-	-	( 5 seers).
			Dhoun	-	-	-	(20 " ).
			Mun	-	-	-	(maund, 40 seers).
Sealkote	-	-	Manee	=	4	pandee.	} Used by the agriculturists in weighing grain, &c.
			Pandee	=	12½	paees.	
			Paece	=	4	topees.	
			Topee	=	4	puropee.	
Puropee varies from 7 to 8 chittacks according to locality.							
Umballah	-	-	Pukka seer	=	little more than 2 lbs.	(general use).	
			Cutchra "	=	36	tolahs.	
Simla	-	-	Cutchra seer	=	36	tolahs	} Weighing grain, &c.
			Rutti	=	5	seers	
Rhotuck	-	-	Chittack	=	2 oz., 7 pennyweight and 12 gr.	} Weigh- ing grain.	
			Seer	=	2 lbs. 6 oz.		
			Mun	=	100 lbs.		

Sirsa	- - -	{ Mun bagri	= 25 seers.	} Weighing grain.
		{ „ Seikh	= 17 „	
		{ „ Wuttoo	= 48 „	
Jhujjur	- - -	{ Shahjehanee mun	= 35 seers.	} Weighing grain.
		{ Dharree	= 4 „ 6 chittacks.	
		{ Seer	= 14 chittacks.	
		{ Powa	= 3 „ 2½ tolabs.	
		{ Chittack	= 4⅔ of a tolah.	
Jhung	- - -	{ 1 Mun	= 9.6 lbs.	} Weighing grain.
		{ 1 Seer	= 2.40 „	
		{ Chittack	= 0.15 „	
Dera Ismael Khan	- - -	{ 1 Seer	= 2½ lbs.	
		{ 1 Mun	= 100 „	
		{ 1 Pau.		
		{ 1 Purupa	= 1 lb. 15 oz.	
		{ 1 Topah	= 7 lbs. 8 „	
		{ 1 Paee	= 1 gr. 2 lbs. 14 oz.	
		{ 1 Chouth	= 4 „ 11 „ 6½ „	
		{ 1 Chutthee	= 16 „ 9 „ 10 „	
		{ 1 Puth	= 65 „ 10 „ 8 „	
Jhelum	- - -	{ 1 Bahadoor Shahee chittack	= 4 tolabs 7 mashas.	} Weighing goods.
		{ 1 Powa	= 3½ chittacks.	
		{ 1 Seer	= 15 „	
		{ 1 Mun	= 37½ seers.	
Huzara	- - -	{ 1 Seer	= 2 Co.'s Rs. in excess of 2 lbs.	} Weighing goods.
		{ „ Zemindaree	= „ „ „	
		{ „ Lahoree	= 18 „ „ „	
		{ Bahadoor Shahee	= 10 „ „ „	

(Used in the Kurral and Dhoond countries.)

## MEASURES OF LENGTH.

*General.*

Guz, yard	= 36 inches.
Hâth, cubit	= ½ yard.
Girah = 3 fingers	= 16 = 1 yard.
Kurroo	= 4 feet 6¾ inches.
Coss	= 6,120 feet.
Moura hâth	= 24 inches, for measuring cloth and the sink of a well.
Kurum	= 5 feet.
Git, 4	= yard.
Kan = 3 kurums, or 445	= coss.
Ungli	= ¾ of an inch.
Moosht	= 2.75 inches.
Span	= 8.25.
Gantha	= 2 yards 2 feet 3 inches.
Jarib, or chain	= 10 rods, poles or perches.
Jow	= one-eighth of an inch.

*Local.*

Leia	- - -	{ Bilauk	= 2 feet 9 inches.	} Land Measure.
		{ Kurum	= 5½ feet.	
		{ Coss	= 1¼ mile.	
		{ Guz	= 44 inches.—Cloth Measure.	
Dera Ismael Khan	- - -	{ Coss	= 1½ mile.	} Land Measure.
		{ Kuroh	= 2 paces.	
Dera Ghazi Khun	- - -	Guz	= 5.4 yards.—Cloth Measure.	
Rawul Pindie	- - -	{ Lahoree yard	= 38 inches.	} Cloth Measure.
		{ Bahadoor Shahee	= 32 „	
		{ Toonda yard	= 26 „	
Hoshiarpore	- - -	24 Tussoos	= 1 Akbaree yard.—Wood Measure.	
Kangra	- - -	{ Pbaari guz	= 8 chireeks, 1 chireek = 4 giras.	
		{ Guz, pushmeena	= 18 giras.	
Lahore	- - -	Yard	= 38.5 inches.—Cloth Measure.	

## PAPERS RELATING TO

Umballah	-	-	{ Bahadoor Shahee guz = 32 inches--Used by Weavers. Shahjehanee guz = 34 " Used by Masons.
Loodianah	-	-	{ Ungli = 0.88 inches. Chappa = 3.51 " Kudam = 5 feet 6 inches.
Delhi	-	-	{ Hâth, or cubit = 1 foot 4.5 inches } Long Measure. Guz, or yard = 2 feet 9 " }
Goorgaon	-	-	Guz = 33 inches.
Nuh	-	-	Guz = yard and a hand.
Kurnaul	-	-	Guz = 32 inches. -- Cloth Measure.
Hissar	-	-	{ Kutcha guz = 2 feet 2 inches. } " = 2 " 5 " } Among Zemindars. " = 2 " 3 " " = 1 " 11 "
Sirsa	-	-	Moran hâth = 22 inches.--Measuring Cloth.
Rhotuck	-	-	{ Kutcha guz = 2 feet 9½ inches.--Used by Tailors. " = 2 " 2 " " Weavers.
Jhujjur	-	-	{ Poras = 2 yards. Shahjehanee guz = 2 feet 10 inches.
Mooltan	-	-	{ Mooltanee guz = 32 tussoors = 3 feet 10 ins. } Cloth " = 24 " = 2 " 10½ " } Measure.
Mozufferghur	-	-	{ Sooltanee guz = 1 yard 10½ inches. Mooltanee guz = 1 " 8 " Khyrepore = 1 " 6½ " Allypore = 1 " 4 "
Jhelum	-	-	{ Tussoo = 1½ inch. Hâth = 1 foot 10 inches. } Land Measure.
Guzerat	-	-	{ Coss, Shahjehanee = 3.5 miles, English. Jarib = 13.2 poles. Doree = 5.6 " Gunteh = 3 yards 24 inches. } Land Measure. Dund = 2 " 16 " Guz = 44 inches. Bâl, or hair of a horse = 0.10 "
Peshawur	-	-	{ Shahee yard = 3 feet 4½ inches.--Measuring cloth, silk, and shawls. Akalee yard = 3 feet 2½ inches.--Cloth measure. Bahadoor Shahee = 3 feet.--Measuring loongees.
Kohat	-	-	Guz = 3 feet 2½ inches.--Cloth measure.
Huzara	-	-	{ Bahadoor Shahee yard -- Varies to ½ an inch under the standard. } Cloth measure. Soobakhanee yard = 37 inches. Akalee = 37 " Joolabee = 34 " Hâth = about 21 inches. } Long measure, Karum = 63 inches. } land and cloth.

## MEASURES OF SOLIDITY.

Not known in Kohat, Huzara, Rawul Pindee, Dera Ismael Khan, Dera Ghazi Khan, Mooltan, Delhi, Goorgaon, Kurnaul, Rhotuck, and Sirsa.

*In Simla.*—Measures are used only in calculating the weight of limestone, kunkur, and sissoo and saul beams, thus—

3 maunds, lime	=	2 feet, cu bic.
32 " stone	=	1 yard "
1 " kunkur	=	1 foot "
1 (beam) wood	=	1 " "

*In Loodianah.*—Cubic measures are made by the hâth, except where Government employés understand English measure.

*In Ferozepore.*—There is no specific superficial measure in use. By the usual process of cross-multiplication, length measures are converted into cubic measure.

*In Goojranwallah.*—The "half guza" is used, which is 16½ inches of the English yard measure, or 33 inches for full guz. This guz is divided into 24 tussoos, and each tussoo is little less than 1½ inch, or little more than 1½ inch. The "half guza," and not the full guz, is the measure usually employed in building.

*In Umballah and Thanesur.*—There is no fixed standard for measuring solids. The contents

contents are arrived at by ascertaining the length, breadth, &c., by the local yard, and multiplying them together.

Lahore	- - -	1 Tussoo	= 33½ inches.		
Peshawur	- - -	Architectural measure,	measuring timber and buildings,	2 feet 9 inches.	
Jhelum	- - -	{ Tussoo	= 1½ inch.		
		{ Hâth	= 1 foot 10 inches.		
Guzerat	- - -	{ Guz	= 33.50 inches.		
		{ Taswassa	= 1.39 "		
Leia	- - -	{ Mookassur hâth	= 10.648 cubic inches.		
		{ " guz	= 85.184 "		
Googaira	- - -	1 Tussoo	= 1 inch.		
Moozufferghur	- - -	24 Tuswassas	= 1 tussoo.		
Jhung	- - -	{ Guz	= 2.792 feet.		
		{ Tussoo	= 0.116 "		
		{ Taswassa	= 0.0485 "		
Jhujjur	- - -	Guz	= 2 feet 10 inches.—Measuring buildings.		
Hissar	- - -	Guz Shahjehanee	= 2 " 9 " " "		
Jullunder	- - -	} 24 Tussoos	= 1 guz.—Measuring timber and buildings.		
Umritsur	- - -				
Sealkote	- - -				
Umritsur	- - -	24 Tuswassas	= tussoo.		
Sealkote	- - -	4 Paens	= tuswassee.		
Goordaspore	- - -	1 Tussoo	= 795 cubic inches.		

This measurement is used in purchasing wood. The tussoo and its aliquot parts have an anomalous application, being actually lineal measurements, and are equated as follows:—

Tuswassa	= 0.058 of an inch.
24 "	= 1 tussoo = 1.4 of an inch.
24 Tussoos	= 1 guz = 2 feet 9.8 inches.

Hooshyarpore	- - -	1 Tussoo	= 576 cubic tuswasees, or 6.7ths of a cubic yard,		
			× 20 cubic inches.		
Kangra	- - -	{	Inches—1,728	= 1 foot	} Building.
			27 feet	= 1 yard	
			1 tussoo	= 1½ inch	} Timber.
			26½ "	= 36 inches	
			= 1 yard		

#### LAHORE COMMITTEE, DATED THE 29TH JANUARY 1866.

REPORT of the Proceedings of a Committee assembled pursuant to Letter (No. 1384), of the 7th July 1865, from the Secretary to Punjab Government to the Commissioner of Lahore Division, to consider and report upon the subject of introducing one uniform standard of Weights and Measures in the Punjab, composed of the following Members:—

*President.*—Major O. J. McL. Farrington, Officiating Commissioner.

*Members.*—W. Purdon, Esq., Civil Engineer, Officiating Superintending Engineer, 3rd Circle.

H. Cope, Esq., Assistant Agent, Punjab Railway.

2. The whole of the correspondence, forming enclosures to the above communication, were carefully perused and fully discussed.

3. The opinions of the Municipal Committees of Lahore, Delhi, and Umritsur appeared clearly in favour of one uniform standard being fixed; the committee are of opinion that, on this point, there can scarcely be doubt; the fraud and confusion that arise are at once apparent. They, therefore, unhesitatingly admit the necessity of a uniform standard, and proceed to record their opinion as to the nature of the standard they would propose, and how they would advocate its introduction.

4. The letter of the Financial Commissioner, No. 291 of the 6th May 1865, to the Secretary to Punjab Government, and Mr. W. H. Bayley's (Madras Civil Service) memorandum on weights and measures, were brought more directly under consideration.

5. As regards linear measure the committee would adopt the English yard or foot; this standard is very simple, and is becoming universally known.

6. For *land* measure they would adopt the acre. The decimal calculation might be made to apply.

7. The standard for weight is less easily disposed of, and admits possibly of a variety of opinions. On a careful consideration of the subject, however, the committee are about to recommend a standard which they cannot but think will be found to possess many ad-

vantages, amongst which may be pointed out simplicity and its adaptation to the coinage of the country.

8. The committee recommend the adoption of the *troy* weights and *tolah* unit; this plan would secure the assimilation of weights with the current coin (*viz.*, the rupee and *tolah*), and would, moreover, afford the decimal calculation; it would also give a ready mode of reckoning to those who are now in the habit of calculating in *kutchu* maunds until such time as they should become quite conversant with the new standard, thus—

$\frac{1}{4}$ th seer	= 8 oz. <i>troy</i>	= 4 chittacks.
$\frac{1}{2}$ "	= $1\frac{1}{2}$ lb. "	= 16 oz. <i>troy</i> , at 32 <i>tolahs</i> per lb. <i>troy</i> .
1 "	= $2\frac{1}{2}$ lbs. "	*
2 seers	= 5 lbs. "	= 1 <i>vutta</i> or 5 seers, <i>kutchu</i> .
4 <i>pucka</i> seers	= 10 lbs. "	
4 "	= 10 <i>kutchu</i> seers.	
90 <i>tolahs</i>	= 1 seer	= $2\frac{1}{2}$ lbs. <i>troy</i> .
40 seers	= 1 maund	= 100 lbs. "

The goldsmiths' weights, as at present existing, fall in with the above, thus—

1 <i>masha</i>	= 8 <i>ruttees</i>	= 15 grains <i>troy</i> .
12 "	= 1 <i>tolah</i>	= 180 grains <i>troy</i> = 1 rupee.

9. The committee were struck with the applicability of certain remarks of the Calcutta assay master in 1833, Mr. J. Prinsep, in his letter, dated 11th April 1833, to the Calcutta Mint Committee; and would here subjoin them:—

*Para. 25.* "The unit of weight has at all times in India been connected with that of the coin. The seer and maund in the Upper Provinces are invariably derived from the rupee; and whenever the Furruckabad rupee has been current, it has become also the unit of weight.

28. "The universal Hindee word *tolah* is much more expressive and simple, and the *tolah* of many parts of the country very nearly agree in weight with the unit now proposed; thus the system would accord at once with the practice and habits of the country, while it would fall, with wonderful convenience, into the scale of English *troy* weight."

10. The committee having, at their first sitting acknowledged the propriety of the above recommendations, resolved, before closing their report, to ascertain whether there were any obstacles to the introduction of the standard. For this purpose the following persons, from the traders of Lahore, were sent for:—

1. Ghomah Shah, merchant and banker.
2. Sheo Ram, chowdry, of Ukber Munde.
3. Gungaram, merchant.
4. Chujoo Mull, chowdry and trader.

11. These persons readily understood the tables, and asserted they were simple and presented no obstacles to introduction. On the subject of *measures of capacity* they appeared inclined to recommend that such measures should be allowed to obtain, as *zemindars* in many parts were accustomed to them for their grain.

12. The committee would observe that, as far as they can learn, measures of capacity for dry goods are rapidly disappearing; they consider this a subject of congratulation, and, therefore, this point need not further occupy their attention. Measures of capacity for liquids appear unknown; their introduction seems unnecessary.

13. It has been incidentally mentioned by Mr. Purdon, one of the members of this committee, that, owing to the decisive introduction of the British square and cubic measurement for timber, as well as earth and brickwork in the Department Public Works, the mode of country measurement is fast vanishing; and parties making sub-contracts amongst themselves insist on the British measurement. This would go some way to prove that new standards of measurement, provided they are simple, are not difficult of introduction.

14. The committee having recorded the standard that should, in their opinion, be introduced, consider when once Government has resolved on any particular standard, that reasonable notice should be given, after which the standard should be obligatory by legislative enactment, and the use of other than the Imperial standard be considered a punishable offence.

O. J. McL. Farrington, Major.  
W. Purdon, C.E.  
H. Cope.

\* *Vide* Financial Commissioner's letter, No. 296, to Secretary to Punjab Government, dated 6th May 1865, paragraph 5.

RESUMÉ of the Opinions of the Municipal Committees of Delhi, Umritsur, and Lahore, regarding a Uniform System of Weights and Measures for British India.

*Delhi.*—The authoritative introduction of the Imperial standard of weights and measures would be received with very great satisfaction by the public. At present there are three standards of measure, viz. :—

1. English yard.
2. Badshahee yard, a trifle shorter than the English.
3. Memaree yard, a trifle longer than the badshahee, but not so long as the English.

There are two standards of weights, namely :—

1. The Imperial seer of 80 tolahs.
2. The badshahee seer of 84 tolahs.

The existence of these different standards, in the opinion of the municipal committee, is quite unnecessary, and gives rise to much fraud and dissatisfaction.

Before the mutiny the badshahee pice, differing in value from the Imperial pice, was largely current in Delhi. Its use was prohibited by the military authorities after the mutiny, and it has disappeared. In like manner, in regard to weights and measures, all that is required is an authoritative order, and the evil will be remedied without any difficulty. Such a measure would not be deemed in any way oppressive by the public at large, but on the contrary a great boon.

*Umritsur.*—The municipal committee generally approve of the proposed measure. The establishment of one scale of Imperial weights and measures all over India would be, in the opinion of the merchants of that city, of great advantage to them, as their trade extends to Scind and Bombay, as well as to Peshawur and Cabul, and will, they expect, on the opening of the Delhi Railway, be carried as far as Calcutta.

*Lahore.*—At a meeting held in the city, the principal chowdrees, merchants, and native bankers unanimously replied they would like to see the present standards maintained. But the municipal committee consider that a uniform standard would be preferable. At present not only do the standards vary in places at short distances from each other, but even in one and the same place. This holds good in regard to standards of weights and measures of length and capacity.

They propose that the English yard be adopted as the standard as regards measurements of all descriptions.

They recommend in regard to weights, that the seer be the only standard, and that the seer should consist of 96 tolahs.

They would maintain the present standard of weight as regards medicines and jewels.

They would also maintain the present standard of weight as regards silver and gold, which is as follows :—

8 chawul, grains of rice	=	1 rutti.
8 ruttis	=	1 masha.
12 mashas	=	1 tolah.
5 tolahs	=	1 chittack.

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— No. 19. —

O U D E.

From *A. H. Harington*, Esq., Junior Secretary to the Chief Commissioner of Oude, to the Under Secretary to the Government of India, Home Department, Simla (No. 3080); dated Lucknow, 3 September 1866.

With reference to your letter, No. 3326, dated 2nd ultimo, and to previous correspondence, I am directed by the Chief Commissioner to forward the accompanying copy of the report of the committee appointed to consider the subject of the reform of weights and measures in Oude.



REPORT of the Committee appointed to consider the subject of the Reform of Weights and Measures in Oude; dated Lucknow, 11 August 1866.

THE committee appointed under the Government Resolution, dated 20th June 1864, to consider the best means of reforming the existing system of weights and measures in Oude, beg to report as follows:—

It appears necessary to treat only of the subject of weights, as that is the most important to the people generally, and the principles determining them can be applied to measures also.

It has been ascertained, both by reports and by conversation with dealers in all parts of the province, that the greatest possible diversity in the standard of weight obtains. The weight regulating almost all transactions between town and country is the cutcha *punj saree*, or five-seer weight; and this has been found to vary even in the same village. Further, it is generally represented by stones liable to great abrasion as well as fraudulent diminution.

Continued efforts have been made, since the re-occupation of Oude, to introduce the Government seer of two pounds. Iron weights were obtained from Roorkee, and distributed or sold in all the principal boroughs. In some markets these still appear to be used in retail sales of grain, but the original purchases are all governed by the *punj saree*.

The pukka seer formerly in use, and still most used in Lucknow, is equal to 96 tolahs in weight, the Government seer to 80 tolahs. The latter is so unpopular that, in 1865, a formal representation was made by the native members of the Municipal Committee concerning the pressure thereby inflicted on the people. It is possible that, for a short time, the dealers might, by a confusion of terms, succeed in selling at the reduced weight for the same price, but it is incredible that such an imposition could endure; still the feeling that the change militates against the common interests, greatly embarrasses any reform introducing a lighter than the customary weight, more particularly when prices are high as at present. It is not too much to say that the attempt to introduce the seer of two pounds has practically failed through the passive resistance of all classes.

The committee hesitate to recommend any approximation of the existing system to that obtaining in England. Such a change would only be from one bad system to another. It would be exceedingly disagreeable to the people of the country, and has no advantage to our own countrymen which cannot be otherwise more perfectly attained.

On the other hand, the French or decimal system is so simple as to ensure its own popularity. It is also generally in use amongst foreign nations, including the Americans, whilst it is far more intelligible even to the English than their own. The committee think it superfluous to repeat the details which have been so well given in the work published on the subject at Madras; but they may mention that their colleague, Maharajah Man Singh, has for some time past been in consultation with the native merchants as to the feasibility of making the proposed change, and has reported favourably thereupon, though, being obliged to leave for Simla, he has left the inquiry still incomplete.

It has been ascertained, however, that, on the plan advocated in the Madras work, the *punj saree* might be retained with an unappreciable variation from the present average; and Maharajah Man Singh has expressed himself decidedly that the business of the country with the towns might be regulated by a system of weights identical with the French without any difficulty. This the committee consider a cardinal point, as the towns would speedily follow suit.

It is stated that some traders, as meat sellers, tobacco dealers, &c., have for so long sold at a customary price, that, whatever variation of standard weight be made, they will make no difference, that a seer is a seer with them, without reference to its intrinsic gravity. There may be some exceptional cases of this sort; but if the new system be supported by the law, the public would, in course of time, not be losers. Indeed, such virtual fraud could only be attempted by strong monopolists.

If it were resolved to adopt the decimal system, it would be advisable to put in circulation simultaneously a decimal coinage; and, as the rupee is the uni-  
versal

versal popular test of the correctness of weights, it would be an advantage if it could be made an equal fraction of the seer weight.

This report has been been delayed partly by the President's absence in camp, and partly by the bankruptcy and disappearance of the native member originally appointed, namely, Shah Mukhun Lal. The committee could have wished to postpone its submission until the completion of Maharajah Man Singh's inquiries, but as the Government have pressed for its delivery, and the Maharajah can be conferred with at Simla, it is submitted in this imperfect form, conveying the distinct opinion that no change, except to the decimal system, is worth making.

*R. H. Davies*, President,

*C. W. Hutchinson*, Lieut. Col., R.E., Member.

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— No. 21. —

CENTRAL PROVINCES.

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From *C. Bernard*, Esq., Secretary to the Chief Commissioner of the Central Provinces, to *E. C. Bayley*, Esq., Secretary to the Government of India (No. 358-4278); dated Nagpore, 27 November 1865.

I AM directed to acknowledge your letter (No. 3154), dated 25th October 1865, inquiring what action has been taken on the Foreign Department Resolution (No. 3839), dated 20th June 1864, on the question of a uniform system of weights and measures for British India.

2. In reply, I am now desired to furnish the information called for, and to express the regret of the Chief Commissioner at the resolution of Government having, through inadvertence, remained unanswered.

3. In the month of June 1862, the subject attracted the attention of the Chief Commissioner, and a circular was issued to all officers, pointing out to them the necessity of adopting an Imperial standard. It was also stated that, as according to the general principles of free trade, the owner of any goods could himself fix the quantity he would give in exchange for money or other goods, and that, as a uniform standard of weights could only be enjoined as a matter of public convenience, all steps were to be avoided which would be of a coercive character; and endeavours were to be made only in free communication with the people themselves, in order to bring about the desired end.

4. District officers were also requested to call meetings of the chief traders of towns and villages, to inform them of the object in view, and to explain to them the advantages which would result from the adoption of a uniform standard. The district officers were also desired to present to each large community or corporation a complete set of Imperial and standard weights and measures, and to keep other sets ready for those wishing to purchase them.

5. A statement, showing the results of these measures, was published as a supplement to the local Gazette (copy appended), and those results were briefly as follows:

In the Nagpore Division the people agreed to adopt Imperial weights\* and the English yard measure, and some hundred sets of iron standard weights and yard measures have been made up and distributed among them. These weights are now to be found in the chief shops of all towns and most villages of the Nagpore Division.

\* Maund,  
Seer,  
Half-seer,  
Quater-seer,  
Tolab.

In the Jabulpore and Nerbudda Divisions a considerable number of these standard weights and measures have been distributed, and the adoption of them publicly proclaimed.

In the Upper Godavery District also the people have agreed to adopt them.

In the Chutteesghur Division, too, some progress has been made, though not to such an extent as elsewhere. Some pattern weights and measures have been made up and distributed among the people.

6. It will be seen, then, that no disinclination on the part of the people to adopt standard weights and measures has been apparent; and Imperial weights and measures have, to a considerable extent, superseded the variable standards in use in nearly every district in the Central Provinces.

7. I am to state that attention has also been given to the subject of a standard and uniform cubic measure of contents. In consequence, however, of there being much difficulty in fixing a suitable standard for this sort of measure, orders in respect of it were carried out in the first instance in the Nagpore District, where a meeting of influential merchants and traders was called, in view to determining a standard measure of capacity; and a measure called a "pylee" was, at the recommendation of the committee, fixed upon.

8. According to local custom the capacity of a pylee is  $84\frac{134}{135}$  inches; and this capacity, with a slight increase for the convenience of gauging, has been represented by a rectangular vessel of the following dimensions, viz. :—

$$3'' / 2'' + 3'' / 2'' + 7'' = 85.'' 75.$$

The standard thus fixed, having found favour with the people of the Nagpore District, has been introduced into the other districts of the Nagpore Division.

Orders were also issued for its introduction in the whole of the Central Provinces generally.

9. The several Commissioners have since reported that the pylee has been very largely adopted, while in some districts a local standard, somewhat differing from the Nagpore pylee, has been adopted.

10. In conclusion, I am to state that the Chief Commissioner hopes the Government of India will be pleased to consider that all that could be done in the way of introducing standard weights and measures in the Central Provinces has been accomplished, and that no necessity exists for convening a committee such as that suggested in the Foreign Department Resolution above quoted.

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SUPPLEMENT to "Central Provinces Gazette;" dated Nagpore, 21 February 1863.

#### WEIGHTS AND MEASURES.

For years past desultory attempts have been made in parts of the Nagpore Province to make some approach to a uniform standard of weights and measures. In some districts the attempts made were so far successful that the Imperial seer of 80 rupees weight, and the Imperial maund of 40 seers, were recognised, though not generally used in the bazars of cities and towns. Among traders in British stuffs the English yard measure was also known and employed.

In July 1861, the Commissioner of Nagpore called upon all district officers of the Nagpore Province for a statement showing the weights and measures in use throughout their districts. The Commissioner stated his intention to introduce a uniform standard of weights and measures, and invited Deputy Commissioners to express their opinion as to the feasibility of the measure. Replies received from district officers showed that the weights and measures in use throughout the Nagpore Province were numerous and variable. Such was the variety in weights that a seer in one village often did not weigh the same as a seer in the next village. A seer of wheat did not weigh the same as a seer of butter, and a seer of cotton wool was different in weight from a seer of any other commodity. Weights obtaining one day were sometimes altered the following day in the same bazar. In linear measure the cubit of a man was the general unit of measurement, and this of course varied with the length of each man's arm. In measuring distances the koss was the unit of measurement, but the length of a koss was not the same at all times and in all places; for instance, in some districts a koss was the extreme distance at which the lowing of cattle could be heard. A unit of measurement more variable than this last it would be difficult to imagine. The names of the measures of grain were the same all over the country, and these measures were generally referable to a unit of weight. But, though the names were identical, the values of the measures differed widely,—the *kundy* of wheat ranged from 120 to 300 Imperial seers. When such a diversity of weights existed, it was not difficult for retail traders to keep one weight for buying and another for selling.

The result of the inquiry made by Colonel Elliot was, that the wisdom of introducing a uniform standard of weights and measures became more apparent than it was before. District officers reported that no great difficulty need be anticipated in introducing Imperial standard weights, and the English yard measure. It was stated that intelligent traders in all

all large towns were willing to adopt the Imperial seer. An ignorant distaste for all novelty might cause some unwillingness to adopt new weights on the part of the less intelligent retail traders in small towns and villages; but it was anticipated that this would soon wear off when Imperial weights should be in general use in the bazars of large towns.

The Central Provinces were formed into a separate administration; and it was believed that, in the bazars of the Saugor and Nerbuddah territories, weights and measures were nearly as uncertain and variable as they had been found to be in the province of Nagpore. On the 4th June 1862, the Official Chief Commissioner addressed a circular to all civil officers in the Central Provinces, instructing them to do their best to introduce a uniform standard of weights and measures into the districts under their control. The following steps were indicated as most likely to secure the end in view:—District officials were to call meetings of traders at all cities and towns, inform them of the object in view, and explain the ultimate advantages likely to ensue if the proposed measures were carried out. To every large corporation was to be presented a set of Imperial standard weights from the quarter chittack up to the seer of 80 rupees weight, it being explained that 40 seers went to the maund. An English yard measure, with feet and inches marked on it, was also to be given. It was recommended that uniform vernacular names should be assigned to these new weights and measures. The weights were to be called *Sircaree wuzun*; the yard measure to be called *Sircaree guz*. As there exist no corresponding vernacular expressions for the English foot and inch, the English names were to be assigned and carefully explained. In order to facilitate the general adoption of standard weights and measures, it was ordered that sets of Imperial standard weights and English yard measures should be made up and kept in store at all large towns, and at sub-divisional Revenue Offices, to be sold at cost price to all applicants. Measures of cubic content being almost unknown in the Central Provinces, matters were not ripe for introducing dry or liquid measures. But district officers were requested to keep the matter in view, and report whether the people were ready generally to adopt any uniform dry measure which might be introduced. It was explained to district officers that, while carefully avoiding any steps that might be felt vexatious, or might savour of coercion, they were diligently to endeavour, in free communication with the people themselves, to effect the desired change:—

During the last six months district officers of the Central Provinces have been devoting more or less attention to the matter. The result of their operations is briefly given below.

#### NAGPORE DIVISION.

*Nagpore*.—At a meeting of the principal merchants and traders of the city of Nagpore in August last, it was unanimously decided to adopt the Imperial standard weights of 80 rupees to the seer, and 40 seers to the maund. The adoption of the English yard measure was also considered desirable. Since then some hundred sets of iron standard weights have been made up, and for the most part sold at one and a quarter rupees per set. In the neighbourhood of Nagpore British troops have been cantoned for nearly 50 years, and the introduction of English weights was easier here than in wilder districts. It is believed that not only in the city of Nagpore, but also in the towns and villages of the district, Imperial standard weights will come into general use to the exclusion of all other weights. It does not seem so certain that the English yard measure will be adopted.

*Bhundarah*.—Here, too, the people have declared themselves ready to adopt Imperial standard weights and the English yard measure. They ask, however, that sets of standard weights be furnished to them. Sets of iron weights were being made up at Nagpore, and by this time are being distributed. Pattern yard measures were also to be furnished. The people of Bhundarah expressed a wish for the introduction of some standard measure of capacity for dry and liquid measure. The Deputy Commissioner is making inquiries, with a view to recommending some well-known measure of cubic content for general adoption.

*Chandah*.—The chief traders in this town and district have adopted Imperial standard weights. It is said that they are already familiar with the English yard measure. A slight mistake was committed at starting, in making the seer equal to 80 tolahs instead of 80 rupees. This has been corrected; and the advisability of dividing the yard into feet and inches, instead of into the native sub-divisions, *girrahs*, has been pointed out.

*Wurdah*.—Traders have agreed to adopt Imperial weights and the English yard measure. Here, as in Nagpore, sets of iron weights, with a distinctive stamp on each weight, have been distributed at cost price. Pattern yard measures are to be made. In the great cotton marts of this district the introduction of the Imperial seer and maund will be a great boon. When cotton comes to be carried by railway, the *bhoja*, or bullock load, will cease to be a convenient unit of weight in buying and selling cotton. This should be pointed out, and the adoption of Imperial standard weights urged on the traders of Hingunghat, Arvee, &c.

#### JUBBULPORE DIVISION.

*Jubbulpore*.—In this district Imperial weights and yard measures are in general use. Three thousand three hundred and forty-eight weights (from one chittack to five seers) have

been distributed to applicants at cost price. Two hundred and nineteen graduated yard measures have also been applied for and distributed. The words *Sircaree uzun* have been stamped on the weights, and *Sircaree gaz* on the yard measures. It has been publicly notified throughout the district that traders have adopted the new weights and measures. In the Jubbulpore cantonment the English yard measure has been introduced. Imperial weights were in use previously.

*Chindwarrah*.—The people were anxious to adopt standard weights and measures. Four hundred sets of Imperial weights have been distributed to applicants in the towns of the Chindwarrah district. Eighty yard measures have also been distributed. Weights and measures are stamped and marked as they are in Jubbulpore. A notification similar to that made in Jubbulpore has been published in Chindwarrah.

*Mundlah*.—There are few towns in this district. One hundred sets of standard weights and nine yard measures have been distributed. The general adoption of the new weights and measures has been publicly notified. The Deputy Commissioner has distributed 13 oil measures. It is not, however, stated what is the standard of cubic content he has adopted. He has been directed to suspend the issue of measures of cubic content, and to report on the measure he considers to be fitted for general adoption.

*Nursingpore*.—Considering that this is a rich and populous district, full of large towns, the progress towards the introduction of uniform weights and measures has not been so great as might have been desired. Years ago standard weights were distributed in some of the principal towns, and, since receipt of the circular of July last, something more had been done in the same direction, and a contract was given to a mechanic of Nursingpore for the supply of sets of standard weights and of pattern yard measures. One man could not supply as many weights and measures as were wanted; and, at the instance of the Commissioner, pattern weights and measures have been sent to the several revenue sub-divisional head quarters; and mechanics in the principal towns are turning out sets of standard weights and pattern yard measures. It is anticipated that, by the end of this cold weather, the new weights and measures will have been adopted throughout Nursingpore.

*Seonee*.—This district is thinly populated, and has few considerable towns. The Deputy Commissioner delayed taking action in the circular of July, and in consequence little has yet been done. About 100 standard weights and measures have been distributed. But it cannot yet be said that Imperial standard weights and the English yard measure have been adopted generally by the traders of the Seonee district. The Deputy Commissioner has been instructed to take the matter up a little more warmly.

The Commissioner reports that, except in Mundlah, nothing has been done towards introducing any standard measure of content. Besides the Deputy Commissioner of Mundlah and Chindwarrah, none of the Deputy Commissioners of the Jubbulpore division have paid attention to the matter. The Commissioner, for his part, believes that if officers set about it properly there would be no prejudice on the part of traders against the adoption of a standard measure of cubic content. He suggests the manufacture and distribution of a few measures containing 500 and 1,000 cubic inches.

#### SAUGOR DIVISION.

*Saugor*.—In the towns of this district more than 400 sets of Imperial standard weights have been distributed. The weights are all stamped. At each revenue sub-division a set of stamps and a pattern yard measure are kept, so that sets of standard weights and measures can be made up and distributed to applicants. The standard weights, kept at the revenue sub-divisions, are to be used as tests by which any doubtful weights which may be used in bazars are to be tried. Proclamation has issued that traders of the Saugor district have adopted Imperial standard weights and the English yard measure, to the exclusion of other weights and measures. In the Saugor cantonment Imperial standard weights have long been in use. As in the district, so in the cantonment, the *gaz*, sub-divided into *girrahs*, used by clothiers, is being converted into the English yard measure, graduated to feet and inches.

*Hoshungabad*.—Eight hundred and fifty-four sets of Imperial standard weights and 103 pattern yard measures have been made up and distributed to traders and mechanics in the Hoshungabad district. More are being applied for, and will be made up and sold. Proclamation has issued here as in the Saugor district.

*Dumoh*.—One hundred and ninety-six sets of Imperial standard weights and 42 pattern yard measures have been made up and sold to applicants. The Deputy Commissioner reports that the traders of Dumoh are glad to buy and use the new weights and measures. A set of standard weights and a pattern yard measure are kept at each sub-divisional head quarters and at each police station-house. The general adoption of the new weights and measures has not been proclaimed in the Dumoh district.

*Baitool*.—Sets of Imperial standard weights and pattern yard measures have been made up and distributed. Patterns are kept at each sub-divisional head quarters and at each police station-house. It is reported that many traders have availed themselves of the opportunity

opportunity to re-cast their weights on the pattern of the Imperial standard weights. The general adoption of the English yard measure and Imperial standard weights has been proclaimed.

The Deputy Commissioner of Saugor is the only officer in this division who notices the subject of measures of cubic content. He is of opinion that traders are so wedded to their old measures, referrible to a unit of weight, that they will not readily adopt standard measures of cubic content.

#### CHUTTEESGHUR DIVISION.

In this division but little progress has been made towards the decided end. The Commissioner has sent to Calcutta for pattern weights and measures. The district officers promise to do their best to introduce Imperial standard weights and the English yard measure. Difficulties that do not exist elsewhere stand in the way of all reforms in the Chutteesghur Division. Still weights sufficiently accurate for all practical purposes, and pattern yard measures sufficiently exact, could have been made up at Nagpore and Raepore. When once a pattern is obtained, the rudest blacksmith can fashion weights, and the most unskilful carpenter can make yard measures. It is hoped that district officers will do something themselves, and will invite traders to co-operate in introducing Imperial standard weights. That there is a cereal glut in the markets of Chutteesghur is beyond doubt. When the Eastern road and its feeders are completed, the existing corn trade between Raepore and Nagpore will be vastly increased. The introduction into Chutteesghur of the same weights that are in use at Nagpore will do something to quicken the traffic in corn.

#### UPPER GODAVERY DISTRICT.

The merchants of Sironcha and other towns in this district have agreed to adopt Imperial standard weights and the English yard measure. Some few sets of weights and pattern yard measures have been made up and distributed. The Deputy Commissioner reports that traders are not inclined to adopt any standard measure of cubic content.

#### GENERAL REMARKS.

From the above review it may be gathered that traders and the public generally are quite ready to adopt uniform standard weights and measures. The keeping of patterns at convenient places has been enjoined, in order that merchants and dealers may be able to re-cast their weights on the model of Imperial standard weights, and clothiers may graduate their guz measures to feet and inches, as English yard measures are graduated.

It is doubtless true that traders and the public generally are less inclined to adopt uniform measures of content than they are to use Imperial standard weights and the English yard measure; but, as the Commissioner of Jubbulpore remarks, much may be done if officers go the right way about it; steps are being taken to ascertain what measures of content are already in general use, and what are most suitable for general adoption throughout the Central Provinces.

Published by Order of the Officiating Chief Commissioner,

*C. Bernard,*  
Officiating Secretary to Chief Commissioner,  
Central Provinces.

— No. 22. —

## BRITISH BURMAH.

From Captain *G. E. Fryer*, Assistant Secretary to the Chief Commissioner of British Burmah, to *E. C. Bayley*, Esq., Secretary to the Government of India, Simla (No. 294—2003); dated Rangoon, 13 September 1866.

IN compliance with the request contained in your letter, No. 3325, of the 2nd ultimo, I am directed to submit this Office Letter (No. 272—810), dated 14th November 1864, with enclosures, addressed to the Secretary to the Government of India, Foreign Department, on the subject of weights and measures.

From Major *H. Nelson Davies*, Secretary to the Chief Commissioner of British Burmah, to Colonel *H. M. Durand*, c.B., Secretary to the Government of India, Foreign Department (No. 272—810); dated Rangoon, 14 November 1864.

I HAVE the honour, by direction of the Chief Commissioner, to acknowledge the receipt of docket No. 611, dated 7th July last, from Mr. Under Secretary C. U. Aitchison, forwarding copy of resolution by the Right Honourable the Governor General of India in Council, in the Home Department, under date the 20th June 1864. This resolution refers to the various systems of weights and measures in British India, and directs the assembly of a committee of well-selected persons in each province to report on that important subject.

2. Having received this resolution, I, on the 15th of August last, circulated it to the three divisions of this province, with a minute, and directed a committee to be formed at each chief town, namely, at Rangoon, at Moulmein, and at Akyab.

3. I now beg to submit a copy of that minute and of the report of each

From the Commissioner, Tenasserim (No. 486), dated 13 September 1864, and Report of Committee at Moulmein, dated 29 August 1864.

From the Local Committee of Rangoon, to the Secretary to the Chief Commissioner, dated 5 September 1864.

From the Commissioner of Arracan (No. 105), dated 16 September 1864, and Report of the Akyab Committee, dated 12 September 1864.

committee as noted in the margin, together with the letters transmitting them. Each committee was well selected. Each contained men of considerable official standing and ability in this province, and merchants of the longest and widest experience.

4. It may be premised that the Burmese system of weights and measures is used throughout the whole country, and also (which is important to be noted) in the adjoining countries to the eastward. The mode by which grain is sold is universally by measure, whether in wholesale or retail transactions. The whole of the grain now shipped from the several ports and exported by river—which trade amounts annually to 450,000 tons—is purchased entirely by measure.

5. The standard grain measure of Burmah is called “a basket or bushel.” The royal standard basket at the capital contains a capacity very nearly identical with the English bushel of 2218·192 cubic inches. On this account a basket of that exact capacity was introduced, some years ago into all bazars throughout Pegu, for retail transactions. It is also used at the frontier custom houses; but as it would have been impossible to introduce this standard basket into the country generally without a legislative Act, no attempt was made to do so. The consequence is that the size of baskets for the sale of grain throughout the country varies almost at every village, though all are intended to be of the original capacity sanctioned under the Burmese Government.

6. All the committees unanimously agree that the Burmese method of selling grain by measure must be preserved; and that, in order to have one general and fixed standard, the English “Imperial bushel” should be adopted. In that standard

standard measure and its fractions all sales, wholesale and retail, should be made; and the use of that measure should be compulsory. Twelve months' notice probably should be given, in order that people may be made aware of the law, and have time to provide themselves with standard measures properly stamped. The time when it should take effect is from June to November, when the change would cause least inconvenience. These measures should in the first instance be made by Government, and be sold at cost price to the people. They should be made of wood, but standard ones of metal should be made to be retained in Government offices.

7. Mention has been made in the committees' reports of liquid measure, but for the ordinary transactions of the country the grain measure and its fractions will suffice. These are given in the margin. In Arracan, where the basket or bushel is smaller than in the rest of British Burmah, the half bushel or *kliwai* will constitute the standard.

4 tsalays	=	1 byee.
2 byees	=	1 tsaroot.
2 tsaroots	=	1 tseit
2 tseits	=	1 kliwai.
2 kliwais	=	1 ten or bushel.

8. As regard weights, the committees consider that the Burmese weights now universally used should be retained; a fixed standard be legalised, and the use of it enforced. But the Arracan committee recommend that the Indian maund and seer should be introduced.

9. The Chief Commissioner admits that there is an immense advantage in the ponderary system being founded on the coin. But he considers it will be found impracticable to supersede the weights now universally used throughout the country. The foundation of these is the tickal, which is stated by Prinsep to weigh 252 grains troy. One hundred tickals equal one viss, which is exactly 365 pounds avoirdupois and 140 tolah weight. The committees, and especially the committee of Rangoon, strongly recommend that no change shall be made in this system, and consider that a change would in fact be impracticable. In this the Chief Commissioner entirely concurs.

10. English weights are used in the sale of all European goods in the shops of the seaport towns. It appears, then, that the weights of British Burmah should be left alone; and the capacity of the "basket or bushel," to be used in lieu of the ordinary existing uncertain measure, to be declared to be 2218.192 cubic inches; the use of the same to be made compulsory under penalties, and 12 months' notice to be given before it is brought into use. The time when it is brought into use to fall between the months of June and November when commerce is less likely to be inconvenienced by the change than if introduced at any other period of the year.

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MINUTE by the Chief Commissioner of British Burmah, on the subject of Weights and Measures for British Burmah; dated Rangoon, 15 August 1864.

LAST year the subject of weights and measures for British Burmah was fully discussed at each of the principal ports in British Burmah. I believe that all parties agreed as to the necessity of having a fixed standard for grain measures; the only difficulty which existed was that of procuring a legislative enactment making the observance or use of a given standard weight or measure compulsory under penalties upon the population at large.

Since then the question of weights and measures throughout the whole of British India has been brought before Government; and it is necessary that there should now be a declaration of opinion by those most interested, and those most likely to know the wants of the country, as to what is required on this important subject for British Burmah.

The Chief Commissioner considers this object can be best attained by committees sitting at the principal towns, namely, at Rangoon, at Moulmein, and at Akyab.

The questions which will be of primary consequence to discuss, the Chief Commissioner ventures to observe, will be as follows:—

In regard to the position of British Burmah and the system of weights and measures already existing, and those existing in the adjoining countries, will it be advantageous to establish the maund and seer of India, that is, the seer of 80 tolahs, of which the rupee is the basis, or to adhere to the method of sale of grain as at present existing throughout the province by the measure called the basket or bushel?

It is well known that, from there being no positive standard basket in British Burmah for wholesale transactions, the capacity of those in use varies considerably, but the royal basket of Ava comes very near to the Imperial standard bushel of England (believed to



contain 2218·19 cubic inches), and can be adopted without difficulty throughout British Burmah. In bazars for daily retail sale this basket is the existing legal measure throughout Pegu. Is it recommended that this basket shall be universally adopted?

In Arracan a half bushel would come very near to the capacity of the basket now used at Akyab.

Further south in that division the same basket exists as elsewhere in British Burmah.

The divisions of the English bushel correspond exactly with those of the Burmese basket, so that there really would be no change, except that of having one general standard basket instead of variety of sizes.

It will be proper to consider whether at first the standard basket should be made compulsory only at the seaport towns or at such places only to which the Chief Commissioner may be empowered under an Act of the Legislature to extend it.

It is desirable to consider whether by law it shall be obligatory to sell paddy, rice, and all grain by measure or by weights.

With regard to weights the first question will be—Should we adopt the Indian seer of 80 tolahs and the Indian weights similarly, or retain the existing Burmese weights for all transactions?

The basis of the Burmese weights is the tickal, which contains 252 grains troy; one hundred tickals equal one viss (365 pounds avoirdupois), and is exactly equivalent to 140 tolah-weight of India; these weights are universally used in every little village throughout the country and in the Burmese territory.

Do we require to notice how English weights should be received or used either at the seaport towns or otherwise? On this point an opinion should be recorded.

Should the basket measure and the tickal or viss be made legal standard weights and measures, what is recommended in order that trustworthy standards for use may be sold or distributed throughout the whole country to the people?

What period of notice should be given in order that people may know the law is to come in force?

The Chief Commissioner has in the Minute endeavoured to bring to notice the principal points which will have to be considered by the committees, and he begs that they will have the goodness to favour him with their opinions on these points, and on any others which may occur to them in connection with this important subject.

*A. P. Phayre*, Colonel,  
Chief Commissioner of British Burmah.

From Colonel *A. Fytche*, Commissioner of the Tenasserim Division of British Burmah, to Major *H. Nelson Davies*, Secretary to the Chief Commissioner of British Burmah, Rangoon (No. 486); dated Moulmein, 13 September 1864.

WITH reference to your letter (No. 2700), dated 15th ultimo, I have the honour to enclose herewith the proceedings of the committee, held here, on weights and measures.

2. I concur fully in the whole of the suggestions made by the committee, and consider that there would be no difficulty in establishing the English bushel, with the subdivisions of the Burmese basket, viz., 16 byees, both for wholesale and retail transactions, throughout the country. I consider that the introduction of any Indian weight or measure, such as the maund or seer weight, would be most inadvisable.

3. The Burmese viss of 365 lbs. avoirdupois, with its different subdivisions, should be retained for country produce; and, where the parties agree to it, English weights could be used in the purchase and sale of European commodities, such being the custom at present.

4. The notice proposed to be issued for the introduction of the British measure, as also the form and the manner these measures should be provided, appear to be very proper.

5. The documents which accompanied your letter under reply are returned herewith.

REPORT of the Committee assembled at the Office of the Deputy Commissioner on 29th August 1864, to take into consideration the Regulation of the Weights and Measures for British Burmah.

## PRESENT:

Colonel D. Brown, Deputy Commissioner.  
T. J. Fallon, Esq., Town Magistrate.  
Robert Hannay, Esq., Honorary Magistrate.  
D. McDonald, Esq.  
J. H. Miller, Esq.

READ letter (No. 163 of 1864), from the Commissioner of Tenasserim Division, and the various documents accompanying the same, relating to the regulation of the weights and measures for British Burmah having been fully considered, we beg to submit the following opinions and remarks thereon:—

The absence of a fixed standard of weights and measures in Burmah is felt as a great inconvenience to trade, and it would benefit all classes to have the weights and measures of the country regulated by law.

The standards of weights and *lineal* measure appear to have been settled by law or custom, and have been long in use. The practical unit of weight being the *viss* of 365 lbs. *avoirdupois*, and that of the *lineal* measure the cubit of 18 inches and the foot; the former is used in measuring cloths, &c., and the latter for timber, and both are well understood and found convenient by the whole community, and can be readily verified by their English equivalents; in fact, English weights and foot rules are largely used in practice, being easily convertible into the Burmese denominations of *viss* and cubit, and we would not recommend these being disturbed.

The measures of capacity, both for liquids and dry commodities, are in a very unsatisfactory state, and require to be regulated by authority. The "old English gallon" is still partially in use in the bazars and shops; we would recommend its being abolished, and the imperial gallon used in its stead.

The "dry measure" of capacity, the "basket," is the most uncertain of all, while it is of the utmost importance to have it correct; for, besides being used in the purchase of the daily food of the people, it is essential to fair commercial dealings in some of the principal exports of the country. We believe that no recognised standard of "dry measure" exists, certainly none is in use; and the greatest conceivable variety exist in what is denominated the "Burman basket," ranging from 62 lbs. up to 78 lbs. of rice in measures in actual use in the export trade; and it need hardly be noticed that the smallest size is that used by Europeans in their purchases. We, therefore, think it most desirable that a "dry measure" of capacity should be established by law.

The next question for consideration is the capacity of the required standard for "dry measure;" but in this we are not able to gain any definite information either from the papers before us, or from inquiries made of those most likely to assist us; nearly all recommend the Burman basket in preference to the English bushel, but none appear to know what is the actual capacity of the Burman or Ava basket. It does not help us to a solution of the question to say that it contains 16 or 18 *tabees* or *viss*, for the *viss* being the only certain guide in this definition, we are not told what commodity or substance is used for the test, a *viss* of one thing may be double the bulk of another. The only approximation to the actual cubic contents of the basket of Ava that we have been able to gather is contained in the minute of the Chief Commissioner, where, after stating that there is no positive standard basket in British Burmah, he goes on to say that "the royal basket of Ava comes very near to the Imperial standard bushel of England." In McCulloch's Commercial Dictionary (Article Rangoon), it is stated that the basket ought to weigh 16 *viss* of clean rice, or 58.4 lbs. *avoirdupois*; a basket of clean table rice purchased for the experiment in Moulmein bazar weighed 59½ lbs., while an English bushel of the same rice weighed 63½ lbs.; and this we believe is all that will ever be known of it, for it may be fairly questioned if the Burmese have either the means or the skill to construct either a standard measure of capacity, or a scale beam that would be found rigorously exact.

It thence follow that the various baskets now in use have no common basis, but are purely arbitrary measures made to suit individual interests. We would, therefore, recommend a basket for British Burmah to be made and fixed by law; and as the English bushel is found to be very nearly the same with the basket in use in Burmah Proper, and the subdivisions of both being alike, we see no objections to making that the standard for British Burmah, retaining the native denominations of basket and its sub-divisions.

Regarding the introduction of Indian weights and measures into British Burmah, we do not think such a change would be acceptable to any class of the community; they might be used by Indian traders at the sea-ports in dealing with their own countrymen, but Europeans do not require them; and to the Burmese in the interior, and the natives of the neighbouring States, they would be wholly useless. The Burmese readily adopt many European improvements, but have little respect for Indian customs, which they consider are inferior to their own. We would, therefore, recommend that in the sale of grain, the *measure* be retained instead of introducing the sale by weight, and that the standard basket be made compulsory throughout the country, both for wholesale and retail.

The use of English weights has already become common both for the purchase and sale of certain English commodities when the English denominations of *cwts.*, *qrs.*, and *lbs.* are

retained, and also for large transactions in Native produce, which are usually weighed by English weights, and converted into Burmese denominations; in making up accounts this practice prevails very generally throughout British India, and should not be interfered with in Burmah; this will render it necessary to keep a standard test weight for English as well as country weights.

If six months' notice be given for the introduction of the standard basket, we think it would be sufficient time for the people to prepare for the new measures, and to complete or adjust existing engagements to the change. Tenders might be invited for a certain number to be made for Government, to be supplied to the public at cost price; but parties should be allowed to make their own measures by adhering to the capacity and form of the standard, and having them stamped; after being verified, the distribution in the district might be made through the local officers, who would indent on the chief authority for any number likely to be required; and it is probable that the agriculturists would register their requirements through their native headmen, on notice of the change being given.

We have only further to remark that, in constructing measures of capacity for grain, the form of the vessel should not be overlooked. We would recommend a cylinder as the best form, as all angular and irregular-shaped vessels, although corresponding with each other in the measurement of fluids, will vary considerably if applied to grain or other dry commodities.

*Note by Mr. D. McDonald.*—I am of opinion that all measures should be made by Government only, and none by private individuals.

Moulmein, 7 September 1864.

(signed) *J. H. Miller,*  
Honorary Secretary.

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From the Rangoon Local Committee appointed to inquire into the subject of Weights and Measures for British India, to Major *H. Nelson Davies*, Secretary to the Chief Commissioner, and Agent to the Governor General; dated Rangoon, 5th September 1864.

\* President:—Major G. Faithfull.  
Members:—G. Bullock, Esq.; J. Black, Esq.; E. Fowle, Esq.; R. S. Edwards, Esq.; and Captain E. B. Sladen.

WITH reference to your letter (No. 02699), of the 15th instant, we\* have the honour herewith to report the result of our inquiry upon the subject of a uniform system of weights and measures for British India.

2. Before entering upon the more immediate subject of our report, we are desirous of accounting in some measure for the apparently short space of time given to our deliberations as compared with the magnitude and importance of the subject which has been submitted for opinion.

3. In venturing an explanation, we may first be allowed to mention that our committee comprises amongst its members the Deputy Commissioner of the Rangoon district, the Collector of Customs of Rangoon, two of the leading merchants of British Burmah, a resident gentleman of Rangoon, who is acknowledged to possess a very extensive and varied experience in all matters appertaining to the peculiarities of Burmah and its people, and the Rangoon town magistrate.

4. One very natural, and at the same time noticeable, feature in the proceedings of a committee thus formed is, that there has resulted an almost unanimous decision on the several questions brought under notice. Argument has not been wanting, but that very argument has been connected with subjects, which for many years past could not fail to have received the attention of our committee, whose interests are specially identified with those of British Burmah. We have found in a most remarkable degree that our pre-conceived knowledge and opinions only tended to make us arrive at a unanimous finding and resolution on the various questions involved in the subject of our inquiry. This must account for the fact that our committee has held but one general sitting; and though we have been consciously impressed with the gravity of the matter we have had to deal with, in its more extended form, as applied to the wants and necessities of British India as a whole, we naturally feel somewhat complacent and satisfied under the honest conviction that our inquiry has resulted in an expression of opinions and suggestions calculated to advance the material prosperity, of one large portion at least, of Her Majesty's dominions in the East.

5. In giving expression to these opinions, we are bound to notice that as the representatives of a province (for the purposes of an inquiry), or as a provincial local committee, we have not been able to forget that, in investigating the question of one uniform system of weights and measures for all British India, it is not irrelevant to our inquiry to regard with importance the present condition of foreign States contiguous to ourselves, and the effect which any change we may suggest may exercise not only on them, but on ourselves in our dealings with them.

6. In fact, we cannot but look upon this portion of our inquiry as one which should particularly be allowed its weight and importance in determining a point which must seriously affect our common traffic dealings with foreign States contiguous to British Burmah, and on which British Burmah mainly depends for commercial support. What we mean is that, under present existing circumstances, British Burmah uses, in common with Burmah Proper,

Proper, almost one uniform system of weights and measures; and that, deriving, as we do, a very large amount of our supplies for export trade from provinces beyond our frontiers, any change we may be led to adopt with a view of assimilating British Burmah with British India will be likely to entail endless confusion, and misconception and difficulty in our commercial dealings with those States, if the same change cannot practically be extended to them.

7. We frankly acknowledge that the difficulty of coping in any satisfactory manner with the broad question which relates to the adoption of one uniform system of weights and measures for the whole of British India, has made us diffident in expressing any general opinion beyond the vocation or requirements of a mere local committee.

8. We think we are best fulfilling our duties as a local committee in limiting the scope of our report to the question, in so far *only* as our knowledge enables us to form just and sound deductions from actual experience, leaving it, in common with other local committees, to a central committee, or to the Government of India, in collating the several reports which will be submitted to it to evolve general conclusions.

9. It is only necessary to remark further in this tedious preface to our report, the mode and manner in which our local committee has managed its inquiry. We have been principally guided by the able minute forwarded to us by the Chief Commissioner. A secretary was appointed to record proceedings, and draw up a final report. Every question for discussion detailed in the Chief Commissioner's Minute, has been laid before us separately and in order, and the result of our argument on each question was at the time noted down in the proceedings by the secretary. Every member at the same time recorded roughly in writing his own reasons upon each question; and the whole of the papers were, at the conclusion of the committee's sitting, made over to the secretary as a basis on which to draw up the committee's final report.

10. The points of inquiry prescribed in the Chief Commissioner's Minute, resolve themselves into a series of questions, which we propose to make the basis of our inquiry and report.

11. *1st Question.*—The prominent and leading question is undoubtedly that in which we are asked to state whether, in our opinion, having all due regard to British Burmah and the system of weights and measures existing therein, and those known to exist in the adjacent countries or foreign States contiguous to British Burmah, it will be advantageous to establish the maund or seer of India, or to adhere to the method of sale of grain by the basket as at present in use throughout the province or throughout British Burmah.

12. The fact that this point of primary investigation met with almost immediate unanimity of opinion in favour of the present existing system, will of itself argue our localisation.

13. We justly concluded that one uniform (and if possible) universal measure of capacity was a grand desideratum in the sale and purchase of all kinds of grain. Our internal trade in grain, and our export trade in this staple commodity to Europe and other countries foreign to British India, is infinitely greater in extent than our dealings in the same or any other article of commerce with British India. In short, rice forms our chief export trade; and that trade has no real reference to any system of measures which can be said to require assimilation with the system of measures in use in British India. No advantages would be likely to accrue from the introduction into British Burmah of Indian measures of capacity, unless some compensating influences in other articles or commodities of traffic between British India and British Burmah outweighed the importance of non-intervention in the present immense export trade in grain between British Burmah and foreign Europe. We are convinced no such compensating influence exist.

14. We find, however, that, even under our own prevailing system of baskets or bushel measure, a very large opening exists for fraud and misconception, from the circumstance that the system itself is not compulsory, and that the size of the basket is often made to vary. Though we have a system, therefore, we lack uniformity; as a consequence, a door is opened for dishonesty in their daily transactions by traders in grain of different denominations, who take advantage of a state of uncertainty to adopt at will various standards of their own.

15. The rice basket in use, according to its actual standard capacity, professes to weigh about 64 lbs., and yet each merchant's standard varies between 66 lbs. and 80 lbs. Chinese traders, who are thriftily inclined, even exceed this maximum weight; so that, although we have a measure of capacity, it is of mere nominal value, and subject in extent to the caprices of every trader, great and small. The basket measure of British Burmah owes its origin, we believe, to the royal basket of Ava, to which it is supposed to be assimilated both in size and capacity. This royal basket of Ava, in its integrity, approaches within a mere inappreciable difference to the size and capacity of the English Imperial bushel,—its subdivisions, too, coincide (as a coincidence let it be assumed) in all material respects with the subdivisions of the English bushel.

16. We seem bound, therefore, to decide unanimously that whatever system is introduced, that system should not only be uniform, but compulsory, to be of any real or practical

cal advantage. Such uniformity will, we believe, be most effectually maintained by the general introduction of the English bushel as the standard measure of capacity for British Burmah, and we hope in time for British India.

17. Its introduction will alike protect the Native and European dealer; confusion and uncertainty, on the score of novelty, will be partly obviated from the circumstance that no appreciable change will in reality take place in the actual capacity of the measure already in use in British Burmah, beyond the rendering of that measure uniform and compulsory.

18. The ulterior advantages of such uniformity present themselves at once in the facility which will be given to our dealings with the States adjoining British Burmah, in which the royal basket of Ava (the English bushel) is nominally at least recognised, and with which we are so confessedly allied in our commercial dealings. In proposing, as we now do, the general adoption of the English bushel as the standard compulsory measure of capacity for British Burmah, we do not wish to lose sight of those prospective results (however remote) which may, in the progress of time, and the increasing rapidity of communication, necessitate one universal system of weights and measures throughout British India and the parent country.

*2nd Question.*—We are next asked to offer an opinion as to whether, if a standard measure of capacity is made compulsory by legal enactment, its operations shall be confined to our sea-port towns only, or to such places as the Chief Commissioner may be empowered under an Act of the Legislature to extend it.

19. The question is one of both political and commercial importance. We have brought before us, not only the interests of the wealthier and more advanced classes of our town and country populations, but are obliged to bear in mind at the same time the conditions and characteristics of many hundreds of villages, over which the influence of any one defined set of rules or system of trade has never been felt, and may consequently prove both novel and burdensome.

20. It may be very generally admitted that our chief supplies of grain for export purposes are derived or obtained by means of native agents, who are deputed by the merchants and traders of the larger sea-port towns to proceed into the interior and make advances to cultivators whilst yet the crops are standing. In some cases contracts are entered into for a certain supply, at a certain rate, within a given time.

21. The daily retail trade in grain for local consumption is small as compared with the supplies which are brought up to meet the demands of our export trade. If the sale of grain in the latter case can be regulated by a uniformity in the standard measure, by which the demand is supplied, we apprehend that protection in a corresponding degree will extend itself over the lower branches of the same trade, provided only that the uniform system is understood and can be rigidly enforced. In the attempt to enforce a compulsory system of measures, we are inclined to oppose anything having the semblance even of a mere partial introduction.

22. With the knowledge which our joint experience of the condition of our most distant villages has given us, we fail to see how even *their* interests would be injuriously affected by the extension to them after due notice of the standard measure uniformly with its introduction into our sea-port towns. Our reason for forming this opinion is that, if it is determined to adopt the English bushel as the new standard measure of capacity throughout British Burmah, in this case no very appreciable change in the present existing measure (as already remarked) will in reality take place, beyond the compulsory nature of the new system. Instead of injury, to which the hard-working cultivator is frequently exposed by fraud, deception, and uncertainty, he will, we think, reap the advantages of being able to make his bargains, and deliver his contract supplies under a test which will possess at least the merit of certainty and uniformity. We all of us know, and have heard, of contract sales of paddy brought from the interior in which the Burmah basket has been mentioned, or stipulated for, as the measure to be used on making delivery; but where, when delivery has been taken with this supposed basket, its dimensions have been made to exceed the original standard to such an extent as to entail, in large sales, serious consequences on the vendor. Whilst, therefore, we advocate without limit a compulsory standard measure of capacity for British Burmah, we wish it to be borne in mind that the success of the new system will depend as much upon the energy and ability of Government officials to make the system understood as on their promptitude and determination to enforce it.

23. If we are averse to half measures, it is only because we have confidence in the possibility and expediency of establishing whole or complete ones.

*24. 3rd Question.*—We may now pass on to consider the next question which suggests itself as a sequence to the anticipated adoption of one standard measure of capacity for the whole country.

The point for consideration is whether the law shall make it obligatory to sell paddy and all other grain by measure or by weight. At present the sale by measure universally prevails throughout these provinces, so that any change from measure to weight would revolutionise the present mode of all grain dealings or transactions. The only departure from the measure system as applied to grain that we can call to mind solely concerns our import trade

trade by sea. The import of grain by sea into British Burmah is limited to small supplies of Bengal grain (chenna), and Madras gram (kooltee), which arrive in country vessels from the other side of the Bay of Bengal. This grain arrives in bags, containing two maunds; other varieties of grain may in like manner be imported and received, and disposed of by weight, but the sum of the whole is infinitely small as compared with our export grain trade with foreign Europe and the United Kingdom, or our daily retail sales of grain in the country itself.

25. We cannot, therefore, conscientiously recommend any change in the present existing state of sale of grain measure in British Burmah, as opposed to sale by weight; and we do not consider that any compulsory or obligatory system is required by which to restrict the sale of grain either to weight or measure. It appears to us that any binding obligation in such matters might be made highly inconvenient, and involve a restriction and interference with trade incommensurate with any supposed benefits which the change might be expected to produce. We are of opinion that our merchants and traders may very consistently be allowed, in adapting themselves to the peculiarities or circumstances of each particular dealing or purchase of grain, to mutually arrange amongst themselves the conditions (including the question, whether by weight or measure) under which such sale should proceed.

26. In dissenting, therefore, to any compulsory change in substitution of the present existing plan of grain dealings by measure as opposed to weight, we are convinced that the instances in which there may arise any wish even to depart from the measure system, will be exceedingly rare. Accordingly any change for the mere consideration only, without definite object, of adapting our system in British Burmah, to that of any *one* of the systems prevailing in British India, or of meeting the requirements of other countries without a corresponding benefit to this country itself, is, we are bound to say, inexpedient and uncalled for.

27. We are thus led on gradually, and by a systematic plan, as it were, to consider the subject of weights as apart from measures, and to offer suggestions either in favour of retaining the Burmese viss of 100 tickals now in universal use throughout Burmah, or of substituting the Indian seer of 80 tolahs. We are not instructed in respect to any manifest advantage which the change may be designed to bring about, nor are we informed whether such a change is even desirable, beyond the assumption that uniformity of system is the desideratum aimed, obtainable only by the adoption in British Burmah, of such weights as would ensure conformity with the system in force in British India.

28. This reduces our inquiry to the simple practical question, whether an approximate uniformity will ever be established in a complete system of weights for British India by the adoption into British Burmah of the Madras seer of 80 tolahs? In the different Presidencies of India, and even in the Presidencies themselves, we are aware that various systems of weights prevail. In Bengal we have the bazar maund and the factory maund, both of which not only vary considerably in themselves, but differ from the Madras maund in a proportionately greater degree than the Madras seer does from the Burman viss.

29. If British India is bound to present a uniformity in weights capable of extension to its dependencies or more distant provinces, it would be admissible in theory to anticipate success from the introduction throughout Her Majesty's Eastern dominions of a similarity in weights and measures which would tend more effectually to identify and link the several parts in one common bond of commercial intercourse.

This incentive to uniformity has no real existence. It would be as easy, or perhaps far easier, to ask the whole of Europe to arrange its system of weights, so as to bring them into conformity with any one of the many nations of which it is comprised, as to expect that the Indian standard can be reduced to one uniform level throughout the whole of British India.

30. Our duty, however, as a local committee, is to deal with that portion of this momentous question which most intimately concerns the interests of British Burmah, and upon which we may, with a greater degree of certainty and safety, venture to offer opinions. The Burmese calculation by weight is essentially a decimal system. It is universally used in every little village throughout British Burmah and the whole Burmese territory. What would be the operation or effect of substituting a system (the Madras seer, for instance, or the Bengal bazar or factory maund) of confessedly less pretensions to merit on the one hand, or facility in practice on the other? We say unreservedly that a change to either of the numerous Indian systems would be accompanied by untold complexity and confusion. The Burman race, though untrammelled by caste prejudices, are strangely, and at the same time, naturally, bigoted to national customs. They are possibly the most impossible mathematicians in existence. They import foreigners (Pownas\*), and allow them a kind of official status, according to their ability to master ordinary calculations. As for themselves they have no system of mathematics, the very name of which implies something akin to a divination of the supernatural by means of figures.

\* Brahmins.

31. After many years of practical experience, Burmans, as a whole, even in British Burmah, fail to comprehend the divisional differences between their own tickal in silver, and the corresponding tolah of India (our rupee). For instance, the tickal contains, in Burmese arithmetic (allowing that there is such thing), ten "moos" of two annas each. Our tolah or

rupee contains *eight* "moos," still they designate our half rupee as *five* "moos," and the difficulty or error in the calculation hardly becomes apparent to them; when *six* moos are demanded (a very frequent one) as the price of any petty bazar commodity, and 10 annas is given. In fact, 10 annas is very often made to take the place of 12 annas. We all know, who have had any bazar intercourse with Burmans, the perplexing difficulties with which even this apparently easy and absurd calculation is fraught. It is hardly extravagant to remark, that it is the cause (and will continue to be so for years to come), of daily bazar bickerings and pice haggings between Indian and Burman petty dealers throughout the country.

32. To follow up, or attempt to solve, the maze of difficulties which would arise from any attempt to extend an altered system of weights, is almost beyond the scope of this report, and certainly beyond our ability. Difference of race, language and religion, must have a place in any argument or discussion upon such a question; and when we add, that all three may, more or less, be opposed to a change, not by reason of its novelty, but in consideration of the difficulties which it would entail upon the transactions of every-day life, we think we have said enough to lay the matter in a sufficiently detailed form before those who, in deciding elaborate question of one uniform system of weights and measures for the whole of British India, will have to deal with the varied reports of the several Presidencies and local Governments of India.

33. English weights, we presume, must always be recognised in all parts of Her Majesty's dominions in the East as a basis of account. Their introduction as the standard weight for British Burmah would be attended no doubt with the same complication and confusion (though not to a greater extent, we apprehend) than that of any one of the Indian systems.

34. It will generally be gleaned, therefore, from this report on the subject of weights and measures, that our committee are unanimous in recommending a compulsory standard measure of capacity, and that they advocate the adoption of the English bushel in its entirety for British Burmah in the place of the present Burmese basket; further, that they advise, on incontrovertible grounds, the retention of the present existing system of weights on account of its universality throughout British Burmah and the adjoining countries, upon which British Burmah relies for commercial support, and also because any change in the system would be fraught with difficulties of an almost impracticable character and extent.

35. It only remains for us to remark upon the plan by which the compulsory bushel measures may be most successfully introduced and practically enforced. In the first place, it will be essential, we consider, that not less than six months' notice be given of any anticipated change. This change should come into operation between the months of June and November of any particular year, the period when the grain trade is slack. It will thereby be less likely to affect or interfere with actual dealings so largely carried on during the rice season. Test bushel measures of the standard capacity, with the English subdivisions complete, might, we think in the first instance, be procured from England, and be freely and gratuitously distributed throughout the country. These measures should be made of some solid and durable material, which would defy all ordinary attempts at fraud. The magistrates of districts might superintend their issue, so as to ensure to all towns and villages under their charge every facility in completing the object of a uniform system.

We have, &c.  
 (signed) *G. Faithfull*, Major.  
*G. Bullock*.  
*J. Black*.  
*R. S. Edwards*.  
*E. Fowle*.  
*E. B. Sladen*, Captain,  
 Honorary Secretary.

PROCEEDINGS of a Committee assembled at Rangoon by order of Lieutenant Colonel *A. P. Phayre*, C.B., Chief Commissioner of British Burmah, to discuss the subject of a uniform system of Weights and Measures for British India.

## PRESENT :

Major <i>G. Faithfull</i>	-	-	-	-	-	-	-	<i>President</i> .
<i>G. Bullock</i> , Esq.	-	-	-	-	-	-	-	} <i>Members</i> .
<i>J. Black</i> , Esq.	-	-	-	-	-	-	-	
<i>E. Fowle</i> , Esq.	-	-	-	-	-	-	-	
<i>R. S. Edwards</i> , Esq., and Captain <i>E. B. Sladen</i>	-	-	-	-	-	-	-	

The committee appoint Captain *E. B. Sladen* to be honorary secretary to record proceedings, and draw up final report.

READ Minute of the Chief Commissioner, dated Rangoon, 15th August 1864, together with Resolution of the Government of India (No. 3339), of 20th June 1864.

The

The committee determine to discuss and report separately on each subject in the order laid down in the Chief Commissioner's minute; and, at the conclusion of their sitting, to draw up a general report, embodying the several objects and reasons upon which their final decision on each point has been based.

## QUESTIONS FOR DISCUSSION.

*1st Question.*—Whether, with reference to the position of British Burmah in its connection with other countries, it will be advantageous to establish the maund and seer of India?

*Answer.*—The committee are of unanimous opinion that the maund and seer cannot be established with any advantage in British Burmah.—*Vide* Report.

*2nd Q.*—Shall the royal basket of Ava be universally adopted?

*A.*—No. The committee are of opinion that there should be one uniform measure of capacity, and recommend that the English bushel, which approaches so near to the royal basket as to exhibit an almost unappreciable difference, should be universally adopted in British Burmah, and be styled the standard basket of British Burmah.

*3rd Q.*—Is it desirable to sell all grain by measure or by weight, and shall such sale by one or the other be made obligatory?

*A.*—The committee, having established one universal standard weight and measure, are of opinion that it will be generally advantageous to allow traders to purchase or sell by such standard weight or measure as most convenient to each particular case.

*4th Q.*—Is it desirable that the standard basket be made compulsory as the standard measure of capacity in the large seaport towns only, or throughout the whole of British Burmah?

*A.*—Compulsory throughout British Burmah.

*5th Q.*—Should we adopt the Indian seer of 80 tolahs, or retain the existing Burmese weights for all transactions?

*A.*—The committee think that the existing Burmese viss of 100—100 viss being equal to 365 lbs. avoirdupois—should be held to be, and retained as, the standard weight for British Burmah, and universally adopted. They are of opinion that the English standard weight must be recognised in all seaport towns, or elsewhere, throughout British Burmah, as a basis of account, and used optionally to suit the convenience of parties.

*6th Q.*—What is recommended in order that trustworthy standards be sold or distributed throughout the whole country to the people, provided the tickal and basket measure are made legal standards?

*A.*—The committee recommend that a sufficient number of weights and measures be ordered to be made (the measure of sheet iron) for distribution throughout the country. They think that one or more sets of each standard weight or measure should be kept for inspection by the head native official of every town and village. They suggest that at least six months' notice should be given of any anticipated change; and that on no account should such change be introduced, excepting between 1st June and 1st November of any particular year.

The committee, having generally replied to the questions which have been put to them, think it advisable that a report upon the subject before them be drawn up as a means whereby their opinions may be more clearly expressed.

*E. B. Staden*, Captain,  
Honorary Secretary.  
*G. Faithfull*, Major,  
Deputy Commissioner.  
*R. S. Edwards*,  
Collector of Customs.

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From Major *R. D. Ardagh*, Officiating Commissioner of the Arracan Division of British Burmah, to Major *H. Nelson Davies*, Secretary to the Chief Commissioner of British Burmah, Rangoon (No. 105); dated Akyab, 16th September 1864.

IN reply to your letter (No. 02701) of the 15th ultimo, I have the honour to report that, in accordance with the instructions contained therein, I formed a committee, composed of one civil servant (Mr. C. J. Brown, collector of customs), one merchant (Mr. E. Christien, of the firm of Burot, Gerber, and Company), and one engineer officer (Major J. F. Tennant, R.E.)

The committee elected Major Tennant to be its honorary secretary, and I have now received its final report, which I beg to submit in original.

The members of the committee recommend that the English bushel, which is nearly identical with the Burmese basket in size, should be adopted as the standard *measure*;



and that the standard weights should be the Bengal maund and seer, which are multiples of the standard coin (rupee or tolah).

They recommend that weights and measures should be tested, where required, by Government officers authorised to do so, in the same way that weights and measures can be tested on the payment of a small fee by Exchequer arrangements in England.

They do not consider that legislation should extend to the providing that grain should be sold exclusively by either weight or measure; but they consider that the use of the standard measures and weights be made compulsory, all others being abolished,—one year's time being allowed for their complete introduction in the principal seaport towns and cantonments.

If the legislative enactment is intended to include liquid as well as dry measures, the committee thinks the standard should be the imperial measure; and for linear measurement, the English yard and foot.

I concur generally with the recommendation of the committee; but in measures, besides the contents in cubic inches, it may probably be of advantage to declare the weight of their contents in water, and thereon to construct tables on ascertained data, by which a fair proportionate weight may be assigned to each description of grain, less than that which would allow of the purchaser to demand an abatement in price.

The substitution of weights calculated on that of the current silver coinage of the country it appears to me would not be attended with any difficulty. If considered objectionable, the tolah might still be retained as the standard unit, and the Burmese peiktha recognised as a weight of 140 tolahs, with its divisions into the half viss of 70, and quarter viss of 35 tolahs; but this is only recommended in case of the Chief Commissioner seeing cause for otherwise objecting to the introduction of the Bengal seer of 80 tolahs as the recognised weight of the country. With the above remarks, I beg to submit the committee's report, which I hope will be favourably received; I consider the question of such great local importance and interest that, in the absence of a public newspaper, I have taken on me to have printed 150 copies of the Governor General's resolution, the Chief Commissioner's minute, and the local committee's recommendation, so that the resident merchants and others here may be kept well informed of what is being done. I send you a dozen copies, as you may find it convenient to make use of them.

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REPORT of a Committee appointed by Major *R. D. Ardagh*, Officiating Commissioner of the Arracan Division of British Burmah, under Instructions from the Chief Commissioner of British Burmah; dated Ackab, 12th September 1864.

THE committee recommend that the standard of dry measure be the English bushel, containing 2218·192 cubic inches, or eight imperial gallons. The basket of Arracan would be the half bushel, and that of Pegu the bushel. The committee would suggest that the Legislature should deal only with the "bushel." The local term "basket" would be applied then in the one case to the bushel, and in the other to the half bushel. The mean of a considerable number of local baskets in Arracan has been found to be 1062·5 cubic inches, which is so close to the half bushel that the local trade would not be disturbed.

The committee deprecate any legislation as to whether grain shall be sold by weight or by measure.

As regards weight, the committee are of opinion that the Indian maund and seer, whose sub-divisions are founded on the weight of the standard coin, and readily verifiable by reference to that coin, offer great advantages. These denominations of weight are well known in Arracan ports, being constantly used.

The Burmese tickal is probably liable to change, and consequently the viss, dependent on it; and the committee think that, as far as the wants of this province (Arracan) are concerned, and probably as regards British Burmah generally, there would be no advantage in a standard of weight differing from that of British India. They are disposed to think that no greater inconvenience would arise in transactions between parties on different sides of the frontier from the Indian standard being in use in the British provinces, than from a standard viss, as long as the weights of Burmah are in any way uncertain.

As regards the supply of standard weights and measures, the committee are of opinion that it is impossible to make them for the whole country by Government agency. They recommend that certain Government officers, the more numerous the better, should be authorised to verify and authenticate any weights or measures brought to them for that purpose on payment of fees.

If any liquid measure is introduced into India, the Committee consider that it should be Imperial measure in all respects, and they would recommend that the English yard and foot be enforced.

The committee think that the use of standard weights and measures should be rendered compulsory, within one year after the passing of the Act, in all seaports, sudder towns of districts, cantonments, and in such other towns as may be appointed by the chief civil authority, who should have power to name a later period at which their use should be enforced in all bazars and shops in his jurisdiction.

In

In all contracts the weights and measures shall be understood to be standard weights and measures, and shall be so construed by the courts; all contracts specifying other units to be rejected.

The Committee would have willingly avoided any compulsory clauses, but it has become evident that, without some, there will be no change, and that the measure, as well as the price, will be a subject of discussion, thus introducing a most undesirable element into bazars. It is hoped that the gradual introduction of the system provided for above will prevent any material inconvenience from the change. As regards English weights, the Committee believe they are little used as such, except in transactions of Europeans with each other; and that the reasons for prohibiting the use of all other weights applies with equal force to these.

*J. F. Tennant*, Major, R.E.  
*C. E. Brown.*  
*E. Christien.*

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— No. 23. —

MYSORE.

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From *L. Bowring*, Esq., Commissioner of Mysore, to *E. C. Bayley*, Esq., Secretary to the Government of India (No. 4420-50); dated Camp Anturgutta, Cudoor District, 28 December 1865.

IN reply to your letter, No. 3156, dated 25th October 1865, I have the honour to state, for the information of his Excellency the Viceroy and Governor General in Council, that my attention was attracted three years ago to the multifarious denominations of weights and measures in use in this province, and that some statistics were collected for me by Major J. Puckle, one of the Deputy Superintendents of this Commission.

2. It soon became apparent, however, that it would be useless to attempt any local or partial reform, and that no beneficial result could be looked for, unless the instruction for modifying the present weights and measures emanated directly from the Supreme Government, and were made applicable to all parts of India. But at the onset we are met with the difficulty that no uniformity has as yet been attained in England itself; and it does not seem advisable to build up a new system which may require to be constructed *de novo*, should it be thought necessary to assimilate Indian weights and measures with those adopted in England, and that such a course would be most advantageous to trade cannot be denied. I beg to enclose the last authentic report that I have seen on the subject, from which it would appear that it is still under the consideration of a Committee of the House of Commons.

3. No practical result would be gained by my submitting proposals for modifying existing weights and measures in Mysore; but, in order to afford the Government an insight into the bewildering details which now embarrass the question, I beg to enclose a copy of tables showing most of the varieties which prevail, accompanied by an able memorandum by Major J. Puckle.

4. The remarks made in this memorandum are worthy of perusal; but, as observed above, it is useless to attempt to modify local weights and measures which are peculiar to a particular province; as, however happy the solution may be for that part of the country, it is improbable that it would apply equally to other provinces. Hence it would appear that the Supreme Government alone can, with advantage, prescribe an authoritative table; and, as doing so will necessarily involve running counter to long-rooted customs, it is essential that the change should be as perfect as possible. I consider, therefore, that no change should be made till the English standards have been laid down by Parliament, which has hitherto only partially expressed an opinion on the subject.

5. I understand, moreover, that, although in France the decimal system has long been in force, people in the country still cling to weights and measures officially deemed obsolete; and if this be true it is only reasonable to infer that in a country like India, where prescription and usage have so much authority, the

natives will not relinquish their local weights and measures unless some immediate and evident advantage is apparent to them from adopting a new system authorised by Government.

6. Land measures are to a certain extent already in a transition state, as the revenue survey adopts the English acre, with a subdivision however of 40 koontas, which, however convenient, has no reference to the decimal system. The terms "kandy" and "koodoo" are universally used in Mysore, but are, I need not observe, unknown in Upper India. Even in these measurements there are two descriptions recognised by Government, one for irrigated, the other for unirrigated land; the former kind of kandy containing 10,000 square yards, and being equal to 2·066 acres; the latter containing 64,000 square yards, and being equal to 13·223 acres. There is a great variety of "sthul," or local measurements, as shown in the tables submitted. It is to be expected that the survey will extinguish all old land measurements, leaving only the acre and its subdivisions.

7. In regard to weights I have no doubt that, so long as the rupee remains the standard coin of the country, and is the equivalent of a tolah or 180 grains, this should be adopted as the unit, as its multiples would be easy. I found, however, on weighing rupees by tens and hundreds, that the average weight was only  $179\frac{16}{100}$ , though, of course, 180 grains would be assumed as the basis of calculation. The disadvantage which presents itself in assuming this groundwork is that the maund would be 25·714 lbs., which is not so good a multiple, for intercommunication or commercial matters, as the existing maund of 28 lbs., which is now used by the coffee planters of this province.

8. In reply to the immediate question put in your letter, I have the honour to state that no copy of Resolution, dated 20th June 1864, was sent to this office, and that no committee was consequently appointed. Much correspondence on the subject took place with the superintendents with reference to a circular issued by me in October 1862; but, as I have before observed, the attempts then made to revise existing discrepancies were not sufficiently encouraging to induce me to prosecute the measure at the time, it does not appear necessary that I should trouble the Government with the circular mentioned, and the replies received from the divisional officers.

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SECTION (F.)—ECONOMIC, SCIENCE, AND STATISTICS.

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FRIDAY.

REPORT on the best means of providing for a uniformity of Weights and Measures, with reference to the interests of Science, by a Committee consisting of Lord Wrottesley; the Right Honourable C. B. Adderley; Sir W. Armstrong; the Astronomer Royal; S. Brown, Esq.; W. Ewart, Esq.; the Master of the Mint; Sir John Hay, Bart.; Professor Hennessy; J. Heywood, Esq.; Dr. Lee; Dr. Loane Levi; Professor Miller; Professor Rankine; Rev. Dr. Robinson; Colonel Sykes; W. Tite, Esq.; Professor Williamson; and F. Purdy, Esq.

For a uniformity of weights and measures, with reference to the interests of Science, the Committee recommend to the British Association the following Resolutions:—

1. That it is desirable, in the interests of science, to adopt a decimal system of weights and measures.
2. That in furtherance of this proposal, it is desirable, from its scientific capabilities, to adopt the metric system.
3. That as the weights and measures of this country are gradually undergoing a process of decimalization, it would be more advantageous, instead of drifting by degrees into a heterogeneous variety of systems, to change at once to a really convenient system.
4. That it be recommended to the Government, in all cases in which statistical documents issued by them relate to questions of international interest, to give the metric equivalents to English weights and measures.
5. That in communications respecting weights and measures, presented to foreign countries which have adopted the metric system, equivalents in the metric system be given for the ordinary English expressions for length, capacity, bulk, and weight.

6. That

6. That it be recommended to the authors of scientific communications, in all cases where the expenses of labour involved would not be too great, to give the metric equivalents of the weights and measures mentioned.

7. That the influence of the British Association would be beneficially exerted in obtaining from Paris an authorised set of metric weights and measures, to be placed in some public and frequented building in London.

8. That advantage will be derived from the recent publication of metric tables, by C. H. Dowling, c. e., in which British standard weights and measures are compared with those of the metric system. That treatises explaining the metric system, with diagrams, should be forthwith laid before the public. The works on arithmetic should contain metric tables of weights and measures, with suitable exercises on those tables; and that inspectors of schools should examine candidates for pupil teachers in the metric system.

9. On the subject of temperature, it is recommended that the authors of reports to be presented to the British Association relative to temperature, be requested to give the degrees of heat or cold according to both the centigrade and Fahrenheit's thermometers.

10. It is recommended that the scales of thermometers constructed for scientific purposes be divided both according to the centigrade and Fahrenheit scales; and that barometric scales be divided into fractions of the metre as well as into those of the foot and inch.

11. That a Committee on uniformity of weights and measures be re-appointed.

Prince Talleyrand, in 1790, distributed among the Members of the Constituent Assembly of France, a proposal founded upon the excessive diversity and confusion of the weights and measures then prevailing all over that country, for the reformation of the system, or rather for the foundation of a new system, upon the principle of a single and universal standard. A Committee of the Academy of Sciences, consisting of five of the most eminent mathematicians of Europe—Borda, Lagrange, Laplace, Monge, and Condorcet—were subsequently appointed, under a decree of the Constituent Assembly, to report upon the selection of a national standard; and the Committee proposed in their report that the ten-millionth part of a quarter of the meridian of Paris should be taken as the standard unit of linear measure. Delambre and Mechain were appointed to measure an arc of the meridian between Dunkirk and Barcelona. They commenced their labours at the most agitated period of the French Revolution. At every station of their progress in the field survey they were arrested by the suspicions and alarms of the people, who took them for spies or engineers of the invading enemies of France. The result was a very wonderful approximation to the true length, and one in the highest degree “creditable to the French astronomers and geometers, who carried on their operations under every difficulty, and at the hazard of their lives, in the midst of the greatest political convulsion of modern times.” By means of the arc of the meridian measured between Dunkirk and Barcelona, and of the arc measured in Peru in 1736 by Bouguer and La Condamine, the length of the quarter of the meridian, or the distance from the pole to the equator, was calculated. This length was partitioned into ten millions of equal parts, and one of these parts was taken for the unit of length, and called a metre, from the Greek word *μέτρον* (a measure). If the arc of the meridian be calculated from the result of French researches, the metre itself is equal, in English measurement, to 39·37079 inches; and multiplying this length by 10,000,000, the length of the quadrant of the meridian, when converted into feet, will be 32,808,992 feet. Sir John Herschel estimates the length of the quadrant of the meridian at 32,813,000 feet; so that, according to his calculation, there is a difference between the French and the new estimate of the quadrant of 4,008 feet, and therefore the French length of the quadrant is  $\frac{1}{8194}$ th too short, and the metre is  $\frac{1}{208}$ th of an inch less than the length of the ten-millionth part of the quadrant. An error of  $\frac{1}{208}$ th of an inch in the determination of the metre is more than counterbalanced by the extreme simplicity, symmetry, and convenience of the metric system. Professor Bessel observed, with respect to the metre, “that, in the measurement of a length between two points on the surface of the earth, there is no advantage at all in proving the relation of the measured distance to a quadrant of the meridian.” Professor Miller, of Cambridge, who quotes this remark, deems the error in the relation of the metre to the quadrant of the meridian to be of no consequence; and he mentions another slight error in the metric system, discovered by recent research, and relating to the density of water, which he gives in the following words of Bessel:—“The kilogramme (1,000 grammes) is not exactly the weight of a cubic decimetre of water. Many of the late weighings show that water at its maximum density has a different density from that which was assumed by the French philosophers who prepared the original standard of the kilogramme; but nobody wishes to alter the value of the gramme on that account.” M. Chevalier stated to the Committee of the House of Commons on weights and measures in 1862, that, in calculation, the metric system spares both time and labour, exactly as a good machine would do for spinning or weaving. The metric system is considered by Sir William Armstrong to be “the only one which has any chance of becoming universal.” Two important principles form the basis of the metric system (1), that the unit of linear measure, applied to matter in its three forms of extension, viz., length, breadth, and thickness, should be the standard of all measures of length, surface, and solidity; (2), that the cubic contents of the linear measure in distilled water, at a temperature of great contraction, should furnish at once the standard weight and measure of capacity. Scientific advisers were summoned to the counsels of King Louis-Phillipe on his accession to the French throne; and that monarch

has the credit of having enforced the metric system in France. The opposition to the metric system among the French had not arisen from the requirements of commerce; the Department of the Bridges and High Roads and the officials of the Naval arsenals had, with the consent of the French Government, already adopted the metric system, and the new system came into general operation in 1840. The Department of Commerce in France superintends the proper observance of weights and measures. Standards made for the course of trade are very numerous.

"If you have been walking about Paris," says M. Chevalier, "you may have seen the metre in the streets, fixed in the wall of many a public building. It is made by public authority. Any buyer, who is afraid that he has been cheated, can go to some street at a short distance, and there he finds the measurement of the metre fixed by authority for the use of the people; besides he has a process more simple to know whether he has been dealt with fairly—he has his own metre in his pocket." Verifiers of weights and measures are appointed in every district (*arrondissement*) of France, and each verifier has his own set of these instruments. Measures are made very cheap in Paris; balances furnished with small weights may be purchased at a trifling expense; and in the larger weights the principal expense is in the metal. Gutch's *Literary and Scientific Register* for 1864 contains a useful comparison of metric and English measures, compiled by Mr. Warren de La Rue, in which the different quantities of the metric system are expressed in their English equivalents, and the value of several important English weights and measures is given in the terms of the metric system. Until comparative tables of the English and metric systems had been published, the labour of converting English weights and measures into the metric system was so excessive, that when communications to scientific societies were published in England, with merely British weights and measures, such papers were frequently not translated in foreign countries, and the labours of the English man of science were consequently not appreciated beyond the limits of Anglo-Saxon dominions. Practical inconvenience was felt during the negotiation of the Commercial Treaty between France and England, on account of the English inch not being at that time usually divided except into quarters and eighths. Mr. Ogilvie, Surveyor General of the Custom House in London, who assisted Mr. Cobden in the French Treaty, found the advantage of the minute subdivisions of French measures, such as the millimetre, which is one-third less than one-sixteenth of an inch, and is the one-thousandth part of the metre. French workmen are familiar with the millimetre as a unit of width, and as especially useful with reference to plates of iron or other materials. Duties had to be calculated for the Treaty on rolled iron, in cases where the work of rolling increased the value of the iron, and where a slight diminution of width was of great importance. Mr. J. Mumford, Master of the British School at Highgate, recommends decimals to be placed immediately after numeration in the ordinary arithmetic books, instead of being put after compound interest and other difficult rules. The children in schools, who usually follow the order of subjects in an arithmetic book, would thus learn decimals at an earlier period of their education. So much time is occupied in schools in committing to memory the various tables of English weights and measures, and in working examples of compound addition, subtraction, multiplication, and division, that Mr. James Yates is of opinion that a year would be saved in the education of boys if the metric system were to take the place of the existing tables of weights and measures in England.

The English workmen engaged in building trades, such as carpenters, masons, and bricklayers, Professor Donaldson considers to be generally very intelligent; and whatever would afford to them facility in calculation would be acceptable as soon as it had been explained to them.

In railway operations a civil engineer ascertains weight by computation of measure; he cannot take scales and beams, and weigh pieces of iron of 20 tons and upwards; he knows the specific gravity of the iron, and he ascertains by measurement the weight of a given quantity of that metal. The metric system aids in all calculations relating to specific gravity.

Mr. W. Crosley, C. E., stated to the Committee of the House of Commons on weights and measures, that he believes the decimal system is extending itself very much, especially for scientific purposes, and amongst professional men, "it is extending itself among them very considerably, without any law whatever."

Chemists, pursuing important researches, employ generally metric weights and measures. Thus, in the Royal Institution of Great Britain, in Albermarle-street, the operations of the laboratory are carried on with the aid of the metric system; and Dr. Frankland, one of the chemists of that Society, finds the metric weights and measures particularly valuable in his experimental investigations respecting gases. The gramme, with its multiples and minute subdivisions, is a popular weight with chemists.

In the practical business of a druggist the metric system of weights and measures if generally adopted, would, in the opinion of Mr. Squire, save a great deal of labour to the rising generation. In the metric system, Mr. Squires observes, as the divisions and multiplications are all by ten, the subject and the calculations would be much simplified.

A meeting held in June 1863, of the Pharmaceutical Society of Great Britain adopted a petition to the House of Commons, in which they recommended an assimilation of the weights and measures of all nations, as likely to "tend greatly to the convenience of pharmacutists and the safety of the public."

The Pharmaceutical Society of Great Britain felt assured that a "very few years would familiarise

familiarise both prescribers and dispensers with the new weights and measures; and that the easy multiplication or division of them by the decimal system, universally applied, would afford such facilities of computation as to recommend it strongly to the adoption of medical men and chemists; and they are strengthened in this opinion by the invariable practice of English and all other analytical chemists already to state the results of their investigations in decimals."

Some metric measures and weights approach very nearly to corresponding English quantities; thus, in liquid measure, five litres are nearly equal to  $1\frac{1}{10}$  gallon, or 1 gallon 0·402 of a quart. A half-kilogramme, or weight of 500 grammes, is equivalent to 1 lb. 1 oz. 10·191 drams avoirdupois. The following brief table by Mr. Samuel Brown, condenses the system of all the metric measures and weights into a small compass:—

SYSTEM OF METRIC MEASURES AND WEIGHTS.

	LENGTH.	SURFACE.	CAPACITY.	WEIGHT.
MULTIPLES.				
Myria - - -	10,000	- -	- -	10,000
Kilo - - -	1,000	- -	1,000	1,000
Hecto - - -	100	100	100	100
Deka - - -	10	- -	10	10
UNITS.				
Divisions.				
	<i>Metre.</i>	<i>Arc.</i>	<i>Litre.</i>	<i>Gramme.</i>
Deci - - -	·1	- -	·1	·1
Centi - - -	·01	·01	·01	·01
Melli - - -	·001	- -	- -	·001

It will be observed that the multiples of the unit in each case are designated, in the metric system by Greek prefixes:—*Myria*, 10,000; *kilo*, or *chilio*, 1,000; *hecto*, or *hecato*, 100; *deka*, 10; whilst the divisions of the unit, in each case, are expressed by Latin prefixes:—*Deci*,  $\frac{1}{10}$ th; *centi*,  $\frac{1}{100}$ th; *milli*,  $\frac{1}{1000}$ th. The English equivalents to the measures of length and capacity, and to the weights, according to the metric system, are thus given:—

METRIC MEASURES OF LENGTH WITH ENGLISH EQUIVALENTS.

METRIC NAMES.	ENGLISH EQUIVALENTS.			
	<i>Inches.</i>	<i>Ft.</i>	<i>In.</i>	<i>Yards.</i>
Millimetre (1-1000th) -	0·039			
Centimetre (1-100th) -	0·394			
Decimetre (1-10th) -	3·937			
1 Metre - - - -	39·371	3	3·371	1·094
Dekametre (10 metres) -	- -	32	9·708	10·936
Hectometre (100 metres) -	- -	- -	- -	109·363
Kilometre (1,000 metres) -	- -	- -	- -	1093·683

METRIC MEASURES OF CAPACITY WITH ENGLISH EQUIVALENTS.

METRIC NAMES.	ENGLISH EQUIVALENTS.			
	<i>Gill.</i>	<i>Quart.</i>	<i>Gals.</i>	<i>Qts.</i>
Centilitre - - - -	0·070			
Déclilitre - - - -	0·704			
Litre - - - -	- -	0·886		
Dékalitre (10 litres) -	- -	- -	2	0·804
Hectolitre (100 litres) -	- -	- -	22	0·039

## METRIC WEIGHTS WITH ENGLISH EQUIVALENTS.

METRIC NAMES.	AVOIRDUPOIS.				TROY.	
	Cwts.	qrs.	Lbs.	Oz.	Drams.	Grains.
1 Décigramme (1-10th)	-	-	-	-	-	1·543
1 Gramme -	-	-	-	-	-	15·432
1 Dékagramme (10 grammes)	-	-	-	-	5·644	
1 Hectogramme (100 grammes)	-	-	-	3·527		
1 Kilogramme, or kilo (1,000 grammes)	-	-	2·205			
1 Myriagramme (10 kilos)	-	-	22·046			
1 Metric quintal (or 100 kilos)	1	3·874				
1 Metric tonne (1,000 kilos)	19	2·736				

Professor Chevalier, in his evidence before the Committee of the House of Commons on weights and measures, states his opinion that some objections may be made to the gramme as the unit of weight:—"It is very small; perhaps it would have been better to have taken the kilogramme, but such a change can be easily made. If you think our measure of weight is too small, in case you adopt the system, you may take the kilogramme (observes the Professor) for the unit." The metric system of weights and measures has been adopted, not only by France, but by Italy (except the portion under Pontifical Government), Spain, Portugal, Belgium, and Holland; it has been partially received in Switzerland, which adopts the half kilogramme as the pound. The majority of the States composing the "Zollverein," or Customs-League, in Germany, have expressed their approval of the metric system. The half-kilogramme has been introduced into all great mercantile operations in Austria. At the International Statistical Congress, held at Berlin, in September 1863, 33 nations of Europe and America were represented by statistical delegates, and the Congress agreed to the following fundamental resolution on weights and measures:—"The adoption of the same measure in international commerce is of the highest importance. The metric system appears to the Congress to be the most convenient of all the measures that could be recommended for international measures." A Commission of the Imperial Academy of Sciences in St. Petersburg has recommended that such alterations should be made in Russian weights and measures as would put them in conformity with the metric system of France. The Grand Duke Constantine, brother of the Emperor of Russia, is in favour of the metric system; and Dr. Kupffer, a delegate from the Russian Government, has declared that Russia would recommend the adoption of the pure metric system if Great Britain would take the lead. "We wish England," said Dr. Kupffer, "to take the lead. England is a country of prior civilisation. Let England do it, and we are sure to follow." In the new Belgian law on weights and measures, the units of the metric system have been extended by adopting the doubles of each unit, and of its multiples and subdivisions. The Belgians have also adopted the principle of having weights representing 50, 20, 5, 2, and 1; and they have followed a similar arrangement with regard to measures of length and measures of capacity. In Holland the law requires the use of the metric system in all things, except weighing medicines. The old Dutch names, such as "elle" and "palm" are preserved in the metric tables; the "elle" is the metre (3·2809 feet), and the "palm" the decimetre (or 3·937 inches.) A "kan" in Holland is the name for a litre or 1·760 pint. In weights, the "ons" is the Dutch name for a hectogramme, or 3·527 ounces; and a "pond" corresponds to the kilogramme (=2·205 lbs). In Spain the Government has purchased 600 sets of metric weights and measures, and it intends to buy more, so that it may supply each important town with standards for comparison. On the Spanish railways distances are measured by kilometres, and weights by kilogrammes. Tables are published containing the equivalents of the old Spanish weights and measures in metric quantities, and calculated in each case from 1 to 1,000. Official tables are published in Portugal, containing Portuguese measurements in metrical quantities, and *vice versa*. Inspectors of schools, appointed by the General Superintendents of weights and measures, have inspected 2,720 public and private schools; and schools are established under the same superintendence to explain the new system. A great number of elementary works have been published in Portugal on metrical weights and measures, for the use of schools as well as for the public. In the United States of America a Committee has been appointed by Congress to consider the subject of metric weights and measures. The Confederate States of North America have also expressed a wish to introduce into their Republic the metric system of weights and measures; and the system has been adopted in Mexico, Chili, Peru, New Grenada, Bolivia, Venezuela, and French and Dutch Guiana. Mr. Samuel Brown, in his evidence in 1862, before the Committee of the House of Commons on weights and measures, states, that in 1859, of the total trade of Great Britain, including 79,405 vessels, there were 47,393 vessels going to or from countries using the kilogramme, or about 60 per cent. of the total number of vessels; and of 19,332,174 tons, there were 7,726,148 tons carried to or from countries using the kilogramme, or about 40 per cent. of the total tonnage.

tonnage. Postal arrangements between Great Britain and France are complicated by the French weight for letters being somewhat heavier than the English foreign weight. An English ounce weighs 28·349 grammes; and the quarter of an ounce, or English foreign weight, weighs 7·087 grammes. In France, the postal weight for single letters from England is 7·5 grammes; so that the French allow an excess of weight of ·443 of a gramme, or more than one-third of a gramme more than the English. If a letter be pre-paid by stamps, the advance is 4 *d.* in England for every quarter of an ounce, and 40 centimes in France for every weight of 7½ grammes. The Postal treaty between the two countries declares, that "no letter, of which the postage is paid by stamps, is to be treated as an insufficiently paid letter, unless the value of the stamps be less than the amount required for its payment according to the weight allowed, not only by the English, but by the French scale of weight, of which 7½ grammes is the unit." In practice, the postal officials in London weigh letters going to France, and paid by stamps, with French weights. Sir Rowland Hill informed the House of Commons Committee that if the pre-paid letter does not exceed the French allowance, no additional charge is levied; if it does exceed that allowance, it is marked as insufficiently paid. Local letters in France are charged by a scale similar to that of England. It begins at 15 grammes, then it advances to 30, then to 60, and then to 90 grammes, and so on. Ten grammes are equal to nearly one-third of an ounce, 15 grammes are a little more than half-an-ounce, an ounce being 28·349 grammes. The use of metric weights and measures has recently been legalised in Great Britain; and the Act on this subject has been passed in 1864, "for the promotion and extension of our internal as well as our foreign trade, and for the advancement of science." Mr. William Ewart, M.P., has ably conducted this measure through the House of Commons; Earl Fortescue has had the successful charge of it in the House of Lords; and the Bill has been also supported by the International Decimal Association, in whose labours Mr. James Yates has taken an active and leading part. The investigations of the Committee of the House of Commons on weights and measures in 1862, have assisted in forming an influential Parliamentary party in its favour. Various recommendations were made in 1862 by the House of Commons Committee, at the close of their Report, among which were the following:—"That a Department of weights and measures be established in connection with the Board of Trade. The metric system should form one of the subjects of examination in the competitive examinations of the Civil Service. The *gramme* should be used as a weight for foreign letters and books at the Post Office. The Committee of Council on Education should require the metric system to be taught (as may easily be done, by means of tables and diagrams) in all schools receiving grants of public money. The Committee further suggest that, 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." It will be satisfactory to notice that in a Report in 1862, by Mr. James Ball, published by the British Association for the Advancement of Science, "On Thermometric Observations in the Alps," the temperatures are given according to the centigrade scale, the corresponding temperatures according to Fahrenheit being frequently added in brackets. Sometimes the observations in this Report merely record the fluctuations of the mercury in the centigrade thermometer. Observations may, in like manner, be easily registered both according to the English and French scales of temperature, and the fluctuations of the barometer may also be noted so as to be intelligible both in France and Great Britain. At the end of Mr. Dowling's "metric tables," a comparison of the scales of Fahrenheit's, the centigrade, and Réaumur's thermometers is given, as well as a comparison of the British and metric barometers—the latter containing the equivalents, from 27 inches to 30·98 inches, in linear inches and millimètres. Under the head of "chemistry," in the Matriculation Examination of the University of London, candidates are frequently asked, among other questions, to convert a given number of degrees Fahrenheit into the corresponding degrees of a Réaumur or a centigrade thermometer. Sir William Armstrong remarked, at Newcastle-upon-Tyne, in his address to the British Association in 1863, that our thermometric scale had been originally founded in error; he regarded it as most inconvenient in division, and advised that the centigrade scale should be recognised by the numerous men of science composing the British Association. The distinguished President of the British Association stated his regret that two standards of measure, so nearly alike as the English yard and the French metre, should not be made absolutely identical. We in England, observed Sir William, have no alternative but to conform with France, if we desire general uniformity. He was convinced that the adoption of the decimal division of the French scale would be attended with great convenience both in science and commerce. He could speak from personal experience of the superiority of decimal measurement in all cases where accuracy is required in mechanical construction. In the Elswick Works, as well as in some other large establishments of the same description, the inch is adopted as the unit, and all fractional parts are expressed in decimals:—"No difficulty has been experienced in habituating the workmen to the use of this method, and it has greatly contributed to the precision of workmanship. The inch, however, is too small a unit, and it would be advantageous to substitute the metre, if general concurrence could be obtained."



From Major *J. Puckle*, Deputy Superintendent, Mysore Commission, to the Secretary to the Commissioner of Mysore, on Circuit; dated Ootacamund, 20 December 1865.

WITH reference to the accompanying memorandum by the Commissioner. I have the honour to submit a few observations on the subject of weights and measures therein alluded to, and to apologise for having detained the papers that were obligingly placed at my disposal, and which are herewith returned, for so long a time.

#### MEMORANDUM OF WEIGHTS AND MEASURES.

THE tables attached to this memorandum show the great variety that exists in the weights and measures in ordinary use, and the necessity for their simplification, or assimilation, to some recognised standard.

2. Though the people would realise that this would facilitate their commercial dealings, they are so averse to any change that co-operation is not to be expected; and it therefore only remains to institute such measures as will bring about the needed reform with the least possible interference with what now obtains.

3. *For Weights.*—The maund and seer are almost universally known, though the former varies generally from 24 lbs. to 29 lbs., while in Bengal it is 80 lbs. In Mysore the maund of 28 lbs. is used for coffee, though this is only nominally 28 lbs., the referible standard being 1,120 rajah rupees (now an obsolete coinage), or their supposed equivalent, viz. 1,097 Government rupees, which would be in excess of the real weight by more than eight rupees.

4. The fact is that there is no real standard of comparison; the weight of a seer (for instance) depending on a certain number of obsolete coinage, or their supposed equivalent in Government rupees, or else on the weight of the nine kinds of grain that are used to determine the size of a seer of capacity, hence no two measures or weights can ever be exactly the same.

5. The coffee maund of 28 lbs. is an aliquot part of an cwt.; and the seer, which is generally assumed to be 2 lbs., would, if fixed at that, be an aliquot part of a maund, and might be subdivided as far as necessary. Moreover, by using the maund and seer of exactly 28 lbs. and 2 lbs., the assimilation of the Indian to the English "weights" would be complete, and very little change in value or nomenclature is shown in the following table:—

#### PROPOSED TABLE OF WEIGHTS.

	English Equivalent.
180 Grains = 1 tolah - - - -	180 grains.
243 Tolahs = 1 pullum - - - -	1 ounce.
16 Pullums = 1 rātl - - - -	1 pound.
2 Rātls = 1 seer - - - -	2 lbs.
14 Seers = 1 maund - - - -	28 lbs. or $\frac{1}{4}$ cwt.
4 Maunds = 1 bhāra - - - -	112 lbs. or 1 cwt.

6. *The Measures* need simplification and reduction to a recognised standard equally with the weights, as the existing kristnaraj seer or capacity is only to be determined by the ancient Nowdaniem standard, viz., by taking  $9\frac{1}{2}$  rajah rupees weight of each of the following kinds of grain:—

1. Wheat.	4. Bullah.	7. Gingely seed.
2. Rice in husk.	5. Black gram.	8. Horse gram.
3. Pigeon pea.	6. Chenna.	9. Moong.

or in all, 84 rajah rupees weight of cereals, pulses, &c. This quantity, assumed to weigh 2 lbs., and on which the seer avoirdupois is based, fills a cylinder of a certain shape which, from many careful measurements, may be stated to contain, on an average,  $71\frac{1}{4}$  cubic inches.

7. This is so near the capacity of the Imperial English quart that the seer might be fixed at that (or 69.3185 cubic inches); and the cutcha seer, which is a well known and favourite measure, be fixed at a quarter of the above, or 17.329625 cubic inches, which is as nearly as possible its present capacity. The assimilation to our English measures would thus be complete, while the whole nomenclature would be unaltered, the only difference being that the candy would contain five quarts less for one quart in one bushel (than it is now supposed to do); but then accuracy would be substituted for inaccuracy.

THE PROPOSED TABLE.

	English Equivalent.	Contents in Cubic Inches.
4 Chitaks - - = 1 cutcha, or pow seer	$\frac{1}{2}$ pint, or 2 gills -	17·320625, or $17\frac{1}{2}$ nearly.
4 Chitaks, or pow seer = 1 kristnaraj seer -	1 quart - - -	69·3185, or $69\frac{1}{2}$ "
8 Kristnaraj seer = 1 koodoo - - -	2 gallons, or 1 peck -	554 $\frac{1}{2}$ nearly.
20 Koodoos . - - = 1 candy - - -	5 bushels - - -	11091 "

*N.B.*—Four koodoos would exactly equal one bushel (or capacity in cubic inches of 2,218 $\frac{1}{2}$  very nearly), and 32 koodoos (or 1·6 candy) one quarter or cubical capacity of 10 $\frac{1}{2}$  feet. These might be added to the table if thought necessary, or the first one only, when it would be interpolated between the two last items.

And these measures would answer for liquid as well as dry measurement.

8. The great variety that exists, even in villages in the same talook (as the accompaniments of this memorandum will show), is a serious hindrance to commerce, but this cannot be rectified until the Government lead the way by declaring some such alteration not only advisable but imperative; and by causing it to be known that, in all its dealings, especially in the Commissariat Department, no other than the new sirkari or kristnaraj standard would be recognised, and by ruling "that in the sale of articles, no receipt should be valid in law on which the statute weight or measure was not stated," leaving the facilities that this reform would afford to commend itself by its gradual ramification from the more enlightened centres of trade, down eventually to the agricultural population.

9. The standards for "weights" should be of a uniform pattern, and those for "measures" should be of exactly uniform depth and diameter, for the proper cubical capacity; and the question of heaped and struck measure should be settled between the vender and purchaser; the Government meanwhile setting an example, by declaring that, in all its transactions, struck measures should only be used.

10. *Land Measure* is now entered in the accounts in English acres, but the difference in the dry and wet measurements still exists according to the Bijwaree system, where a certain measure of seed was supposed to sow a certain area of land (both measure and area being called by the same name), and by which the relative proportion of dry to wet area is as about six to one.

11. The "wet" koodoo is 500 square yards, and a candy 10,000 square yards; but by making a very slight alteration in the "pylee" viz., by reducing it from 31 $\frac{1}{2}$  square yards to 30 $\frac{1}{2}$  yards the "mamool pylee" would exactly correspond with the English *pole*, by which the assimilation to the English standard would be complete, while the whole nomenclature would be retained. This should be made applicable to every description of land without reference to the cultivation.

12. The following table shows the slight alteration required:—

	English Equivalent.
4 Square baths (9 square feet) - - - = 1 square guz -	1 square yard.
30 $\frac{1}{2}$ Square guz (instead of 31 $\frac{1}{2}$ ) - - - = 1 square pylee	1 square pole.
16 Pylees (or 484 square yards instead of 500) = 1 koodoo or square sankli.	1 square chain, or 1-10th of an acre.
20 Koodoos or square sanklis - - - = 1 candy -	2 acres.

*N.B.*—Ten sanklis, or chains of 22 yards or 100 links [of 7·92 inches per link] in length and one in depth, measure one acre.

13. The above suggestions are, it is thought, adapted for Mysore, as the assimilation of existing weights and measures to the English standard would be complete with the retention generally of the old nomenclature and value, while the reform would be carried out with the minimum of interference with old-established customs and ideas, and a fixed systematic standard would be substituted for a variable one.

14. Should any such alterations be made, the term "sirkari," or other definite name, should be given to prevent mistakes.

15. But should it be deemed advisable to introduce the decimal system, instead of the above, the following remarks may not be deemed out of place:—

16. The method of determining the capacity of a measure (seer) by liquid is not unknown—oil, milk, and ghee having been so used; the kutchia seer containing as nearly as possible 24 rajah rupees weight of oil. The kristnaraj seer contains 100 Government rupees,

## PAPERS RELATING TO

rupees weight of water, which would form an excellent standard, based on the decimal application of the favourite tolah, which would be intelligible all over India; and the exact capacity in cubic inches would be determined by 100 rupees weight of distilled water, at a temperature to be agreed on, and with the barometer at the sea level.

17. The names suggestive of divisions by one-half, one-quarter, one-eighth, &c., as adha, chetak, alak, gidda sola, veesa, solign, &c., should be abolished; and those indicating a decimal division, and still familiar to the Indian ear, should be adopted, as has been attempted in the following table, where the average capacity of the present kristnaraj seer has been taken at 71·3 cubic inches:—

TABLE OF MEASURES OF CAPACITY.

New Decimal Denomination.	Contents in English Cubic Inches.	Contents in Imperial Gallons.	French Equivalents.
10 Dassakas = 1 cutha seer - -	7·13	0·025714	1·16828 letre.
10 Kutchas = 1 kristnaraj seer -	71·3	0·25714	1·16828 deciletre.
10 Kristnaraj seer = 1 koodoo (instead of 8 seers, as at present).	713	2·5714	1·16828 hectoletre.
10 Koodoos = 1 palah - - -	7,130	257·14 { or 32·12 bushels }	1·16828 kiloletre.
10 Palahs = 1 candy - - -	71,300		

18. The weights based decimally on the rupee would be as under:

	English Grains.	English Pounds.	Government Rupees.
10 Spatakas (or cents. of a tolah) - = 1 dassaka or masba	18	- - -	0·1
10 Mashas - = 1 tolah - - -	180	0·025714	1
10 Tolahs - = 1 dhadga - - -	1800	0·25714	10
10 Dhadgas - = 1 seer - - -	18000	2·5714	100
10 Seers - = 1 maund - - -	180000	25·714	1000
10 Maunds - = 1 bharah - - -	1800000	257·14	10000

By this the maund would be, as nearly as possible, the weight that it is commonly valued at, viz., 25 lbs.

19. *Land Measure.*—The cubit, according to the average of many trials, ranges from 19·6 to 19·7 English inches, and this accords well with the length assigned to it by the natives. If this were fixed at 19·68395, it would exactly correspond with the French half metre, and the guz of two cubits with the metre; and the Mysore wet candy, of 10,000 square yards, would be a synonym for a French hectare, or 2·473614 English acres. On this the following table has been calculated; the present nomenclature being retained as nearly as possible:—

TABLE FOR LAND MEASURE.

New Decimal Denomination.	Equivalents in English Square Yards.	French Equivalents.
10 Square hastas = 1 square kadam (sirkari).		
10 Kadams - = 1 " guz - - -	1·196033	1 square metre.
10 Guz - = 1 " dhaza - - -	11·96033	10 "
10 Dhazas - = 1 " sankli - - -	119·6033	100 "
10 Sanklis - = 1 " koodoo - - -	1196·033	1000 "
10 Koodoos - = 1 " candy - - -	11960·33	10000, or 1 hectare; or 2·473614 Imperial acres.

N.B.—One hasta (linear) = 3·937079 English inches; and one square hasta, about 15½ square inches; and one square kadam, 155 square inches, nearly.

20. The first suggestions for the assimilation of the weights and measures to the English standard, though intended originally for Mysore, would admit of general application; as the kristnaraj seer of about 71 cubic inches, founded on the "Nowdaniem" standard, is known

known and used throughout Southern India and in Bengal; while the seer avoirdupois has relation to the same seer of capacity, inasmuch as the *quantity* of grain determines the capacity of the latter, and its *weight* (84 rajah, or 2 lbs. English) the former. The reduction of the seer of capacity to 69·3184 cubic inches (or the English quarter), and the kutch a seer to 17·329625, which is very nearly what it now is, and the fixing of the seer and maund avoirdupois at 2 lbs. and 28 lbs. respectively, would, without any serious innovation, establish a fixed systematic standard, which would be intelligible to all.

*J. Puckle*, Major,  
Deputy Superintendent, Mysore Commission.

Ootacamund, 20 December 1865.

VARIETIES OF LAND MEASUREMENT, KOOSKEE OR DRY.

Name of Measurement.	Number of Seers for 400 Square Yards per Koodoo.	Square Yards per Koodoo.	Square Yards per Candy.	Local Area, Square Yards.	Equivalent per Candy, in Acres.	Where Prevalent, &c. &c.
Kristnaraj standard . . . . .	8	3,200	64,000	-	13·223	Present Government standard.
Madavaraya . . . . .	-	17,250	345,600	-	-	In Seerah and part of Mudgiri. This is exactly four times the wet measurement.
Louboo . . . . .	-	-	-	1,024	-	In Herioor, Ayammyalam, Matad, Cancoppa, and Devangeri. Wet and dry the same.
Ackadi . . . . .	-	-	-	480	-	In Hosdroog, parts of Herioor, Devangeri, and Hurryhur Talooks. Wet and dry the same.
„ . . . . .	-	-	-	750	-	In Hoshally Talook, and Hurryhur Proper.
Sairra . . . . .	-	-	-	2,844½	-	In parts of Nugur.
Jungle koodoo . . . . .	-	-	-	1,000	-	Dry land reclaimed from jungle in Nugur.
„ . . . . .	-	-	-	3,200	-	Former lot at four annas, the latter at six annas.
Pucka koodoo . . . . .	16	6,400	128,000	-	26·446	The koodoo equals one cawni, and is used in Coongul, Toomkoor, Cudab, Honavri- alli, Chicknaickwhully, Toorvakeri, Cu- door, and Terrikerry.
Sihul koodoo, &c. . . . .	3	1,200	-	-	-	In Soorab.
„ . . . . .	80	32,000	-	-	-	Shikarpoor and Mulcalmooroo.
„ . . . . .	18	7,200	-	-	-	Homelly, Shimogah, and Terrikerry.
„ . . . . .	3½	1,400	-	-	-	Lucknully and Chickmoogloor.
„ . . . . .	2½	900	-	-	-	Ditto and Wustara.
„ . . . . .	27½	11,000	220,000	-	-	Luckmully.
„ . . . . .	24	9,600	192,000	-	-	Terrikerry, and Turoor in Kortagiri.
„ . . . . .	20	8,000	160,000	-	-	Terrikerry.
„ . . . . .	2½	1,000	20,000	-	-	Wustara.
„ . . . . .	64	25,600	512,000	-	-	Doderi, part of Powgur and Tulluc.
„ . . . . .	96	38,400	-	-	-	Madavaraya.

N.B.—It will be observed that the number of seers of 400 square yards for dry cultivation varies from 2½ to 96 per koodoo; though eight for wet and dry is the Kristnaraj standard, making the koodoo 3,200 square yards, and the candy 64,000, or 13·223 acres.

In parts of Chittuldroog District there is a local measure (ackadi) used both for wet and dry land, of 480 square yards, which is only four yards less than the tenth of an acre.

In the Toomkoor and Cudab Districts the koodoo equals the Madras cawnie.

## LAND MEASUREMENT, WEIGHT, AND BAGAYET.

MEASUREMENT.	Number of Seers per Koodoo of 62½ square yards.	Square Yards per Koodoo.	Square Yards per Candy.	Local Area, Square Yards.	Equivalent per Candy, in Acres.	De- scription.	REMARKS.
Kristmaraj standard - -	8	500	10,000	-	2.066	both -	Government standard.
Sthul koodoo, &c. - -	80	5,000	100,000	-	20.66	ditto -	Mulcalmooro
Ditto - - - - -	24	1,500	30,000	-	-	wet -	Turoor in Kortagiri.
Madavaraya koodoo, &c. -	96	6,000	120,000	-	-	garden and wet -	Nidigul; Herioor; Mudgiri; Seerah; Madigasy; Chinnroy Droog, part of Kortagiri; and Mahakala Droog.
Madavaraya - - - - -	-	4,320	86,400	-	-	wet -	Seerah and part of Mudgiri.
Sthul koodoo, &c. - - -	-	750	-	-	-	garden -	Mulberry garden, Coongul.
Ditto - - - - -	-	750	-	-	-	wet -	Boodyhal.
Ditto - - - - -	-	800	-	-	-	garden -	Capillary borie cultivation.
Pucka - - - - -	-	1,000	-	-	-	both -	Boodyhal, Cudab, Toorvakiri, Chicknaickwhully, Coongul, Honavally.
Sthul koodoo - - - - -	-	18,000	-	-	-	garden -	Powgur.
Ditto - - - - -	-	12,000	-	-	-	-	Nidigul.
Ditto - - - - -	64	4,000	-	-	-	-	Tullac, part of Powgur and Dodari.
Dhaya for soopari, cardamoms, pepper, betel, and coffee - - - - -	-	-	-	23½	-	-	Sangor and Soorub - } Square space between two
	-	-	-	18	-	-	of Anantapoor - } trees.
	-	-	-	26	-	-	Luevully Proper, and Terrikerry.
	-	-	-	25	-	-	Shimogah, Hala, Honore, and Honalli.
Bhurma - - - - -	-	-	-	-	-	-	Space between two rows, Nugur and Anantapoor.
Dhaya for soopari, cardamoms, pepper, betel, and coffee - - - - -	-	-	-	13½	-	-	Cowli Droog, Coppa Gandanhully.
	-	-	-	10½	-	-	Luevully, Kaloo in Wastara.
	-	-	-	4	-	-	Chickmoogloor (coffee).
	-	-	-	100	-	-	Terrikerry, Cadoor (cocoa-nut).
	-	-	-	144	-	-	In other Talooks (cocoa-nut).
-	-	-	480	-	-	both -	Chengiri, Hosdroog.

N.B.—The kristmaraj standard is eight seers of 62½ square yards per koodoo, or 500 square yards. The candy is 10,000 square yards, or 2.066 acres. The local seer varies from eight to 96 per koodoo.

The dhaya is a local measurement varying according to the cultivation, and is intended generally to denote the square allotted to each plant; thus coffee trees are ordinarily planted six feet apart, which gives four square yards to each, and admits of rather more than 1,200 trees in the acre. Cocoa-nut trees have a dhaya of about 100 square yards, and areca nut trees about 10 square yards.

## MEASURES OF CAPACITY.

PLACE AND NAME.	Cubic Inches per Seer.	Seers per Koodoo.	Seers per Candy.	Equivalent in Imperial Bushels per Candy.	REMARKS.
Mudgiri Mudavarow - -	74	96	1,020	64	30 of these seers equal, very nearly, 1 bushel. 1 bushel = 2218.192 cubic inches. 30 seers = 2220 - ditto Same in colour.
Kristmaraj standard - -	71.75	8	160	5.175	
Seringapatam (pucka) or Sultany.	74	16	320	10.66	
Ashtagram (ordinary) -	74	14	280	9.33	
Sthul - - - - -	74	5	100	3.33	All kinds of grain sold by this, but generally grain is sold at so much per 100 seers.
Bangalore candy - - -	74	10	200	6.66	
Periapatam - - - - -	74	7	140	4.66	Used for wheat, raggi, rice, and salt. Ditto - - ditto.
Huldipurn - - - - -	87½	-	-	-	Used by the farmers.
Ditto - - - - -	32½	-	-	-	Used by the merchants.
Hurryhur - - - - -	159½	80	1,600	115.2	The seer, or as it is called "chitty," is 159½ cubic inches, 4 chittys = 1 gydna.
Ditto - Cutcha seer of oil	16½	-	-	-	20 gydnas = 1 kolaga, 20 kolagas = 1 candy (1,600 cwt).
Kristmaraj standard assuming it to be 1 gallon of distilled water, at 60° Bar. 30 = 10 lbs. - -	71.75	8	160	5.175	1.035 quarts, Imperial = 1 seer, 71.75 cubic inches. 3.8617 seers = 1 gallon, 277.274 " " 8 seers = 1 koodoo, 574 " " 30.5930 seers = 1 bushel, 2218.192 " " 160 seers, or 5.175 bushels = 1 candy, 114.80 cubic in.
Rutnagiri Haldah - - -	-	80	1,600	-	In Mudgiri.
Pucka - - - - -	-	64	1,280	-	Ditto.
Cutcha Mysore seer - -	17½	-	-	-	This filled with water, at a temperature of 75° and Bar. 27°, weighs 23½ Government rupees, or 24 Rajah rupees, or 0.60428 lbs.
Mysore pucka - - - - -	71.75	10	200	6.4	Nearly used very generally in the villages about here.
New Mysore, weighing 100 tolahs of water.	71.73	10	Seers per palah. 100	Seers per candy. 10.00	or 32 bushels almost.

N.B.—The cutcha seer of Mysore is found, on the average of many trials, to contain 17½ cubic inches. If this were fixed at 17.329625, it would be exactly one-quarter of an English quart Imperial, and the kristmaraj seer might be fixed at the exact quart, or 69.3185 cubic inches. This could hardly be called an innovation, but rather determining a fixed and systematic standard for a variable one which, after the first distaste for change of any sort, would soon commend itself to the people.

## WEIGHTS.

N.B.—One Sultany Rupee = '02518 lbs. One Company's Rupee = '025714 lbs. = 180 grains.

NAME AND PLACE.	Number of Government Rupees.	Number of Sultany Rupees per Seer.	Weight in pounds of one Seer.	Number of Seers per Maund.	Pounds per Maund.	Candy.	REMARKS.
Mudgiri Madavaraya	-	22	0.554	48	26.61	-	
Seerah	-	22	-	56	-	-	For local sales.
Ditto	-	-	0.554	48	26.61	-	For exports, such as cocoa-nuts.
Seringapatam cutcha seer	-	24	0.60428	40	24.17	-	For jaggery, sugar, tamarinds, betel, condiments, sandal wood, wool, silk, cotton, thread, rope, honey, wax, oil, and ghee.
							A seer of capacity of oil is the standard for the weight of this name.
Bangalore cutcha Periapatam and Mangalore.	-	24	-	40	24.17	-	For ghee, walagram, betel, and black pepper.
Bangalore	-	24	-	42	25.8	-	Nearly for wholesale for every article of weight except those brought from Seringapatam, but in retail the Seringapatam standard is used.
Ditto	-	24	-	44	26.7	-	Very nearly. For cotton wool.
Colar cutcha, 21 duds or dubs; these are a little heavier than rupees.	-	-	-	48	25.5	-	
Colar seer	-	-	-	52	27.6	-	Jaggery, sugar, tamarind, &c., sold by this gram usually sold at per 100 seers.
Mangalore	-	24	-	46	28.14	-	Generally used in Mangalore bazar, and in quantity as above.
Ditto	-	24	-	-	28.55	-	Used by merchants when they buy.
Huldipoor, Barcoor, and Honawur.	-	24	-	40	24.17	-	Common bazar weight in Mysore territory.
Ditto ditto	-	24	-	42	25.5	-	Maund of pepper.
Ditto ditto	-	24	-	45½	27.9	-	„ of betel-nut.
Ditto ditto	-	24	-	48	29.13	-	„ of cocuanut-kernel, kopra.
Ditto ditto	-	24	-	44	26.7	-	„ of jaggery.
Hurryhur	-	24	-	48	29.13	-	„ of cotton.
Ditto Takady	-	24	-	36	21.8	-	„ of farmer's weight.
Ditto Bazar	-	24	-	40	24.17	-	Maund of local bazar; 8 maunds = 1 bullock load; 20 maunds = 1 barah; 40 maunds = 1 bandy, or nearly 1,000 lbs.
Packa seer, Bangalore	-	84	2.11512	-	-	-	A kilogramme nearly, which is 2.20548 lbs. (849 rupees is 2.16).
Sandal sales	-	28	0.705	40	28.2	-	Sandal wood sold by this.
Chicknaikenpully Walay Tooka.	-	27½	0.69245	40	27.7	-	This is a local weight, and is used for kopra and areca nuts; it was formerly 275 rajah rupees for one dodhe (10 seers); but as they are out of currency, 270 Government rupees have been arbitrarily fixed as the weight of a dushera, 10 seers = 1 dodhe, 4 dodheras = 1 maund, 8 maunds = 1 heroo, or bullock's weight or load.
N.B.—Stone weights are used; 1 chaveeka, nearly 7 lbs., used for areca, coffee, &c.							{ 8 maunds = 1 heroo. 20 „ = 1 bhara. 40 „ = 1 bandy load, or more than 1,000 lbs. avor. 1 bandy load = 1,000 lbs., this for areca, kopra, &c. *
Honavully Havoy Tooka	-	26	-	40	-	-	
Cutcha seer (about)	23½	24	0.60428	40	24.17	403.4	
Bengal	-	-	-	-	80	-	
Indian	-	-	-	-	82½	-	
Cuddapah, Masulipatam	-	-	0.617136	40	24.685	-	Weight in Government rupees of one maund.
Vizagapatam, Ganjam, Rajamundry.	-	-	-	-	-	-	960.
Bellary	-	-	-	-	25.92	-	1,008.
Chingleput, North Arcot, Tanjore, Madura, Salem, Nellore, Guntoor.	-	-	-	-	24.685	-	960.
South Arcot	25	-	-	-	25.71	-	1,000.
Canara.	-	-	-	-	-	-	
Mangalore, Buntwal, &c.	-	-	-	-	28	-	1,069.
Bekul	-	-	-	-	25.7	-	1,000.
Honore, Shendasheoghur	-	-	-	-	-	-	1,120.
Coompta and Soonda	-	-	-	-	-	-	1,152.
Soonal	-	-	-	-	-	-	1,272.
Bilghi	-	-	-	-	-	-	1,000 (hera pauch seer).
Ditto cutcha maund	-	-	-	-	-	-	8,760 (and 20 of these to a candy).

N.B.—The Mangalore maund is very nearly 28 lbs. or ¼ cwt., and coffee in Mysore is supposed to be weighed by the maund of 28 lbs. It would be found on trial that the weight of Nowdaman grains that would fill an English quart Imperial would balance almost exactly 2 lbs. Goldsmith's weight 1-16 canteroy pagoda = 1 vessa, and so on by eighths to one pagoda. This is called vessa tooka, also 1½ canty fanams = 1 choway tooka, 5 canteroy fanams = 1 hormoo, 2 hormoos = 1 pagoda.

20 December 1865.

J. Puckle, Major,  
Deputy Superintendent, Mysore Commission.

## HYDERABAD.

From Sir *G. U. Yule*, C.B., and K.C.S.I., Resident at Hyderabad, to *E. C. Bayley*, Esq., Secretary to the Government of India, Simla (No. 29); dated 18th July 1866.

WITH reference to your letter, No. 3155, of the 25th October 1865, and Government Resolution, dated 20th June 1864, on the question of a uniform system of weights and measures for British India, I have the honour to submit, for the information of his Excellency the Viceroy and Governor General of India, copy of a letter from the Officiating Commissioner, Hyderabad Assigned Districts, No. 641, of the 5th July 1866, with enclosure on the subject, and to state that the only measure required to make the use of the new weights universal is to give power to seize and confiscate the old weights, and inflict some slight punishment on parties using them.

From Major *W. Nembhard*, Commissioner, Hyderabad Assigned Districts, to Major *J. Stubbs*, 1st Assistant Resident, Hyderabad (No. 641)—175; dated Ellichpore, 5th July 1866.

IN acknowledging the receipt of your letter, No. 2239, of the 18th December 1865, I have the honour to enclose an extract from the Administration Report of 1862-63, explaining what has been done regarding the introduction of a uniform system of weights and measures in the assigned districts.

2. The people use, to a considerable extent, the prescribed weights and measures; but, as there is no penalty for not using them, complete uniformity cannot be expected.

3. I beg strongly to recommend that the weights and measures adopted by Government should be made compulsory by law.

4. In the event of a general system of weights and measures being introduced for the whole of India, it would be applicable to the assigned districts, but, till this takes place, I think it would be a great benefit to the country were the use of the present weights and measures made compulsory.

EXTRACT from the Commissioner's Administration Report for 1862-63, dated 18th June 1863.

*Section VIII.—Weights and Measures.*

Introduction of a new system of weights and measures.

Para. 118. There had been the most utter confusion regarding weights and measures in Berar, and it was considered absolutely necessary to introduce uniformity. The weights adopted were the following:

1 tolah	=	180 grains.
5 tolahs	=	1 chittack.
16 chittacks	=	1 seer.
40 seers	=	1 maund.
20 maunds	=	1 candy.

Measures, how fixed.

119. These weights were adopted because they were those most commonly used in this and the adjoining provinces. Grain, however, is universally sold by measure and not by weight; and it became necessary, therefore, to establish a seer measure, which should contain, as nearly as possible, 80 tolahs weight of grain. As different species of grain are of different specific gravities, it was necessary to strike an average, as it would have been most inconvenient to have had a different measure for every different kind of grain; eight of the most common kinds were mixed in equal quantities, and the seer measure was made to contain 80 tolahs weight of the mixed grain. This measure was found to contain almost exactly a quantity of water weighing 100 tolahs. This test was, therefore, ordered to be applied to the seer measures, and it is a test which can be easily applied by any one.

Denomination of weights not altered.

120. No change has been made in the denominations of the weights, and all that has been done was to make a system of weights universal in Berar which was already in existence in many parts of it. Time and patience will of course be required thoroughly to introduce the new system, but the people show no aversion to it, and therefore the difficulties in the way of obtaining uniformity are not great.

— No. 25. —

From *Leoni Levi*, Esq., LL.D., Secretary to the Metric Committee of the British Association, to *E. H. Lushington*, Esq., Secretary to the Government of India, Financial Department; dated, 10, Farrar's Building, Temple, London, 20th June 1866.

I HAVE the honour to enclose two addresses on the subject of metric weights and measures, one signed by Earl Fortescue, President of the International Decimal Association, and one by Sir John Bowring, Chairman of the Metric Committee of the British Association, which I pray you to submit to the Government of India. The Act and Report of the Committee of the House of Commons on the subject are also forwarded to you this day by post. Any communication you may be so good as to send to either body or both, have the goodness to forward to myself.

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To *E. H. Lushington*, Esq., Secretary to the Government of India, Financial Department; dated 10, Farrar's Building, Inner Temple, London, 19th June 1866.

I AM desired, by the Council of the International Decimal Association, to transmit to you, for the Government of India, a copy of an Act of Parliament passed in 1864, being the 27 & 28 Vict. c. 117, entitled "An Act to render permissive the use of Metric Weights and Measures in the United Kingdom." This Act was the result of a Parliamentary inquiry conducted in 1862 by a Committee of the House of Commons, which was appointed to consider "the practicability of adopting a single 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." A copy of that report I have also the honour to transmit. As you will see, the Committee came to the unanimous conclusion of recommending 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 this Act much has been done to promote the practical adoption of the new system; and we trust that, with an increased knowledge of the same throughout the country, the time will speedily come when a still more definite legislation may be safely introduced.

In bringing before you the steps taken in this country, we are anxious to call the attention of the Government of India to the great advantage of a uniform system of weights and measures throughout the British Empire, and to the great need of the co-operation of your Government, which exercises such paramount influence over the vast and populous territories of Asia, with a view to the attainment of so desirable an object. If we are rightly informed, moreover, the condition of India as regards its weights and measures is not better than that of this country. We understand that every village almost, certainly every talook throughout India, has measures differing in some respects from every other. In weights, the tola, the unit, is in one place 193 grains; in another 178; in another 209. The seer is in one place 41 tolas, in another 107, in another 24. The maund is in one place 42 lbs., in another 163 lbs., in another 24 lbs. In measures of length, the guz is in some places 44 inches, in other places 31 inches, and in others 27 and 34 inches. The cubit differs as extensively. On the multiplicity, confusion, and intricacy of Indian weights and measures several works have appeared, such as Dr. Francis Buchanan's "Journey from Madras," in 3 vols. 4to. (1807); Major Jervis's "Indian Weights and Measures, showing their equivalents in the metric system;" Mr. H. Bailey's "Suggestions for a uniform System of Weights and Measures throughout India," (1857); and lastly, and above all, a pamphlet on Indian weights and measures by Charles E. Gover, principal of the Military Male Orphan Asylum at Madras (1865), the result of careful study and extensive inquiries. It is, moreover, evident from these works that no progress whatever has been made towards unity in late years; and that, whilst the commerce and prosperity of India have advanced in



a wonderful manner, the weights and measures of the country exhibit the same disorder and confusion now as they did 60 years ago.

From the experience of this and other countries, we are sure that such a state of things must produce great inconvenience, trouble and uncertainty in trade, and greatly hinder social intercourse between the different provinces. The Council of the International Decimal Association are pleased to learn that the Government of India has already given its attention to the question as one requiring an immediate remedy; but we would submit that this is a favourable time, when new legislation is required in other directions, for introducing a sound and permanent reform aiming at conformity with the weights and measures of other countries.

It is quite unnecessary for us to recall the attention of your Government to the fact that, under similar circumstances, and after many efforts for obtaining a natural standard, the scientific men of France resolved upon adopting the metre, or a definite portion of the arc of the meridian, as the unit of both measures and weights, with a decimal system of divisions and multiples, and a special nomenclature at once simple and significative of the respective quantities. This system, ever since its introduction, has made steady advance towards universal adoption; and wherever any change has been made, as in Spain, Portugal, Italy, Greece, Belgium, South America, &c., &c., the metric system is the only system chosen; and, when once chosen and put in practice, it has never been abandoned.

The desire of uniformity 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, and 1862; the International Statistical Congress held at Brussels, Paris, Vienna, London, and Berlin; and, during the forthcoming Universal Exhibition in Paris, we trust a special exhibition will take place of the standard weights and measures of all countries, with a view to the universal adoption of the metric system.

From this distance the Council of the International Decimal Association do not venture to suggest to your Government any specific measures. Yet they would respectfully submit that the claims of the metric system, as a basis for the weights and measures of India, should be properly considered; and that, having regard to its many advantages, it would be desirable to legalise the same throughout the Indian Empire, in the same manner as in the United Kingdom, and especially to promote the teaching of the same in all public schools. The rapid increase of the direct commerce of India with countries using the metric system renders such a measure highly necessary; and the Council trusts sufficient reasons have been shown for recommending to the Government of India a measure likely to bring that great empire within the network of countries and states throughout the world having one uniform system of measures, weights, and coins.

(signed) *Fortescue*, President.  
*Leone Levi*, LL.D., Secretary.

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To *E. H. Lushington*, Esq., Secretary to the Government of India, Financial Department; dated 10, Farrar's Building, Temple, London, 19th June 1866.

WE are desired by the Metric Committee of the British Association for the Advancement of Science, to transmit to you, for the Government of India, copy of an Act of Parliament passed in 1864, being the 27 & 28 Vict. c. 117—“An Act to render permissive the use of Metric Weights and Measures in the United Kingdom.” This Act was the result of a Parliamentary inquiry instituted 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 the benefit of our internal trade, but to facilitate our trade and intercourse with foreign countries.” Copy of their Report we have also the honour to transmit; and, as you will see, the Committee came to the unanimous conclusion of recommending 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 this Act much has been done to promote the practical adoption of the new system; and we trust that, with an increased knowledge of the

the same throughout the country, the time will speedily come when a still more definite legislation may be safely introduced.

In bringing before you the steps taken in this country on the subject, we are anxious to call the attention of the Government of India to the great advantage of a uniform system of weights and measures over all the British Empire, and to the great need of the co-operation of your Government, which exercises such paramount influence over the vast and populous territories of Asia, with a view to the attainment of the still further object of uniformity in the weights and measures of all countries. If we are rightly informed, moreover, the condition of India, as regards its weights and measures, is not much better than that of this country. We understand that every village almost, certainly every talook throughout India, has measures differing in some respects from every other. In weights, the tola, the unit, is in one place 193 grains; in another 178; in another 209. The seer is in one place 41 tolas, in another 107, in another 24. The maund is in one place 42 lbs, in another 163 lbs., in another 24 lbs. In measures of length the guz is in some places 44 inches, in other places 31 inches, and in others 27 and 34 inches. The cubit differs as extensively.

On the multiplicity, confusion and intricacy of Indian weights and measures several works have appeared from time to time, such as Francis Buchanan's, M. D., F. R. S., *Journey from Madras* (1807); Kelly's *Universal Cambist* (1811); Major Jervis's *Indian Weights and Measures*; W. H. Bailey's *Suggestions for a uniform System of Weights and Measures throughout India* (1857); Frederick Noback *Masse at Gewichte*, 1862; and lastly a pamphlet on *Indian Weights and Measures* by Charles E. Gover, Principal of the Military Male Orphan Asylum, Madras, the result of careful study and extensive inquiries. It is evident from these works that no progress whatever has been made towards unity in late years; and that, whilst the commerce and prosperity of India have advanced in a wonderful manner, the weights and measures of the country exhibit the same disorder and confusion now as they did 50 years ago.

From the experience of this and other countries, we are sure that such a state of things must produce great inconvenience, trouble and uncertainty in trade, and greatly hinder social intercourse between the different provinces. The metric committee of the British Association are pleased to learn that the Government of India has already given its attention to the question as one requiring an immediate remedy; but we would submit that this is a favourable time, when new legislation is required, for introducing a sound and permanent reform, aiming also to uniformity with the weights and measures of other countries.

It is quite unnecessary for us to recall the attention of your Government to the fact that, under similar circumstances, and after many efforts for obtaining a natural standard, the scientific men of France resolved upon adopting the metre, or a definite portion of the arc of the meridian, as the unit of both measures and weights, with a decimal system of divisions and multiples, and a special nomenclature at once simple and significative of the respective quantities. This system, ever since its introduction, has made steady advances towards universal adoption; and wherever any change has been made, as in Spain, Portugal, Italy, Greece, South America, &c. &c., the metric is the only one which has been adopted, since it does meet all the requirements of commerce. The desire of uniformity 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, and 1862; the International Statistical Congress held at Brussels, Paris, Vienna, London and Berlin; and, during the forthcoming Universal Exhibition in Paris, we trust a special exhibition will take place of the standard weights and measures of all countries, with a view to the universal adoption of the metric system.

From this distance the metric committee of the British Association do not venture to suggest to your Government any specific measures, yet they would respectfully submit that the claims of the metric system, as a basis for the weights and measures of India, should be properly considered; and that, having regard to its many advantages, it would be desirable to legalise the same throughout the Indian Empire in the same manner as in the United Kingdom, and especially to promote the teaching of the same in all public schools. The rapid increase of the direct commerce of India with countries using the metric

system renders such a measure highly necessary; and we trust we have shown sufficient reasons for urging on the Government of India a measure likely to bring that great empire within the net work of countries and States throughout the world having one uniform system of measures, weights, and coins.

(signed) *John Bowring*, A. F. R. S., LL. D.,  
Chairman of the Committee.  
*Leone Levi*, LL. D., Secretary.

OFFICE MEMORANDUM, Financial Department (No. 1874); dated Simla,  
9 August 1866.

TRANSFERRED to the Home Department.

By order, &c.  
(signed) *J. E. Cooke*,  
Assistant Secretary to the Government of India,  
Financial Department.

— No. 26. —

MEMORANDUM.

HAVING had my attention drawn of late years to the necessity of reforming our system of weights and measures, and especially so by natives of India, I have perused the papers on the subject that are in the Home Office, and am of opinion that reform is called for, and not attended with any great difficulties. In submitting this memorandum, and a draft Act that I have drawn up for the consideration of his Excellency the Governor General in Council, I beg to express my willingness to take charge of the introduction of the Bill, if its general principles be approved.

2. The papers clearly show that the want of a uniform system of weights and measures throughout India has long been felt as an evil scarcely tolerable, and that it would have been remedied ere now had it not been for the difficulty of deciding what scale was the best to adopt. The decision of this point was rendered more difficult from the uncertainty whether the decimal system would be introduced into England. There is little prospect of this being done now, and, in the meantime, the whole retail trade of India suffers from the disgraceful cheating that the unrestricted use of many various scales gives room for.

3. The remedy divides itself into two main points for consideration.—(1), the selection of a scale; (2), the measures necessary to introduce the scale into common use.

4. As regards the selection of the scale, most of the plans proposed strove to combine three points,—

- (1).—The adoption of the English pound avoirdupois as a unit.
- (2).—The decimal system.
- (3).—The retention of some of the Indian weights and measures in conjunction with the English pound.

5. The decimal system is practically abandoned in England, and is not so necessary in India, where the people have always been accustomed to count by “fours” rather than by “tens.”

6. The retention of the present terms, seer, maund, or any attempt to assimilate our standard weights to them, or to refer to them in any way, is undesirable, as being certain to lead to confusion, if not to increase that now existing.

7. It seems better to adopt an entirely new scale, with new nomenclature, and none is so unobjectionable as the Imperial avoirdupois scale of England,  
which

which combines the multiples of 12 and 16, and the pound avoirdupois should be the unit of weight.

8. The unit of capacity should be the gallon, a measure containing a certain weight of pure water, and the scale should ascend and descend in multiples and sub-multiples of the unit. It is not necessary to adopt the numerous measures of capacity used in the English scale, as no such measures are now used in India or apparently required; the seer and its multiples and sub-multiples being the only measures used. The "gallon scale" will also serve, as does the "seer scale" now in use, for both liquid and solid capacities.

9. The English yard should be the unit of length.

10. The first part of the draft Act declares the Indian weights and measures, and provides for the custody of special standards in the mints at Calcutta, Madras, and Bombay, and ordinary standards at Collectors' cutcherries and other places throughout the country. The special standards in the mints will not, of course, be of much practical use, but the formality will give importance to the measure. The other standards will be available for constant use and reference.

11. The second part is the most important. It is useless to declare scales of weights and measures unless these are used, and they will never be used generally without a certain amount of compulsion. The class who must be compelled to use them are the small shopkeepers who sell the necessaries of life. When this is done the rest will follow. It is proposed, therefore, to insist gradually on the use by all such retail dealers of the new scales, and it will be for the Executive Governments to see that every facility is given for their supplying themselves with any weights and measures they require at the lowest possible price. The change to the new system must, though gradual, be as complete as possible, and retail dealers must therefore be absolutely prohibited from possessing or using any other weights or measures. But there are cases where retail dealers, such as druggists, &c., may be in the habit of selling other articles besides the necessaries of life, and for which other special scales are commonly used, and for such persons a special license will be given on application and on certain conditions. The adoption of the new scales will also be enforced on all public companies.

12. Legislation cannot go farther than this point; it must be left for local and municipal rules to reach those who do not come under the head of retail shopkeepers, such as country people who come in to sell at markets or bazars, and for this, provision is made in the Bill.

13. The Act must be supplemented by an alteration in all existing Acts where measures of weight or capacity or length, other than the "Indian measures," are made use of. The Acts relating to customs, salt, and opium will be those most affected. These alterations will doubtless be carried out by the various Legislatures concerned.

14. It will also be necessary to instruct all public officers and municipal bodies to make use of the "Indian weights and measures," so far as practicable, in all transactions in which they are concerned in their public capacity.

15. Proposals have been made for fixing a uniform scale of superficial area for the whole of India, but this does not seem to me so practically necessary as the other scales, though it may be desirable as affording a standard of comparison as regards statistics of land revenue. Land is not bought and sold by retail, nor does it form the subject of sale between persons of different Presidencies. The adoption of a uniform unit of area throughout India, though very desirable, does not seem so necessary as to justify the alteration of the land settlements which it would entail.

16. I do not put forth this scheme as showing either originality or completeness, but it is simple, and will, I think, be effective; and it is certainly desirable that some proposal should be placed before the public with the object of eliciting opinions that may lead to a final settlement of this question. It may be doubted whether, as we are going to have an entire abandonment of existing weights and measures, it would not be better to adopt the decimal

scales at once, instead of the old English scales which have been declared so inferior to the decimal system. For my own part, I think that assimilation to English scales, whatever they may be, is a point of greater importance than the adoption of a decimal system. The publication of this Bill will probably elicit valuable opinions on this point; but whatever scales be adopted, it seems to be most desirable that no time should be lost in declaring them, and that the plan of introduction sketched out in the second part of the draft Act, or some similar plan, should be adopted.

7 February 1867.

(signed) *M. J. Shaw Stewart.*

WHEREAS it is desirable to fix a uniform scale of weights and measures for India, and to make special provision for the adoption of that scale for the retail sale of the ordinary necessities of life; It is enacted as follows:—

I. This Act may be cited as “The Indian Weights and Measures Act of 1868,” and shall consist of two Parts. The first Part shall take effect from the time of passing the Act, and the second Part shall take effect in the manner prescribed in Section IX., and not otherwise.

II. In this Act the following words shall have the meanings set opposite them, unless there be anything in the context repugnant:—

Indian weights and measures shall mean the weights and measures described in Sections III., IV., and V. of this Act.

Retail dealer shall mean every person who keeps a shop and sells by retail any or all of the articles described in Schedule (A.) of this Act.

Local Government shall include every Chief Commissioner, or other officer whom the Government of India shall authorise to exercise the powers of a Local Government for the purposes of this Act.

#### PART I.

III. From the time of passing this Act the Indian measures of weight shall be the same as the Imperial avoirdupois weights of England, that is to say:—

16 drams to the ounce.	28 pounds to the quarter.
16 ounces to the pound.	112 pounds to the hundred weight.
14 pounds to the stone.	20 hundred weights to the ton.

IV. From the time of passing this Act the Indian measure of capacity shall be the gallon and its multiples and sub-multiples; the gallon shall be a cylindrical measure, the contents of which when filled with pure water shall weigh exactly pounds avoirdupois.

V. From the time of passing this Act the Indian measure of length shall be the Imperial yard of 3 feet or 36 inches.

VI. A standard Indian pound, and seer, and yard, shall be kept in the mints of Calcutta, Bombay, and Madras, under the custody of the mint masters, in boxes, with three secure locks, the keys of which shall be retained by the chief or senior secretary to the Governments of Bengal, Madras, and Bombay respectively, and by the chief municipal commissioners of those towns, and by the mint masters; and these boxes shall not be opened, except by the order of the Government of India, or Local Government.

VII. Standard Indian weights and measures shall be kept by all Collectors of land revenue, or officers exercising the powers of a Collector, and by such other officers as the Local Government may direct. These standards shall be examined and verified at least once in every period of 10 years, under such rules as may, from time to time, be issued by the Government of India.

VIII. The officers in charge of Indian weights and measures mentioned in Section VII., shall receive any weights and measures that may be brought to them for examination, and shall examine them, and, if correct, shall impress on them a stamp, and return them. A fee of 6 pies shall be levied for each weight or measure so stamped. It shall also be lawful for the said officers to keep, or cause to be kept, correct and duly stamped weights and measures for sale to any person at a price not exceeding their cost and the stamping fee.

## PART II.

IX. From the 1st day of January 18 , the provisions of this second Part shall take effect within the towns of Calcutta, Madras, and Bombay, and in all towns containing an estimated population of not less than 5,000 persons to which the Local Government may extend it, and in all railway stations and military cantonments, and from and after the 1st day of January 18 throughout the whole of British India.

X. It shall not be lawful for any person to sell, by retail, any of the articles specified in Schedule (A.) by any weights and measures other than the Indian weights and measures prescribed by this Act.

XI. Any retail dealer who shall use, or have in his possession, any other weights and measures than Indian weights and measures, except under special licenses granted in accordance with Section XII. of this Act, shall be liable for a first offence to a fine not exceeding 10 rupees for each weight and measure so had or used, and for a second and any subsequent offence to a fine not exceeding 50 rupees for each weight and measure so had or used; and all weights and measures that have formed the subject of conviction under this section shall be destroyed.

XII. Any retail dealer who sells by retail any article other than those specified in Schedule (A.) of this Act, for the retail sale of which a special scale of weights and measures is commonly used, may apply for a special license to have and use such weights and measures, for the articles other than those specified in Schedule (A.) Such application shall be made to any of the officers in charge of the standard Indian weights and measures mentioned in Section VII., and shall specify the number, names, and presumed weight, capacity or length of the weights and measures presented for examination. The weights and measures shall be examined, and, if found correct, shall be returned with a license in the Form (B.), which shall be in force for a period not longer than five years. A fee of four annas shall be levied for each weight or measure stamped under this section.

XIII. Any person who shall have received a license under the last section, to have and use for certain articles special weights and measures, and shall use such special weights and measures for the retail sale of any of the articles specified in Schedule (A.) of this Act, shall be considered to have used such weights or measures fraudulently, and to have committed the offence described in Section 265 of the Indian Penal Code.

XIV. In towns and places where there are periodical bazars, markets, or fairs, it shall be the duty of the Municipal Commissioners, or (if there are no Municipal Commissioners) of the magistrate of the district, to make rules for the guidance of all persons attending such market or fair, with the object of ensuring the use of Indian weights and measures in the retail sale of all the articles included in Schedule (A.) of this Act; and such rules, when approved by the Local Government, shall have the same force as any other orders issued by the Municipal Commissioners, or magistrate of the district.

XV. Indian weights and measures, and no others, shall be used at all railway stations by the servants of the railway company; and any railway company that shall have or use any weights or measures other than the Indian weights and measures, shall be liable to a fine of 50 rupees for each weight or measure so had or used, and all such weights and measures, or instruments used as such, shall be confiscated.

XVI. Every police officer, or other person when empowered by warrant from a magistrate, or any two Municipal Commissioners, and every police officer in charge of a station without warrant, may enter any shop or premises for the purpose of inspecting or searching for any weight or measure kept or used therein, whenever there is reason to believe that there are in such shop or premises any weights or measures kept or used in opposition to the provisions of this Act. Any such weights or measures may be seized, and information given to the nearest magistrate.

XVII. All offences under this Act (except those described in Section XIII.) may be tried by any magistrate under the provisions of the Code of Criminal Procedure.

SCHEDULE (A).

Grains and seeds of all kinds when sold by weight or capacity. Bread and biscuit of all kinds. Butcher's meat (beef or mutton). Tobacco in leaf. Salt. Sugar.	Sweetmeats. Brass and copper vessels, when sold by weight. Cloth, when sold by length. Ghee. Oil.
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SCHEDULE (B).

Name of Applicant and Residence.	Names of Weights or Measures specially Licensed.	Equivalent in Indian Weight and Measure, of each Weight or Measure specially Licensed.	Purpose for which each Weight and Measure specially Licensed is to be Used.	Period for which this License is to Run.