

Government of Madras.

EDUCATIONAL DEPARTMENT.

Hand.

Enclosures

1916.

Regd

Spars & ptes

G.O. No. 115, 4th February 1916

11

Dyeing

Recording the report of the — Expert on the results of the investigations conducted at the Indian Institute of Science, Bangalore.

1-A 2

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Spare copies

G.O. No. 115, 4th February 1916

Dyeing

Recording the report of the — Expert on the results of the investigations conducted by him at the Indian Institute of Science, Bangalore.

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\* ரா. இராமச்சந்திரன் \*  
\* செப்பனாபுரம் பெயர் \*  
\*\*\*\*\*

செப்பனாபுரம் பெயர் எடுத்துக்  
கொள்ளப்பட்ட நாள் 10/2008

செப்பனாபுரம் பெயர் நாள் 10/2008

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15/1/08

செப்பனாபுரம் பெயர்  
ரா. இ. பா. எ. 15/1/08  
கையொப்பம்

## GOVERNMENT OF MADRAS.

## EDUCATIONAL DEPARTMENT.

## READ—the following paper :—

Letter—from A. CHATTERTON, Esq., C.I.E., Director of Industries and Commerce, Mysore.

To—the Secretary to the Government of Madras, Educational Department.

Dated—Bangalore, the 4th January 1916.

No.—2368.

I enclose a copy of a report which Mr. Marsden has sent to me at the conclusion of his work up here. I have very carefully followed all the experiments which have been made at the Indian Institute of Science and at the Lakshmi Dye Works, where he dyed a lot of yarn with such colours as might possibly be marketable. I am completely in agreement with Mr. Marsden in thinking that notwithstanding the shortage of synthetic dyes at the present time, nothing useful can result in attempting to resuscitate vegetable dyeing on cotton. The reasons for this are given in Marsden's report and may be summed up briefly—

- (1) the extreme cost of vegetable dyeing;
- (2) the scarcity of dyeing materials; and
- (3) the change in the tastes of the people who are accustomed to buy brights and regard the vegetable dyes on cotton as too dull and sombre.

So long as there is a shortage of synthetic dyes, a certain amount of work can be done with mineral dyes and tannins, also of course with indigo. In regard to the future, it all depends upon the extent to which German dyes are allowed to come on to the market again. It is not improbable that they will be so heavily taxed as to be practically excluded from Indian markets. We may have to rely almost entirely on British made dyes and these will probably require different treatment. It therefore seems to me that the best interests of the Indian trade will be served by the development of the Madras scheme that Mr. Marsden originally came out for. So far, he has had merely a tinctorial laboratory and the conditions here are such that I think he ought also to have a small dye house so that he can dye a certain amount of yarn in bulk. If this extension of his work is provided for, he should be able to render great assistance to the dye trade during a period of scarcity and of change in the quality of dyeing materials.

## ENCLOSURE.

Letter—from F. MARSDEN, Esq., Ph.D., M.Sc., Dyeing Expert to the Government of Madras.

To—the Director of Industries and Commerce, Mysore.

Dated—Bangalore, the 28th December 1915.

I have the honour to submit my report upon the work carried out in connection with the utilization of indigenous or other materials in the dyeing industry.

At the outbreak of the European war, it was felt that owing to the imports of dyes being practically entirely in enemy hands, there would be a serious shortage and enquiries were made at once to find out to what extent the materials, which had been displaced by the synthetic dyes were available. The demand in Southern India

is largely for red dyed cotton and attention was directed to the important part which might be played by the red dyeing roots, such as chay root (*Oldenlandia umbellata*), nuna or al (*Morinda citrifolia*), mangkudu (*Morinda umbellata*) and plants of the rubia species.

The results of the enquiry were not encouraging, for it became evident that the cultivation had practically ceased and that only such plants as had persisted in a wild state were available. Seeing further that in the cultivation for dyeing purposes the plants had to remain in the ground for about three years, that the conditions for obtaining the best results, and the treatment subsequent to gathering, storage, etc., had been largely forgotten, little hope was held out that ryots would take up the cultivation of a product, the results of which would be so problematical. I therefore endeavoured to obtain information as to the quantity of material available in the wild state and was informed that although nuna was found in quantity in certain districts, it was so widely scattered that the collection of any quantity would be a matter of some difficulty and would be costly. The request was, however, made that quantities of about one hundredweight should be collected and forwarded to me, but the result was very disappointing and the material obtained possessed almost no dyeing power whatever.

The Director of Industries, Madras, again circularised officials in May of this year, and as we had decided that the investigation could be most conveniently carried out with the facilities available in the Indian Institute of Science, arrangements were made whereby materials were forwarded there and the Director of Commerce and Industries, Mysore, appointed an assistant to work under the direction of the Professor of Chemistry. The Madras Government then placed my services at disposal and I proceeded to Bangalore to take active part in the investigation.

## The materials which have been collected include

|                            |                                      |
|----------------------------|--------------------------------------|
| Chay root                  | Cutch                                |
| Nuna                       | Divi divi and other tannin materials |
| Ventilago bark             | Annatto                              |
| Rubia cordifolia (Munjeet) | Kapila                               |
| Red sander's wood          | Lac                                  |
| Sappan wood                | Wrightia tinctoria leaves            |

*Chay root*.—Chiruvur is a small plant belonging to the order Oldenlandia which was largely cultivated in Madras and was the chief material in use before the introduction of alizarine. In appearance and properties it is very similar to the European madder, is treated and dyed in the same way and gives shades of a slightly bluer tinge of red than the latter, but just as fast. In preparing the material for dyeing, it is steeped in water and washed, then dried and ground.

Dye trials made with the product came out rather thin and uneven and better results were obtained by giving a treatment with boiling sulphuric acid after steeping in water. The resulting shades were a little fuller and purer, but even for a light pink it was necessary to use some 40 pounds of treated root (corresponding to about 60 pounds of untreated) per 100 pounds of cotton. For a full shade of red such as is in general demand for women's sarees, it would require some 400 pounds of roots per 100 pounds of yarn and the material would have to be put through the dyeing process several times. An old dyer who had used the root in the past reported that he had to repeat the dyeing operation eight to ten times to get a full red, and that was at a time when the dye content of the root may be taken to have been at a maximum as a result of cultivation. The dye content is affected by the conditions of storage, and in Europe great care and attention were devoted to this matter, as it was found that during the first two years after cutting the dyeing power increased by storage, but then began to diminish. The experience upon this point is now lost and it would take years for it to be again accumulated and I should not be surprised if the roots now available contained only some 50 per cent of the dye contained when this material was in general demand.

Certain it is that in the early days of the war, stocks amounting to a few thousand pounds were accumulated in Madras to take the place of alizarine, but the dyers (even such as had experience of the roots in the past) found that the results were

most unsatisfactory and ceased to use the roots as the process was too costly and could not compete with alizarine even at the high price at which this was selling. From what I gather, the price of the roots is about As. 4 per pound, so that for a light shade of pink the cost for 100 pounds cotton would be Rs. 15 for raw material, to which would have to be added the charges for grinding and treating, and the extra labour and protraction of the dyeing period make it that the dyer cannot undertake the dyeing at prices which permit of any profit being made.

Experiments were made upon the extraction of the dye with solvents but the cost of marketing the dye in the paste form would be prohibitive and the material would have no advantage except that of concentration over the form in which we employed it in our trials, i.e., after washing, grinding, and acid boiling to liberate the dye.

Nuna, al, maddi, the root bark of *Morinda citrifolia*, is a material containing dyeing principles very similar to those contained in chay root and was extensively cultivated as a crop. It was the material which I thought would be most useful and which I was most desirous of obtaining in quantity. I have obtained samples from various districts, but in no instance did the appearance of the material agree with the description in the literature of the dye materials of the past. My samples were all of bark from half to one inch in thickness and in large pieces (manifestly the bark of the tree itself) whereas the old descriptions agree that the total thickness of the roots (including bark) should be less than one inch, and that the thinner rootlets contained more dye-stuff than the thicker ones. I received notice of the despatch of some guaranteed samples of roots, but unfortunately these appear to have been lost on the way and the experiments were conducted upon the material which was in hand.

The dye-stuff contained in morinda is comparable with that contained in chay root and madder, but is in such a form that it is not directly available for dyeing and the decomposition of the dye-containing principle is not easy. Simple fermentation is sufficient to liberate the true dyes in chay and madder, but apparently has very little effect in the case of nuna and it has been found that the simplest way of liberating the dye in this case is to wash well with water and then boil for a protracted period with dilute acid. This was the principle followed in our experiments and examination of the spent material after dyeing showed that practically all effective dye had been removed.

Washing with water and boiling with acid remove a very large quantity of earthy and mineral matter, but even then the remaining product is very weak in dyeing power and a scientist at present conducting a research upon this material informs me that he considers the dye-contents to be less than one per cent. This is confirmed by our dyeing trials for even 200 per cent of washed material (that is, 200 pounds to each 100 pounds of cotton) only gives a pink shade. I was interested to know what amount of material would be required to produce a full red shade, and to attain to this, I had to dye ten times with 100 per cent of material each time. With such a material the possibility of effectively carrying on commercial dyeing is quite out of the question, especially as the shade tends towards the yellow side of red and not to the blue side, which the market demands, and the cost of collection is such that the only price for the roots I have had quoted to me is Re. 1 per three pounds, delivered at a station north of Waltair.

*Rubia cordifolia* (Munjeet) is a dye material belonging to the same class, a large sample of which was obtained through the Forest Department, Mysore. I had examined a sample from the north of India a short time since, but I presume that this must have been another variety and not *Rubia cordifolia*, as the shades obtained with it were distinctly orange and by no means red like those with true *Cordifolia*. The dye is easily extracted, but is not present in sufficient quantity to give any prospect of commercial utilization and from the experiments made it does not appear to me to be so fast either to washing or light as those obtained from the preceding species.

*Ventilago madraspatana*, vembadam bark, surolpattai, paplehukkai, is the root bark of a shrub which appears to be widely distributed and available in quantity. It is rich in dye material and was largely used in conjunction with chay root and nuna to deepen and give body to the dyeings with these products. That it is not fast, however, was proved by the fact that under the influence of washing and exposure

the effects due to it disappeared and the dyeings became brighter. It appeared to be a most promising material at the present time and dyeing trials were made not only with the bark itself, but with extracts with water, hot and cold alkali, and also with the paste obtained by the precipitation of the last with acid. Upon bleached and mercerised cotton, or upon ordinary cotton, mordanted with oil and alumina, the shade given was moderately good and to people badly in need of dye-material might have been acceptable, but the self-shade upon ordinary cotton mordanted with alum alone was dull and unpleasing and would I am certain find no application. A bulk dyeing was made, but there was no option but to give up all idea of using the shade and it had to be converted into black.

*Red sanders wood* was largely exported to Europe and extensively employed, especially in wool dyeing, and a quantity was obtained from the Forest Department as it was felt that some use might be found for it at the present time. The colouring matter contained in the wood is very insoluble in water, but is readily extracted by alcohol and hot or cold alkali, and by the addition of acid to the latter solution the dye is precipitated and after draining forms a stiff paste, or could be dried and ground to powder. Had the dye been found really useful for cotton dyeing this treatment might have been recommended but although upon wool shades of good colour and intensity can be obtained there is great difficulty in fixing the dye on cotton and the shades are not at all pleasing, inclining to reddish brown upon an alum mordant. The European practice was to dye upon a tin mordant which gave dull crimson shades but this mordant is not available to the Indian dyer and would be expensive; so attention was devoted to the production of shades upon the alum mordant which is the one in common use here.

For general purposes the amount of alum which can be fixed by ordinary methods suffices but in the case of sanders wood it appears that a heavy mordanting is required to get deep shades and I had to have recourse to the method (to be described later on) with myrobolams and lime to get a sufficient deposit of alumina in the yarn, and even then the shades obtained were dull and brownish and more suited to European than to Indian tastes.

*Sappan wood* is apparently not an indigenous product but comes from Burma and Japan, although I am informed that it is grown in Malabar. The dye contained in it is very easily extracted with water and no further treatment is required than the rasping of the wood, to give a suitable dyeing material.

Dyed upon an alum mordant, it gives a bright bluish crimson shade but unfortunately this is of very little or no value at all, as exposure to the sun for less than twelve hours caused the shade to lose some 50 per cent in depth and therefore, however much it might be employed upon silk, where the demands are not so severe, it can never hope to find application here upon cotton.

*Cutch* is the dried extract of a species of acacia and was extensively employed in Europe in the production of fast brown shades. Its use for this purpose has been largely restricted by the introduction of more suitable, fast synthetic dyes, but in this time of scarcity I thought it would prove decidedly useful in the manufacture of cotton coatings and striped materials. Samples have been dyed and fixed with copper and chrome, but the reddish brown shade obtained is not one which is likely to find favour in the Indian market.

Cutch belongs to the class of tannin matters in which India is so rich, and although the use of these materials in dyeing is often referred to, it is not that they constitute in themselves effective dyeing materials, but that they are useful, on account of their astringent and mordanting properties, in the fixation of other more highly coloured bodies.

Being of an acid character the tannin matter combines with metals to form more or less soluble, coloured salts, the best known of which is the black compound with iron which is the basis of the ink manufacture. I find that the general country method of utilizing this black is to follow the old method of ink manufacture and stain the yarn in the decoction. The method of preparation is tedious and the recipes are full of ingredients which are ineffective for the purpose in view. I have often pointed out to dyers who have applied to me how yarn should be dyed to obtain the best results,

but the material (West Indian log wood) which was employed in Europe to give body and bloom to the black is not available here and I have recommended a light topping of indigo in place of it. Sanders wood, vembadam bark and other materials might be employed, but they give a rusty appearance instead of the bluish bloom which is generally in demand on black.

To fix sufficient iron and tannin matter on the yarn to give a good black by themselves is not easy, but I find the best result is obtained by working the yarn in a strong hot bath of myrabolams, leaving to steep and then (after wringing) to fix the tannin by passing through a lime bath and rinsing well. If this liming is omitted, fixation in the iron bath is very incomplete owing to the liberation of free acid which dissolves a certain amount of colour, and the unfixed tannin has time to be washed out of the yarn and so discolour the iron bath that all control is lost; by the interposition of the lime treatment (followed by proper rinsing in water) the tannin is more effectively fixed whilst the iron bath remains clear and can be utilized to the fullest extent, with the result that a good useful black can be obtained. The depth of shade can be varied by regulating the strength of the myrabolam bath in which the yarn is first soaked.

In place of iron salts, alum may be employed, the tannin and lime treated yarn being then dyed a dull yellow colour.

*Annatto*.—The dye obtained from jabara seeds was tested upon bleached, mercerised cotton, upon which it gives a pleasing rich orange shade. The method of dyeing is simple, consisting in working the yarn in a warm alkaline bath made by extracting the dye containing powder on the dried seeds with water and then adding a little carbonate of soda or potash. The dyeing is finished by giving a weak bath of acid and rinsing.

It is generally assumed that the shades given by annatto are not fast but I find that the fastness property are equal to those of many of the bright aniline dyes which have been so largely used here and there is no reason why, if the shade is liked, the material should not find a more extended use upon silk and cotton materials in which brightness of colour is a consideration.

*Kapila* and *lac* are essentially silk colours, the former exclusively so, while the latter is useful for wool also.

The method of dyeing *kapila* appeared to me to be wrong in one essential particular in that the dye was rendered soluble by means of alkali, and alum (a distinctly acid substance destructive of alkalis in general) was added.

I dyed a little silk in a weakly alkaline bath of *kapila* and the fastness of the dyeing appears to be good in every way, no matter whether the silk be afterwards immersed in dilute acid or in alum.

With *kapila* the great difficulty is to obtain material which has not been adulterated; with *lac* it is one of obtaining stick *lac* from which the colouring matter has not been removed by washing. The information available regarding the method of extraction of *lac* followed in different districts is not definite, as in some cases it is stated that the extraction is made with water alone, in others that soda, lime, or alum is used. I find that simple water extraction although tedious gives the best result for dyeing, the shade I obtained being purer and redder than that which is obtained by the country dyer in his so-called arrak shade.

The part played by indigo in dyeing and the difficulty of obtaining sufficient quantities of this dye at the present time lent peculiar interest to a sample of the leaves of the *Wrightia tinctoria*, said to be used in some places as a material from which the dye was obtained. The sample when I saw it was rather dry and steeping in water gave no trace of colouring matter. Freshly cut leaves, however, were delivered and from these, by steeping and fermentation, a blue coloured substance was obtained which dyed like indigo but in rather dull tones.

The point to be noticed is that the dye content of the leaves diminishes rapidly after cutting and unless set to steep at once very little dye is obtained. Even at the best, however, the yield is only about one-half that which is obtained from the indigo plant and from the rough trials I had time to make it appeared to me that the

preparation of the dye would be more tedious and costly, as saturation with caustic alkali previous to aeration seemed to be necessary to develop the dye and this necessitated a subsequent neutralization with acid.

Considering that the trees are widely scattered, that collection would be slow and costly, that the stripping of the trees would destroy them, the expense for alkali and acid would be material and the final yield of dye stuff small and of problematical quality, I do not consider that we shall find in the *Wrightia tinctoria* a source of dye of any importance and think that the best prospect of indigo supply is the increase in the area of ordinary indigo under cultivation in those districts where the plant and facilities for manufacturing are available.

I have mainly devoted myself to the question of materials for cotton dyeing as it is in the shortage of these that the chief difficulty at present lies. For silk dyeing cochineal, *lac*, *kapila*, *annatto*, indigo are available and for the amount of wool dyeing which is done in the south of India the indigenous materials used in the past are available and the methods employed have not been forgotten. Red-sanders wood is not much used here in this connection, but in Europe it was largely employed as a wool colour and I have dyed samples of alum, chrome, and iron mordanted yarn with it to show that it gives quite respectable shades upon wool (much better than those upon cotton), but without carrying out the necessary trials I am not prepared to pass an opinion upon the fastness of these shades and their suitability for use in the manufacture of carpets.

The chief demand is for dyes for cotton, but dull and fugitive shades are here out of place and of the materials tested there is nothing but *chay root* which is to my mind likely to be of service. In the case of *chay root* it is the tediousness of the dying process, the difficulty of getting sufficient material, and the expense, which makes it very unlikely that we shall see any great increase in the amount of dyeing done with it.

To test the feasibility of doing commercial dyeing with the materials at command, arrangements were made with the owner of a dye house in Bangalore to dye a quantity of yarn. Some bundles of iron black (both alone and topped with indigo) ouch, chrome yellows and greens, indigo blues and vembadam bark were dyed and by actual sales we hope to see whether the demand for such colours is a good one.

To my mind the results of the investigation are definite and have convinced me that the indigenous materials are incapable of meeting the demands which have been created by the developments in the manufacture of synthetic colours.

The purity and brightness of the shades given by some of these, the fastness of others and the general simplicity of the dyeing processes have appealed both to the Indian public and to the dyers and it would only be the absolute impossibility of obtaining any synthetic dyes whatever which would give any hope of the indigenous dyes finding application and then, the quantity of dyestuff available would be so small compared with what might be required to dye the cotton cloth now produced, that prices would rise to a prohibitive figure. Such a possibility, however, will not arise so long as synthetic dyes are available (even though it be only in small quantity) or dyed yarns are imported; these will set the standard and the indigenous dye materials with their dull shade and (with few exceptions) general lack of fastness upon cotton will find no favour with the Indian public.

The prices at present ruling for synthetic dyes are far in excess of those which the dyer in general is prepared to pay and in the centres from which I have had reports or of which I have recent personal experience, there is little dyeing work going on, the work-people in many cases finding occupation on the land or in other directions. The position for many however is very difficult and will not be improved until adequate supplies of imported dyes are available and the difficulty in this connection is that the people only know of certain brands which were common in the market and expect to be able to get these again in the future. All others will be looked upon with suspicion and non-German manufacturers will find that the introduction and placing of their products in quantity will be a matter of some difficulty.

Order—No. 115, Educational, dated 4th February 1916.

Recorded.

2. The Director of Industries will be requested to report, in consultation with Dr. Marsden, whether any addition has to be made to the design of the dyeing section of the Madura Technical Institute, and, if so, to submit a full explanation of the requirements.

(True Extract.)

P. RAJAGOPALA ACHARIYAR,  
*Secretary to Government.*

To the Director of Industries.  
Editors' Table (Dr. Marsden's letter and paragraph 1 of Order).

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

No. 116.

From

THE HON'BLE DIWAN BAHADUR

P. RAJAGOPALA ACHARIYAR AVARGAL, C.I.E.,

Secretary to the Government of Madras,

Educational Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

DEPARTMENT OF EDUCATION.

*Dated Fort St. George, the 4th February 1916.*

SIR,

In continuation of this Government's letter No. 1421, Educational, dated the 14th December 1915, I am directed to forward a copy of Dr. Marsden's report on the results of the investigations made by him at the Indian Institute of Science, Bangalore, in connection with the utilization of indigenous materials in the dyeing industry.

I have the honour to be,

Sir,

Your most obedient servant,

P. RAJAGOPALA ACHARIYAR,  
*Secretary to Government.*

EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O. Nos. 115-16, EDUCATIONAL,  
DATED 4TH FEBRUARY 1916.

[SUBJECT.—*Report on the investigations made by the Dyeing Expert at the Indian Institute of Science, Bangalore.*]

*From the Director of Industries and Commerce, Mysore, dated the 4th January 1916, No. 2368.*

Please see G.O. No. 1209, Educational, dated the 10th November 1915, in which Dr. Marsden was permitted to proceed to Bangalore to carry on certain investigations at the Indian Institute of Science in the manufacture of vegetable dyes. Mr. Chatterton now submits the report of Dr. Marsden on the investigations made by him. The report deals with the properties of the various indigenous materials used in dyeing. In 1912, Dr. Marsden, in a report on the dyeing industry in this

G.O. 112, Educational, 9th February 1912.

Presidency, referred to the dyeing properties of the indigenous stuffs. That report showed that there was not much scope for the revival of the use of indigenous vegetable dyestuffs. The investigation of the possibilities of using such dyes was one of the objects for which the Dyeing Expert was employed and activity in this direction was therefore closed. The present report is more exhaustive in dealing with each indigenous dyestuff so far as cotton dyeing is concerned and re-affirms the opinion already expressed by him. It is for orders whether the report should be printed and published.

Please see paragraph 2 of letter to the Government of India on page 11 of G.O. 3446, Revenue, 27th October 1910.

2. Recently, in connection with the proposal to retain Dr. Marsden permanently, the Government of India asked for reports of the investigations made or other record of work done by him. They were furnished with copies of his reports. It is for orders whether a copy of the present report may also be sent to that Government in continuation.

3. Mr. Chatterton suggests that a small dye-house should be placed at the disposal of Dr. Marsden so that he can dye a certain amount of yarn in bulk. It is not clear whether the dyeing in such a dye-house will be with vegetable dyes or with the imported materials. The new building of the Madura Technical Institute which is now under construction will, when completed, give Dr. Marsden a permanent tinctorial laboratory. It is not known whether, apart from this, any special dye-house should be provided for him and if so whether it is required in advance of the construction of the laboratory. Perhaps Dr. Marsden may himself be asked to explain this point.

G.O. 2380 W., 7th December 1914.

4. For the present the latter will have sufficient work in connection with the purchase and distribution of the dyestuffs ex S.S. "Barenfels" which are now with Messrs. Gordon Woodroffe & Co., and which it has been decided should be acquired by Government.

S.K.—19-1-16.

V.S.—19-1-16.

Copies of the letter and report may go to the Director as they did not come through him.

2. The report may be printed and placed on the Editors' Table and copy may be sent to the Government of India.

3. The Director may be asked to consult Dr. Marsden as to whether he desires any addition to be made to the design of the dyeing portion of the Madura Technical Institute and if so to submit a full explanation of his requirements.

4. I understand from Mr. Chadwick that there has been a large expansion in the cultivation of and trade in indigo and that much trouble is caused by extensive adulteration. He is anxious to utilize Dr. Marsden's services in devising means for combating this. This may be permitted.

C. G. TODD HUNTER-20-1-16

P[ENTLAND]—23-1-16.

C.G.T.—24-1-16

P.R.—1-2-16.

A draft order and letter to India and two draft demi-officials are submitted for approval.

S.K.—29-1-16.

2. For orders whether in the Editors' Table copies of the Government Order

P.R.—1-2-16.

This should suffice.

on the Editors' Table only the report and first paragraph of the order.

V.S.—29-1-16

P. RAJAGOPALA ACHARIYAR—1-2-16.

*Demi-official*—from the Hon'ble Diwan Bahadur P. RAJAGOPALA ACHARIYAR  
Avargal, M.A., B.L., C.I.E., Secretary to Government, Educational  
Department.

To—K. T. B. TRESSLER, Esq., Director of Industries.

*Dated*—the 3rd February 1916.

No.—35-1, Educational.

The Government understand from Mr. Chadwick that there has been a large expansion in the cultivation of and trade in indigo and that much trouble is caused by extensive adulteration. As it is considered necessary that some means should be devised to combat this evil, the Government have permitted Mr. Chadwick to utilize the services of Dr. Marsden for the purpose. I am to request you to inform the latter accordingly.

*Demi-official*—from the Hon'ble Diwan Bahadur P. RAJAGOPALA ACHARIYAR  
Avargal, M.A., B.L., C.I.E., Secretary to Government, Educational  
Department.

To—D. T. CHADWICK, Esq., I.C.S., Director of Agriculture.

*Dated*—the 3rd February 1916.

I am to enclose for your information copy of my letter to Mr. Tressler regarding the utilization of Dr. Marsden's services in connection with the improvement of the trade in indigo.

[G.O. Nos. 115-16, Educational, dated 4th February 1916.]

READ AGAIN G.O. No. ...., dated ..... 191

191

READ ALSO:—

C. No. 35- From the *Div. of Industrial Hygiene*, No. 2308, dated 4-1-1916

191

" " ..... " " ....."

ORDER

No. 11580, dated 12-2-1916

Recorded

58X  
19.11.76. 2. The Director of Industries will be requested to report in consultation with Dr. Harid whether any addition has to be made to the design of the dyeing section of the Main Technical Institute, and if so, to submit a full explanation of the requirements.

29/1/11

To The S. I. E. T. (L. *paradoxus* letter  
12



st. II

ORDINARY

PRESS SLIP

PREFERENCE

URGENT (a).

Edinburgh DEPARTMENT

Current No. 35, dated 191

G.O. No. 115-116, dated 4-2-1916

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Brief subject: Please see within

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| Letter only | Complete G.O. | Special issue copies of G.O. | Notes |
|-------------|---------------|------------------------------|-------|
| No.         | Papers        |                              |       |
| 2           | 2             |                              |       |

|                                |       |  |  |
|--------------------------------|-------|--|--|
| Signature copies               |       |  |  |
| India Office                   |       |  |  |
| Govt. of India                 | Dept. |  |  |
| Revenue Department             |       |  |  |
| Public Works Department        |       |  |  |
| Local and Municipal Department |       |  |  |
| Educational Department         |       |  |  |
|                                | Dept. |  |  |
| Public Dept.                   |       |  |  |
| Judicial Dept.                 |       |  |  |
| Political                      |       |  |  |
| Financial Dept.                |       |  |  |
| Marine Dept.                   |       |  |  |
| Ecclesiastical Dept.           |       |  |  |
| Total                          |       |  |  |

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| The   |    |  |  |
| The   | 10 |  |  |
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| Total |    |  |  |

# INSTRUCTIONS FOR THE SECRETARIAT

(a) If a paper is marked to be printed urgently, the Superintendent of the section concerned should sign the Press slip. The Superintendent should exercise a careful discretion in the matter.

(b) Each letter, memorandum, or order, or set of orders, in the file of correspondence should be headed in succession with the Roman numeral I, II, III, etc., the number being written in red ink or blue chalk above the item. The particular papers to be printed in the special issue-copies should be indicated by the Roman numeral (I, II, etc.) by which that item has been headed in the correspondence file. All matter, including marginal remarks or references, to be printed should be written in ink and matter which should not be printed should be encircled. Initials and signatures that are not quite legible should be re-written distinctly.

(b) For rules regarding printing of notes, see rule 315 of the office Manual.

(c) The number of copies and the details of distribution should be filled in by the Superintendent or Referencer concerned.

(d) In the absence of special instructions to the Press to keep matter standing for a specified period, ordinary papers of 8 pages and under will be kept standing for one week, and larger papers for two weeks only. The type of notes and of all confidential papers is distributed immediately after striking.

(e) This slip, properly and completely filled in, should accompany every paper sent to Press; it will be returned by the Press when proofs are furnished; it should be sent to the Press when a call is made for revised proofs or when a corrected proof is sent for striking. When finally returned by Press it should be filed with the original order or letter.

# INSTRUCTIONS FOR THE PRESS

(a) If, in the opinion of the Superintendent of the Press, a paper has been marked urgent unnecessarily, he should send the Press slip to the Registrar with a remark to that effect.

(b) Unless a note to the contrary is made against the matter, pencil entries should not be printed. The Superintendent of the Press may bring to the notice of the Registrar any instance of incomplete or careless editing.

(c) Signature copies of letters to the Secretary of State or to the Government of India should be printed on hand-made paper.

(d) This slip should be returned by the Press to the Secretariat when proofs are furnished; it will be sent back to the Press when proofs are returned corrected and should be finally returned to the Secretariat when struck-off copies are supplied.

(e) The names of the Secretary and Members should be printed in full when they occur on the right hand side, only the first time when they appear on the left side, the initials alone being printed later.

Please send proof in duplicate. The papers have been carefully edited.

Proof returned corrected. Please strike off and send number of copies as indicated.

Type may be released after usual interval, at once.

As the matter is clear manuscript and has been carefully edited, (b) proof need not be sent. Please print and supply number of copies as indicated.

Type may be released after usual interval.

Reference.  
Clerk.

Reference.  
Clerk.

Reference.  
Clerk.

Supdt.

Supdt.

Supdt.

## SPECIAL INSTRUCTIONS.

Urgent

The ltr. should be printed in two sets - one for issue & record & the other for E.T. In the former Mr. Chatterton's letter should first be printed as an off. comm. in- cation & Dr. Harenden's do. as an enclosure to it. In the latter, Dr. Harenden's letter alone need be printed with para 1 only of the order; Dr. Harenden's letter should be headed as follows: "Report of Dr. Harenden, the Dyeing Expert, on the results of the investigations conducted by him at the Indian Institute of Science, Bangalore".

Diary.

Initials of Press official.

|                                               |         |    |
|-----------------------------------------------|---------|----|
| Received in Press on.....                     | 21/2/24 | LB |
| First proof furnished on.....                 | 21/2/24 | LB |
| Call for revised proof received on.....       |         |    |
| Revised proof furnished on.....               |         |    |
| Corrected proof received for striking on..... | 21/2/24 | LB |
| Final copies supplied on.....                 | 21/2/24 | LB |

| Account of copies.                                                               | Complete copies. | Notes. | Issue copies. | Special E.T. edition. |
|----------------------------------------------------------------------------------|------------------|--------|---------------|-----------------------|
| Supplied to Secretariat for Record.....                                          | 35               |        |               |                       |
| " " " Issue.....                                                                 | 47               |        |               |                       |
| " " " for Extra E.T. copies to supply requisitions for sale to the public.       |                  |        |               | 4                     |
| For Volumes.....                                                                 | 16               |        |               |                       |
| For supply to newspapers and institutions admitted to the privileges of the E.T. |                  |        |               |                       |
| Total ...                                                                        | 98               |        |               |                       |