me to consult Sir George Birdwood regarding the engagement of a scientific Italian sericiculturist for employment under the Kashmir State.

In accordance with these instructions, I have come up to London and have seen Sir G. Birdwood, Mr. Lawrence, and Captain Chenevix-Trench, having read the requirements stated in the letters received from Sir Adelbert Talbot, Captain Chenevix-Trench, and Mr. Walter Lawrence which you enclosed.

After discussing the matters with these gentlemen, I have come to the conclusion that the best course for the Kashmir Durbar to pursue would be for them to try to obtain the services of Mr. C. B. Walton, a few years back Superintendent of the important Silk Filature at Surdah in Bengal.

I personally know Mr. Walton, and fully believe him to be thoroughly qualified to undertake the required duties. He is well acquainted with all the varied details of Indian sericiculture. He is now residing in India, and his address is Montrose House, Mussoorie.

With regard to the second and very important part of the Resident's letter, the purchase of seed, and of modern special silk machinery for cocoon reeling, it will be necessary that I should visit Italy, particularly the Italian Governmental Sericicultural Station at Padua, and also the silk district of Milan.

I would propose that Captain Chenevix-Trench, Assistant Resident in Kashmir, now in London, should be asked to accompany me to Italy.

I understand from the Resident of Kashmir's

letter that Captain Chenevix-Trench has authority from the Durbar to purchase a limited number of cocoon-reeling machines, and 29 seers of silkworm eggs. I cannot state what the cost of the machines would be, but I believe they are under £15 each.

Captain Chenevix-Trench informs me that he considers the Durbar would not require more than from five to ten machines at first. I would propose therefore making an arrangement for the purchase of the number required of the most modern and approved construction, in conjunction with Mr. Chenevix-Trench, and informing you by wire of the probable cost, for communication, if necessary, to the Resident of Kashmir. Similar arrangements can be made as regards the purchase of the 29 seers of eggs required by the Durbar.

I estimate the probable cost of my expenses to be as under:—

Journey to Milan and Padua £10.

Return Journey £10.

Hotel expenses at 31/6 per diem from date of departure to date of return, most probably about three weeks.

The above expenses are approximate and could be adjusted on return.

As it is most important that the very best cocoon-reeling appliances be purchased, I think it desirable to obtain the opinions of experts both in France and Italy, and as I am acquainted with several filateurs in France, I think it would be

highly desirable that on our way to Italy we should visit Alais and Montpellier and see the most recent improvements in reeling in operation, for it is on this that success in Kashmir will mainly depend.

I think it would be advisable to purchase five of the best French reeling machines and five Italian ones.

In this case, the cost of travelling, say from Alais to Milan, would be increased by about £5, and the time lengthened by a few days.

Mr. Lawrence strongly advises that an additional microscope be purchased and sent out to Kashmir, as that now used is not very satisfactory in the detection of pebrinised moths and seed. I propose that I select a suitable instrument at Messrs. Beck's, the eminent microscope makers in Cornhill, London. I would select suitable objectives for the work they would have to do. The cost of the complete instrument would be from £10 to £12.

I have, &c.,

THOMAS WARDLE.

The Under Secretary of State
for India.

Enclosure 4 in No. 1.

1, St. James's Street,
24th February, 1897.

Sir,

Before leaving Kashmir on four-and-a-half months furlough, I was deputed by the Kashmir State to arrange with Sir Thomas Wardle, Sir George

Birdwood, and Mr. Lawrence to secure the services of an Italian sericiculturist expert.

I have seen Sir George Birdwood and Mr. Lawrence. I understand that Sir Thomas Wardle suggests that, if possible, the appointment should be given to an Englishman in preference to a foreigner.

He suggests the name of Mr. Walton, and asks that the Resident of Kashmir may be asked by telegram to personally see this gentleman, and inform us whether he would suit.

Sir Thomas Wardle has, I think, already addressed you on this point.

As it has been proposed that I should accompany Sir Thomas Wardle to Italy, to at any rate choose the required machinery and seed, I have the honour to ask that, if this proposal is approved of, I may be put on special duty from date of departure to Italy to date of return to England, and that this period may be considered as an interruption to my furlough, which now ends on the 27th April.

I estimate that the cost of the journey would be the same as that applied for by Sir Thomas Wardle, viz. :—

Journey to Padua and Milan £14.
Return ditto to England £14.
Hotel expenses at 31s. 6d. a day, from date of departure to date of return.

I have, &c.,

G. CHENEVIX-TRENCH,
Captain.

The Under Secretary of State for India.

Enclosure 5 in No. 1.

Leek, Staffordshire,

8th April, 1897.

Sir,

I beg to enclose a letter I have received from Mr. Walton, who I am glad to find has been appointed Sericiculturist to the Kashmir State.

From this letter it appears that the Resident authorises Mr. Walton to request me to purchase 50 tavelettes.

I am distinctly of opinion that the tavelettes should not be sent without the rest of the machinery, that is, without specimens of the complete machines, and I venture to suggest that three, four, or six of the best machines, containing the tavelettes which are required, and which are absolutely necessary in order to reel silk sufficiently well for European uses, should be selected by me in Italy and in France.

Considerable economies have been made in the cost of reeling, both in France and Italy, with two results (1) a diminished cost, and (2) greater excellence of quality, so much so that these methods are now being adopted both by the Chinese and Japanese extensively, and it is necessary in the interests of Kashmir that the most perfect appliances should be bought.

I think, if my suggestion is carried out, no more machines than I have mentioned would be necessary, because in Kashmir the machines could be reproduced as well as the tavelettes.

There is urgency in this matter, because the new crop of cocoons will be ready to be reeled in May, and if the reeling is done in the same slovenly way that it was done last year, the prospects of Kashmir will be seriously thrown back, and I think it is of the utmost importance that the most perfect and economical machinery be sent out at once, I mean the 50 tavelettes named by the Resident and Mr. Walton, and also the pattern machines. I do not think one pattern of each kind would be sufficient, because it would not show the connection of the bassines one with the other.

If you will authorise me to go down to France and Italy, I will do so at once, and as Captain Chenevix-Trench is very anxious to accompany me, it would probably be a very good thing for his future in Kashmir that he should do so.

Yours, &c.,

THOMAS WARDLE.

The Under Secretary of State for India.

Enclosure in above.

15th March, 1897.

Dear Sir Thomas Wardle,

Since writing to you, the Resident has been over to see me, and to inform me that Sir George Birdwood and Captain Trench propose going to Italy to buy seed and reeling machines, if my services are engaged.

The Resident has asked me to ask you to send some tavelettes by parcel post; if you would kindly do so we shall begin reeling about middle of June. They might be sent to Bombay consigned to King, King & Co., with instructions to send them at once by passenger train to the Resident or me at Srinagar, Kashmir.

I do not know how many you could procure in England, but we should require some 50 at first at any rate, if you would send as many as you can and let know the cost, &c., I would refund it to you. This year of course we can only make experiments of the reeling with Italian machinery. I think it would be the greatest thing for the industry to get a good quantity of seed, as there is no lack of mulberry and the rearers will soon take to rearing when they find so much interest being taken. It would be my first object to enlist the sympathies of the zamindars to induce the villagers to take up rearing on a large scale, and I shall constantly visit all cocoon-rearing villages to show them how they must make their huts to suit. With kindest regards.

Yours, &c.,

C. B. WALTON.

Enclosure 6 in No. 1.

India Office,

27th April, 1897.

Sir,

I am directed by the Secretary of State for

India in Council to acknowledge the receipt of your letter of the 8th instant, enclosing a letter from Mr. C. B. Walton, who has been appointed Sericiculturist to the Kashmir State from the 1st May of this year; and advising, with reference to the requisition of the letter for 50 tavelettes to be forwarded to him by parcel post, and that Captain Chenevix-Trench, Assistant Resident in Kashmir (Leh), and now at Cannes, and you should be at once authorised to proceed to Lyons and Milan to purchase these tavelettes and also four or six complete silk-reeling machines, half of which are to be French and half Italian machines, and in reply I am to inform you that your proposals are sanctioned.

You should arrange for the immediate despatch by parcel post, of 42 tavelettes to Mr. Walton, and for the subsequent despatch of two French and two Italian complete silk-reeling machines, with one extra tavelette for each machine, in time to reach Kashmir if possible by the 1st of June next. It will probably be advisable for you to arrange with Messrs. Henry S. King & Co., 65, Cornhill, E.C., for the safe delivery of the complete reeling machines in Kashmir; they should be sent on from Bombay by passenger train. Both Captain Chenevix-Trench and yourself will be granted first class travelling expenses and a subsistence allowance at the rate of one guinea a day for the period during which you may be engaged on this deputation, which it is understood will not exceed a fortnight.

A joint report of your proceedings, together with the account of the expenses incurred, should be furnished to this Office at your earliest convenience. A copy of this letter has been communicated to Captain Chenevix-Trench for his information and guidance.

I have, &c.,

A. GODLEY.

Sir Thomas Wardle, Knt., F.C.S., &c.

Enclosure 7 in No. 1.

India Office,

27th April, 1897.

Sir,

I am directed by the Secretary of State for India in Council to forward herewith, for your information and guidance, a copy of a letter to Sir Thomas Wardle regarding the purchase in Italy of silk-reeling machines for the Kashmir State.

I have, &c.,

A. GODLEY.

Captain Chenevix-Trench, I.S.C.

Enclosure 8 in No. 1.

St. Edward Street,

Leek, Staffordshire,

3rd May, 1897.

Sir,

I have the honour to acknowledge the receipt

of your letter of the 27th April, No. 1342/97, requesting me to proceed with Captain Chenevix-Trench to France and Italy to purchase silk-reeling machinery on behalf of the Kashmir Government.

In reply, I beg to state that I shall start on the journey on Friday or Monday next.

I am very closely engaged in my business just now, and I must endeavour to compress my journey within the shortest possible time, but you may rely on my not hurrying it over to the detriment of the duty entrusted to me.

I shall at once obtain the 50 tavelettes, but as regards the reeling machines there is a difficulty. I have had much correspondence on the subject since I last saw Sir George Birdwood at the India Office, and find that these machines are generally sold to manufacturers in batteries of six, and that to ask for two separately raises suspicions of the purchaser having some sinister intention. I desire, therefore, to be allowed discretion on this point, and if necessary to purchase a battery and a half of machines, *i.e.*, nine instead of four.

I see my subsistence allowance has been fixed at one pound per day, the same as Captain Chenevix-Trench. In doing this it must have been overlooked that I am not in the pay of the Indian Government, but engaged in an independent lucrative business of my own, which I cannot quit without incurring far greater sacrifice than even the most liberal subsistence allowance could possibly repay. Among business people such

services as I am now rendering to the India Office would be paid for, beyond out of pocket expenses incurred, by an honorarium, but considering the relations on which I have always stood with the India Office, I say nothing of that, and only refer to the matter at all in the frankness engendered by my past friendly relations with the India Office, and the gratifying way in which they have recently been acknowledged. But I cannot accept a subsistence allowance on which I could not even barely subsist, and, if I am paid at all, must claim two guineas a day, or whatever may be the highest sum allowed by the India Office to specialists not in their regular employ.

My address at Lyons will be the Grand Hotel, Bellecour, and at Milan the Grand Hotel de Milan, and at Padua, care of Cavaliere E. Verson, the Director of the R. Stazione Bacologica, Padua.

I have, &c.

THOMAS WARDLE.

The Under Secretary of State
for India.

Enclosure 9 in No. 1.

India Office,
7th May, 1897.

Sir,

I am directed by the Secretary of State for India in Council to acknowledge the receipt of

your letter of the 3rd instant, and in reply to inform you that your proposal to purchase nine reeling machines, if necessary, for the Kashmir State instead of four, is sanctioned, and that your subsistence allowance during the time you are making these purchases in the South of France and Italy will be, not one guinea per day, as stated in my letter of the 27th April, but two guineas per day.

The present sanction for five additional reeling machines is given subject to the condition that the total outlay, for the purchase of machinery and seed, shall not exceed £200 in all, which sum has been sanctioned by the Government of India.

I am, &c.,

A. GODLEY.

Sir Thomas Wardle, Knt., F.C.S., &c.

Enclosure 10 in No. 1.

Leek, Staffordshire,

11th June, 1897.

Sir,

Under instructions from you in your letter dated 27th April, 1897, R. and S. 1266, I have visited Italy and France with Captain Chenevix-Trench, Assistant Resident in Kashmir, and have the pleasure to send to you herewith, first, our

joint Report of our journey, investigations and purchases.

Second. Collection of Italian and French cocoons described in the Report.

Third. A box containing the price-lists, diagrams, photograghs and accounts.

Fourth. A book on Sericiculture by Cavalieres Verson and Quajat.

The three last are being sent off to-day by railway, addressed to you at the India Office.

You will find full instructions as to payments of accounts.

I have drawn up the Report and have submitted the draft of it to Captain Chenevix-Trench, who has approved of it, and will sign it at the India Office.

I enclose a copy of a letter I have to-day received from Signor Giovanni Battaglia, whose promptitude and execution of the order is quite satisfactory.

Please to send a cheque to him for 340 francs as per invoice enclosed. The invoice is simply for tavelettes and not for the reeling machines complete.

I have, &c.,

THOMAS WARDLE.

The Under Secretary of State
for India.

CHAPTER IX.

VISIT TO ITALY.

Enclosure 1 in above.

Report of a journey to Italy and France on Government of India Sericicultural business, in May, 1897, by Sir Thomas Wardle, of Leek, and Captain Chenevix-Trench, Assistant Resident at Kashmir.

T. Wardle.

On arriving at Milan, I met by appointment Captain Chenevix-Trench, Assistant Resident at Kashmir, who had been staying at Cannes, and and who came on to Milan to meet me.

T. Wardle and Captain Trench.

We commenced our work in Milan by an inspection of the cocoons of the best merchants of that commodity.

Owing to the lateness of receiving a reply from Kashmir in respect of the visit to the south of Europe, we found it was quite impracticable to attempt to give orders for eggs to be of any service for this season. We decided therefore not to purchase any. We were further confirmed in our view that this was the right course from

a telegram received 9th May from Mr. C. B. Walton from Srinagar, as follows:—

"At the Resident's request I am wiring Bombay to advise that no new European seed should be sent out till October."

We thought it would be much the best to defer the purchase of seed until samples of cocoons had been selected and sent out to Kashmir. Such a collection, which has been most carefully selected, accompanies my Report.

The houses we visited at Milan were the following:—

No. 1. Rinaldo et Agostino Casati, via St. Andrea 19.
No. 2. Signor Susani, via St Andrea 2.
No. 3. Guillo Cesari Albini, via Manzoni 43.
No. 4. Biffi di Filippo, via Cusani 14.
No. 5. Signor Numa Laval, via Broletto 37.
No. 6. Cav. Laugier Félix, via Durini 23.

The following is a seriatim account of our visits to these houses.

1. Rinaldo et Agostino Casati.

This is an excellent house. The prices of their seed ("graine, eggs") were from 8 lira per ounce of 30 grammes. We obtained from them nine varieties of cocoons, of which we send you samples of each as follows:—

No. 1. Varo.
No. 2. Ascoli.
No. 3. Brianza.

No. 4. Incrociata Giallo. Marca Sublime.
No. 5. Incrociata Bianco Giapp. Con. Giallo.
No. 6. Incrociata Shanghay Sfer. Con. Giallo.
No. 7. Incrociata Chinos Oro. Con Giallo.
No. 8. Chinese. Marca Oro.
No. 9. Bianco Giapponese.
No. 10. Bianco Shanghay.

From these cocoons it will not be difficult for Mr. Walton to select seed when purchasing.

We would most distinctly recommend some purchases to be made from this selection, in fact we think it would be well if the amount of seed required to be purchased for next year's crop could be divided amongst each of the dealers we are reporting upon.

In this way cropping results could be compared simultaneously and a reliable opinion arrived at in one year.

We distinctly promised Signor Casati he should have an order, and the cocoons he has given us are, in his opinion, the best for exportation to Kashmir. We send herewith his book of instructions and price list. (D, E.)

2. Signor Susani (Istituto Bacologica Susani).

This is a well known house, and the one from which Mr. Mukerji purchased eggs in 1892 at 15 francs per ounce.

He deals in two kinds of eggs; those he calls "cellulare" are those which have had all the moths microscopically examined; the eggs are

guaranteed free from pebrine corpuscles, and those which he calls "industrials" are those in which the moths have not been so examined. There is a difference of about one-third in the price. We enclose a copy of his list. (F, G.)

The following is a list of his cocoons:—

No. 1. Giallo Puro.
No. 2. Giallo Puro. Var.
No. 3. Bianco Giapponese.
No. 4. Bianco Indigeno.
No. 5. Bianco Chinese.
No. 6. Giallo Puro.

He recommended for Kashmir two kinds. The Bianco-Chinese and the Giallo Puro (*see* Nos. 5 and 6 in the box), the Chinese being originally from Chinese seed but reared in Italy and the Giallo Puro being the pure Italian yellow breed. He says these two breeds crossed produce excellent silk, and he thinks would best suit Kashmir. His prices are:—

12	lira	per ounce	for 50	oz. orders.
11	„	„	200	„
11	„	„	500	„
10	„	„	1,000	„

He thinks it would be best to send out the eggs in October or November.

He said the yield from one gramme of graine of his Giallo Puro cocoons was 2 to $2\frac{1}{2}$ kilogrammes of fresh cocoons, one gramme of graine of the white kind produces 2 kilogrammes of fresh cocoons, and

he considers the average weight of dry cocoons is one-third that of fresh cocoons, that is 3 kilogrammes of fresh yield 1 kilogramme of dry.

This I (Thomas Wardle) have always understood to be the more correct estimate, and I know it is usual so to consider it in France.

Twelve kilogrammes of fresh cocoons of his yellow kind produce one kilogramme of silk, and sometimes 11 kilogrammes will produce the same weight.

We send you a selection of Susani's cocoons, strongly recommending them. Also a circular of his. He said he could procure any appliances for sericiculture.

3. Guillo Cesari Albini.

This house appears to be a very good one and some seed should be ordered from it, as we made a partial promise that this would be the case. He stated that the average weight of fresh (that is, undried) cocoons, obtainable from one gramme of eggs of the race he recommended, would be from 2 to 3 kilogrammes, and he also said that one ounce of graine produces 60 to 70 kilogrammes of fresh cocoons, and that the average weight of dry cocoons is one-fourth that of fresh, that is, 4 kilogrammes of fresh cocoons are equal to one kilogramme of dry.

He stated that one gramme of graine produced half a kilogramme of dry cocoons, but this I (T. Wardle) think is rather under the mark.

He stated that 8 kilogrammes of his cocoons produce one kilogramme of grège or raw-silk, with 2 or 3 ounces of "waste," some qualities of cocoons producing as much as 8 ounces of waste.

His price was 12 lira per ounce of 30 grammes, sold in 30 gramme packets, for quantities below 50 packets, but for 50 packets the price would be 10 lira. In practice the ounce contains 30 grammes, although in Italy the ounce is from 27 to 28 grammes. The kilogramme consists of 33 and one-third grammes.

He thinks the eggs should be sent out at the beginning of November, and he could not well get them ready before.

The temperature at which eggs must be kept in transit must be 17° to 18° R. *i.e.*, 62° to 64° Fahr.

He had no samples of cocoons to furnish us with.

4. Signor Biffi di Filippo.

This was the next house we visited and we enclose his price list.

We were very favourably impressed with Mr. Biffi. The following is his list—

No. 1. Ascoli, used for crossing with White Chinese, Ascoli, and Pyrenees give the same results.

No. 2. Result of crossing the yellow Pyrenees with White Chinese.

No. 3. The Chinese White used to cross with Yellow Pyrenees and Ascoli both giving the same results.

No. 4. Yellow Pyrenees used for crossing with White Chinese; Ascoli and Pyrenees give the same results with White Chinese.

He crosses Ascoli cocoons with White Chinese. He also crosses Yellow Pyrenees with White Chinese.

The Pyrenees and the Ascoli when crossed with the Chinese give the same result.

These he recommends for Kashmir, and thinks they will do admirably.

His prices range from 14 lira per ounce to 12 lira, as will be seen from the enclosed list, No. 5. (H, I, J.)

5. Cav. Numa Laval.

We had a good reception at Cav. Numa Laval's, he evidently does a large business.

His assortment of choice cocoons consists of the following:—

No. 1. Varo.
No. 2. Var Liban.
No. 3. Giallo Pirenei.
No. 4. Giallo Pirenei.
No. 5. French Var.
No. 6. China White.
No. 7. Produced by crossing 5 and 6.

The eggs supplied by him would be ready to be sent to India in August, and could be sent out any time after that. His prices are remarkably low. They are at the present time,

for 50 ounces, 7 lire per ounce, 500 ounces to 1,000 ounces, 6 lire per ounce. Of these eggs he says about 2 per cent. of them contain pebrine corpuscles.

If the order comes later than August, the price will be one lire per ounce in excess of this.

We enclose his published list, No. 6. (K).

Ten kilogrammes of fresh cocoons will produce one kilogramme of raw-silk, with 5 per cent. of waste.

He recommended the French race, but thinks also that the hybrid race crossed with French (Var) and Chinese will give the most silk, but the Chinese are always more or less infected with pebrine, and it does not signify whether it is the masculine French, or the feminine Chinese, or the reverse. The eggs come from China on cards, and have the drawback of being infected with pebrine.

6. Cav. Félix Laugier.

This is also another good house. The eggs would be ready to be sent in August. They should not be sent in ice. The price is 10 francs per ounce of 30 grammes for orders up to 100 ounces. For orders of 100/200 ounces 9 francs per ounce, and for orders of 200/500 ounces 8 francs per ounce. (L.)

One kilogramme of his fresh cocoons produces 100 grammes of silk, one-third of dried cocoons makes the same quantity.

He says that one ounce of his eggs produced 90 kilogrammes of fresh cocoons, and 30 of dry, and the average weight of fresh cocoons from one gramme of "graine" (eggs) is 3 kilogrammes, and of dry cocoons 1 kilogramme per gramme.

He thinks that the eggs ought to be sent from Marseilles about the 15th August, to arrive in Kashmir a month afterwards. On arrival they must be carried at a suitable temperature until November from zero to 15° R., from November to March at a temperature of from zero to the natural, and from March to April from zero gradually to 7° centigrade (48° Fahr.) until they hatch.

The surrounding temperature must never be allowed to go beyond this.

He informed us that he sends out the eggs in wooden boxes full of holes in divisions, covered with zinc. He has already sent cocoons to Kashmir. It is probable that they were sent by him two years ago.

The kind he sent are of the Italian race crossed with French, similar to those we send in box No. 7, and, in his opinion, produce the best results. He seems to know all particulars about silkworm breeding, and we have no doubt is most reliable.

We should decidedly advise that some cocoons be bought from him, because he is a Frenchman whose principal works are at Cotignac (Var),

France, and the seed would probably be sent from France. We think it would be very desirable to introduce into Kashmir the French races, which, as far as we have been able to judge, are on the whole a little superior to those of Italy.

In Italy the magnanerie, that is, the breeding of worms, is entirely now a cottage industry.

In feeding the silkworms from the early to the last stages perforated paper is used, commencing with very small perforations, and increasing at each moult, through which the silkworms creep up to the food.

The holes in the first stage are not more than the sixteenth of an inch in diameter, and in the last stage at least a quarter of an inch.

Upon this perforated paper are placed fresh mulberry leaves and the worms creep through the holes to the leaves, thus securing cleanly feeding.

Articles for sericiculture can be obtained from the following houses:—

E. Marcani & Co., Via Aparti 14, Cremona.
Ditta Onorio Gavziero, Via Santa Enfernia 16, Verona.
Cav. Pietro Motta, Campocroce di Mogliano, Veneto.

In addition to the houses we have just mentioned, we would also especially recommend some to be ordered from Monsieur Laurent de l'Arbousset,

Rue Mandajors 22, Alais (Gard), Frence. He is a great expert, a silk breeder, a large distributor of seed, and a silk reeler, and almost the best cocoons we have seen have been at his establishment. In reference thereto we only need refer to the samples which will be found in box No. 8, the description of which is as follows:—

No. 1. Race à Papillons noirs, l'ancienne race pure de Cevennes.

No. 2. Race Arbousset; race jaune croisée representant, en beau, tous les principaux cocons à croisement elévés en France.

No. 3. Race ordinaire du Var, le race pure (sans croisement).

No. 4. Race Var.

These are the principal races which best represent the majority of good cocoons produced in France.

His price of graine (eggs) is 130 francs per kilogramme or 3/- per oz.=4 francs 30 centimes per oz.

In each kilogramme there are 33 ounces of 30 and one-third grammes (French).

Monsieur l'Arbousset says cocoons for India should be sent out from Alais in August or September, and the eggs ought to be kept in a mountainous and fresh district until the following spring. It would neither be safe nor practicable to pack them in ice, as they would miss the air and perish going out. The voyage should be

made before they are exposed to the frosts of Europe, and it is owing to this rule not being observed that so many have been unsuccessful.

Monsieur l'Arbousset is the editor and proprietor of the "Bulletin Sericole Français," a weekly periodical, the subscription to which is 10 francs per annum, which we would strongly recommend to be regularly sent to Kashmir, as it contains much of sericicultural and silk trade interest.

The average weight of fresh ("frais") undried cocoons obtained from one gramme of "graine" is 1 kilogramme 500 grammes, and the average weight of dry cocoons obtained from one gramme of "graine" is 500 grammes.

The average weight of fresh cocoons obtained from one ounce (of 30 grammes) of "graine" is 45 kilogrammes, and the average weight of dry cocoons obtained from one ounce of "graine" is 15 kilogrammes. It takes 3 kilogrammes of fresh cocoons to make one of dry cocoons.

The average weight of raw silk (grège) to be obtained from one kilogramme of fresh cocoons is about ·085 grammes, and of dry cocoons about 0·255 grammes.

The amount of raw silk that can be reeled per day with a battery of three reeling bassines, and with three fileuses and one batteuse, ought to be for a "titre ordinaire" (11 to 13 deniers) about 1 kilogramme 200 grammes, and with good cocoons 300 grammes each fileuse more.

In addition to the Alais (Gard) cocoons of Monsieur l'Arbousset's, I (Thomas Wardle) now wish to draw attention to those with which I have been favoured by the kindness of Monsieur F. Lambert, Director of the Government Sericicultural Station, Montpellier.

I send you ten of the principal French varieties which I have received from him, with the following full description of each:—

No. 1. Pierced yellow cocoons from the Alps.
No. 2. Yellow cocoons from the Alps.
No. 3. Yellow cocoons from the Cevennes.
No. 4. Yellow cocoons from Corsica.
No. 5. Pierced yellow cocoons from the Cevennes.
No. 6. Pierced yellow cocoons from Var.
No. 7. Pierced yellow cocoons from Roussillon (Perpignan).
No. 8. Pierced white cocoons from the Cevennes.
No. 9. Pierced yellow cocoons from Heroult (Sericicultural Station).
No. 10. Pierced white cocoons from the Alps.

We think this list certainly exhausts the best dealers in eggs. We would recommend that none be purchased except those of moths which have been microscopically examined under the system of Pasteur, that is, the "Cellulare" as distinguished from the "Industriale,"

CHAPTER X.

VISIT TO A COCOON-REELING FILATURE NEAR LUINO. PURCHASE OF COCOON-REELING MACHINERY. STEAM-POWER VERSUS "FILATEUR DOMESTIQUE" REELING. TAVELLETTES. SIGNOR A. GRANZELLA.

BY recommendation of several of the best filateurs in Italy we thought it necessary that we should visit the establishment of Signor Giovanni Battaglia of Luino, on Lago Maggiore.

We spent an exhaustive day there, inspecting machinery in various stages for reeling cocoons.

The system now adopted is that of the tavelette, similar to that I (T. Wardle) took out to India in 1885, but considerably modified and simplified in construction.

Before ordering at this house, we went some distance to a very large silk-reeling factory where between 200 and 300 workpeople were employed, chiefly in reeling cocoons with machinery constructed by Battaglia.

This machinery was working with the greatest possible regularity and efficiency, and we consider the journey amply successful if no other constructor had been visited.

The girls and women were doing beautiful work, turning out raw-silk of the very best quality. The wages of this factory were 50 to 80 centimes per diem for women and girls, and for children 1 franc to 1½ francs per week, all making twelve hours a day.

There was a considerable quantity of throwing machinery at work, making organzine and tram, and also a little weaving going on of cheap cotton and silk cloths for America.

We returned to Battaglia and there completed our purchases, bringing away with us working drawings of the machinery, which we send, and duplicates of which Captain Trench possesses.

The enclosed account will explain the extent of the machinery bought. It consisted of two tables, each comprising two bassines and one batteuse, with accessories to provide for breakages, altogether amounting to 1,200 francs. (M.)

We found one fileuse attends to each bassine, each bassine having over it five tavelettes, that is, reeling five compound threads at the same time, in Italy. In France four threads only were being used.

One bassine reeling four sets of cocoons in France produces 400 grammes of raw-silk of the ordinary "titre" (11 to 13 deniers) per day, worked by steam power. Battaglia's five tavelettes yield 500 grammes per day. One batteuse prepares cocoons for two bassines.

Besides these, we ordered 30 tavelettes complete, which were to be sent off in ten days at furthest by Parcel Post to Mr. C. B. Walton. The total bill amounts to 1,690 francs, 27 centimes, payment of one-third of which was demanded on giving the order, the rest to be paid for when the machinery is ready. Captain Trench undertook to send a cheque for this one-third, and in the course of at furthest two months, an application will come to you through us, for the remaining two-thirds.

It was necessary to purchase these three machines of a construction to be heated by a wood-fire, with furnace underneath, because it was understood from Captain Trench that there was no steam power arrangement for cocoon-reeling in Kashmir. These machines will be so constructed as to be worked together by one turner, or separately. One young person can easily turn 20 of them, but in the factory we visited there were about 50 similar machines in each row, and all turned by steam power, the water of the batteuse and the bassines being also heated by steam, and all working with great regularity.

We should advocate the adoption of this steam power system in Kashmir over and above the other method, which they term "filateur domestique." The Plan 2074 shows how the bassines (in which the cocoons are at first softened and

their reelable ends found by a brush) are heated by a "foyer" underneath.

The important part of this machine is the "croissure" where the threads of four cocoons are twisted round each other and made to pass over three small glass bobbins or pulleys before the compound thread goes on to the reel at "a." This pulls all the kinks out of the thread and causes it to be conveyed to the reel with the least possible "duvet." The Plan 2069 gives the side view of the machinery.

In addition to the working drawings we also enclose two photographs, one of which shows two smaller tables with a separate batteuse, and another the most approved system and such as is now used most successfully in a very large filature at Covia near Luino. We also send a third photograph showing the batteuse.

Signor Battaglia was instructed in about the following words as to the forwarding of the machinery, as advised by Messrs. Henry S. King & Co. It was to be despatched to Signor E. Dionisi, of Brindisi, and to be at that port at least three days before the ship sailed, but we instructed Battaglia previously to enter into communication with Signor Dionisi before the goods were sent there. He was also told that the goods must not be exceptionally heavy, but must be packed in several cases in order that shipment might not be refused if the steamer were late in loading

them, so we do not think there will be any difficulty in the matter.

From Luino we journeyed by Lugano and Como to Padua, which is near Venice, and on arriving there we were most agreeably received by Cavalieres Verson and Quajat, the Government Directors of the R. Stazione Bacologica, who spared themselves no trouble in explaining to us every possible detail of the course of instruction in sericiculture at that interesting and excellent school. We saw some students in attendance at lecture, being instructed in the use of the microscope, &c., others superintending the hatching-out and feeding of the worms in separate chambers.

In each chamber there were two tables about seven feet long, each three to four feet wide, covered with cut and sliced mulberry leaves, upon which numerous silkworms were feeding.

These tables were so constructed between two vertical supports as to be capable of being inclined towards the light or being kept flat.

Another method was for each pair of uprights to contain several flat tables up to about six feet high and about 18 inches apart. Upon these tables immense numbers of silkworms were feeding on mulberry leaves which had been cut by a machine, in which the leaves were closely packed, and cut with a knife, after the manner of cutting hay, into salad-like shreds. These shreds

were placed upon the perforated card paper mentioned previously.

Another method by which the worms were fed upon uncut leaves was arranged by placing branches of the mulberry tree with the leaves attached, and placed upon sloping frames near to the ground. The worms seemed to thrive well by this method. Perforated cardboard was not used in this method as the excrementitious matter falling to the ground made it unnecessary to use a perforated cardboard.

In one of the rooms the hatching of the worms had been expedited by artificial heat, and the worms were at the end of their fourth moult, and were mounting the "bruyère," many of them having almost formed their cocoons.

I (T. Wardle) would also mention the recent work entitled "Il Filugello e l'arte Sericola by E. Verson and E. Quajat, Direttore e Vice-Direttore, Della R. Stazione Bacologica Sperimentale di Padova, 2 volumes, price 10 lira each." An exhaustive and recent treatise on Sericiculture, which I would recommend to be translated into the vernacular and also into English. I bought two copies, one of which I send, the other I would like to retain, at least for perusal. It is the most recent book on the subject. (Q.)

Nothing can exceed the perfection of the arrangements of this place, and it is not surprising that the result of such excellent instruction causes

Italy to occupy such a high position in the sericiculture of the world.

About 30 species and varieties of the mulberry were being grown in the Government Gardens, as well as the ailanthus and other silkworm feeding trees.

Captain Trench took many notes, and made some drawings of the educational machinery.

We had the pleasure of meeting there with Signor A. Granzella, a young man of about 30, who was taking lessons from these gentlemen, and who had come over from China, where he was attached to the Imperial Maritime Customs, Shanghai, under Sir Robert Hart. From Padua he was going to Como to the weaving school there.

He was exceedingly attentive to us. He speaks English very well, and, being in the Anglo-Chinese Civil Service, was very much interested in our visit. His home address is Pianello, Lake of Como, where he will be up to the end of next year, but he will stay at Padua till the end of next June. His address in China is, Imperial Maritime Customs, Shanghai. He might be of service to Kashmir before his return.

He gave me (T. Wardle) some live Chinese Tussur Cocoons, with which I hope to make some experiments by feeding the worms on the English oak. I have already recommended to the Secretary of State for India that it would be very desirable to see if this species of Tussur

silk could not be cultivated on oak trees on the Terai at Kashmir, being a silk at the present time very much in demand.

We went on to Lyons, France, and visited the establishment of Messrs. J. Berthaud et Fils, the principal makers of cocoon-reeling machinery.

Here we found a good deal of machinery in construction, of the most approved French type and also of the Italian tavelette system. The difference between these systems is that the "Chambon" is without tavelettes. We found opinions varying from those in Italy. Monsieur Berthaud had the conviction that for economy and good work the French Chambon system was preferable to that of the Italian tavelette; but on our pointing out to him that he was executing a considerable order for machinery in the Italian system, and on asking him if the order was for France, and he replied "yes," we said, "How is it that any French filateurs can prefer the Italian system if the Chambon is better?" He smiled and said, "Well, there are some filateurs in France who think the Italian tavelette is better and prefer it."

On examination of his machinery of the Italian system, we found little or no practical difference between his and what we had ordered from Battaglia, and we thought it better not to purchase any there, but to content ourselves with simply ordering one table of the French system Chambon.

It seemed to us there was no good in spending more money in these small hand machines ("filature domestique") when there was a possibility of Kashmir in the near future using steam-power machines.

We therefore simply ordered two bassines, with supplements for replacing breakages, altogether amounting to 710 francs. We enclose the account. With regard to payment, Monsieur Berthaud said he would be glad to receive the money whenever it was convenient to the India Office to pay it. (N.)

He will send photographs* of the machinery as soon as they have had some taken, which we will forward. This is a first-rate house. The machinery will be manufactured with the least possible delay, and will be sent to Marseilles through Messrs. Henry S. King & Co., to be forwarded to Mr. C. B. Walton, The Residency, Srinagar, Kashmir.

Attached to the machinery of Monsieur Berthaud's is a system called "Jette-bous." To one of the bassines the jette-bous system will be attached. The plan of the machinery belonging to it is shown in the accompanying diagram No. 3. Near to the eyelet-hole through which the four threads from the four cocoons pass, there is a revolving brass spindle which catches up the ends quickly and enables an inefficient worker to reel cocoons easily.

* Since received and included.

Enclosed with these papers of Monsieur Berthaud's is one which gives an account for an experimental bassine, suitable for a State or Technical School, and also having a serimetre-dynamometre for testing the strength and elasticity of the bave of the cocoon.

This machine is necessary where students have to be taught, but we did not purchase one. We thought it might be useful to Kashmir to be in possession of their description and cost. They are similar to those supplied to the R. Stazione Bacologica, Padua.

There are also a few inexpensive machines which it is recommended might be bought from Messrs. Berthaud et Fils such as "Eprouvettes" to measure the skeins before weighing and testing them. These could be ordered direct from Kashmir when wanted. The Serimetre, Fig 4, p. 2, would be particularly useful and also the other accessories in the list.

Messrs. Berthaud et Cie consider the reeling is not as good by fire-heating as by steam, because the heat cannot be kept up with regularity, and with fire-heating there is dust, which causes the silk to be less lustrous.

For Bengal cocoons the Italian system is better than the Chambon, but Monsieur Berthaud was of opinion that for Kashmir the Chambon system is better than the Italian.

With regard to the jette-bous he said it was more convenient to use it by those who are not

well acquainted with the system Chambon, and the jette-bous can be used or not; but if the workpeople are to be well trained it is better not to begin with it.

The best filateurs in France use the system Chambon because it gives the best results, the thread being better and stronger than the Italian system; but the Italian produces more. Still, opinion is divided on this point.

The Chambon makes less "duvet" than the Italian because the croissure is more energetic by being at a wider angle.

The two machines of Messrs. J. Berthaud et Cie. will be sent off on the 15th June, the tavelettes in ten days by parcel post.

I (T. Wardle) have also received from Alais particulars of a cocoon-reeling machine, called "filature Antoine," which is recommended by Monsieur Laurent de l'Arbousset. I enclose his letter and one from Léon Malméjean, the constructeur, of Alais, a mechanician employed by Monsieur Laurent de l'Arbousset. The drawing is too rudely done.

As I have not seen the machine at work I did not think it well to order one, especially as we have been most fortunate in securing machines of undoubtedly the best Italian and French systems, leaving little, if anything, to be desired as to their capabilities of working in the most modern and economical way.

This completes our Report, which we hope will be found useful to Kashmir as well as India. It contains information and references of a most thorough and useful kind, and we shall be glad to learn that it gives satisfaction to you and to the authorities in Kashmir.

We have been very anxious to complete it in the least possible space of time, and from the extent of ground travelled over, we have reason to hope that you will think that as much has been done as could possibly be in the time.

We have, &c.,

THOMAS WARDLE.

G. CHENEVIX-TRENCH, Captain.

Leek, 11th June, 1897.

Illustrations, &c., to Report by Sir Thomas Wardle and Captain Chenevix-Trench.

LIST.

1. Report by Sir Thomas Wardle and Captain Chenevix-Trench.
2. Cocoons from Casati, two boxes, Nos. 1 and 2.
   Cocoons from Susani, one box, No. 3.
   „ „ Biffi, one box, No. 4.
   „ „ Numa Laval, two boxes, Nos. 5 and 6.

Cocoons from Laugier, one box, No. 7.
„ „ Arbousset, one box, No. 8.
„ „ Lambert, one box, No. 9.

A.B.C. Three photographs of silk reeling machinery from Battaglia.
Three diagrams of cocoon reeling machinery from Battaglia, Nos. 2069, 2074, 2134.

D.E. Instruction book and price list of Casati's.

F.G. Prospectus and price list of Susani's.

H.I.J. Prospectus, price list, and order sheet of Biffi di Filippo.

K. Prospectuses from Numa Laval.

L. Instructions and price list of Felix Laugier.

M. Account of Battaglia's amounting to 1690 francs 20 c.

N. Berthaud's accounts amounting to 710 francs.

O. Price list of J. Berthaud et Fils.

P. Berthaud's estimate amounting to 510 francs.

Q. Diagram of Jette-bous from Berthaud.
Book, one volume, "Il Filugello e l'arte Sericola," by E. Verson and E. Quajat.

R. Letter from Monsieur Laurent de l'Arbousset.

S. Estimate from Léon Malméjean.

Enclosure 2 in above.

Luino, 8th June 1897.

I received your letter of 28th May. We are hurrying on with the construction of the apparatus for "croissure" (tavelettes), but some time

has been lost on account of the postal arrangements. This is what has happened: The Luino post office, on being asked if there was any parcel post connection with Kashmir, answered in the affirmative, and when the boxes were sent there, they would not take them in, saying that they had made a mistake and that there was no parcel post arrangement with Kashmir. I then applied to the Swiss post office and have succeeded in sending off the six boxes by Monteggio (Canton Tessin). They were sent on the 1st instant, and I am now enclosing the bill for 340 francs.

I am sending one copy to Captain G. J. Chenevix-Trench and another to Mr. H. Walton at Srinagar.

With regard to the first parcel, I must tell you that in the demand 2146 of 13th May, we made a mistake in your favour charging too much for the tavelettes. We invoiced them at 330 francs, whilst with carriage, packing boxes, and exchanges, this sum is only exceeded by 10 francs.

Notice that 76 francs are for carriage and 12 francs for packing cases.

I am sending you duplicates of the designs 2069, 2074, and 2134, and six photographs.

I remain, &c.,

GIOVANNI BATTAGLIA.

Sir Thomas Wardle.

One bill, six photographs, six designs, together.

Enclosure 11 in No. 1.

R. & S. 1708/97. India Office,

Sir, 12th August, 1897.

I am directed by the Secretary of State for India to acknowledge the receipt of your letters of the 11th and 18th June last respectively, submitting the report prepared by Captain Chenevix-Trench and you on your recent mission to the Continent, for the purchase of silk machinery for the Kashmir Durbar, and a statement of the travelling expenses incurred by you on the occasion. In reply I am to inform you that the Accountant-General has been instructed to forward you a draft for £91 15s. 4d. on the latter account, and to pay any duly certified bills up to a total of £200 on the former account. The account for machinery should be countersigned by Captain Chenevix-Trench and yourself.

On hearing from you that the whole of the machinery, &c., has be supplied, a copy of your report, with accompanying samples, will be forwarded to the Kashmir Durbar.

I have, &c.,

A. N. WOLLASTON.

Sir Thomas Wardle, K.B., F.C.S., &c.

Enclosure 12 in No. 1.

India Office,

Sir, 12th August 1897.

I am directed by the Secretary of State for

India to forward you the enclosed copy of a letter addressed to Sir T. Wardle regarding your joint report on your recent deputation to the Continent to purchase silk machinery on behalf of the Kashmir Durbar, and with reference to your claim for £51 19s. 8d. for travelling allowance, &c., to inform you that the subsistence allowance admissible to you by rule is at the rate of one guinea a day. The Accountant-General has therefore been instructed to forward to you a draft for £35 3s. 8d.

I have, &c.,

A. N. WOLLASTON.

Captain Chenevix-Trench, I.S.C.

CHAPTER XI.

REPORT OF AN INFORMAL MEETING HELD AT THE INDIA OFFICE ON THURSDAY, THE 26TH SEPTEMBER, 1901, TO DISCUSS THE PRESENT POSITION AND FUTURE PROSPERITY OF THE NEW SILK INDUSTRY OF KASHMIR.

PRESENT: Sir Thomas Wardle, in the Chair; Sir George Birdwood, K.C.I.E., M.D., LL.D., C.S.I.; T. W. Holderness, C.S.I., I.C.S.; Sir Adelbert Talbot, K.C.I.E.; L. W. Dane, C.I.E.; and two other gentlemen connected with silk and sericiculture in London and Calcutta.*

Sir George Birdwood said he had arranged this informal Meeting in order to give Sir Thomas Wardle and the other gentlemen present, all of whom were interested in the revival of the silk industry of Kashmir, an opportunity of expressing their views on the present position of the industry for the information of Mr. Dane, who was proceeding shortly to India to take up the post of Resident in Kashmir, previously held by Sir Adelbert Talbot. Mr. Dane had seen the official papers on the subject, and so they would under-

* See the India Office Official Report.

stand that he was aware of the facts connected with the question.

Sir Thomas Wardle said he was strongly of opinion that until the standard of the silk produced in Kashmir was raised to that of the finest Italian silk, and its exact position in the market was definitely determined, the revived industry should continue to be administered by the Kashmir Durbar. There is almost an immediate possibility of the silk being reeled up to the highest European standards by an improved mode of procedure in treating the cocoons which he had suggested for the present harvest, and which had given the silk a better colour and bone. The reeling also was now so much improved that there was no reason why the silk should not soon command as good a price in the European markets as the raw-silk of the Cevennes or Italian silk.

He showed a specimen of the raw-silk, which he had recently received from Kashmir, of this year's crop, which was of excellent appearance and quality. He had sent it to Lyons to be examined, and he read the report, to the effect that, although "duveteuse" (i. s. downy) it was of excellent colour, strength, elasticity, and improved in reeling.

He had been completely surprised and greatly distressed to learn from Mr. Walton that it was in contemplation to transfer the industry to the control of a private company.

The great need now was to afford Mr. Walton extra European supervising assistance, both in the breeding of the worms and in the reeling of the silk; and it was essential for the present that all the profits accruing from the silk turned out by the Durbar should be applied to the extension of the present industry, or at least to the direct benefit of the Kashmir State.

One speaker said that the point on which he was most anxious was the rearing of the silk-worms, quite a separate matter from silk making. In a cottage industry the ordinary amount of seed given to each rearer was one ounce. Now Mr. Walton was getting out 25,000 ounces a season, or enough for 25,000 cottages, when the number of persons employed under Mr. Walton did not exceed 10,000, and was probably nearer 7,000. A large percentage of the cost of the seed was in this way lost; if only from the worms smothering one another when hatched.

In his opinion the proper thing to do was to import "cellular seed" each year sufficient to produce a crop of "industrial seed" for the year following, and to set aside a plot of land for this purpose only, and place the operation under a specialist attending to it only, and to the instruction of intelligent natives in the conduct of it. You would thus gradually educate a number of Kashmiris in the proper methods of rearing of silkworms. If this "cellular seed"

proved in any year unsuccessful, there would still be time to get out "industrial seed" from Europe for the next crop. But even if this (impoverished) "cellular silk" had to be spun, the cost of it would be well spent in the education of the rearers.

"Cellular seed" was guaranteed perfectly free from pebrine. But "industrial seed" (*i.e.* seed of the following generation) contains 5, or even more, per cent. of pebrine, or just enough to carry the crop through. The breeders of "industrial seed" do not undertake to give pure seed as some have thought. If they did they would ruin their own business, as the purchasers would then keep enough of their crop to breed again next year, instead of buying from the breeders. As soon as the eggs of the "cellular seed" were laid, the moths could be tested; and if they did not show more than 5 per cent. of pebrine, they would be safe to use for the coming year. If they showed over this, then "industrial seed" should be bought from the European sellers. A special place must be set aside for working the "cellular" seed, as the whole Kashmir Valley was just now full of pebrinous disease, and very contagious. But with so many subsidiary valleys sloping down into the main one, this could easily be managed.

Also the question of working all the year round should be taken in hand at once. If the

houses could be kept at a fixed temperature the natives would only be too glad to work in them in the cold weather, as the people do in North Italy, which is much colder than Kashmir.

Sir Thomas Wardle said that the reeling should be continuous, and this could easily be managed by the use of the Sturtevant apparatus, which would maintain a proper temperature in the reeling factories.

He had from the first recommended that the industry should be carried on exclusively with the seed purchased regularly every year from the best races of France and Italy, with the exception of experimental work of a limited nature. The success of the present system in Kashmir from the commencement had conclusively proved the wisdom of this, and in these views he has been long supported by the Government establishments of Padua and Milan, as well as by the opinions of experts and practical sericiculturalists in both France and Italy.

The time had not yet arrived for cultivating silk commercially from eggs raised in Kashmir; he had recommended Mr. Walton to try this at first, but on a small scale only, and it was somewhat curious to learn that each experiment had failed in consequence of the prevalence of pebrine in Kashmir.

The progress under the present system in Kashmir had been marvellous, and pointed to

considerable profit, both in the immediate past, the present, and the future, and he most strongly recommended that the present system be continued.

The breeding of silkworms was a very scientific business, and it was difficult to conceive that under the ablest supervision the natives could be successfully taught, in a large way, to prevent disease. He was quite against any system of silkworm breeding other than from purchased eggs, excepting only very gradually. The eggs that he had assisted in purchasing in Italy and France for Kashmir had been absolutely guaranteed to him to be free from pebrine, and he held written guarantees from the dealers. Mr. Walton had written to him very favourably of the freedom from disease of the imported eggs, and he therefore advised them, for the present, to let well alone.

Another speaker stated that the silk was still defective, but in the circumstances marvellous progress had been made; and the information that the Kashmir Government were thinking of making over the new industry to a private company, had come to him as a great and painful surprise. The time had not yet come for the enterprise to be handed over to, or, indeed, taken over by, a private company, and whenever it was passed into private hands it should be under arrangements which, while relieving the Government of all detailed control, gave them a fair share in the profits; and these arrange-

ments should be subject to revision every three or five years. The concessionaires should have a knowledge of both silk production and silk business. If the industry was handed over to mere company mongers, it would be ruined, and the Government greatly discredited.

He would also point out that there is beside the waste a serious risk of importing seed as at present. He understood that the Accountant-General had already pointed this out, and he was quite right; for, if through any cause the shipment were lost, or got chilled on the way out, the year would be a blank, as there would be no time to repeat the shipment before hibernation had set in on this side the water; and once that had begun, the seed would either hatch out before reaching the cold in Kashmir, or get spoilt before it arrived there from the hiatus in the incubation. A typewritten memorandum by two of the gentlemen present on the subject of private enterprise versus State conducted industry was handed in and is hereto attached.

Some general conversation then followed on the subjects brought forward by Sir Thomas Wardle and the others; after which the meeting broke up.

GEORGE BIRDWOOD.

26th September, 1901.

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1. We beg to submit the following for con-

sideration in connection with the proposal for making over the Kashmir silk industry to private enterprise.

2. In our opinion it is advisable that the State should retain a direct interest in the business for the following reasons:—

(*a*) It is not yet known to what extent the industry is capable of being developed, and, accordingly, it is not possible to fix a fair sum for the State to either exact or accept for the sale of the monopoly. A royalty or tax on silk produced might be found afterwards either unduly heavy or unduly light. In the one case the growth of the business would be hampered and in the other the State would not receive a fair return for the advantages granted.

(*b*) If a great monopoly should grow up in which the State is not directly interested, the interests of the State and those of the monopoly might conflict, and friction arise.

3. On the other hand, there are the following disadvantages in the State itself conducting the business:—

A Government is never well placed for running a commercial enterprise, for its officials cannot have the requisite freedom of action; indeed, it would be hardly warrantable for them to act in the same way as mercantile men with experience

of their trade, and with their own money at risk. With Government working, the control of expenditure must rest with the finance authorities, who must frequently find difficulty in determining whether the recommendations of the silk department should be adopted or not. In the present case we gather that the following difficulties have arisen, and these and others can hardly fail to occur from time to time.

(*a*) Money is difficult to be had when suddenly wanted, as may often be the case in a business of this sort.

(*b*) Sanction for additional assistants is withheld though necessary for proper reeling, and thereby the value of the silk may be lessened by 10 to 15 per cent.

(*c*) Estimates are cut down and a large increase of good business is thereby likely to be lost.

(*d*) Estimates on an excessive scale may be passed. At present looking to the quantity of seed bought, and the silk produced, it is evident that a large portion of the seed is lost, which shows extremely bad education, and a great expense could be avoided if the natives were better instructed in the work.

In our opinion the best course is that the State should retain a direct interest in the business, but that it should rid itself of all control and management of it, and hand it over

on payment of an agreed sum to be conducted as a private enterprise, the profits to be divided in proportions to be arranged, between the State and the concessionaries.

This course would best secure the good management and expansion to the utmost of the industry. It would free the State from the difficulties and risks of running the business on its own account, for it should be provided that the State cannot be called upon to pay any losses. Moreover, in our opinion the profits which the State would receive would in all probability much exceed any profits it would make under the present system.

5. The power of recalling the concession after a fixed number of years, and on fair terms, should remain with the Government.

6. The concessionaires should have a knowledge of both silk production and the silk business. If the concession were handed over to company promoters the result would very probably be the ruin of the industry.

CHAPTER XII.

A CONFERENCE (THE THIRD) ON SERICICULTURE HELD AT THE RESIDENCY, SRINAGAR, ON FRIDAY, MAY 1ST, 1903, IN THE PRESENCE OF THE RESIDENT IN KASHMIR, DURING THE VISIT OF SIR THOMAS WARDLE.

PRESENT:* The Governor of Kashmir; Major J. L. Kaye, Settlement Commissioner; Mr. F. Anderson, Accountant-General; Mr. Walton, Director of Sericiculture. Sir Thomas Wardle also attended the meeting, by special invitation.

Read proceedings of the last conference of 8th September, 1902.

The following matters came under discussion.

Seed.

1. † 1-2. Seed has been sent to the Ramband Tahsil for this year. Sir T. Wardle is opposed to the idea of raising industrial seed in the country, but thinks that a small experiment may continue to be made with portion of this seed.

* The Revenue Member of Council was unable to be present, but has since signified his assent to all the decisions arrived at in this Conference.

† Reference to previous meetings.

Decided that a portion of the seed produced should next year be sent, after microscopical examination, to another part of Kashmir to be reared.

2. *I-6. Mr. Walton has sent seed to the Tahsildar of Ramband and Kishtwar, and about 100 rearers are being employed in these two tahsils this year.

Mr. Walton will shortly get full particulars from the Governor of Jammu.

A few rearers in Bhadrawah have also been given seed.

Decided that Mr. Walton should report progress and results after six weeks.

3. *II-1. Seed has been distributed on the principles approved, to a largely increased number of rearers. The total number of rearers is likely to be fully 10,000. The Committee expressed approval.

4. Decided that 24 maunds be obtained for next year instead of 20 maunds, and that the Director get half a maund of Italian seed from Italy to experiment with.

Rearing.

5. *II-3. In this para. 20,00,000 strong young plants should be 2,00,000.

The number has now been raised to 3,15,000, exclusive of Verinag.

The Verinag nursery, however, is found to be

* Reference to previous meetings.

damp, and may have to be abandoned. The same number of trees will be planted in one of the other places. Mr. Peychaud will be asked to continue the process every year.

Sir T. Wardle's severe criticisms of the manner in which the mulberry trees had been damaged by the loppings for feed last year, and by the unscientific pruning this year were considered. As regards the latter, the Resident stated that he had enquired into the matter and had ascertained that the Governor of Kashmir, in spite of several letters from the Director of Horticulture, had delayed the issue of orders until much too late in the season, and had then issued urgent orders, which led to the pruning being carried out in a hurried and careless manner. The damage that was being done had, however, been discovered before it had gone very far, and was promptly stopped. It was agreed that the so called pruning had chiefly taken place along the river and roads, where it was most noticeable, and had not had time to extend to villages at a distance, before it was stopped. This opinion has been verified by further enquiry.

In regard to loppings for feed, it was stated that the villagers were allowed to cut branches much too large, but the complete prohibition of cutting as advised by Sir Thomas Wardle would be dangerous to carry out in Kashmir, where the people have no ladders or rearing nets, as in

France, and that the worms might not get sufficient air and ventilation if leaves only were to be picked.

Decided that for this season lopping for feed should be restricted to shoots not thicker than a man's finger.

As to pruning that this should ordinarily be done in Sawan as already directed; that Mr. Peychaud should be asked to tour at that time this year, to instruct the villagers in the right method of pruning, in all Tahsils if possible; that for the future an Assistant to the Director of Sericiculture should be appointed who should be a qualified Forest Officer, on the ordinary scale of pay for Sericiculture Assistants, with fixed travelling allowance. His duties will be to supervise the Inspectors of rearing, of whom there are now three in each Tahsil, to prevent undue lopping of trees for feed, to instruct the people in pruning, to see that their rearing houses are kept clean and in good order, and to give them general advice as to methods of rearing.

The committee would also place under this officer and the inspectors the village nurseries, which are not, under present arrangements, working well. The Tahsildar would be required to see that any matter which the Inspectors could not themselves put right were duly carried out by the Lambardar.

Sir Thomas Wardle suggested that the attention of the officer should be specially directed to the

cultivation of the white mulberry and the "bedana." The Committee accepted this suggestion. Mr. Peychaud has reported that great numbers of the "white mulberry" are already in his nurseries.

6. The question of rewards for rearing was considered.

Decided that rewards should not be given to Tahsildars and Lambardars, but that prizes should be given to rearers, who have their silkworms and arrangements in best order, and to Lambardars of villages which, on the whole, show most care in treatment of trees and in care of the worms.

Weighment and Storage.

7. *III-1. Accountant-General reports that he has considered the opium rules, but is of opinion that opium being a very valuable commodity in small bulk, the conditions are very different and the rules are much too elaborate to apply.

The Committee consider that the best system is, that the cocoons as brought in, should all be weighed out by assistants, whose accounts should be recorded by themselves, and by a clerk, in the vernacular, the results being entered at once in the tally book, and thence transferred to the Filature Account Books. The weighments last for twenty days, and the present arrangements for supervision are regarded as desirable. There are

* Reference to previous meetings.

three scales, and if, owing to the new filatures, additional assistants are necessary, the inspection work in the filatures can be entrusted for this short period to the assistants not employed on weighments.

8. * III. (2) (First meeting). Decided that the payments by results is sufficiently secured by the varying amounts produced by different rearers from the same amount of seed, though men who bring in inferior cocoons are paid at Rs. 10 per maund, or some figure lower than the average rate, and these men are further punished by getting less seed next year.

9. A question raised by the Resident, of keeping the cocoons of different Tahsils separately, in order to test by results the silk produced in different localities, was considered.

Decided that a sufficient quantity of cocoons from each Tahsil should be kept separate and treated separately throughout, for experimental purposes: and that the results in value of silk produced from each, should be duly reported by the Director.

10. * III-4. One séchoir has been provided by the Public Works, but the cost of this is still not reported. State Engineer to be asked to expedite this. Seven séchoirs at Rs. 2,500 each, have been ordered from Hari Ram & Co., of Rawal Pindi; one has arrived and two are on

* Reference to previous meetings.

the way, and four are to leave on the 15th May. The boilers and engines and fans left Pindi on 25th April. The State Engineer has been requested to expedite the erection of the séchoirs and boilers in place.

Director to be asked to report on the Hari Ram séchoirs after they have been used this season.

Reeling and Filatures.

11. *IV. 2, 3. The additional Filatures for which at the last meeting it was decided to make provision, are approaching completion, and are single storied buildings with excellent ventilation. The engine houses are not quite complete, but the State Engineer has been pressed to push these on, and also to put the boilers, which have arrived, in place. It is anticipated that the four filatures will be all ready, and in working order, in June.

Decided that immediate steps should be taken for the insurance of these new buildings.

12. *IV. 1 & 2. Various proposals for economy of working were next discussed. The Director reported that the experiment of putting up a verandah for fifty basins had been tried, but that the effect was to darken the interior of the building, and make it more difficult for the reeler to see flaws in his silk there, while in the verandah itself the workmen had to sit with their

* Reference to previous meetings.

faces towards the light, whereas for proper detection of duvet, &c., the light should be behind. The State Engineer had also reported that the construction of the verandahs, considering the smaller number of basins for which room could be provided, would be scarcely less expensive than the construction of new filatures.

The Committee decided that the verandah experiment was not likely to prove economical, but that the Director should submit a special report on the value obtained of the silk wound in the verandah, and in the filature immediately opposite the verandah.

In regard to electric lighting, expert opinion is to the effect that it is bad for the quality of the silk, a view which is fully endorsed by Sir Thomas Wardle. The Resident pointed out that the use of electricity would, however, be in many ways, advantageous *e. g.* for power-reeling, a form of econony which is strongly advocated by Sir Thomas Wardle. The Accountant-General pointed out that electric heating should also be considered. At present the consumption of fuel is enormous, and it would in time, as the industry grew, constitute a great danger to the forests of Kashmir, or to the industry itself, and that this danger would be greatly reduced, if not altogether avoided, by the application of electricity for heating.

Decided that the first experiment towards economy of working be directed towards power-

reeling, and the application of electricity both for reeling and for heating, and that State Engineer be asked to consider the question of providing water-power for the purpose, and further that Messrs. Osler & Co., Kilburn & Co., and Messrs. Octavius Steel be addressed by him for full information with regard to methods of electric heating.

13. * V. 2. The Resident pointed out that owing to the heavier snowfall this winter, there would probably be no difficulty this year in floating timber down the Dudhganga, and that the Conservator of Forests had informed him that a large supply of fuel was to be brought in by this river. The State Engineer would, however, consider the question of canalisation of the Dudhganga together with the subject of providing water-power near the filature, and probably both schemes would be worked together, though electric heating could be arranged, the necessity for providing water-carriage for fuel for the filatures would be less imperative.

Establishment.

14. * VI. Decided to urge Revenue Member to nominate sericiculture apprentices without further delay, and that the number ought to be at least five.

Meanwhile the necessity of further European

* Reference to previous meetings.

supervision to supervise work in the additional filatures is incontestable. Sir T. Wardle urged the view taken in his Report that there should be one European assistant to each filature building, but the Resident pointed out that in view of the eventual appointment of high class Native supervision, so large an increase was not desirable. The Director reported that Mr. Phillips had resigned his appointment.

Decided that two more European assistants should be engaged, one to replace Mr. Phillips and one additional, thus securing one such assistant to every two filatures.

Mr. Phillips having resigned, at present there are only three not four.

15. Sir T. Wardle's proposal about sending young men to France to be trained was considered. The Resident pointed out that this would secure men with previous training, but could not be carried into effect this season, whereas the question of appointing additional assistants was immediate.

Decided to accept proposal in regard to one such assistant, and that of the two to be now engaged in India, one should be engaged permanently and the other temporarily.

16. The Settlement Commissioner raised the question of house accommodation.

Decided that a house with accommodation for four assistants should be built on the site origin-

ally selected for that purpose in time of Sir A. Talbot.

Sale.

17. * VII. The Committee agree unanimously that the silk should continue to be trusted to one agent only, and that all business opinion is against giving it to more than one agent in Europe. Messrs. Durant Bevan have done very well, and the Committee decide not to divide the produce but to continue to entrust it to them, as at present, as sole agents in Europe.

When the silk is sufficiently good for the American market, the question of employing a separate agency for America can be considered. Sir T. Wardle can advise as to this.

18. Mr. Walton laid before the Committee a letter from Messrs. Durant & Co. with a complaint about certain of the silk supplied being moth-eaten. This complaint appears to be only from one buyer, and applies only to bales bought by him. No complaint has been received about other bales sent at the same time.

Decided to wait another letter from Mr. F. Durant who is going to call at Marseilles, on his way to England, to look into the matter.

This is the first objection ever received of the kind. The bales are packed in waxcloth and gunny. The bales complained of were dispatched

* Reference to previous meetings.

at different times, during a period extending over four months, and no other purchaser has complained.

Accounts.

19. *VIII.-i. Mr. Anderson thinks that the account forms are sufficient, and might indeed be simplified.

The stock of silk has been checked. The forms have been in use for six months, and have been found to be sufficient with some simplification.

The Accountant-General proposes stock should be taken twice a year, at the end of the official year and in June, in order to check at a time when the cocoon stock is likely to be low.

Proposals Approved.

20. *VIII.-ii. Rules for regulating the power and position of the Director have been passed and approved.

21. The Accountant-General laid on the table a statement of account (copy attached) showing that since Samvat 1954, the business now showed a profit of Rs. 6,03,308-10-3, inclusive of part of commission due, or a return in six years of 117 per cent. on the capital expenditure. During the present year the actual cash receipts, exclusive of stock and sums due but not yet credited in the Treasury, had for the first time, exceeded the total working expenses. The cocoons in stock had

* Reference to previous meetings.

been valued at Rs. 15 per maund only, whereas their value when converted into silk, is likely to be much higher, so that the estimate of profits is, if anything, below the mark.

The account was explained by the Accountant-General and accepted.

22. The Accountant-General laid before the meeting a proposal that the value of silk should be realised from the agents at once, instead of after three months interval. The State would, by this, lose the discount, but as the rate of interest in India is generally higher than the bank rate in England, if the money were put out to interest immediately on arrival in India, there would be no loss, and the State would avoid any risk which might arise from the money being left unsecured in the hands of the agents during the three months' interval.

Decided that the agents should be asked to realise at once, the Accountant-General being responsible for putting the money received out to interest at once.

Miscellaneous.

23. Employment of female labour.

Decided that the reelers and turners should be informed that if they wish to bring their women-kind to work with them, thereby adding to the family earnings, they would be permitted to do so. Arrangements would be made for the male and female members of one family to work together

24. New filatures.

Decided that the State Engineer be asked to select a site for a filature at Anantnag, and to report within four months whether it could be worked with electricity, and to prepare estimates of cost, both for a filature worked by steam, and one worked by electricity. The estimate might be for a filature of 300 basins.

25. Vote of thanks to Sir T. Wardle.

The Resident said that Sir T. Wardle, ever since 1896, had taken the keenest interest in the industry, and had offered the most disinterested advice. He had now come out to Kashmir at his own expense, and had written two reports which were with members (copies attached) in which he had embodied his views on the whole subject. Most of Sir T. Wardle's suggestions had been accepted by the Committee. The Resident thought that the industry was much indebted to Sir T. Wardle for the help and counsel he had given for so many years.

Resolved that the Resident's remarks be endorsed and a vote of thanks recorded to Sir T. Wardle.

Extract from an Un-Official Note dated the 1st May 1903, from the Accountant-General, Kashmir State, to the Resident in Kashmir.

Preliminary Balance-Sheet of Silk Industry from

Samvat, 1954 (1898), to end of 1959 (12th April, 1903).

LIABILITIES.

		In Rupees.			In English money.		
		Rps.	A.	P.	£	s.	d.
A.	Capital	5,16,320	9	1	34,421	6	8
B.	Working expenses	17,07,895	8	9	113,859	14	8
C.	Profit	6,03,308	10	3	40,240	8	0
		Rps. 28,27,524	12	1	£188,521	9	4

ASSETS.

D.	Block	4,10,935	12	10	27,395	13	4
E.	Cash receipts ...	17,26,261	15	3	115,084	1	4
F.	Stock in hand ...	6,90,327	0	0	46,021	16	0
		*Rps. 28,27,524	12	1	£188,501	10	8

Out of profits, Rs. 3,476-6-0 have been disbursed as part of the commission due on profit of earlier year's working. A further sum is now due.

When all profits in connection with the accounts for 1959 are settled, a revised balance-sheet will be issued.

CHAPTER XIII.

PROCEEDINGS OF THE FOURTH CONFERENCE ON SERICICULTURE, HELD AT THE RESIDENCY, SRINAGAR, ON THURSDAY, OCTOBER 22ND, 1903, IN THE PRESENCE OF THE RESIDENT OF KASHMIR.

PRESENT: General Raja Sir Amar Singh, K.C.S.I.; K. B. Ghulam Ahmed Khan, Revenue Member, Kashmir State Council; Major J. L. Kaye, Settlement Commissioner; Pandit Man Mohan Nath Kaul, Governor of Kashmir; Mr. G. M. R. Field, State Engineer; Mr. F. Anderson, Accountant-General; Mr. C. B. Walton, Director of Sericiculture; Major A. F. Bruce, Assistant Resident.

Read proceedings of the last Conference held on the 1st May, 1903.

The following matters came under consideration.

Seed.

1.—1.* Mr. Walton reported that the cocoons raised in the Ramban Tahsil had been subjected to microscopic examination, and the seed was found to be tainted with disease and unfit for

* Reference to Proceedings of 3rd Conference.

distribution as "Industrial seed" in any portion of Kashmir as was decided at the last Conference.

Decided, that the danger of using tainted seed could not be overestimated and that the cocoons should be used for reeling and not for seed.

2.—3.* The actual number of rearers this year was 10,898, as against 8,158 in 1902, and the average amount of seed per rearer 2·34 oz. as against 3·12 oz. in the preceding year. Owing to unpropitious climatic conditions the seed had to be distributed later than usual and the crop suffered from excessive heat, as well as from abnormal cold following rain. The total crop of the year was more than 25 per cent. less than in 1902, the decrease being due to the above-mentioned causes, in spite of the larger number of rearers among whom the seed was distributed.

The Resident has brought to notice, that the amount of seed given to some rearers is still too large. These men again distributed the amount they are unable to rear themselves to "kashtkars" and take a portion of the crop from them. This is objectionable. No one man should be given a larger amount of seed than he can rear himself.

The Settlement Commissioner also brought to notice, that when distributing seed, sufficient attention was not paid to the supply of mulberry leaf available in each village. Sometimes a

* Reference to Proceedings of 3rd Conference.

village possessing few mulberry trees was given an amount of seed for which feed in the village was not available and that in neighbouring villages the amount of feed was only sufficient for the seed. This leads to continual disputes among the rearers, and as the total amount of feed available in the neighbourhood is insufficient for the seed distributed, the crop consequently suffers.

Decided that, especially in view of the larger amount of seed ordered for next year, every attempt must be made to still further increase the number of rearers and that now that the industry has gained popularity, the Director must give special attention to the capacity of each individual rearer and to the amount of mulberry leaf available in each village when deciding the amount of seed to be distributed to the rearers.

3.—4.* The extra amount of seed decided on at the last Conference has been purchased and has arrived.

4. The Resident noticed that there were a a considerable number of mulberry trees in the Naoshera Tahsil Jammu and that operations might well be extended to that tahsil.

The Director stated that he was in communication with the Governor of Jammu on the subject.

It is noted that the seed will probably have

* Reference to Proceedings of 3rd Conference.

to be distributed earlier in this tahsil and the Director should determine the proper time in communication with the Governor of Jammu.

Rearing.

5.—5.* Owing to the recent floods the Director of Horticulture was unable to proceed to each tahsil during the month of Sawan to superintend and give lessons in pruning. He has promised to visit each tahsil during the winter months and direct pruning operations where pruning may be found necessary.

Decided that the Director of Horticulture should tour in the winter months as promised. The Committee would note, however, that, as trees pollarded during the winter will be useless for the supply of leaf during the ensuing spring, pollarding should only be effected to a limited extent, and in villages where the number of mulberry trees is very large.

6.—5.* The Settlement Commissioner brought to notice that the damage done to mulberry trees by rearers felling large boughs is still very great. Practically no attention was paid to the orders directing that no boughs thicker than a man's finger should be cut. The Inspectors of rearing do not seem to perform their duty in preventing such damage. When the damage done to the trees has been excessive, punishments have been

* Reference to Proceedings of 3rd Conference.

given this year and it is hoped that the effect of such punishments may be apparent in more careful lopping for feed next year.

Recorded.

7. The Revenue Member having brought to notice that the large amount of mulberry leaf available in the Dachigam Valley was not available for use by the rearers, correspondence on the subject has been conducted with the responsible officers. Colonel Ward, as officer-in-charge of the State Shikargahs, has agreed to allow leaf to be taken from the Dachigam Valley and is in correspondence with the Director on the subject.

Decided that the Director of Sericiculture should notify to the Vice-President the dates during which mulberry leaf is required from Dachigam.

8.—5.* In accordance with the recommendations made at the last Conference, the State Council have sanctioned the entertainment of a forest trained assistant.

The Director has heard from the Superintendent of the Dehra Forest School that a suitable trained man may be available next March and is in communication with the Conservator General of Forests on the subject of the entertainment.

The action so far taken is approved, and it is hoped that the matter will be settled before the close of the winter.

9.—6.* The Director of Sericiculture expressed

* Reference to Proceedings of 3rd Conference.

his inability to frame any suitable proposals for the grant of rewards to rearers and lambardars.

The new Forest Assistant when appointed will be asked to give his special attention to this question of rewards.

10. The Resident pointed out that the question of State-built rearing-houses had been left over for further discussion after the results of the present year's crop was known (vide Proceedings of 2nd Conference II-2).

In his opinion large houses, in which a number of men would rear silk-worms, were not required. These are difficult to keep clean and it is doubtful whether the rearers would make use of them. He was inclined to advocate the building of small houses sufficient for one man. These could be left to men whose objection to taking seed is that they have no room for rearing. The rent could be recovered from such rearers' cocoon payments.

Or, as an alternative suggestion, he would suggest that loans might be given by the State for the building of such houses, the sums advanced being recovered in the same way in two or three years.

The Committee are in favour of the second proposal coupled with the condition, that the lambardars are held responsible, that the money is applied to the purpose for which it is advanced and that the amount in each case does not exceed

Rs. 50. The loans given in the first year would be free of interest.

Weighment and Storage.

11.—10. The engines and fans supplied for the new séchoirs by Messrs. Davidson & Son have not worked satisfactorily. Whether the defects are due to faulty installation or to inherent faults in the machinery is being tested. Under the sanction of the State Council the suppliers are sending up a man to examine the machinery.

The séchoirs supplied by Messrs. Hari Ram & Co. have given satisfaction.

Recorded.

Reeling and Filatures.

12.—11.* The four new filatures have been completed since the last Conference and are now in use. Two of these buildings have been set apart for women reelers. The buildings have been insured.

Recorded.

13.—12.* In regard to the adoption of electricity for power-reeling and heating, the State Engineer reported that he would furnish a note on the subject. (Vide Appendix).

The Committee decided that the experiment should be made but that the question of the application of electricity should await the develop-

* Reference to Proceedings of 3rd Conference.

ment of the general water-power scheme now under consideration.

14.—13.* The questions of the canalisation of the Dudhganga, and of providing water-power near the filatures, are being considered in the Public Works Department in connection with the Flood Spill-channel scheme.

The canalisation of the Dudhganga, might be prepared but should not be carried out until the experiment in electric heating has been made.

15. Pending the elaboration of schemes for improving the carriage of fuel to the filatures by water or for the adoption of electric heating, a tramway has been laid down to connect the filatures with the river, this has proved a great convenience and economy in the transport of fuel from the ghat by the La Mandi to the silk factory. The line was damaged by the floods but is now repaired.

Recorded.

16. The experiment in power reeling, the power to be generated by the séchoir engine, has not been tried. The State Engineer, in accordance with the decision arrived at by the Committee at the Second Conference (Proceedings of Second Conference IV. 3.) prepared an estimate for a separate shed to contain 20 basins. The estimate amounted to Rs. 4,073 and this was considered a large sum to pay for the experiment. The

* Reference of Proceedings of 3rd Conference.

question of applying power to 20 basins in one of the present filatures was suggested, as an alternative, and the State Engineer was asked to have a revised estimate prepared on those lines. The estimate has not yet been received.

Decided, that the State Engineer will frame a new scheme for the experiment in power reeling, making use of existing buildings and machinery as far as possible.

17. The Committee notice with pleasure that continued improvement is taking place in the quality of the reeling, as evidenced by the prices obtained for the silk. In 1901 the average price per lb. was only 13s. 3d. In 1902 the better silk realised 15s. per lb. (vide Proceeding of Second Conference IV., 1.) The last sales reported this year show that the price obtained has now reached 16s. 11d. per lb. This high value proves that the Durbar is getting an excellent return for the money expended on extra supervision.

The Committee whilst noting with satisfaction the high prices realised suggests that Messrs. Durant Bevan & Co. be asked to quote the prices realised by silk of the same denier from Italian and French filatures in the same years.

Establishment.

13.—14.* In accordance with the decision of the last Conference, the Revenue Member on the

* Reference to Proceedings of 3rd Conference.

10th June last selected five candidates for training in sericiculture work.

1. Thakar Das Bali.
2. Pundit Aftab Kaul.
3. Pundit Shiv Ram.
4. Pundit Maheshor Kaul.
5. Khawaja Ghulam Mohi-ud-din.

These men have now been in training for four months. The Director reports that these are absolutely useless and recommends their dismissal. He states that they are not men of the right class, have not the educational qualifications laid down by the Second Conference (Proceedings of Second Conference VI., 1,) and do more harm than good, being unable to command and only give incorrect orders.

He advocates the promotion of the Head Filature Inspectors to the post of native assistants, as these men are trained, will see orders carried out and are of just as good family as the candidates deputed while such promotion will encourage good work.

Decided that the candidate who has given least satisfaction should be dismissed but that the Director should give the others a further trial punishing them when necessary in order to enforce discipline.

19.—15.* Sir Thomas Wardle intimates that he has selected in Europe a Mr. Thomas as an

* Reference to Proceedings of 3rd Conference.

assistant and sent him to France for training. His training will be completed and he will be available for appointment about March, 1904. Sir Thomas has enquired whether the State will defray the cost of his passage from England to Kashmir.

The Committee advise that the cost of a second class passage be paid by the State.

20.—14.* According to the advice tendered by the Committee at the last Conference, the State Council sanctioned the entertainment of one more permanent European assistant in place of Mr. Philips, resigned, and the engagement of a second such assistant as a temporary measure, pending the arrival of the assistant selected by Sir Thomas Wardle for training in France.

Mr. Walton reported that he was unable to obtain the services of a European assistant on the terms offered for temporary employment only, and that as extra assistance was necessary he engaged both Messrs. Amesbury and Giles for permanent employment, subject to their giving satisfaction while on probation.

Mr. Walton asks that his action be approved, and that, in view of the increased work caused by the opening of the new filatures and the extra testing of silk, both assistants be permanently employed.

Decided that the position as already arranged

* Reference to Proceedings of 3rd Conference.

by the Committee be carefully explained by the Director to Messrs. Amesbury and Giles as the services of one of them, unless a vacancy occurs in the meantime, will probably have to be dispensed with. The temporary appointment of one assistant as sanctioned at the third Conference was intended to be for one year.

21. The sericiculture assistants have sent in a memorial setting forth that, in consideration of the long hours of work taken from them, the present rate of salary offered by the Durbar (Rs. 150- 25- 300-) is too small and asking for more generous treatment.

Decided that no sufficient grounds have been disclosed for an increase of salary.

22. The calculation made by the Accountant-General of the amount of commission due to the Director up to the end of Samvat 1959 was laid before the meeting.

Decided that the Accountant-General be asked to re-examine the figures for the first two years 1954-55 with a view to ascertaining the exact loss which has accrued to the State during those two years and which should not be taken into account in calculating the Director's profit. Subject to this proviso the Director should then be called upon to elect whether he accepts Mr. Anderson's figures as they stand, or the method of calculation adopted by Mr. Pritchard.

Sale.

23.—18. With regard to the complaint of certain silk having been received moth-eaten, enquiry has shown that the damage caused was by friction in carriage and not by moths.

Although every endeavour is made to pack the bales in such a manner that the silk may not be rubbed, it is very difficult to ensure that such damage is not caused during the long transit to Europe. The portion of the journey most to be feared is that between Srinagar and Rawal Pindi by cart. The Director reports that the carts supplied by the Imperial Carrying Company for the purpose are most unsuitable, being roughly made with projecting nails, etc. To safeguard the silk on this part of the journey the Director has been in communication with Messrs. Hari Ram & Co. of Rawal Pindi, who, on condition that all silk and stores required by the Sericiculture Department are made over to them for carriage, agree to build special carts for the carriage of silk and to charge Rs. $\frac{3}{8}$ per maund for transport to Pindi instead of Rs. 4 charged by the Imperial Carrying Company.

The Director has been informed that he may make a contract on these lines.

Recorded.

24.—17. The improved value obtained for silk this year has been noticed in paragraph 17 supra. The Committee record their appreciation of the

services of the Agents for the sale of silk, Messrs. Durant Bevan & Co., in this connection.

Miscellaneous.

25.—23.* The introduction of the scheme for the employment of female labour in the factory has been effected and appears likely to prove a success. One and a half filatures are now filled with female reelers, and though these are of course still backward, some of the women are now reeling four skeins.

The Committee express their satisfaction at the results obtained in this direction, and note that, if the scheme continues to be attended with success, the difficulty of the permanent supply of labour and the retention of skilled hands will be overcome.

Decided that the filatures be kept open as late as possible this year in view of the scarcity prevailing in the city.

26—24.* The preparation of plan and estimate for a filature at Anantnag, to be worked either by steam power or electricty decided on at the last Conference, has not yet been carried out. The question of the site, which was left to the Public Works Department, has been referred for consideration by the Sericiculture Department but no further communication received.

The Committee note that, in view of the shortage in the crop of this year, no such addi-

* Reference to Proceedings of 3rd Conference.

tional filature will be required at present. For future consideration the plans and estimates should however, be prepared and the State Engineer has been asked to arrange for this.

27. The supply of fibre for the brushes used by the cooks is difficult to procure. The old system of indenting on village labour to supply the fibre is unsatisfactory. The Director states that he has been unable to obtain a contractor for the supply of fibre.

The Settlement Commissioner states that he has asked the Governor to try and find one or more men willing to contract for this supply and to put the Director in communication with them.

Recorded.

28. The Director reports that the old Sericiculture buildings at Chirpur and Raghnathpura in charge of the Sericiculture Department are no longer required and might be dismantled.

The Settlement Commissioner states that he has addressed the Revenue Member with a view to the buildings in question being taken over by the Revenue Department or dismantled as suggested.

The Committee agree that the buildings should be dismantled and the chaukidars brought under reduction.

29. The question of the introduction of silk-weaving in Kashmir advocated by Sir T. Wardle was discussed.

Decided that enquiry be made from leading

firms in Bombay as to the value of the silk after it has been woven as compared with the raw article. If the results of the inquiry are satisfactory a dozen looms might be started at some central place near the filatures and Mr. Stott engaged on the terms proposed.

Appendix to the proceedings of the Fourth Conference on Sericiculture.

Note by G. M. R. Field, State Engineer, on the question of heating the water in the basins by electricity in the Silk Filatures, Srinagar.

1. Some little time ago the Resident in Kashmir asked me to make enquiries regarding the heating of water in the basins at the silk filature by electricity I took up the matter but was quite unable to find anything about it in the Indian catalogues. I therefore wrote to several of the largest firms in Calcutta and received some replies. But they were all very unsatisfactory. No one seemed to know anything about such a process nor could they give me any information. Several firms asked for more particulars and these were supplied but up to date no information has reached me.

On the arrival of Mr. Simkin, the Electrical Engineer, I discussed the matter with him. He told me that as far as he was aware very little had been done in this direction in England or on the Continent. That the apparatus was very

expensive and uncertain in its application. The breakdowns were frequent and restorations difficult and expensive and in fact almost prohibitive in a place like Kashmir so far removed from any large manufacturing towns, etc.

3. There are two obvious methods by which the water can be heated.

(1.) By heating water in the boilers as at present only using electricity instead of fuel.

(2.) By heating water in the basins by means of electric currents passing through the filatures on wires.

The great objection to the first method is the uncertainty of operation. If a breakdown occurred the whole filature served by the boiler would be at once thrown out of work. The repairs would be very costly and probably delay the re-opening of the filature for weeks or months.

By the second method if a basin broke down no great harm would be done, it could easily be replaced by a new basin (of which a reserve stock could be kept) at trifling expense.

4. On the whole, therefore, the second method was proposed as the most efficient. Mr. Simkin then wrote off at once to Messrs. Crompton & Co. in England as being the most likely people to be able to satisfy our demands. Mr. Simkin sent a sketch with dimensions of the existing basins and gave full particulars of the work to be done, the temperatures required and other details. It was

suggested that each basin should be separately heated and the current controlled by a regulating switch. The resistance coils in the heaters should be arranged so that they could easily be replaced if injured, and should be as simple as possible. Messrs. Crompton & Co. were also asked if they would supply six such basins at a very early date for experimental purposes. They were also to quote approximate cost and power required. They were also asked whether it was possible to arrange an automatic switch which would cut off current at a certain temperature. To the above enquiries no replies have as yet been received though expected every mail.

5. In addition to the above, the Resident in Kashmir has made enquiries as to reeling the silk by power instead of by hand. This matter was talked over with the Director of Sericiculture and he said that he did not think it would work on account of the practical difficulties of controlling and regulating the speed, etc., while the reelers were at the same time handling the cocoons and threads. However I discussed this matter also with Mr. Simkin who considered that when he got our basins from Messrs. Crompton and Co., the best plan would be to put a rough shed at the electric installation in the Basant Bagh and set up our basins and the reeling wheels in connection with the electric light engines. We could then at the same time test

experimentally the heating of water in the basins and the reeling by electric power. This suggestion seemed to me a very good one as it would save the heavy expense of the wires out to the silk factory. All that we should require would be a small motor costing perhaps Rs. 600 and some shafting and a few pulleys. The expense would be trifling and the experiment likely to be satisfactory alongside the existing engines and dynamos.

CHAPTER XIV.

MY NOTES ON THE PRESENT STATE AND METHODS OF SERICICULTURE AND COGNATE SUBJECTS MADE DURING A VISIT TO LYONS AND IN THE CEVENNES, CHIEFLY AT ALAIS (GARDE), FRANCE, IN FEBRUARY, 1903, EN ROUTE TO KASHMIR, BEING REPORT No. 1, PRINTED IN JAMMU.

On Cellular Seed.

CELLULAR seed or "graine" are the eggs of the silkworm moth Bombyx mori laid in cellules, each cellule enclosing the eggs laid by a female moth, as well as the moth itself.

There are two kinds of cellules (both being small openly woven muslin bags), the smooth cellule made in frames, and the dry or wrinkled cellule. The latter should always be used as they offer every desirable guarantee to the purchaser. One hundred cellules contain one ounce of 30 grammes of eggs, graine or seed, but generally 100 cellules contain 35 to 37 grammes of seed. The former cellule, is called the smooth cellule, the latter the pouched or wrinkled cellule, because the latter is pouched or folded. All seed should be refused except those sold in pouched or

wrinkled cellules. This is the kind sent year by year by Messrs. Laurent de l' Arbousset and Son to Kashmir.

The seed sent in this way in pouched cellules or bags gives a guarantee, that the moth in each cellule has been microscopically examined for pebrine, and shows that greater expense has been incurred, because each moth has to be crushed separately and microscopically examined.

The following details explain why smooth cellules cannot be safely guaranteed.

The first case is to make a selection of the best moths so as to keep up the breed and prevent degeneration. An expert employé is appointed whose duty it is to select from those cocoons chosen for reproduction or breeding, the finest couples or moths, male and female, and to put them into cellules which are called cellules of production. When the eggs are laid, M. Arbousset and his son solely undertake the microscopical examination of the moths.

Only those eggs are retained of which the moths have passed a good examination as to breed, freedom from pebrine and other defects.

These eggs are then distributed in Var some 150 miles South-east of Alais in small quantities of about 10 to 25 grammes at the most, amongst 600 or 700 growers for rearing, which has become a cottage industry. These rearings are visited four or five times during the hatching either by

M. Arbousset or his representatives and the progress entered in his books by name of the rearer and number of the order. All the rearings which have shown any signs whatever of disease during the hatching are pointed out and sent to the filature on their arrival at the cocoonery. Rearings which have not shown any signs of disease arrive at one of Messrs. Arbousset's offices. The Manager weighs the cocoons and separates at once one kilogramme. These are counted so as to know the number per kilogramme.

The counting done, the next thing is to shake each cocoon and listen, in order to know how many dead cocoons there are per kilogramme.

The dead cocoons are set aside and taken to the Director of the cocoonery, who opens them one by one to find out what disease the chrysalides have died of, whether of flacherie, grasserie or muscardine.

The number of cocoons per kilogramme is taken down for each rearing and every Manager is ordered to report them to the filature.

Every rearing of the Var race should have more than 450 cocoons per kilogramme.

Any rearing which has not given at least two kilogrammes of cocoons for one gramme of graine hatched is rejected also.

Also every rearing having more than 3 per cent. of deaths through any kind of disease. At the same time a special woman picks out of each

rearing the double cocoons (called in Italy doppio cocoons), these are where two silkworms have made one cocoon and in so doing have rendered it unreelable. She opens them and takes the chrysalides to the microscopist to be examined. If the examination is satisfactory, the sorting of the rearings is begun. It is done on a very large table, where they separate all the satiny-looking cocoons, also the saffron or over-coloured cocoons, and all the small and pale ones which have too poor a fibre, as well as all the dead or badly proved cocoons that may be found.

When each rearing is thus prepared and sorted it is ready to be set aside on the cocoonery to wait for the emergence of the first moth and then to place them on the frames or shells.

As soon as the moths appear and it is possible to select 100 couples of them, they are carried into the examination room and put under microscopic examination. If they do not show any signs of disease the rearing is admitted into the cocoonery.

If there should be only 2 per cent. of pebrine corpuscles found, such moths are either sent to the head office or put into the stifling stove attached to the Establishment at Besse.

This is M. Laurent de l' Arbousset's system and knowing for several years his great experience and the high confidence in which he is held both in the Cevennes, in Var and the districts outside France,

Hungary amongst others, where sericiculture has been successfully introduced, in recent years, I feel sure that the best selection possible has been made from the number of French and Italian dealers in silkworm-eggs upon whom I called when sent down to these countries in 1897 by the Government of India.

The result has satisfied the selection as no disease has appeared in Kashmir from any of the eggs so supplied.

I feel certain that it would be a great mistake to make any change, more especially as M. Arbousset's sericicultural methods have enabled him to supply Kashmir with eggs at a much lower price than any of his confrères, French and especially Italian. I believe him to be a sericicultural authority thoroughly to be relied upon. No such satisfactory results have been obtained elsewhere and I should deprecate any change; but at the same time selections of other races might be tried for comparison, especially of Italian and crossed breeds. M. Arbousset informs me that if he were not also a reeler of cocoons as well as a breeder, he could not be as successful as he is, but thanks to his filature, he says, he can refine his cocoons without too great losses. This I fully believe. He informs me that last year (1902) he sent from his breeding grounds in Var 8,000 kilogrammes of cocoons for grainage to his filature in Alais.

I have had from the first a written guarantee from M. Arbousset for my own satisfaction that the eggs he supplies to Kashmir are free from disease.

How to obtain the greatest number of cocoons from the seed distributed.

First of all it is necessary to keep the seed properly sheltered from variations of temperature. Mr. Walton understands this perfectly. Then the worms should have plenty of space, particularly when they are young. The worms from 1 ounce of seed should occupy a surface of $4\frac{1}{2}$ yards, that is, the worms from the hatching up to the first moult. They should be kept at a temperature of 23°C. (73°F.) to 25°C. (77°F.) and should have four meals in 24 hours and plenty of fresh air.

The right quantity of eggs to distribute in the work-people's houses.

The quantity should vary according to the size of the house and the number of the people in it. A family of a man and woman having one young child, could by working well, rear a box of seed of 30 grammes (one ounce); but they must arrange screens or drying poles so as to give to the worms, when they mount the branches to make their cocoons, at least 50 to 60 yards of space.

If the family consists of one or two older people of about 50 years and two children of, say 12 and 16 years, these could easily rear two boxes

or 60 grammes of seed, under the express condition that they give a space of 100 yards to the worms when making their cocoons. The question of space is quite as important as the question of numbers.

Precautions in the Nurseries (magnaneries).

The first precaution to take is to make sure of a current of air, a good ventilation, and at the same time an even temperature of 22°C. (71°F.) to 23°C. (73°F.) from the hatching to the first moult and 20°C. (68°F.) during the remainder of the "education" (rearing) and five days after the worms have mounted the branches ("bruyère"), so that they can form their cocoons under the best conditions.

The litter should be removed two days after each moult, and twice, if possible, between the 4th moult and the mounting; the 2nd day after the 4th moult, and the 5th day afterwards.

To prevent loss of eggs.

Loss is preventible and should never exceed 5 per cent. M. Arbousset strongly advises a translation into the Kashmir language of his printed instructions and for each cottage to have it framed and hung up. These instructions I forwarded to Mr. Walton some time ago, and, no doubt, they have been circulated and acted upon, because the loss has not only been wonderfully less in the

rearings of last year, but the average has been brought down almost, if not quite, to that of France and Italy where the rearing of silkworms is thoroughly understood and the loss of eggs during hatching does not, as stated above, exceed 5 per cent., which is very reasonable and small especially when compared with the loss of newer sericicultural countries where the rearing is not yet so well understood as I will show below :—

The produce of cocoons per ounce of eggs in France.

One ounce of eggs or 30 grammes should realize between 83 lbs. to 88 lbs. of fresh cocoons, equal to 49 lbs. to 52 lbs. of dry cocoons, or say, 1 kilo 250 grammes of cocoons from 1 gramme of eggs.

The cocoons from the fresh state to the dry lose 60 per cent. of their weight. 22 fresh cocoons equal 7.22 dried ones. In countries where the rearing is not yet so well understood, such as Hungary for example, they obtain only $2\frac{1}{5}$ lbs. of cocoons from 15 grains of eggs; in Persia and Central Asia where the rearing is very inefficient, they scarcely could obtain $\frac{1}{2}$ a kilogramme $\frac{1}{10}$ of pound of cocoons from each grain of eggs, whilst on the contrary, in the small silk-rearing districts of the Var and the Alps they obtain at least 2 kilos 500 grammes from each gramme of eggs hatched.

For further suggestions for rearers of silkworms see translation of M. Arbousset's printed instructions a copy of which I have brought.

Translation of M. Arbousset on losses of silkworms after the fourth moult, being an important letter in reply to some questions I lately put to him.

Your letter of June 3rd found me at Gonfaron (Var) during my busiest season in the hatching of silkworm eggs, and in the rearing of the worms, this will explain the reasons of my delay in replying.

I understand that the losses of which you complain arrive after the 4th mue (moult); they are generally due to a heat-wave, or what we call here "une touffe."

In order to escape this danger as much as possible, you must first put the eggs down to incubation as soon as the first buds of the mulberry trees begin to open, so that the harvest will be begun and, if possible, finished before the hot weather arrives.

Raise the worms to the perforated places in the doors and numerous windows, letting in a strong draught of air when the temperature becomes too hot.

Draughts of air are never injurious to silkworms. It is great mistake and a dangerous prejudice to believe to the contrary.

If the heat persists in spite of the draughts of air, water the roof if possible abundantly, just over the worms, but if that is not possible, hang large damp cloths, sheets for instance, over the place where the worms are, which by evaporation produces a rapid lowering of the temperature. But if you use damp sheets you must let the

draughts of air continue, for in a closed room evaporation of the water by increasing the dampness of the air becomes a danger instead of a remedy.

These are, dear Sir, means for saving the silkworms from a heat wave if you care to add them to any letter you may be writing to Mr. Walton. I think you will be doing him a great service, and that you will be able to make sericiculture prosper in a district which is already indebted to you for so much progress.

Here in Var, where the climate is so mild, we have had a splendid harvest, which gives me confidence in the rearing stage, the moths are emerging full of life and activity in spite of the weather being rather fresh.

Yours, etc.,

LAURENT DE L'ARBOUSSET.

Ordering Graine.

Eggs must be ordered before the 15th of May, from M. L. De L'Arbousset, this he wishes me to impress on Mr. Walton.

I think the ordering of eggs should remain entirely in the hands, and at the discretion of Mr. Walton. I notice with much surprise in a report by the French Consul at Bombay, dated January, 1903, on sericiculture the following sentence, translated and sent to me by the India

Office: "French houses are advised to send cases of eggs through Latham & Co., of Bombay, to Mr. Peychaud, of Srinagar, who will transmit them to the local authorities to the Director of Sericiculture and to the Maharaja for his private estates." In my opinion this will be an unwise step. Any interference with the present method, which is the most direct possible, will be sure to lead to irregularities and confusion.

Non-exposure to light of Cocoons.

There is still a difference between the silk of the Cevennes and that of Kashmir in the paler colour of the latter, although since 1901 the colour has been much better.

One preventive is to avoid direct sun-light and day-light exposure both to the reeling machines and to the silk in every stage as much as possible. Their reels when filled by the cocoon reelers are transferred to low dark rooms. The yellow colour of the gum-silk is very evanescent to light exposure. A fine golden yellow raw-silk adds to its attractiveness to the buyer.

Also M. Arbousset thinks that in killing the cocoons by steaming the fault will be very much avoided. This is done by the Etouffoir which I will describe further on.

Cocoon-sorter.

This necessary instrument is already largely in

operation at Srinagar, and need not be here described. It was sent by M. Arbousset as well as the Etouffoir some time ago.

Cocoons of Reproduction or Etalons.

These can be supplied at 15 francs per ounce of 30 grammes.

If the project in buying them is to enable Kashmir to breed its own eggs M. Arbousset fears an unsuccessful attempt, as in supplying these it is not absolutely possible to have some of the eggs free enough from pebrine to obtain good reproductions, for to *succeed*, the country and the climate must be favourable to preserve the race, a risk in Kashmir not worth running. This was tried in Cyprus but failed each year, although the Cypriotes used the "graines selectionnès" of the Var. It has proved also the same in Syria where the shape of the cocoons grew smaller and degenerated each year to such an extent that every year they had to come back for cellular graine to France. The Royal Inspector wished to have a large quantity last year to regenerate the race, but could only be supplied to a quarter the extent required. It is better, therefore, to purchase the celluled eggs as Kashmir is now doing. The shape of the cocoons becomes modified even in the first year according to the temperature, the nature of the soil and climate, where the eggs of reproduction are introduced and it is difficult

to attempt reproducing in any country where the people are not trained to reproduction. M. Arbousset tells me that he gives this information in order to prevent Kashmir making a mistake, but he is quite willing to supply them if it is wished. I am of opinion that it is not worth while to make the experiment, but to *let well alone* and go on as at present. If the natives can be trained gradually to all the *minutiæ* and scientific requirements then it will be well to try the experiment. But the lesson I learn from my visit and much correspondence and visits to the South of Europe, to the Government Sericicultural Stations at Padua and Montpellier is that as good seed cannot be grown in the Cevennes where the best silk is made, but the eggs have to be reared in the Department of Var, also that in India, *pari passu* the best quality of indigo is produced in the Behar district from imported plants, it is clear that one district may be suitable for silkworm rearing and reeling of cocoons, but that another is better for production of eggs. I do not advise any change. The advice given at the India Office Conference should be followed.

Production of silk from cocoons.

In France four kilos of cocoons produce one kilogramme of silk.

The production from one ounce of eggs realises between 83 lbs. and 88 lbs. of fresh cocoons, equal

to about 49 lbs. to 52 lbs. of dry cocoons, or say 1 kilo 250 grammes of cocoons are produced from one gramme of eggs as stated in a former part of this paper. Fresh cocoons lose 60 per cent. of weight in drying.

On the respective merits of the French Etouffoir and the Dubiné Séchoir.

I had a good discussion with M. Arbousset on this very important question. He showed me that in France they prefer the cocoons to be Etouffées by steam on the Etouffoir. They believe that cocoons reel better than those passed through the Dubiné Séchoir if they are reeled say four or five months after and up to the end of the year, and they cost much less; but cocoons passed through the Séchoir reel better if reeled immediately and up to two or three months immediately following the Etouffage in the séchoir; but in any case Etouffage by steam or Séchoir shows considerable progress on Etouffage by the sun, or in other words for cocoons to be reeled immediately it is better to use the Séchoir, and for those reeled in four months and afterwards it is better to use the Etouffoir, provided the climate is sufficiently dry and hot to dry the cocoons at the end of August like that of France and Italy.

To steam cocoons in the Etouffoir or steaming machine they should be in it 20 minutes for the first time and then 15 minutes afterwards; thus

passing cocoons through it four changes in each hour.

The Séchoir or drying machine has nothing to do with the Etouffoir. The Séchoir is a hot air machine whilst the Etouffoir is steam.

In damp climates, such as Tonkin and the south of China, where it is impossible to dry the cocoons naturally by putting them on shelves, it is necessary to use the Séchoir: but it is important to know that when the cocoons have passed through the Séchoir, if they are not reeled within the following three months the thread breaks oftener than when the cocoons are Etouffées by steam.

The Sale of Cocoons.

This is a subject I discussed at much length both at Lyons and Alais.

The fact of the filatures at Srinagar not having proved adequate to the requirements of reeling all the cocoons produced in each year and especially in 1902, owing chiefly to a much larger yield from the same quantity of eggs by improved *magnanerie* attention and system of egg-distribution which Mr. Walton has introduced, had caused me to think it might be advisable to enquire if any cocoons left over after the winter closing of the filatures could be exported to any country or countries where the filatures are open all the year, and knowing also that Marseilles was an important

centre of cocoon commerce and distribution, I made the enquiries which result in the following information.

Whenever Kashmir thinks it advisable to export any cocoons to Europe they will be eagerly sought and bought at Marseilles, but upon the point of advisability I shall have more to say presently as the information I have obtained has greatly modified my opinions as to the policy of exporting cocoons.

The present time is an excellent one to sell cocoons at Marseilles. They are fetching a good price namely 10 francs 50 centimes per kilo (3/9 per lb.) for cocoons are scarce.

They need only to be simply sent to Messrs. Henry S. King & Co., Marseilles, who can easily dispose of them.

I saw Mr. King's brother in London and discussed the matter with him; he told me they would be glad to have the cocoons consigned to their Marseilles branch where they would be put on the market and sold to the best advantage; it is quite needless to employ any other merchants or brokers. To export cocoons the following precautions are necessary. They must be packed in a single strong piece of cloth as lightly as possible without crushing them. The bales must not exceed 80 lbs. to 90 lbs. in weight, for above that they are charged by 500 grammes and there would be a loss in carriage.

The following are names also of other Marseilles Buyers and Importers of Cocoons and Raw-silk.

W. Mooser, 6, Rue Nicolas, Marseilles.
Giraud Frères, 42, Rue Saine, Marseilles.
Stocker, Goldsmid & Co., 50, Rue Montgrand Marseilles.
S. D. J. Bensimor, Rue de l'Arsenal, 24, Marseilles.
Chabrières, Morel et Cie, Rue Paradis, 52, Marseilles.
L. Désgrand et Cie, Rue Montgrand, 14, Marseilles.
Alléon, Domerque, Rue Sylvatelle, 44, Marseilles.
Amade, Rue Montgrand, 40 Marseilles.
H. Estrangin, Place Paradis, 6, Marseilles.

As the distance from Kashmir to Marseilles is so great, it might happen that the constant rubbing together of the cocoons might damage them, and it would be better first to send a small trial lot, say about 500 to 600 kilogrammes uncrushed cocoons which always reel better than crushed ones: but some might be sent, say half-crushed also, this would make a more economical transport, and 500 to 600 kilogrammes might be sent with the uncrushed ones, the results could then be compared.

M. Arbousset (if any should be sent) would ask a cocoon-reeling friend to put his reeling bassines at our disposal to make these trials.

M. Arbousset informs me that he has been selling cocoons to his colleagues in France and Italy, and says he is quite ready to give practical

advice to Messrs. King & Co., who have fine warehouses in Marseilles for storage of large quantities. He says that cocoons are always sought after in Marseilles, and that the quantity annually passing through is very considerable and approaches three million kilogrammes of dry cocoons annually. If it is thought well, and should it be necessary to send trial lots of cocoons as now recommended, M. Arbousset will take 500 kilos. of each kind, crushed and uncrushed cocoons, and purchase them at the current rate, and then report results to Mr. Walton.

It is the French and Italian filateurs who buy the cocoons sold in Marseilles, but the greater part are reeled in the Cevennes. When the English Government took over Cyprus I suggested to Mr. Chamberlain that as I had found in examining cocoons for the Royal Commission of the Colonial and Indian Exhibition, those of the old race of Cyprus produced the finest quality of silk, it would be worth while to try to revive the industry and the old race then almost extinct. After several interviews with him he ordered a recommencement of the industry which has been very successful, and the cocoons are exported to the Marseilles market and sold there now at the value of £20,000 per annum.

I brought with me from Messrs. Guerin & Cie. of Lyons (Filateurs and Dealers) a sample of

Persian raw-silk made from cocoons they had bought from Persia, to show how well imported cocoons can be reeled. The silk is of perfect quality and very much better reeled than can be done in Persia.

From what I have learned during my visit to the south of France, I do not recommend the export of cocoons. In the first place there is little or no risk in keeping a surplus unreeled through the winter, proper care being exercised. They keep better in winter than in summer, I erroneously thought the reverse might be the case, and, secondly, there would be a considerable loss of profit in the difference between the sale of cocoons and the sale of raw-silk.

Cocoon-reeling.

For the third time during the last six years I visited the Cevennes (Department Gard, chief town Alais), for the purpose of a closer enquiry into all the *minutiæ* of cocoon-reeling and its subsidiary branches.

I was very kindly received by M. Laurent de l'Arbousset, of Alais, and also by M. Messac, of Messrs. Messac & Cie., who reel the finest silk in the Cevennes. This company reel their silk by the system "Tavelette Chambon" which consists of making the croissure by the friction of two separate compound threads from two bassines upon each other. The other system is known as the ordinary or Dubiné system of tavelette by which

the croissure is made by the rubbing or friction of each bassine-thread upon itself. I brought working models of each system for trial in Kashmir and comparison with the system there which is that used in Italy. I shall be able to prove which of the three systems obviates most the defects in Kashmir silk complained of. The two French ones I will describe further on with drawings.

On the French precautions necessary in Cocoon-reeling and on the modus operandi generally.

The first requirement in raw-silk is evenness of thread, therefore, the reelers must always be trying to keep the same number of cocoons unwinding in the bassine, taking into consideration that the cocoon which begins to unwind has a stronger and thicker thread than it has towards its close.

Those cocoons which commence are called new cocoons, and those which are nearly unwound or reeled old cocoons. Four new cocoons-threads being reeled together of the best Cevennes cocoons should, if carefully enough reeled, give a thread of 10/12 deniers, but as it is necessary to use the old ones, half or three quarter unwound, the best way to obtain these 10/12 deniers size is to see that the reeler must reel five cocoons mixed, three new and two old. Cocoons should only be regarded as old when they have become sufficiently