MEMORANDUM

OF

ACTION TAKEN IN ACCORDANCE WITH RESOLUTIONS

OF THE

JOINT COMMITTEE ON COLONIAL INDUSTRIES,

ADOPTED ON THE 30TH OCTOBER, 1871.

PRESENTED TO BOTH HOUSES OF THE GENERAL ASSEMBLY, BY COMMAND OF HIS EXCELLENCY.

WELLINGTON.

1872.

MEMORANDUM OF ACTION TAKEN IN ACCORDANCE WITH RESOLUTIONS OF THE JOINT COMMITTEE ON COLONIAL INDUSTRIES.

1.—*Beetroot.*

Mr. Krull, the German Consul, has been invited to assist the Government in giving practical effect to the recommendation of the Committee, and has been asked to recommend an agent in Germany with whom the Agent-General for this Colony can communicate with regard to the selection of emigrants who have practical experience of this industry. He has written fully to the Chancellor of the German Empire, and to mercantile firms in Hamburg and Berlin, informing them of the terms on which it is proposed to introduce this manufacture into the Colony.

The supply of the best seed used in Germany, which the Committee suggested should be obtained, has been ordered, and steps have been taken to have it tested in different parts of the Colony. (Appendix A.)

2.—*Fish Curing.*

It has been arranged that the Matapouri Block, comprising 500 acres, at Tutukaka Harbour, is to be immediately handed over to the Province, and that the Superintendent has expressed his intention to give effect to the recommendation of the Committee upon such terms as would ensure the fulfilment of Messrs. Persten and McLeod's promises, or else the forfeiture of their occupation.

A report on the edible fishes found on the New Zealand coast, and a classified descriptive list of all the known species, has been prepared under Dr. Hector's supervision, and circulated for general information.

3.—*Paper.*

The bonus recommended of £2,500 for the production of the first one hundred tons of printing paper produced by machinery, has been offered on the following conditions:—

"The paper is to be manufactured in New Zealand, by machinery permanently established and working in the Colony.

"The required quantity to be completed before the 30th June, 1873.

"The weight of each ream of printing paper to be not less than 30 lbs.

"The reward will be paid on the certificate of an officer, to be appointed by the Government, that the above conditions have been complied with." (*New Zealand Gazette*, 3rd February, 1872.)

The above terms have since been somewhat modified, the time having been extended to 30th June, 1874, and the restriction as to the weight of paper in each ream having been removed. (*New Zealand Gazette*, July 15th, 1872.)

4, 5.—*Brunner and Mount Rochfort Coal Mines.*

Reports on these and other coal mines in the Colony, have been obtained from the Geological Survey Department, and will be found in papers D. 3, relative to public works.

In consequence of the destruction of a part of Greymouth by the heavy floods in February, such portions of the future railway works as form part of the wharf frontage and harbour protection were immediately undertaken. (*See* Public Works Paper D. 10.)

Sericiculture.

The Committee, consisting of the Hon. Dr. Renwick, Messrs. Curtis and Lightband, was appointed, and the sum of £100 placed at their disposal, in terms of the recommendation of the Committee. They have informed the Government that they have undertaken to purchase 2,000 mulberry trees from Mr. Batchelor, with a view to their distribution.

Timbers.

The Public Works Department have been requested to procure samples of all timbers which are likely to be used, or have been suggested, for the engineering works in different parts of the Colony; the specimens to be collected under the superintendence of the District Engineers, or other qualified persons, and forwarded, along with specimens of the leaves and flowers if possible, to the Colonial Museum, where they will be tested and preserved for reference.

With reference to the use of birch, in place of totara, for railway sleepers in some districts, a memorandum by Dr. Hector is appended, and experiments are in progress which will thoroughly test this important question in a practical manner. (Appendix B.)

The supply of coniferous seeds which was ordered from California was duly received and distributed throughout the Colony. Their quality was excellent, and all kinds germinated freely, but reports of the success which attended the experiment have not yet been received. The seeds were received on 9th November, 1871. (Appendix C.)

Preserved Milk.

Attention has to be drawn to the appended valuable report by Mr. W. L. Buller, on the manufacture of condensed milk, as being a new and profitable industry, well worthy the attention of settlers in this country. (Appendix D.)

Weaving Machinery.

Estimates were obtained by the Hon. Mr. Vogel from England of the cost of machinery used in the manufacture of sacking, and Hessians, and other coarse cloths, which may be of service to persons who contemplate the establishment of this branch of manufacture from the fibres indigenous to the Colony. (Appendix E.)

W. GISBORNE.

APPENDICES.

APPENDIX A.

No. 1.

Mr. G. S. COOPER to Mr. F. A. KRULL.

SIR,— Colonial Secretary's Office, Wellington, 30th January, 1872.

I have the honor, by direction of Mr. Gisborne, to transmit to you six copies of the Report of the Joint Committee on Colonial Industries, and to request your attention to the paragraph therein numbered 1, relative to the cultivation of beetroot and the production of sugar therefrom, in this Colony.

The Government are anxious to give practical effect to the recommendation of the Committee, and they would with that view feel much obliged if you would favour them with such information on the subject as would, in your opinion, best enable that end to be attained, and if you would procure for them a sufficient quantity of beetroot seed, of the particular varieties best adapted for this manufacture, the expenses of which will be paid by the Government.

I am also to say that you would confer a favour on the Government, if you would recommend some agent in Germany with whom the Agent-General for this Colony in London could communicate with regard to the selection of emigrants.

Dr Hector, the Government Geologist, has been asked to place himself in communication with you, and to give you every information as to the character of the soil and climate in different districts, with a view to the selection of the best blocks of land for the formation of settlements for the cultivation of beetroot.

I have, &c.,
G. S. COOPER,
Under Secretary.

F. A. Krull, Esq., Wellington.

No. 2.

Mr. F. A. KRULL to the Hon. W. GISBORNE.

SIR,— Consulate of the German Empire, Wellington, 4th March, 1872.

I have the honor to acknowledge receipt of your letter of the 30th January, No. 81, enclosing six copies of the report of the Joint Committee on Colonial Industries, and drawing my attention to the paragraph concerning the beet plant, and the desire of the Government to encourage and assist any attempt to manufacture beetroot sugar in this Colony.

I have communicated with Dr. Hector, and have received valuable information regarding the conditions of climate and soil most favourable for the healthy development of the plant.

My correspondents in Germany have advised me that they have forwarded a parcel containing seed from the best kinds of beet, which, in all probability, will arrive in the "England." Upon receipt I shall have the pleasure to submit the seed to Dr. Hector, in order that he may take whatever steps he may deem best with a view to ascertain the relative value of the various kinds, and their adaptability to different localities.

By the last San Francisco mail I wrote fully, not only to the Chancellor of the German Empire, but also to two mercantile firms, one in Hamburg and the other in Berlin, informing them of the decision the Government has arrived at in regard to the important industry of manufacturing sugar from beetroot.

When I have heard from my German friends that a company is in process of formation, it will then be time to communicate with the Agent-General in London, in order that the necessary preliminaries may be arranged.

I have, &c.,
FR. AUG. KRULL.

To the Hon. W. Gisborne, Colonial Secretary.

APPENDIX B.

No. 3.

Mr. G. ALLEN to the Hon. W. GISBORNE.

SIR,— Waiwetu, Hutt, 30th August, 1871.

Some disparaging remarks were made by an honorable member in the Legislative Council, on the value of the native wood called black birch, for railway purposes.

I wish to offer my opinion of the timber. There are two or three varieties of the wood; the black and white are the best; and, sir, after thirty years' experience of the timber, in or out of the water, (if fresh, as it will not stand against the ravages of *teredo navalis*,) I have never seen a piece of rotten birch that is free from sap—the sap, as of any timber, being, as you are aware, useless.

I consider it equal to any timber, for strength or durability, in the world for railway purposes.

I have, &c.,
GEO. ALLEN

The Hon. W. Gisborne.

No. 4.

Mr. J. KNOWLES to Mr G. W. BLAIR.

SIR,— Public Works Office, 26th September, 1871.

I am directed by Mr. Gisborne to draw your attention to the enclosed memorandum by Dr. Hector, in which he points out the importance of testing, from time to time, those woods that may be thought suitable for public works.

It is not desired that a collection of such woods should at once be made, but in calling for tenders it is considered advisable that, when practicable, tenderers should be asked to send in samples of the woods proposed to be used, of the sizes mentioned by Dr. Hector, and that they should afterwards be forwarded to the Museum at Wellington for scientific examination.

If in any other way opportunity should offer of forwarding Dr. Hector's views, especially in reference to doubtful woods, you would, by availing yourself of it, be advancing the public interest.

I have, &c.,

G. W. Blair, Esq., District Engineer, Dunedin. JOHN KNOWLES.

[A similar letter to the above sent to Mr Bray.]

Enclosure in No. 4.

MEMORANDUM by Dr. HECTOR.

THERE is great confusion about the names of the *birches*, as they are called. Three species only exist as forest trees:—

1. *Fagus menziesii.*—This is in Wellington, red birch; Nelson, white birch; Otago, red birch.
2. *Fagus fusca.*—This is in Wellington, black or red birch; Nelson, red birch; Otago, black birch.
3. *Fagus solandri.*—This is in Wellington, black birch; Nelson, black birch; Otago, white birch.

In Canterbury, and the Amuri districts, the last-mentioned, *Fagus solandri*, is divided by the settlers into two varieties, one being called black, and the other white birch.

As to the quality of the different varieties, I find, after correcting the names that,—

1. *Fagus menziesii*, in Wellington, is classed with *F. fusca*, and is not useful. In Nelson, this wood is likewise not valued In Otago, this species is considered the best of all the kinds, and, next to the Kauri, the best wood in New Zealand, for strength and durability.

2. *Fagus fusca* in Wellington, is not considered a valuable tree. In Nelson, it is considered to be better than No. 1., but inferior to No. 3. In Otago, is one of the largest timber trees in the country; wood, clear grained, splits freely, but is not so lasting, when exposed, as No. 1.

3. *Fagus solandri* is most valued in Wellington and Nelson, being used for fencing; the heart of the wood becoming exceedingly hard with age. The Waiau-ua Bridge is said to be built of this timber, which was cut at Motueka, in Nelson. In Otago this wood occurs chiefly along the sides of the streams, among the mountains, and on the West Coast, and is considered worthless for anything but cooper work. The three species are easily distinguished by the leaves and bark together.

1. *Fagus menziesii* has a small heart-shaped, rigid leaf, with round notches; the bark, especially on the young stems, and small twigs, having horizontal bars like a cherry stem. In the old trunk the bark breaks into longitudinal furrows, and the horizontal marking disappears.

2. *Fagus fusca* has a thin membranaceous leaf of considerable size, and with sharp pointed notches. The bark is dark when young, and when old, very thick, rough, and of a dull red or brown colour.

3. *Fagus solandri*, always a white bark, unless when covered with a sooty coating, which appears to arise from disease. The leaves are small and with smooth edges.

The accompanying lithograph, nature—printed from the leaves of these three species of *birch* (figs. 1, 2, 3)—will illustrate the peculiarities by which they are to be recognized.

The Miro (*Podocarpus ferruginea*) fig. 4, and the Matai (*P. spicata*) fig. 5, are also contrasted, as trees which are not properly distinguished in the selection of timber, the latter being much more valuable than the former.

The Manoa (*Dacrydium colensoi*) fig. 6, one of the most lasting and invaluable timbers in New Zealand, has also been given for comparison with the Kawaka (*Librocedus donianus*), fig. 7, (which is a worthless wood for out-door work,) as in one stage of its growth the leaves of the former resemble those of the latter, and I find that they are both occasionally called "cedar," a name which should be applied only to the Kawaka.

Only three samples of birch belonging to the two species *Fagus menziesii* and *F. fusca* were tested by the late Mr. Balfour, and the result shows that the estimate of the relative value of the woods of the two species tested is in favour of *F. fusca*, grown both in Wellington and Otago, as against *F. menziesii* grown in Otago.

It would be most advantageous if samples, not only of the birch woods, but all other timbers which are likely to be used or suggested for use in the public works in different parts of the Colony, were collected under the superintendence of the District Engineers, or other qualified persons, and forwarded, along with specimens of the leaves (and flowers if possible), to the Colonial Museum, where they could be tested and preserved for reference. An average section of the trunk of a well-sized tree should be sent in each case, not less than 2 feet in length, and in large trees about one-fourth of the tree, taking care to preserve the bark, and to keep the specimen bound together with iron hoop.

Samples of sawn timber of each tree should also be sent, such as pieces of scantling or boards, showing the ordinary form in which it is found in the market, and which should be the samples tested.

The appended extract from Mr. Balfour's report, shows that he did not consider that his inquiry had exhausted this most important subject, and, at the time of his death, he was engaged in collecting the material for instituting a fresh investigation.

In the meantime, I would suggest that Mr. Allen should be requested to forward a specimen of the wood and leaves of what he calls the black birch.

13th September, 1871. JAMES HECTOR.

MEMORANDUM OF ACTION TAKEN IN ACCORDANCE WITH

Extract from Mr. Balfour's Tables, page 474, &c., of Jurors' Report of New Zealand Exhibition, 1865.

	Fagus fusca.		*Fagus menziesii.*
	Wellington.	Otago.	Otago.
A. Weight of cubic foot	50.90 lbs.	44.43 lbs.	38.99 lbs.
B. Greatest deflection in inches, elasticity remaining uninjured	·49 in.	·54 in.	·65 inch.
C. Greatest weight carried with unimpaired elasticity ...	100 lbs.	116 lbs.	73 lbs.
D. Deflection in inches at instant of fracture	2·2 in.	2·37 in.	2·55 in.
E. Length of a beam 12 in. deep and 6 in. broad, supported at both ends, which will just break with its own weight	230·57 ft.	268·64 ft.	233·4 ft.
F. Breaking weight at centre of a beam 20 ft. clear span (supported at ends), reduced to a uniform weight of 20 lbs. per lineal foot, and having the proportion of depth equal twice breadth	10·5 tons.	15·3 tons.	12·3 tons.

Extract from Mr. Balfour's Report in Jurors' Reports of New Zealand Exhibition, 1865, page 468.

"New Zealand woods are certainly for the most part short in the grain, and break with little warning, though there are a number of valuable exceptions; but it will be observed that the ratio of safe load to breaking weight is high, which to a great extent compensates for this peculiarity.

"The table indicates the probability that black and red birch will be largely used for public works in future, as they grow to a very large size, and possess many valuable properties.

"It is certainly desirable that all the experiments should be repeated and verified on a larger scale, and it is to be hoped that the General Government will take such steps as to be in a position to undertake to test all samples which may be forwarded to them for the purpose from any part of the Colony.

"Another point which calls for further investigation, is the proper season for felling timber, about which little is known.

"In countries where the winter is more severe, it is generally considered that the best time to fell timber is in mid-winter, when the trees are almost entirely free from sap, and the last formed wood has to some extent consolidated; but the next best period is considered to be about midsummer, after the foliage has been fully developed, when the tree appears to rest before commencing the formation of wood—at which time also it is remarkably free from sap. Spring and autumn are the worst seasons for felling. As, owing to the mildness of the New Zealand winter, trees, except at considerable elevations, never entirely cease to grow, it may probably be found that mid-summer is the best season for felling in this Colony; but the subject requires and deserves a thorough investigation, there being few questions which could be taken up by the Colonial Government with a better prospect of ultimate public benefit.

"When the proper season for felling has been ascertained and adopted, and when more attention is paid to the important question of careful seasoning, it will probably be found that the New Zealand woods will give even higher results than those in the tables."

No. 5.

Mr. W. N. Blair to Under Secretary, Public Works.

Sir,— Dunedin, 6th October, 1871.

I have the honor to acknowlege receipt of your favour of the 26th ultimo, directing my attention to the subject of making a thorough investigation into the character of native timbers, and in reply, to state that I shall have much pleasure in doing all I can to forward the inquiry, especially as it is a subject in which I am very much interested. Indeed I began some months ago to collect information for the same purpose, but on account of other engagements, have not been able to get much done.

As it is not intended to make the inquiry a matter of business, but one to be prosecuted as opportunity offers, I would suggest that it be extended to native building materials of all kinds—timber, stone, clay, limes, and cements. Our information on the subject of limes is very limited, and, as it is the most important element in engineering works, it demands the greatest attention. In connection with this I would like to know Dr. Hector's opinion as to whether any of the volcanic earths of New Zealand possess the same properties as the natural cements of Italy and France.

If the investigation is extended, as above indicated, I would suggest that residents in the country be invited to contribute specimens of the various materials, but such contributions must be confined strictly to the *useful*, otherwise the inquiry will become too extensive.

It will also be necessary to adopt some general arrangement under which the information should be collected.

I have, &c.,
W. N. Blair,
District Engineer.

The Under Secretary for Public Works, Wellington.

No. 6.

MEMORANDUM for the UNDER SECRETARY, Public Works.

WITH reference to my previous memorandum relative to the employment of birch timber for permanent works, I have to state that Mr. Sinclair has submitted a series of specimens of the timber which they obtain at Wainui-o-mata, together with the leaves, so that I have been able to identify the trees from which they are respectively derived.

I find that the term black heart birch is applied to *Fagus solandri*, or the white birch of the South Island. Specimens of the heart-wood of this tree, that have been in a fence for twenty years, show it to be exceedingly durable; but the proportion of heart to sap is very small, so that to procure only sound wood would cause much waste of labour and loss to the sawyer.

The term black birch has only of late been applied to the tree which is known in Nelson by that name, and which previously, by the Wellington sawyers, was termed red birch. This is *Fagus fusca*, and undoubtedly the best of all, as it contains the largest proportion of heart to sap-wood. The heart-wood of this tree is remarkably durable, and can be obtained and distinguished from the sap with facility. Its chief defect arises from its becoming so hard after a few years that it cannot be bored or worked, which would render the repair of works constructed of this timber somewhat difficult. Mr. Sinclair brought in a second kind of timber, as red birch, which belongs, however, to a totally different tree, being the Tawhero of the Natives (*Weinmannia racemosa*). The use of this timber must be guarded against, as it is perfectly worthless.

The third specimen of birch, which is called the red birch in the South (*Fagus menziesii*), is termed white birch at Wainui-o-mata, from the colour of the wood, or circular bark from the marking on the trunk. It is only found on hill tops, so that it is not brought to the mill. The proportion of heart-wood in this tree is very small. As far as I have yet learnt, the difference in the value of the three kinds of *Fagus* as timber trees depends entirely on the proportionate quantity of heart-wood which they contain, and as this will vary in different parts of the country, it serves to explain the conflicting opinions which have been expressed of the relative durability of the trees. I think it may be accepted that in all the heart-wood is a reliable timber for construction.

JAMES HECTOR.

4th November, 1871.

No. 7.

Mr. G. ALLEN to the Hon. W. GISBORNE.

SIR,— Waiwetu, The Hutt, 28th November, 1871.

I have the honor to forward the following information relating to the timber of this Colony:—

1. *Kowai* (*Sophora tetraptera*).—This is a timber little known in the North Island, but in the earlier stages of this Province I was enabled to obtain it for the knees and timbers in building the coasters used here. It is a splendid timber, very strong, lasts well in the ground. Why I draw this inference is that the timber obtained was in all cases completely hidden by moss and vegetable mould that had fallen on the ground; there was no appearance of any barrel of the trees to be found in the immediate vicinity of the timber obtained for the uses above described. The kowai used to be plentiful in the Province of Otago, and was extensively used by the whalers for making oil-casks, and for railway works is, in my opinion, equal to any wood, either here or in the Australian Colonies. It is also used in this part of the Province by wheelwrights, being very elastic, and does not shrink. This wood must not be mistaken for the *goe-goe*, which is of no use whatever, and will only last some two or three years exposed.

Totara (*Podocarpus totara*).—I need not make any remarks as its good qualities are well known, and if used in its green state for retaining walls on the sea-shore, resists the *teredo navalis* better than any Australian or New Zealand wood that I am acquainted with.

Black Birch.—What I wrote in my previous letter to you relative to the strength and durability of this timber is more confirmed by information I have obtained from settlers who have been in the Colony since its first settlement in 1840, and they all declare that they have never seen any of the heart of birch rotten in any removal of fencing, stockyards, and shedding. I must also mention that in all cases the timber was obtained from large trees. Young or small trees from one foot to eighteen inches in diameter do not last well. The trees must not be less than two feet six inches in diameter, and as much larger as can be obtained; and I do not think that it matters whether the timber is used green or not for railway sleepers. This timber is soon destroyed by the *teredo* in salt water.

Matai, or black pine, is of no use whatever for any work that is much exposed. It is rapidly destroyed by a large grub that generates in the middle, and in eight or nine years is rotten. Many of the houses in this district were built on piles of matai, and in nearly all cases have had to be removed years ago. The black pine of the Province of Canterbury is of the same description as the matai of this Province. I have used it in this place for planking of a vessel. The timber, black pine, was sent by its owner for me to use; no doubt it is the best they have at hand in Canterbury for the purposes required, namely, sleepers or posts for fencing, but I have no hesitation in saying that, should you use it for the purposes mentioned, you will have, after a few years, to make extensive repairs; whilst confining yourself to kowai, black birch, or totara, another generation will succeed us, and find that the works were of the most durable character. There are no other woods in this or the Southern Provinces at all fitting for ground or exposed works whatever.

I have, &c.,

GEO. ALLEN.

The Hon. W. Gisborne.

No. 8.

The Under Secretary, Public Works, to Mr. G. Allen.

Sir,— Public Works Office, 21st December, 1871.

I am directed by Mr Ormond to acknowledge the receipt of your letter of the 28th November, in which you afford valuable information as to New Zealand timbers; and, in reply, to inform you that the attention of the Engineer-in-Chief has been called thereto, and that instructions have been given to have all native timbers experimented on.

I have, &c.,
John Knowles.

George Allen, Esq., Hutt.

APPENDIX C.

No. 9.

Mr. A. Kellog to Dr. Hector.

Sir,— San Francisco, 18th October, 1871.

The order for Californian forest tree seeds came to hand so late that I find it impossible to send a full supply. These seeds are mostly from my South Californian Coast expedition. My North Coast expedition is not in by the time allotted, and though often urgently written to for whatever could be sent here before the 10th inst., none have come in, and only a few have been received from the Sierras. I am unable to send any of the silver firs, and some of the spruces here seldom open before frost, which sometimes holds off late. Hence the list is meagre, compared with what it ought to be, had a previous understanding of the urgency of your requirements been impressed upon the parties.

Under the circumstances, I felt reluctant, hesitating whether to make up a package or not; but, at the suggestion of Mr. Collie, I concluded to do so. Another year they can mostly, if not all, be ready perhaps early enough for—say the 10th October.

The box is packed in such a manner that I think all the seeds will arrive in a good vital condition.

I have delayed until the last hour, expecting seeds by express from the interior.

Did time allow, a word might be offered with regard to the culture of these trees.

Thuja gigantea thrives on foggy coast, and well north.

Cupressus macrocarpa in fogs further south, and with *Pinus insignis* and *tuberculata*, and also *muricata*, tolerate bleak windy coasts as shelter trees.

Good seed often proves poor by the forester violating its nature, planting them beneath the soil, where nature never intended them to be. They should be sown literally on the soil, with a compost of forest leaves or sawdust sprinkled over them, and wetted with a rose so fine as to sprinkle lightly, and not disturb the seed; they will then grow, even though they do not touch the soil at all. Ask nature's laws whether there be any pith in the root, and if none, and the seed be below, deep in the soil, the point of the departure of the stem and root being beneath the earth, the pith turns black and is diseased, and growth is delayed, if indeed they grow at all. If sown, therefore, on the soil, they will not disappoint your just expectation.

In haste,
Yours truly,
A. Kellog.

Dr. James Hector, Colonial Museum, Wellington.

APPENDIX D.

No. 10.

Memorandum on the Manufacture of Condensed Milk.

The manufacture of condensed milk is beginning to attract some attention in England; and it is worth considering whether it might not be made a profitable industry in such a Colony as New Zealand.

Although this preparation has been for many years past a standard article of home consumption in America, it has only recently come into notice here; and at present there is only one factory in England —the works of the English Condensed Milk Company, established at Aylesbury—where the manufacture is carried on upon anything like an extensive scale.

The value of the condensed milk as a dietetic preparation is, however, being more widely recognized every day, and it is fast rising into importance as an article of commerce.

At present the English market is mainly supplied with it from three sources, viz.,—1. The English Condensed Milk Company's Establishment at Aylesbury, already mentioned; 2. The Anglo-Swiss Company at Cham, in Switzerland; and 3. The Irish Factory at Mallow. And it is said that already the demand is far in excess of the ordinary supply. It comes upon the market in sealed tins, and is gradually becoming a common article of household consumption, being in reality far purer and better than the so-called fresh milk sold in cities, which is always more or less adulterated with foreign substances or diluted with water. The only drawback at present to its universal use appears to be the prejudice attaching to the dessicated milk of commerce, which, however, is a totally different thing. In this preparation, which is commonly known as "Preserved Milk," the butter globules are necessarily broken or decomposed, and the article not only loses its principal nutritive properties and its milk-like aroma, but is apt to become more or less rancid and unpalatable.

In the condensed or concentrated milk, on the contrary, all the original substances—namely the globules of cream, the curd, and the whey—are actually preserved in their unchanged, natural condition; and, by the addition of the necessary amount of water, a milk as pure and wholesome as the original is immediately reproduced.

The process, which is a very simple one in theory, consists in extracting by condensation, *in vacuo*, about three-fourths of the water naturally contained in the milk, and the residuum, of the consistency of thick syrup, is rendered semi-solid and effectually preserved by the addition of a certain proportion of refined sugar. This preparation is then hermetically closed in tins, and thus protected, will keep sound and sweet in all climates for an indefinite time, and even when exposed to the air, will not suffer deterioration for several weeks.

The theory of the process may be thus stated:—About 85 per cent. of milk, as it comes from the cow, consists of water. By carefully eliminating a large proportion of the water, and adding sugar, the other constituents are preserved in their original unchanged state; and by subsequently restoring the same quantity of water as was previously evaporated, the true milk is reproduced, only artificially sweetened.

As the condensed milk is fast taking hold of the English market, its production, as an article of export, in a country like New Zealand, where there is good milk in abundance, recommends itself on several grounds. Its manufacture in the Colony would doubtless be quite as easy and successful as that of cheese or butter; while, on the other hand, being far less liable to damage or deterioration on its way through the tropics to the English market, it would no doubt prove a safer or more reliable article of export. There would, moreover, be a ready market for such an export in America, should a direct commerce be opened up with that country.

The precise mode in which the evaporation is effected is supposed to be a trade secret in England, but it is well known that the process is essentially the same in the various establishments, and the whole thing has been fully explained in an article which appeared in the "Food Journal" last year.

The following is an explanation of the process, which is less easy than it appears at first sight—for this simple reason, that the whole success of the undertaking depends upon the careful regulation of temperature, and those niceties of manipulation which experience alone can teach.

But, in establishing a factory of this kind in New Zealand, there would, it is thought, be no difficulty in finding a sufficient number of skilled labourers to undertake the practical part of the business.

The milk is first of all run into a reservoir over a strainer, so as to remove all hairs and impurities, and is then removed by large swinging cans into a tank containing hot water, so as to keep it up to a certain temperature. The next operation is to add about one-third weight of the best cane sugar (although Baron Liebeg is of opinion that beet sugar possesses better preserving qualities, besides being much cheaper). Without the addition of the sugar the condensed milk would not, of course, keep sweet more than four or five days.

The mixture of milk and sugar is then passed up through a tube into a vacuum pan in the room above, where the process of condensing is carried on. The object of this is to evaporate the water of the milk, which gradually becomes more and more pasty, and is finally drawn off with a consistence like very pale liquid honey. It is next cooled, and run into tins, which are soldered down, and is then ready for sale.

It should be mentioned that the utmost cleanliness is necessary during all the operations, from the time that the milk is brought in till it is ready to be sent out in its portable state. It is impossible to overrate the importance of this, for it is stated that even a miscroscopic atom of sour or stale milk will spread like yeast, and will be sufficient to contaminate any quantity with which it may be placed. In the milk works at Aylesbury, the utmost care is taken to prevent the smallest particle of milk remaining. The cans, as soon as emptied, are turned upside down, and subjected not only to a strong column of water, but also to one of steam, which is forced in at tremendous pressure, and finds its way into every nook and cranny, effectually cleansing the vessels of all corroding matter.

The Anglo-Swiss Company sells now about 2,000 tins per month, and could sell more if they could produce it. The P. and O. Company, the North German Lloyds, the Royal Mail, and Pacific Company, all use it in their boats. Each tin (as sold at this establishment) contains the equivalent of rather more than half-a-gallon of good milk; the price per tin is 1s. 3d., the cost of the tin 1d. The price of the condensed milk, when diluted with five parts of water for use, is 6d. a quart. About one-third of a pound of loaf sugar is used for each tin; and the net profit on the production, after paying all charges for manufacturing, freight, agency, &c., is said to be about 1s. 6d. for the gallon of milk.

The present prices at the works of the English Company's establishment at Aylesbury are as follows:—

	Per dozen.	Per case.
For case of 4 dozen 1-lb. tins	7s. 3d. ...	29s.
„ 8 „ ½-lb. tins	3s. 9d. ...	30s.

being somewhat in excess of the prices quoted at the beginning of this year.

W. Buller.

7, Westminster Chambers, Victoria Street, London, S.W., 30th April, 1872.

APPENDIX E.

No. 11.

Mr. E. Fox to the Hon. J. Vogel.

Sir,— General Government Offices, Wellington, 3rd November, 1871.

I have the honor to hand you herewith a letter, enclosing estimates for machinery, which I have this day received from Messrs. Samuel Lawson and Sons, of Leeds.

It is to be observed that the price of the flax-breaker—Lawson's patent, with Fiskin's motion, which was described in a paper handed to you some time since—has been increased from £135 to £150, the cause of the increase being the addition to the machine of a cistern, so as to secure that water shall constantly flow over the rollers and the fibre, with the object of cleaning the latter of gum.

I have, &c.,

The Hon. Julius Vogel, &c. E. Fox.

Enclosure in No. 11.

Messrs. Samuel Lawson and Sons to Mr. E. Fox.

Sir,— Hope Foundry, Leeds, 26th August, 1871.

We have now the pleasure to enclose you estimates, and also price, of the patent breaking machine. We propose to adapt a cistern over the machine, and have a constant stream of water playing on the rollers to free the gum from them, as well as from the fibre, as it is squeezed from the fibre or leaf by the action of the rollers. We think this riddance of the gum is a great feature in the preparation of New Zealand flax, and we are of opinion that the reciprocating action of our machine is particularly favourable to the attainment of that object, in conjunction with the use of water. We send you estimates of machinery for making bags and Hessians. Each loom would produce from 70 to 90 yards per day of Hessians, and 120 to 160 yards per day of bagging, according to the quantity. If you wish, we can send you estimates and plan of a factory for weaving or spinning, with engine shafting, and all accessories. For a rough calculation, you can reckon the cost of the machinery at one-third of the total cost of the factory. More detailed particulars of estimates shall follow by next mail.

We have, &c.,

E. Fox, Esq. Samuel Lawson and Sons.

Hope Foundry, Leeds, 28th August, 1871.

Estimate of Machinery for Mr. Fox, from Samuel Lawson and Sons, Leeds.

1. *Jute System for Warps and Wefts, from* 6 *to* 12 *lbs., chiefly from* 7 *to* 9 *lbs.*

Space occupied by one machine of each kind. ft.	in.	ft.	in.		£	s.	d.	£	s.	d.
16	6	× 10	6.	1 Breaker card, 6 ft. × 4 ft., complete with clothing ...	200	0	0			
10	6	× 10	6.	1 Finisher card, 6 ft. × 4 ft., complete with clothing ...	240	0	0			
13	0	× 5	0.	1 First drawing frame, 3 heads, 4 deliveries per head, 6 in. hackle, 14 in. reach	100	0	0			
14	0	× 0	5.	1 Second drawing frame, 3 heads, 6 deliveries per head, 4 in. hackle, 12 in. reach	100	0	0			
21	0	× 4	6.	1 Roving frame, 6 heads, 10 spindles per head, 1½ in. hackle, 11 in. reach, bobbin 9 in. × 4½ in.=60 spindles, 86s. 6d.	259	10	0			
21	0	× 6	0.	3 Double spinning frames, 60 spindles per side, 3¾ in. pitch =360 spindles, 27s. 6d.	495	0	0			
								1,414	10	0
				1 *Sacking Weft System, from* 20 *to* 40 *lbs.*						
16	6	× 10	6.	1 Breaker card, 6 ft. × 4 ft., complete with clothing ...	£200	0	0			
10	6	× 10	6.	1 Finisher card, 6 ft. × 4 ft., complete with clothing ...	260	0	0			
13	0	× 6	0.	1 Rotary drawing-frame, 12 bosses	105	0	0			
21	0	× 4	6.	1 Roving frame, 48 spindles, 6 heads, bobbin 10 × 5, 100s.	240	0	0			
23	0	× 6	0.	3 Sides of spinning, 48 spindles per side, 5 in. pitch=144 spindles, 38s.	273	12	0			
								1,078	12	0
				For Sacking Weft System, for 28 *to* 50 *lbs., on the Gill Spinning System.*						
16	6	× 10	6.	1 Breaker card, clothed complete	£200	0	0			
16	6	× 10	6.	1 Finisher card, clothed complete	260	0	0			
13	0	× 5	0.	1 Rotary drawing frame, 12 bosses	105	0	0			
18	0	× 4	6.	2 Gill spinning frames, 60 spindles each, bobbin 8 × 3½= 120 spindles, 80s. 6d.	483	0	0			
								1,048	0	0
								£3,541	2	0
				Packing and delivery in Hull or Liverpool, 5 per cent. additional				177	1	0
								£3,718	3	0
				1 Improved lapper				£100	0	0
				1 Spreader				220	0	0
				1 Drawing frame				220	0	0
				24 Spindles, spinning				480	0	0
				1 Rope-laying machine				120	0	0
								£1,140	0	0
				1 Patent breaking machine				150	0	0
								£1,290	0	0
				Packing and delivery in Hull or Liverpool, 5 per cent. additional				64	10	0
								£1,354	10	0

ESTIMATE of WEAVING MACHINERY for Mr. FOX.

	£	s.	d.
5 Cop-winding frames, 80 spindles each, 4½ in. pitch=400 spindles, 42s.	840	0	0
1 Cop-winding frame, 60 spindles, 6 in. pitch, 42s.	126	0	0
4 Drum-winding frames, 80 bobbins each=320 bobbins, 23s. 6d.	376	0	0
3 Dressing machines, £170	510	0	0
5 Beaming machines, £44	220	0	0
5 Banks for machines, £13	65	0	0
6 Beam stands, 73s. 6d.	22	1	0
28 Looms, 36 in. reed space, £24	672	0	0
28 „ 42 „ £25	700	0	0
14 „ 52 „ £27	378	0	0
28 „ 56 „ £30	840	0	0
14 „ 64 „ £34	476	0	0
14 „ 70 „ £36	504	0	0
150 Extra beams, 26s. 6d.	198	15	0
80 Twill motions, 31s. 6d.	126	0	0
1 Cropping machine	65	0	0
1 Damping machine	32	0	0
1 Packing press complete, with pump	360	0	0
	£6,510	16	0
Packing and delivery in Hull or Liverpool, 10 per cent. additional	651	1	6
	£7,161	17	6