PAPERS

RELATING TO

THE INTRODUCTION OF SALMON OVA.

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

WELLINGTON.

1872.

PAPERS RELATING TO THE INTRODUCTION OF SALMON OVA.

No. 1.

Mr. Butts to the Hon. W. Gisborne.

Southland Acclimatization Society,
Invercargill, 14th November, 1871.

Sir,—

I have the honor to inform you that, having received on the 11th instant a letter from Mr. Macandrew informing me that a sum of £500 had been passed by the General Assembly for the purpose of obtaining a supply of salmon ova from Great Britain, a meeting of Committee was convened, when it was resolved to telegraph to Mr. Macandrew informing him "That this Society is prepared to guarantee the sum of £300 for the purpose of sending home by the next out-going mail for a shipment of ova, trusting to the other Societies to recoup us for their proportions of that amount. This is done with the view of expediting the matter."

This will make a sum of £800 to be employed in importing ova; and as the last shipment for Otago, consisting of 119,000 eggs, cost under £720, it should be sufficient.

The Society entertains great doubts as to whether, even if the ova could be collected at so late a season, proper preparations could be made for shipping them. But there is a chance; and if it can be done, they would arrive in New Zealand at the best time for hatching.

The Society is of course unaware whom you intend to appoint at home to undertake the business of despatching the ova; but as it is presumed you will leave the matter in the hands of the Agent-General, perhaps I may be allowed to point out to him through you, that Dr. Youl and Mr. Frank Buckland were the gentlemen who superintended the despatch of the ova for Otago, and they would no doubt give him every assistance and advice.

The causes of the failure of the late shipments to Otago were, in the opinion of this Society, the not despatching them in a vessel of sufficiently known sailing qualities to insure a quick passage, and also in packing the ova before the vessel was ready to go to sea; and I am desired to inform you that it is believed the only chance of getting them out, with every reasonable prospect of success, is by despatching them in a clipper vessel, from the Clyde direct to Dunedin.

I am aware that Dr. Youl and Mr. Buckland object to their going from there, principally I believe on account of its distance from London, and it would probably be an insuperable objection to their personal supervision, but I have no doubt they could bring the Agent-General in communication with some person who would be capable and willing to undertake that part of the business, and even if it should be more expensive, it is nothing if it lessens the risk; but it would in fact be cheaper, because Messrs. Patrick Henderson and Co., of Glasgow, with whom we have been in correspondence previously on this subject, and who have the best clipper vessels sailing from that port to Otago, have promised, in case of ova being shipped for the Society, to take it at half freight, which will considerably reduce the cost of the shipment; and we believe that the other items of expenditure, with proper superintendence, would all be cheaper at Glasgow than in London.

I am directed to request that, if you think proper, you will kindly cause a copy of these few remarks to be forwarded to the Agent-General, informing him also that we do not desire to have the shipment made this season, if there should be the slightest risk of failure through undue haste. At the same time, he will easily perceive how important it is that a season should be saved if possible.

We also think that there should be at least four boxes of sea-trout eggs forwarded with the salmon ova, each box containing from 1,200 to 1,300 eggs—about 5,000 in all.

I am further desired to inform you that this Society is prepared to give its guarantee for the payment of the money when required, in any manner that you may think necessary.

I have, &c.,
Edward D. Butts,
Hon. Secretary and Treasurer.

The Colonial Secretary, Wellington.

No. 2.

Mr. Butts to the Hon. J. Vogel.

Southland Acclimatization Society,
Invercargill, 18th November, 1871.

Sir,—

I had the honor of writing to the Hon. the Colonial Secretary on the 14th instant with regard to the importation of salmon ova from Great Britain; but having to-day received a telegram from His Honor the Superintendent of Otago, requesting me to communicate direct with you, making a definite proposal, I beg to state that I am instructed by this Society to inform you that a sum not exceeding £300 will be guaranteed definitely to assist in bringing out salmon ova from Great Britain, and this guarantee will be given in any shape that you may desire.

It is thought that the total expense of importing ova should not exceed much over £700, probably, if economically managed, somewhat less; and as all expenses on arrival will have to be borne by those Societies that receive a share of the ova, the guaranteed sum, together with the £500 voted by the Assembly, should be amply sufficient for the required purpose.

The other Societies in the Middle Island will no doubt gladly assist to pay their proportion of the

guaranteed sum, so as to be able to claim a fair share of the ova. But even if they do not, this Society is quite prepared to be responsible for the whole sum.

My previous letter will have explained to you the wishes of the Society as to the shipment, which it is not necessary at present to enlarge on.

I have, &c.,
EDWARD D. BUTTS,
Hon. Secretary.

The Hon. the Colonial Treasurer.

No. 3.

Mr. COOPER to Mr. BUTTS.

SIR,— Colonial Secretary's Office, Wellington, 18th December, 1871.

I have the honor, by the direction of Mr. Gisborne, to acknowledge the receipt of your letter of the 18th ult., addressed to the Colonial Treasurer, on the subject of the introduction of salmon ova.

In reply, I am to state that copies of your letters of 14th and 18th November have been forwarded to the Secretaries to the Acclimatization Societies of Christchurch and Nelson, with a request that they will state what sum those Societies will contribute for the purpose. It has also been intimated that the Government considers that the three Societies in the Middle Island should between them contribute at least £500, and they have been asked to suggest the plan to be adopted for obtaining the ova and conducting the whole experiment, and to furnish an estimate of the cost, &c.

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

The Secretary to the Acclimatization Society,
Invercargill, Otago.

No. 4.

Mr. COOPER to the SECRETARY, Acclimatization Society, Christchurch.

SIR,— Colonial Secretary's Office, Wellington, 18th December, 1871.

I have the honor, by the direction of Mr. Gisborne, to transmit to you the accompanying copies of two letters from the Hon. Secretary of the Acclimatization Society at Invercargill, on the subject of the introduction of salmon ova, and to request that you will be good enough to inform the Government what sum the Christchurch Acclimatization Society will contribute for the purpose.

The Government consider that the three Societies in the Middle Island should contribute at least £500 between them; and I am to ask you to suggest the plan to be adopted for obtaining the ova and conducting the whole experiment, and forward an estimate of cost, &c.

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

The Secretary to the Acclimatization Society,
Christchurch.

[Similar letter to Secretary of the Nelson Acclimatization Society.]

No. 5.

Mr. FARR to the Hon. W. GISBORNE.

SIR,— Christchurch, 23rd December, 1871.

I have to acknowledge the receipt of your favour of the 18th inst., No. 631, and to inform you that the Council of the Canterbury Acclimatization Society meets on Friday next, the 29th inst., when your communication shall be laid before them for discussion, the result of which I will forward to you per first mail.

I have, &c.,
S. C. FARR,
Hon. Sec. Canterbury Acclimatization Society.

The Colonial Secretary, Wellington.

No. 6.

Mr. FARR to the Hon. W. GISBORNE.

SIR,— Christchurch, 4th January, 1872.

In reply to yours of the 18th ultimo, No. 631, I am directed by the Council of the Canterbury Acclimatization Society to furnish you with the following suggestions, which, although the time is too far advanced for a shipment of ova this season, may prove useful for the next.

That as the last shipment of salmon ova made by the Otago Government was an improvement as regards packing, &c., on all previous shipments, an important point would be gained in securing the services of those who assisted in the attempt.

Increased difficulties and risk would be occasioned by shipping from any other port but London.

The selection of a swift sailing vessel is of the greatest importance.

Superior advantages, conducing to success, are possessed by Lyttelton, and it would be desirable to make it the port of destination.

The hatching arrangements at the Canterbury Society's Gardens are very complete, and, with a trifling outlay, capable of hatching out the entire shipment, should further removal in the egg state be deemed unadvisable.

The Council have had no experience as to cost in such importations, but have no doubt but that the Southland estimate is a fair one, quoting as they do from Otago expenditure.

"The Council will undertake the reception and hatching out any portion of the ova intrusted to it."

Some ova of the salmon trout and large lake trout would also be desirable, but not the Thames brown trout.

In reference to the contribution from this Society for the purpose, the following resolution was passed at the meeting of the Council on the 29th ultimo:—"That the Canterbury Acclimatization Society joins in the guarantee given by the Southland Acclimatization Society for the introduction of salmon ova to the extent of £100."

I have, &c.,
S. C. FARR,
Hon. Sec. Canterbury Acclimatization Society.

The Colonial Secretary, Wellington.

No. 7.

Mr. COOPER to Mr. FARR.

SIR,— Colonial Secretary's Office, Wellington, 11th January, 1872.

I have the honor, by direction of Mr. Gisborne to acknowledge, the receipt of your letter of the 4th instant, containing suggestions relative to the shipment of salmon ova, for which I am to thank you.

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

The Secretary, Acclimatization Society, Christchurch.

No. 8.

Mr. HUDDLESTON to the Hon. W. GISBORNE.

SIR,— Nelson, 28th January, 1872.

I have the honor to acknowledge your letter of the 18th of last December, with the enclosed copies of two letters from the Honorary Secretary of the Acclimatization Society at Invercargill. It is quite out of our power to assist in the introduction of salmon ova, as our funds are so small, and now, having no chance of obtaining any grant from the Provincial Government of Nelson, I am afraid the Society will die a natural death.

The only way to have any chance of success is for the General Government to undertake the whole affair, as they did in Tasmania; the great mistake was in not continuing the shipments for a longer time, as it is throwing money away unless the project is carried out for some years, or until the salmon are known to have returned from the sea.

My opinion is, that the ova should not be distributed to all the Provinces willing to undertake the hatching of them, but should be all placed in one depôt as far South as feasible.

The sum of £1,000 would be ample, as any surplus might go towards the next year's shipment.

The four Acclimatization Societies of the Middle Island have introduceed four different sorts of fish—namely, trout, perch, carp, and tench; and I think that is as much as can be expected of them.

I have, &c.,
FREDK. HUDDLESTON.

The Colonial Secretary, Wellington.

No. 9.

Mr. COOPER to Dr. HECTOR.

SIR,— Colonial Secretary's Office, Wellington, 20th January, 1872.

I have the honor, by direction of Mr. Gisborne, to transmit to you the enclosed copies of certain letters received by him relative to the shipment of salmon ova, and to request you to be good enough to report what steps you consider should be taken before next season for shipping salmon ova.

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

J. Hector, Esq., F.R.S., Wellington.

No. 10.

MEMORANDUM for the Hon. Mr. GISBORNE.

I FEAR the funds available, including the contributions guaranteed by the Acclimatization Societies, will not be sufficient for more than one shipment of ova, and that any attempt to distribute ova after they arrive in the Colony will be incurring unnecessary risk.

I therefore agree with Mr. Huddleston that the whole shipment should be hatched at one depôt.

Only the following hatching establishments are available, so far as I know:—

1. The Avon Ponds, which are offered by the Canterbury Society.
2. The Waiwera Ponds, which are the property of the Otago Government.
3. The Makarewa Ponds, which are offered by the Southland Society.

The Avon Ponds are conveniently situated for receiving the shipment, but are not connected with any river system of sufficient size and seclusion to allow the fish to reach maturity. It would therefore be necessary to handle the young fish in transmitting them to other rivers. This succeeds well with trout, but might not do with young salmon; and it would not therefore be advisable that so expensive an experiment should be tried at any place where a portion at least of the brood cannot be turned adrift in a natural way.

The Waiwera Ponds are on a tributary of the Molyneux, which offers a splendid river system, provided the quantity of mica in a fine state of subdivision, which is constantly suspended in the water owing to the digging operations, will not be prejudicial to the fish. The Waiwera itself, on which the ponds are erected, is quite free from this possible objection. The Waiwera Ponds, however, are more difficult of access than either of the others.

The Makarewa Ponds are connected with a small-sized stream, the water of which drains from sandstone country, and not likely to be rendered turbid by diggings. It enters a large estuary with which several streams are connected, and it is separated only by short stretches of sandy beach from other large rivers, such as the Jacob and Wairau, the last-mentioned being admirably adapted for salmon, as it has a short, rapid course over a gravel bottom from the Te Anau Lake—into which many streams flow—that would afford spawning ground. If new ponds have to be erected, it would be better to place them on one of these streams than any other place in New Zealand.

The temperature of the sea water and rivers on the south part of the coast of New Zealand has also been shown by observation to be the best suited for the salmon.

From these considerations, I am therefore of opinion that the renewed attempt to introduce salmon ova, if made at all, should be confined to the Makarewa Ponds in the first instance.

When the depôt has been decided on, it will only be necessary to forward to the Agent-General the attached correspondence, together with authority to incur the expenditure, and to request him to confer with competent persons.

I quite agree with the suggestion of the Hon. Secretary of the Southland Society that the shipment should be made from the River Clyde in a selected vessel; and, if possible, an arrangement be made, say by a premium to the captain, for the shipment of ova being landed at the Bluff if weather permits, so as to avoid transhipment from Port Chalmers, which is the usual destination of the Clyde vessels. [On reconsideration, I do not think that this could be arranged without great extra cost, but a ship direct to the Bluff might be obtained.]

29th February, 1872. JAMES HECTOR.

No. 11.

Dr. HECTOR to the SECRETARY, Acclimatization Society, Invercargill.

(Telegram.) 4th March, 1872.

IN what condition are the Makarewa Ponds? How long a time, and what expenditure, is required to put them in order to receive ova? Mr. Gisborne requires to know before communicating with the Agent-General.

J. HECTOR.

Invercargill, 5th March.—Prepared at once to take over everything. Reply.
Dr. Hector, Wellington. BUTTS.

No. 12.

MEMORANDUM for the Hon. the Colonial SECRETARY.

7th March, 1872.

I THINK the instructions should be sent by the first opportunity to the Agent-General, and that the time of shipment should be decided on in England.

Draft letter to Agent-General herewith.

The Hon. Secretary of the Southland Acclimatization Society reports that the Makarewa Ponds are ready. See telegram attached.

It will be necessary to ascertain (by telegram ?) if the Christchurch Society are still willing to contribute to the experiment £100 as they proposed, if it is to be limited to Southland. If not, the total funds available will only be £800.

JAMES HECTOR.

No. 13.

The Hon. W. GISBORNE to Dr. FEATHERSTON.

SIR,— Colonial Secretary's Office, Wellington, 13th, March, 1872.

I have the honor to forward a copy of correspondence relative to the introduction of salmon into this Colony, to effect which the sum of £500 has been voted by the General Assembly, and further aid to the extent of £400, guaranteed by certain Acclimatization Societies, is available.

Government propose to confine the experiment of hatching the ova to one locality, and have selected the Makarewa Ponds in Southland as best adapted for the purpose.

I have to request that you will be good enough to place yourself in communication with Mr. Buckland, Dr. Youl, and any other recognized authorities on the subject, and consult with them as to the best way of carrying the scheme to a successful issue.

You might especially draw their attention to the suggestions of the Honorary Secretary of the Southland Society, that the shipment of ova should be made from the Clyde, taking advantage of the liberal offer of Messrs. Patrick Henderson and Co., of Glasgow.

If the shipment could be made to the Bluff instead of Port Chalmers, transhipment of the ova would be avoided; but I merely suggest this, without having any hope that you will be able to effect such an arrangement, and at the same time secure the fastest vessel.

The ponds are now ready for the reception of the ova, but it would be advisable that you should give me the earliest possible notice of when the shipment will be likely to arrive, so that the final arrangements may be made.

Besides the salmon ova, a few boxes of ova of the white trout or Scottish burn trout, and some of the large lake trout, might be shipped, if possible, by the same opportunity.

I have, &c.,
W. GISBORNE.

I. E. Featherston, Esq.,
Agent-General for New Zealand,
7, Westminster Chambers, Victoria Street, London, S.W.

No. 14.

The Hon. W. GISBORNE to Mr. FARR.

(Telegram.) Wellington, 7th March, 1872.

GOVERNMENT have decided, as the funds available will only afford one shipment of ova, to confine salmon hatching to Southland ponds. Nelson Society does not join in guarantee, which amounts to £300 from Southland, and £100 from your Society. Reply free.

S. C. Farr, Christchurch.

W. GISBORNE.

No. 15.

Mr. FARR to the Hon. W. GISBORNE.

(Telegram.) Christchurch, 13th March, 1872.

WE shall expect, if importation is successful, and there is a fair quantity of ova landed in good condition, that some should be forwarded here, where our arrangements have been very successful with trout.

S. C. FARR,
Hon. Secretary.

W. Gisborne, Colonial Secretary, Wellington.

No. 16.

The Hon. W. GISBORNE to the Hon. W. REEVES.

(Telegram No. 137.) Government Buildings, 14th March, 1872.

Re Salmon ova, £500 voted by House; importation calculated to cost £1,000; Invercargill Acclimatization Society guarantee £300; Christchurch Society, £100; Dunedin asked to contribute remainder; has not replied yet. As funds only allow one shipment, I have decided, on Hector's advice, to send ova to Southland ponds, because of lower temperature of sea, superior character of estuary, and number of rivers flowing into it, and freedom of ponds from contamination from diggings drainage, to which Clutha ponds are liable. Mr. Farr now telegraphs to say that his Society will expect share of ova if importation successful and ova landed in good condition, because they have been successful with trout. Hector says this cannot be done, because ova cannot be examined or interfered with in any way till opened at the ponds. Will you see Farr, and explain; try to prevent Society taking offence. Ascertain if they mean to withdraw guarantee on refusal.

Of course they shall have fair share of fish if hatching successful. Am ordering ova by this mail, and should like your reply first.

Hon. W. Reeves, Christchurch.

W. GISBORNE.

No. 17.

The Hon. W. REEVES to the Hon. W. GISBORNE.

(Telegram.) Christchurch, 15th March, 1872.

FARR, on behalf of Christchurch Society, is agreeable to the proposals of Hector, provided the Christchurch Society has its fair share of the produce of the ova if successful in Southland. The Society, he says, will of course stand to its guarantee upon this arrangement.

Hon. W. Gisborne, Wellington.

W. REEVES.

No. 18.

The Hon. W. GISBORNE to Mr. MURISON.

(Telegram No. 135.) Government Buildings, 13th March, 1872.

Re Vote £500 Salmon Ova.—Government about to send orders for ova, but require £500 to be subscribed by Acclimatization Societies. In addition to vote, Southland guarantees £300; Christchurch, £100; Nelson does not join. Will your Society contribute balance? Communication to you in first instance, accidentally overlooked. Government have decided, as funds only enough for one experiment, to confine hatching to Southland ponds. Shipping to Port Chalmers by fast vessel. Reasons for selecting Makarewa Ponds were, lower temperature of sea water, freedom from being rendered turbid by diggings, favourable nature of estuary, and number of suitable streams running into it.

Reply free in time for outgoing Frisco Mail.

W. D. Murison, Esq., Dunedin.

W. GISBORNE.

No. 19.

Mr. Murison to the Hon. W. Gisborne.

Dunedin, 16th March, 1872.

Your telegram considered at meeting on Thursday. Society not in position at present to contribute £100, but will gladly give that amount if Provincial Council grants Society usual subsidy. Council should meet in two months, and as no steps can be taken at home in connection with proposed shipment until end of year, the Society trusts the Government will be satisfied if a definite reply is sent in two months.

Hon. W. Gisborne. W. D. Murison.

No. 20.

The Hon. W. Gisborne to Mr. Murison.

(Telegram No. 149.) Government Buildings, 18th March, 1872.

Thanks for telegram. Have sent instructions about ova by this mail, that ample time may be given for preparation. Government are quite satisfied to await reply from Society in two months.

W. D. Murison, Esq., Dunedin. W. Gisborne.

No. 21.

Mr. Butts to the Hon. W. Gisborne.

Southland Acclimatization Society,
Invercargill, 9th April, 1872.

Sir,—

I have the honor to inform you that your letter of the 18th December, No. 71–3515, has been laid before the Committee, but, owing to various circumstances, I have not been in a position to reply to it at an earlier date.

I am now instructed to state that the sum which you mention as desirable that the various Societies of the Middle Island should contribute—namely £500,—appears to be altogether unnecessary, this Society having certain information that £700, or a trifle over, is quite as much as will be required up to the time of landing the ova in New Zealand.

It may be that under these circumstances you would prefer that the experiment should be tried by a private society, in preference to leaving it to the management of your Government, in which case I am to inform you, that if you will give the Southland Society permission to undertake the shipment, it is prepared to do so, and should the expense exceed the sum of £700 the difference will be paid out of its funds; in which case it will be necessary to instruct the Agent-General to pay over to the Southland Agent in London any sum that he may expend up to that sum. Of the £200 over and above the Government grant, it appears that a moiety will be subscribed by Christchurch. We are prepared to give the balance at once, unless Otago also subscribes, in which case the amount paid by each can be apportioned.

As it appears from the columns of the newspapers that the Southland Society is prepared to guarantee £300, I am desired to refer you to my letter of the 14th November, in which I said "That this Society is prepared to guarantee the sum of £300 for the purpose of sending home by the next outgoing mail for a shipment of ova, trusting to the other Societies to recoup us for their proportion of that amount." That not having been done, our guarantee so far fell to the ground.

However, as the Society is most anxious that the shipment be made, I am to state definitely that we will guarantee £300, in conjunction with the other Societies, and pay £100 at once, if the Government undertakes the shipment; or, as stated previously, the Society will manage the business on the terms mentioned.

I shall be glad to hear from you in reply as early as convenient, so that, if you are disposed to agree to the shipment being undertaken by us, I may send home instructions on the subject immediately.

You are probably aware that next December is the earliest period at which the ova can be despatched from Great Britain.

I have &c.,
Edward D. Butts,
Honorary Secretary.

The Hon. the Colonial Secretary.

No. 22.

The Hon. W. Gisborne to Mr. Butts.

Sir,— Colonial Secretary's Office, Wellington, 30th April, 1872.

In reply to your letter of the 9th instant, relative to the importation of salmon ova, I have the honor to make the following statement, for the information of the Society you represent, of the action that has been taken in the matter.

Immediately after the passing of the vote of £500 for the introduction of salmon, a letter dated the 14th November was received from you, forwarding an extract from a resolution guaranteeing a further sum of £300 for the purpose of sending home by the ensuing mail for a shipment of ova, trusting to the other Societies to recoup to you a fair proportion of the contribution. A letter of subsequent date (18th November) was received from you while the subject was under consideration, from which it appears you were instructed to guarantee definitely, and not as before, conditionally, a sum not exceeding the above.

In reply, you were informed on 18th December that the Government considered that the Acclimatization Societies should contribute among them a sum of £500 towards the experiment,

so as to insure its success; and this decision, together with copies of your letter, were transmitted to the other Acclimatization Societies.

After considering the replies from these Societies, Government decided that the experiment should be confined to the Makarewa Ponds. To this proposal, the Christchurch and Dunedin Societies agreed in a cordial manner, waiving their own claims to a share of the ova, and promising to bear a share of the required contribution; and on receiving from yourself, by telegram of 5th March, an assurance that the ponds were in a fit state to receive the ova, the order was sent to the Agent-General to effect the shipment in a letter dated 13th March, of which I have the honor to enclose a copy.

In the event of your anticipation that the whole cost of the experiment will not exceed £700 proving correct, I need hardly state that the proposed contribution from your Society will of course be so much less, but the Government have distinctly understood from the action taken by your Society that the condition which they imposed—that the sum guaranteed by the Societies should be £500—was accepted by it.

On receipt of advices from the Agent-General as to the shipment of the ova, you will be duly informed.

I have, &c.,
W. GISBORNE.

Edward Butts, Esq., Secretary,
Southland Acclimatization Society, Invercargill.

No. 23.

Mr. BUTTS to the Hon. W. GISBORNE.

Southland Acclimatization Society,
Invercargill, 11th May, 1872.

SIR,—

I have the honor to acknowledge receipt of your letter dated 30th April, together with a copy of letter from yourself to the Agent-General in London regarding a shipment of salmon ova from Great Britain. The same will be laid before the Committee at their next meeting, and I have no doubt the intelligence conveyed therein will meet with their approbation.

I have, &c.,
EDWARD D. BUTTS,
Hon. Secretary.

The Hon. the Colonial Secretary, Wellington.

No. 24.

Dr. FEATHERSTON to the Hon. W. GISBORNE.

(No. 326.)

7, Westminster Chambers, Victoria Street, Westminster, S.W.,
26th June, 1872.

SIR,—

I have the honor to acknowledge receipt of your letter of 13th March (No. and register as per margin), on the subject of a further shipment of salmon ova to New Zealand.

As the spawning season does not commence before the early part of November, it will of course be quite impossible to do anything at present beyond collecting the necessary information and making all suitable arrangements.

Mr. Buller has, at my request, prepared a memorandum on the subject, which I beg to forward herewith; and by next mail I shall probably be able to furnish the Government with further information, and to report the steps I have taken in the matter.

Meanwhile, I have simply to state that I have received every assurance of assistance and support from Mr. Youal, Mr. Buckland, and other gentlemen whose experience will be of great service to me in giving effect to your instructions.

I have, &c.,
I. E. FEATHERSTON.

The Hon. W. Gisborne, Colonial Secretary.

Enclosure in No. 24.

MEMORANDUM on the Introduction of Salmon into New Zealand.

7, Westminster Chambers, London, 22nd June, 1872.

In compliance with the request of the Agent-General, I have endeavoured to collect the best available information on the subject of introducing Salmon ova into New Zealand, and for that purpose I have personally consulted the following authorities, viz.:—Mr. A. Youal, of Waratah House; Mr. Frank Buckland, one of H.M. Salmon Fisheries Commissioners; Dr. J. E. Gray, F.R.S., the Superintendent of the Natural History Department in the British Museum; Dr. Gunther, F.R.S., the well-known ichthyologist, and Dr. Hooper, F.R.S., Director of the Royal Gardens, Kew.

For the information of the Government, I beg to summarize the results of my conference with each of these gentlemen: but I do not consider it necessary to burden this paper with the detailed instructions as to when, where, and how to take the Salmon, the process of artificial impregnation, the various modes of packing the ova, the hatching and rearing of the young fish, and other similar matters, on all of which most valuable information has been obtained.

1. Mr. Youal has personally superintended no less than five shipments of salmon ova to Australia and New Zealand, and can lay claim to a larger practical experience of the subject than any other person in England. He is strongly opposed to the proposed shipment of ova being made from any port but London. He believes that it would be almost impossible to obtain the requisite skilled labour for such a delicate undertaking as the packing and shipping of the ova, without employing men whom

he has already trained to the work, and the services of these men would not be available at a distance from London unless at a considerable outlay. Every successive operation, from the netting of the salmon for the purpose of taking the ova to the ultimate closing in of the icehouse in which the ova is packed for the sea voyage, requires the careful personal superintendence of some responsible person possessing the requisite knowledge and experience. Mr Youal offers to undertake this duty himself, but declines to go out of London. He states, however, that should the Agent-General decide on making the shipment from the Clyde, as at present instructed, the services of his assistant, Mr. Ramsbottom, would be available at a cost of 30s. per diem, exclusive of expenses. Mr Ramsbottom (as Mr. Youal assures me) is perfectly skilled in the several processes of taking, artificially impregnating, and packing the ova, but he would nevertheless require constant supervision, the whole operation requiring the utmost care and delicacy. So sensitive are the salmon ova at this stage, that the slightest rough usage, even the trundling of the box containing it in a wheelbarrow, or any sudden vibration, would be fatal to the success of the enterprise. Mr. Youal has determined all these points by frequent experiments, of which he furnished me with full particulars. He estimates the cost of a single shipment at from £700 to £800, and he recommends a bonus of £200 (in addition) to a good shipping house to send out a fast sailing vessel. He is of opinion that if the passage exceeds ninety days, there is little or no hope of succeeding with the ova. He thinks that a less quantity of ice than he has been accustomed to use (*i.e.* fifteen tons instead of twenty-five) would be more manageable and quite as effectual. (The price of ice is about £5 a ton, so that this would make a saving of £50 on the total cost.) Considering the temperature of the New Zealand waters in the locality decided on for hatching the salmon, Mr Youal thinks that the ova ought to be shipped about the 15th December, but it ought not in any case to be packed more than two days before the sailing of the vessel, everything in the way of arrangements for receiving the ova on board having been previously adjusted, so as to defer the shipping to the last moment of sailing. He recommends an icehouse on the principle of those used by the P. and O. steamboats; double walls, the outer one being of three-inch deal planks, and the interspace of eleven inches filled with pulverized charcoal well rammed down, the interior chamber being of lead, thickened at the base. He further recommends that the cases for the reception of the ova should be on the model of that invented by himself, and now on view at the Kensington Museum, and that we should adopt his plan of packing in live moss (*i.e.* with the roots and portion of clay attached). He lays the utmost stress on the importance of having some trustworthy agent on the spot ready to receive the ova on its arrival in New Zealand, because the slightest neglect or inattention there would render perfectly useless all the previous care and trouble in packing and shipping it. To provide against this danger, he sent Mr. Ramsbottom, junr., to Australia in charge of one of his shipments, and the result fully justified the expenditure. If the ova should be sent out in an emigrant vessel, this might be done without any appreciable addition to the cost. It would only be necessary to select one or two suitable men among the intending emigrants, and to give them some training in the work before placing them in charge. They might then have free passages granted them, and a reasonable bonus on the successful accomplishment of their task in New Zealand.

2. Mr. Frank Buckland is of opinion that the ova ought not to be shipped before the first week in January. He suggests the use of a refrigerator on the passage out; but this is strongly condemned by Mr. Youal, who declares that the contents of the icehouse, once soldered down, should never be interfered with till the arrival of the vessel in New Zealand.

Mr. Buckland has had considerable experience in the hatching and rearing of salmon and trout; and his fish ponds and nurseries in the Kensington Museum Grounds—which I visited in his company—are decidedly the most successful thing of the kind in England. On the whole, Mr. Buckland is in favour of making the shipment from London instead of from the Clyde, and offers to render any personal assistance in his power. He strongly recommends, however, that the present experiment should be made in two shipments—one from the Clyde, and the other from London. He estimates the cost at a considerably less sum than that named by Mr. Youal, and considers that the amount already authorized would be ample to cover the expense of both shipments.

3. Dr. Günther, while not professing much practical knowledge of the subject, is strongly of opinion that we should stand a better chance of success in shipping from the Clyde than from London, chiefly because we should thus avoid all risk of detention in the Channel. He believes that the whole success of the experiment depends on the quickness of the passage out, and that every other consideration ought to give way to this one. He is of opinion that the ova might with perfect safety be taken even earlier than the date mentioned by Mr. Youal; and he suggests that in any case, before deciding against making a shipment from the Clyde, an agent of the Government should visit that port to make inquiries on the subject, and report the result to the Agent-General. On the subject of quality, Dr. Günther states that the salmon from the Tay are undoubtedly the largest and best that ever come into the market.

4. Dr. J. E. Gray informs me that the proposal to use ice in packing salmon ova for the Colonies came originally from himself; but he disapproves of the manner in which previous experiments have been conducted. He is entirely opposed to large shipments of ova, and considers that a few thousand salmon eggs forwarded at one time, and under proper care, would be more likely to prove a success.

It must be borne in mind, however, that the cost of building an icehouse and leaden chamber for a thousand ova would be as great as for a quarter of a million or more, while the other preliminary expenses of netting the salmon, carrying and packing the ova, &c., would scarcely be regulated by the quantity of ova required. Under favourable circumstances, as Mr. Buckland informs me, fifty females, weighing on an average ten pounds each, would produce half a million of eggs; but, on the other hand, even at the height of the spawning season, you may catch twenty or more females without finding one with ova sufficiently matured to be ready for the artificial impregnation. The expense of hiring nets, employing skilled fishermen, &c., would be the same whether the supply of ova required were large or small; and as Dr. Günther forcibly puts it, *cæteris paribus*, we stand a better chance in the end the larger the number introduced; for a liberal allowance must be made for what are called "blind eggs," or imperfect ova, to say nothing of ulterior causes of failure, such as the dangers to which the newly hatched salmon will be exposed from the existence of fresh-water eels and other predaceous species.

Dr. Gray's advice, however, on another point is well worth consideration. As the result of long attention to the subject, he is of opinion that New Zealand is in every way better adapted to the introduction of salmon than any part of Australia. The existence of snow rivers in the South Island he deems of the very first importance, and he wishes particularly to direct Dr. Hector's attention to the desirability, if possible, of transporting the ova to a subalpine region, so that the salmon, immediately on being hatched, may be placed in the cold back waters with gravelly bottoms, in places where there is little or no strength of current. The young fish will instinctively keep within such a ground, and feed there till they are robust enough to take to the open current of the stream.

In connection with a remark in Dr. Hector's memorandum of 29th February, to the effect that the handling of the young salmon might perhaps jeopardize the whole experiment, I may state, on the authority of Mr. Buckland (who speaks from his actual experience), that the young salmon is quite as hardy as the common trout, and may be handled with impunity. No fear of damage need be apprehended, provided there is no rough usage of the young fish, nor too long an exposure out of water.

5. Finally, I have consulted Dr. Hooker, who takes an active interest in everything relating to New Zealand, and is ever ready to give his assistance. He is of opinion that the further north the point of departure the better our chance of success. On this account, he would give the Clyde the preference over London as a port of shipment, inasmuch as the ova would then be taken, and the packing operations conducted, in a much cooler atmosphere than in any of the London docks.

I called on Mr. Francis Francis (of the *Field* Office), who is known to take considerable interest in the hatching and rearing of salmon, and I have arranged to see Mr. Gould, another reputed authority, but both of these gentlemen are at present out of town.

Before the next mail leaves, I hope to lay further information on the subject before the Agent-General. In the meantime nothing can be done beyond consulting all who have had any experience bearing on the question, and making the necessary arrangements in anticipation of the salmon-breeding season, six months hence.

W. Buller.

No. 25.

Dr. J. E. Gray, F.R.S., to Dr. Hector.

Sir,— British Museum, 21st June, 1872.

I had some conversation with Mr. Buller, by which I hear you have thoughts of trying to introduce salmon in New Zealand. My advice to you is, to take warning and avoid doing all that Australia has done in this business, which has been an utter failure, and very expensive. Here our attempts to breed salmon and other fresh-water fish, have not been conducted as wisely as they might have been. I first brought before the Zoological Society the successful way in which Dr. Davy (Sir Humphry's brother) had sent trout and other *Salmonidæ* from Cumberland to Devonshire, and my belief that the eggs of fish might be carried in the same way, more especially as I had observed that the eggs of fresh-water fish and frogs were retarded and yet kept alive when they were in places that were frozen; but the Australians who attended the meeting laughed at me, and attempted to ridicule the idea. I only asked that the system should be tried, and I believe that the only case where it was fairly tested was the only one where the eggs arrived alive; that is to say, a small box of eggs that was put in the icehouse and forgotten by the Commissioners, and found when the icehouse was cleared out to be refilled on the ship's return. The other box which they took out in ice they opened —as a child does a seed, to see if it has grown—while on the road; the eggs hatched and the young fish soon died. I have more trust in individual skill than in large works conducted by Commissioners; there were no Commissioners when the monks introduced various fresh-water fish into England.

I should recommend that a number of small boxes of eggs be enclosed in one larger box; that these should be kept in the icehouse till the ship reached the port; that a large quantity of ice in a conveyance should be ready to carry the boxes of eggs to the upper part of some of the subalpine rivers, and the boxes and contents be at once transferred and deposited in some streamlet, and the fish allowed, when they get strength, to find their way into the larger streams and rivers. By all means follow nature as much as you can, and avoid breeding-ponds. It is very well for people who want to make a show of it and interest the legislators who have the funds at their disposal, but fish, when they want to breed, know better. They deposit their eggs where they are out of sight, not liable to the interference of man or animal, and where the fish gradually get into larger streams as they become strong enough to compete with their enemies. Their food is also more abundant and more easily obtained in these small out-of-the-way streams. I must remain very incredulous of the success of past experiments, though it might be very dangerous to say so in Australia, or even before some of the gentlemen who have handled so much money in attempting to introduce salmon into Australia, until I have heard of people having eaten some of the fish, or seen them in the market! In New Zealand, where you have such magnificent rivers and snowy mountains, you are more likely to be able to breed salmon, and even Van Diemen's Land has much better rivers for the purpose than Australia; but the Van-Diemen's-Landers seem to have suffered in the same way as the Australians. They had breeding-ponds, put their fish near the large rivers, so that the young fish were too soon in the mouths of the rivers and sea, and became the prey of numerous predacious fishes which infest that coast.

Ever yours sincerely,

Dr. Hector, F.R.S. John Edw. Gray.

FURTHER PAPERS RELATING TO THE INTRODUCTION OF SALMON OVA.

No. 26.

Dr. Featherston to the Hon. the Colonial Secretary.

(No. 380A.) Westminster Chambers, Victoria Street,
Westminster, August 3, 1872.

Sir,—

I have the honor to transmit herewith a further Memorandum, by Mr. Buller, on the subject of the proposed shipment of salmon ova to New Zealand, in terms of your letter of the 13th March (No. 30).

As there will be a manifest advantage in securing the services of one who has had practical experience of the kind required, and as Mr. Youl has signified his willingness to undertake this duty, my present intention is to make the shipment from London instead of from the Clyde, when the proper season arrives.

I would beg to direct your attention to Mr. Youl's suggestion, of offering a bonus to a fast-sailing clipper ship, so as to insure, if possible, a rapid passage out.

As I gather from Dr. Hector's memorandum, that every preparation will be made in the Colony for the custody and hatching of the ova when received, it is hardly necessary for me to refer to Mr. Youl's observations on that head.

I have, &c.,
I. E. Featherston,
Agent-General.

The Hon. W. Gisborne, Colonial Secretary.

Enclosure in No. 26.

Memorandum by Mr. W. Buller on Salmon.

In continuation of the Memorandum presented to the Agent-General on the 22nd June, I have now to report that I have seen both Mr. Gould and Mr. Francis Francis on the subject of the proposed shipment of salmon ova to New Zealand, and with the following result in each case:—

Mr. Gould, to whom I was referred by Dr. Gunther as one of the reputed authorities on the subject, is decidedly of opinion that salmon will not thrive beyond certain parallels of latitude, and that the attempt to introduce it into New Zealand must necessarily end in failure. But as Mr. Gould appears to have held the same view with regard to the acclimatization in New Zealand of the English pheasant and partridge, both of which birds have already been successfully introduced, and are now permanently established in the Colony, and, moreover, as the physical laws which regulate the geographical distribution of species are at present very imperfectly understood, I submit that any such opinion is fairly open to question, and that Mr. Gould's objections may be at once met by a reference to the success of analogous experiments elsewhere, particularly the success which appears to have attended the introduction of salmon into Tasmania.

Mr. Francis Francis, who is a well-known practical pisciculturist, and one of the Editors of *The Field*, is, on the contrary, most sanguine of the complete success of the enterprise, if intrusted to proper hands, and carried through in a careful manner. He is of opinion that the plan of packing in an ice-house, on the principle adopted by Mr. Youl in his Australian shipments, is the only one that can be followed with any safety. He considers the first week in December about the best time for taking the ova; but the exact period must be regulated to some extent by the choice of a river for the supply of ova, the breeding season being a week or two earlier or later according to locality.

Mr. Francis recommends our sending out at the same time a supply of sea trout ova, as being undoubtedly the next best fish to the true salmon. He states, as the result of actual experience, that these species will exist very harmoniously together.

Dr. Gunther, on the other hand, is of opinion that the introduction of sea trout would be a serious drawback to the success of salmon, owing to their predaceous habits, and their fondness for the ova and fry of other fish.

With regard to the requirements in the way of hatching-ponds, &c., Mr. Youl has addressed me the following note:—

"I am in receipt of your favour of the 23rd instant, by which I learn that the matter of the shipment of salmon ova has been referred to the Government of New Zealand. I hope you requested power to pay extra freight to secure the services of a fast-sailing clipper ship, time being an essential element to success; and I trust you also pointed out the absolute necessity of having the ponds in perfect order, ready to receive the ova the moment they arrive. The wonderful success attending the hatching of the salmon and trout in Tasmania is to be attributed to the beautifully-constructed ponds they had all ready to receive them. It is only those persons who, like myself, have impartially watched the attempts made to hatch salmon, and have, by artificial means for many years, succeeded in accomplishing it, are aware of the many failures and difficulties attending every stage of the progress, never indeed to be overcome except by practical hands."

Dr. J. C. Gray, of the British Museum, has sent me the following extract from an address by himself (as president) to the Zoological and Botanical Section of the British Association in September, 1864:—

"Besides the numerous attempts at home to replenish our rivers and oyster beds, much has been written, and large sums have been expended, in trying to introduce salmon into the rivers of Australia, but the many failures show how little those who undertook the task were acquainted with the most common physiological questions connected with the removal of fish, and how small was their knowledge of the habits and peculiarities of the fish which they proposed to remove. What, indeed, could be more absurd than the attempt to introduce salmon into rivers which, for a considerable part of the year, are reduced to a series of stagnant pools! I think I may venture to predict, that if ever salmon are introduced into Australia, they are much more likely to succeed in the deep and rapid rivers of Tasmania than in the streams of Australia proper. At the same time, when we consider the very limited geographic range of the salmon in Europe, confined as it is to those rivers which have their exit into the Northern seas, that the attempt to remove it from one river to another in Europe has always been a failure, and that it is not only necessary that the salmon should have a river similar to that which it inhabits here, but also the same food, and other peculiarities, without which, apparently, it cannot subsist, I must confess that I have no great faith in the success of the introduction of the salmon into Australia.

"I think, therefore, that it is to be regretted that the Australian Acclimatization Societies do not rather make some experiments on the introduction of the gouramy, or some of the other edible fish of countries nearer to and resembling their own."

Mr. Frank Buckland has furnished me with copies of several articles on trout egg-collecting and trout breeding, contributed by him to *Land and Water*, the remarks on this head being equally applicable to salmon. I beg to forward these articles as an appendix to the present memorandum.

WALTER BULLER.

7, Westminster Chambers, London, August 3, 1872.

APPENDIX.

Trout Egg Collecting.

TROUT-breeding by artificial means is a practical science, which, although seemingly easy to the uninitiated, is in reality surrounded at every step with continual difficulties, anxieties, and expense. Mr. Ponder and myself have this year done our utmost to get a good lot of eggs into the troughs at Hampton, the young therefrom to be turned out in due season into the Thames.

The Hampshire trout are celebrated for their handsome shape, pink flesh, and general condition. They are, therefore, the trout of all others that our friends the Thames anglers would like to catch with a spinning bait. I have, therefore, this year done all I could to obtain eggs for the purpose of stocking the Thames.

Having obtained permission of the proprietors of a trout fishery in Hampshire, I undertook the task myself of collecting the eggs. Experience of many years has taught me that if I wished to make a success of egg-collecting I must do it myself. Spawning trout are very delicate fish, and will stand no rough handling. If, moreover, any fish happen to be injured, the blame is quite certain to fall on me, and I really do not think I ever killed a fish in my life. I handle them with great care, and always make a point of nursing the fish when faint by holding their head up stream till they swim out of my hands.

On Wednesday morning last, January 17, at sunrise, I anxiously looked out of my bedroom window at the country inn where I was staying. By Jove, what a day!—raining in torrents, the wind coming round the street corners with the rush of a hurricane; the street gutters full, the roads in flood from a stopped-up drain—in fact, everything looking about as miserable and unpromising as possible. Thinking that some of my piscatorial friends who had never seen the operation of egg-taking would have liked to accompany me, I had invited six friends to go down with me, but one after the other they all declined, except my excellent friend Mr. Bartlett, who, with his usual kindness, came to lend me a hand. At breakfast Mr. Bartlett and myself consulted whether we should turn out such a wretched day. "Turn out?" I said, "of course we *must* go; but I can tell you we shall have a tremendous day of it:" so away we went to try our luck. We soon came to the water meadows in a sort of country omnibus, which took the water-bailiff and ourselves: nets, cans, spawning dishes, a great lot of packages altogether, but all necessary. When we arrived at the appointed place we turned out. The weather, if possible, was getting worse, the river was overbank full and in spate, the "carriers" in the water meadows were overflowing, every inch of ground was saturated, and it was most bitterly cold. "Never mind," I said, "let's go at it;" so in I went with one end of the net; but when the water was nearly up to my arm-pits I must say it was most awfully cold, and I shivered again, even though I had on a wading dress nearly up to my neck. We knew there were a lot of trout in this hole, and we were also aware it would require a good deal of dodging to catch them, as there were a lot of stubs in the hole. However, we fixed the net, beat the water up and down, and at the proper time, and drew it out alive with fish. The following is the list of haul No. 1:—1 hen ripe, 2 hens not ripe, 1 hen spawned, 11 cock-fish, and three as bright fish as though it was the month of May. It should be known that I always take the fish out of the net myself, as I am so afraid of their being injured. Inexperienced hands are apt to injure the gills, or pinch them between the fingers and thumb, and if a fish once bleeds from the gills the hæmorrhage is fatal. I always take with me two "crinoline" nets, that is nets stretched on hoops so as to hold the fish caught till we have got them altogether, and I can make my choice. The "crinolines" should be suspended in deep water, and the fish exposed to the air as little as possible. In a few minutes I had got a nice lot of eggs, and turned back all the fish without injury. Slip them in; don't throw them in. I then began the serious part

of the day's work. Wet leaded nets are very heavy things, and I could see that sometimes the labourers with us could hardly get along with them. Haul No. 2 produced fine two-year-old fish, all males, and bright. We then walked across the meadows to a stream where I had had good luck three years ago. "Confound it!" I said, "the place is weeded up, the spawning bed is gone; nevertheless let us try." So we put the net across, and we walked it carefully down, and caught at this haul, No. 3, one cock only.

While this was going on, I observed there was a watercress bed, which looked very promising, so I determined to explore it. When I go out on these expeditions I always wear a flannel shirt, the sleeves of which are cut right off, as wet flannel sleeves are a great nuisance, especially when one is catching trout in rat-holes or under mud banks, or among roots of trees, &c. I find I can work better with bare arms, though thorns and briars are decidedly objectionable, and make nasty scratches. I also wear a sealskin cap that I can pull right over my face when I want to push it into the middle of a bush to catch a trout in a hole. If a watercress-bed is to be thoroughly hunted I go on my hands and knees. The hand must always be brought from above downwards; you must not sweep with it, or you will not get the fish. I drew the first watercress-bed blank. A yard or two above there was a large trout's nest, as though a navvy had been turning up the gravel with a spade. Just above the nest were two trout hovering over it. They instantly bolted, of course; but I marked them both down among the watercresses. At the first attempt I touched one of the fish, and I missed him. "Ah!" I said to myself, "out of practice—bad; this won't do," so I tried again. Now, if you want to catch trout with your hands you must never, if you touch him once, take your hand or finger away, and if you are in a most uncomfortable position you must nevertheless make the best of it, but *never take your hand away*, or the fish will bolt. There is also a great art in holding fish under water without *injuring* them. Well, I got this pair of fish all right, but the eggs had been deposited in the nest they had just left. I thought of digging up the nest and taking the eggs, but it is a long job, as the eggs are generally from a foot to eighteen inches in the gravel, and they fly away down stream like thistle-down in a high wind. The worst of hunting watercress-beds is that one's uncovered arms and hands get so fearfully marble cold. As long as they are *in* the water it does not matter; but if there is any wind the moment I come out I feel as if I had no hands or arms at all. I always carry a bottle of scented hair-oil, which I use as a kind of varnish, and I find this an excellent plan to mitigate the evil.

To our intense delight the omnibus then appeared with the luncheon, and we did not leave a scrap of it (cold mutton and bread-and-cheese) in the basket. Out again into the wet and cold—we then had three more hauls, as usual no females, all cocks; so I crawled under a wooden bridge, and hunted the great banks of weeds collected round the posts. I had hold of a very large fish, I should say at least three pounds; but I did not bring him to the surface as I found he was a cock-fish, and not worth taking. Our quarter of an hour at luncheon in the fly had spoiled the day, as sitting down had made us all feel chattery about the teeth and stiff about the joints, like cab-horses must feel on the rank on a wet day; besides which it was beginning to get dark, so we agreed to sound a retreat, I fancy to the great delight of the water-bailiff and labourers, who looked thoroughly done up. We quickly piled the wet nets up alongside the coachman, and trotted away to the station. We managed somehow or other to change. I never was so wet in my life before, everything being saturated, and, with the exception of feeling very stiff next morning, I have not experienced the least ill effects. I am happy also to say that Mr. Bartlett (who worked like a horse all day) tells me he is none the worse. In fact, I thoroughly enjoyed the day's outing, and only wish I was going at it again to-morrow.

P.S.—The following is the *résumé* of our day's netting:—Cocks, 48; hens ripe, 5; hens done spawning, 7; bright fish, 8: total, 68. This extraordinary predominance of cock-fish is according to my general experience both with salmon and trout. The above figures show that the proportion of hens is as one to four cocks. My former experiences have averaged as about one to six: this is a point on which I shall hope to dilate at another opportunity.

FRANK BUCKLAND.

Ova of Salmonidæ from Canada and Cumberland.

Mr. John Parnaby, of Troutdale Fishery, Keswick, was kind enough, on Wednesday last, to bring me from Leeds, with his own hands, a most interesting and valuable collection of ova and fry of salmonidæ. Mr. Parnaby has lately returned from Canada; he undertook the voyage across the Atlantic, from Liverpool and back, simply for the purpose to make arrangements for the importation, on a considerable scale, of living American fish to this country, and is now in direct communication with the following eminent American pisciculturists:—Mr. Samuel Wilmot, Newcastle, Ontario; Mr. Seth Green, Rochester, New York; Mr. Slack, Troutdale Fishery, New Jersey; Mr. Stone, Charleston, New Hampshire. On his return, Mr. Parnaby brought back several thousand of ova of the *Salmo Fontinalis*, or American brook trout; they have hatched out in Cumberland most successfully, and the fry which he gave me (about the size of very small minnows) arrived in London quite safely. Mr. Parnaby also gave me some ova of the silver char (*Salmo alpinus*); the Welsh char or *Torgoch*, and Cumberland river trout; also three living Cumberland char, eighteen months old, these about the length of a common cedar pencil; these are lovely little fish. All these fish and ova are now to be seen in the hatching troughs of my "Museum of Economic Fish-Culture, South Kensington," next door to the armour collection. In my troughs can also be examined salmon ova from the Wye and the Tyne; bull trout ova from the Coquet, trout ova from the Wye and Hampshire; also ova of the "roie" or char, from Mr. Bennett, of Christiania. I am sorry to say the rest of the Norway salmon, sea trout, lake trout, &c., hatched out on the voyage. It gives me great pleasure to report that *Salmo Fontinalis* is admirably suited to English waters. The fish nursery at my museum now contains several specimens of these handsome speckled coloured fish, from one to three pounds in weight; these were reared from eggs sent me three years ago by Mr. Seth Green, who has done so much for fish culture in America. These are the first specimens of American fish acclimatized in England. Mr. Parnaby proposes to take another trip shortly to America, and bring back with him living fry of the black bass, a handsome fish, "good to eat," and affording excellent sport to the angler; also fry of the white fish or Attihawmeg

(*Coregonus albus*), an excellent fish for the table, and likely to do well in the Cumberland lakes. Mr. Parnaby's establishment is the first in this country for the sale of fish for acclimatization, and I sincerely trust he will meet with the encouragement he so richly deserves; of course I will do all I can to help him, as to the details of collecting the ova, hatching them, transport of live fish, &c. There can be no doubt that if we succeed with the importation of American, Norwegian, and Swiss salmon and trout to England, our indigenous breeds will become greatly improved both as sport for the angler and also for the table.

FRANK BUCKLAND.

Salmon and Trout Breeding.

The fish-breeding season is now considerably advanced, and "turning out time" has arrived. The salmon, trout, charr, &c., hatched out in my museum have now quite absorbed their umbilical bags, and have been feeding for the last fortnight. Moreover, they are beginning to die in their troughs. This is a certain test that they require thinning and feeding. I have, therefore, sent several thousand fish to my friend Ponder, who has placed them in the nursery, close to Sunbury lock, the use of which has been so kindly afforded to Mr. Ponder and myself by the Thames Conservancy Board. These fish will eventually be turned out into the Thames.

For my own part I am trying a new experiment. I have taken all the minnows away out of my two lower tanks, where the water is about one foot deep, and have transferred the trout and charr to one compartment, the salmon to another, and the Coquet bull trout to a third, and there they can be seen as thick as tadpoles. These fish are as yet very tiny little things, but they are growing fast in their new places of abode. The little salmon have already tried to go up my minature salmon ladder, and every morning several of them are found in the upper and middle steps. Talk of education, why these little fellows who begin to ascend ladders when babies, will surely be able to "lead the way" for the *profanum vulgus*, who have not been properly educated in ladder-jumping in the Science and Art Department.

The great difficulty in artificial fish culture is to rear the fish to, say, an inch long. I believe the mistake has hitherto been to turn them into too large places; anyhow we shall now see whether my doctrine be correct, namely, that when their umbilical bags are quite gone the fish should be transferred to a larger tank—not an out-of-door stream—my tank is made of zinc, about eight feet long and four wide—and "hand fed" for at least another month or six weeks. Mr. Edon, the attendant, has observed that the little fish will feed as their provender falls towards the bottom, and then they leave it alone. If, however, the gravel be stirred, they will run to the place where the cloud is, and pick up the little floating bits. I also give the fish plenty of little red worms—*i.e.*, the worms that give the red colour to the mud on the banks of the Thames. These worms are always wriggling about, and attract the notice of the fish; moreover they are kind enough, apparently, not to mind being eaten up a bit at a time. I buy these worms by the pint from a man who brings them for sale. The charr sent me by Mr. Parnaby have done exceedingly well, and I propose to send a lot of them to Windsor for the Obelisk Lake in the Windsor Great Park. The few charr that survived out of the lot sent by Mr. Bennett, of Christiania, have also done well, but I am sorry to say that the "landlocked" salmon, salmon trout, and white fish from America, given me by Mr. Parnaby, have come to grief. They hatched out, and then died. I can give no reason why they died—possibly they were disgusted at the "Alabama" claims not as yet being settled.

I am more and more convinced that the indoor system of breeding is far more satisfactory than the outdoor system. The Duke of Sutherland has adopted it, and Mr. Dunbar, who has undertaken the management, reports a good crop of fish this year. The Duke's secretary, Mr. Wright, has been good enough to send me the following report:—"Our young salmon look in first-rate order; scarcely any die. I examined all the breeding-troughs repeatedly the week we were there, and I did not get a dozen altogether dead. We turned a few thousand out into an artificial pond we have made, and the remainder will be moved this week. There were two boxes without any gravel at all, nothing but the plain wood; into these a quantity of ova were placed, which it was thought was not properly impregnated, but rather than throw it away, it was put into these troughs, and singularly enough it turned out better than all the rest, more fish hatched out, and they did better on the plain wood, or at least quite as well as those on the gravel." I have also received a letter from Lord Abinger's keeper, in which he reports to his Lordship that the fish breed in slate troughs—not out of doors—for the Spean are doing very well. Mr. J. Napier reports advance in the operations carried out by the Forth Fishery Board at Loch Vennacher. So that we have now three places at least in Scotland where salmon breeding is going on. I hope in time that every district board will have its breeding establishment in England, Wales, and Scotland, for really the slate-trough system is so inexpensive, and so easily managed, that I have great hopes to see its adoption much more universal than it is at present. As regards breeding trout which do not go to the sea, there can be no doubt but that many hitherto barren lakes, streams, reservoirs, &c., can be readily stocked. I can't bear to see water without fish in it: besides which, live and healthy fish mean pure water, and pure water means improved public health.

P.S.—I hear that a Mr. Smith, of Groby, near Leicester, has had great success this year with the fish he has bred for the Earl of Stamford and Warrington.

FRANK BUCKLAND.

Trout Ova Collecting.

The next haul was in a brook, a very old friend of mine, which always contains fish. Keeping the men back, Mr. Bartlett and myself cautiously advanced. There they were, lots of fish on the beds; and now for a bit of manœuvring, so we put a net to command the junction of the brook with the stream, and another net a few yards above the beds. I then took a run and a jump slick into the middle of the stream. Experience has taught me this is the best thing to do. These trout are so dreadfully artful, that if they suspect there is anything or anybody about they are off in a moment; when, however, I jump right into the middle of the stream, they have not time to make up their minds, and bolt up or down the stream, thus getting into one or other of the nets. It may seem strange, but

cock-fish invariably go *down* stream, and the hens *up* stream. My plan on this occasion succeeded; away the frightened fish went like arrows, and the bobbing of the net corks showed me that we had got them. I immediately put them out in the crinoline, so that they should not injure their gills in the trammels of the net. "Confound it!" said I, "seven cocks again and not one single hen;" so I went on my knees, and hunted every inch of the brook, while the water-bailiff came behind me with a lave net, and trod the weeds carefully, but not a single hen could he or I find. I expect in this case the hens had gone back into deep water. We turned the fish back, and went to a neighbouring stream; there they were again, lots of fish on the spawning beds. Steady, or we shall make a mess of this, as the peat banks are so rotten and undermined! In I go again with a rush, and again another net full again—five cocks, two females spawned. I felt under the banks as far as my arm would reach, and touched one fish, which I think was a hen. Just as I was taking out the lower net, a fish rushed into it like a runaway horse. "Ah! there's the lassie I touched just now," I said. She was a beautiful fish, so I picked her out of the net with the greatest care. Strange to say her scales were hardly red at all. She was almost as bright as the enamelled Thames salmon Mr. Sachs so kindly gave me. This lucky capture made an addition of about 2,000 eggs to our can.

At this stage of the proceedings we were tremendously hungry, and anxiously looked for the fly with the luncheon. However, we sounded a halt for ten minutes, and sat under some pollard trees. At that moment rude Boreas and Jupiter Pluvius seemed to make up their minds to drive us home—

Una Eurusque Notusque ruunt creberque procellis
Africus et vastos volvunt ad litora fluctus—

it blowing a terrific gale of wind, with cold sleety rain. Finding I began to shiver a little, and it would not do to stand still, we tried two more brooks, and caught four more cocks, but again no hens. We then came to the best place in the water, but great care must be exercised in netting this, as the water was exceedingly clear and shallow—it runs from a chalk origin—and the river too broad for two nets, even though fastened together, and the fish therefore had plenty of room to escape by the sides; besides which it is a difficult thing to put a net down properly, when the wind is blowing hard and the waves pretty high. However, we had good luck in this place—two females ripe, one spawned, and eight cocks. My hands were so benumbed that I could not positively feel that I had a fish in them, and the first fish kicked the spawning dish over with her tail; so we had to pick up the eggs and begin again. However, I got a nice lot of eggs, the eggs of one fish being of a coral-like red, and the other nearly white. The above fact of the strange variety in the colour of trout eggs has been known to me a very long time, but I know no one who has yet been able to explain it. One fish will give white eggs, the others bright coral-red eggs, with a bloom on them like a ripe plum. At this point I filled up my experimental bottles, as I wish to find out which has the greatest vitality, the milt or the egg—a most important practical point for me to ascertain. The result of these experiments, of course, I will report. My previous experiments show that that the milt has greater vitality than the egg.

Having hunted the watercress-beds, I then gave the order to "up nets," and away went across the meadows to a different place altogether. Quack! quack! quack! by Jove, what a lot of wild ducks! The alarm had been sounded, and they got up all around in such a lot as I never saw before. Not one, however, came near enough to be within shot. They were all of them either in twos or threes. They generally went up wind first, and then, with a sweep and a loud quack, round they went down wind with the velocity of a rocket. Mind, the wind was blowing a gale at the time. While we were watching the ducks, we saw a great flock of birds at a considerable distance—I should say from forty to fifty in number—run into the sedge. "Moorhens!" says the keeper. "Exactly so," says Bartlett, "and a great many, too many for these waters. They are the most omnivorous brutes out, and will eat anything. They will even climb trees and eat the blackbirds' eggs, and I'll be bound they eat thousands of young trout." "Yes," said the head keeper, "I know they eat the young trout, and the wild ducks also have a turn at the trout as they are hatching out in the nests. There's a great deal too many of them about the water." "Mark," I said, "what's that white thing in the weeds?" so in I went. I found a beautiful female trout full of eggs dead, with a great hole which would admit a cedar pencil just below her pectoral fin. "Master 'Jack Heron' has been here," I said. "What will 'G. R.' say now about the herons?" I had a great mind to send him this fish by parcels delivery. He would have shed tears over it!

FRANK BUCKLAND.

No. 2.

The Hon. H. SEWELL to Dr. FEATHERSTON.

SIR,— Colonial Secretary's Office, Wellington, 8th October, 1872.

Adverting to Mr. Gisborne's letter No. 30, of the 13th March last, on the subject of the transportation to New Zealand of a shipment of salmon ova, I have the honor to inform you that Mr. Murison, the Chairman of the Otago Acclimatization Society, has announced to the Government that the state of the Society's funds compels it to decide against guaranteeing the sum of £100 which the Society had, to some extent, led the Government to believe it would be willing to contribute towards the expenses of importing the ova.

You will, therefore, now only be able to depend upon a sum of £900, being the vote by the House of Representatives of £500, £300 guaranteed by the Acclimatization Society of Southland, and £100 by the Acclimatization Society of Canterbury.

I must request that you will limit your operations within the above sum.

I have, &c.,

The Agent-General, London. HENRY SEWELL.