SESS. II.—1887.
NEW ZEALAND.

INTRODUCTION OF FISH-OVA

(CORRESPONDENCE RELATING TO THE).

Presented to both Houses of the General Assembly by Command of His Excellency.

No. 1.

The Hon. SPENCER F. BAIRD to the Hon. the MINISTER having Charge of the MARINE DEPARTMENT.

United States Commission of Fish and Fisheries, Washington, D.C.,
18th August, 1886.

DEAR SIR,—

I am in receipt of your letter of the 16th July, and, in reply, beg to say that it will give me pleasure to enter your request for sundry fish-eggs, and to meet your wishes as far as possible respecting them. We can, in all probability, supply as many of the whitefish-eggs as you want. How many of the others we can send you is somewhat doubtful, especially of the *Salmo sebago* and the California trout. There will be no charge for the whitefish, except the expense of forwarding from Northville, Michigan, to San Francisco. It is probable, however, that we may have to order the trout from some one else; but of this I will advise you hereafter.

I have, &c.,
SPENCER F. BAIRD.

The Minister of Marine, Marine Department,
Wellington, New Zealand.

No. 2.

The ACTING RESIDENT AGENT, San Francisco, to the SECRETARY, Postal and Telegraph Department.

SIR,—

San Francisco, 13th November, 1886.

I have the honour to acknowledge the receipt of your favour No. 2,813, of the 21st September, relative to a shipment of fish-ova.

In my last communication to Professor Baird, relative to the publications required by the Marine Department, I took the liberty of reminding him that you were also anxious to obtain ova of the land-locked salmon, brook-trout, and California trout.

I enclose a newspaper-clipping on the subject, which is full of inaccuracies.

I have, &c.,
CHARLES R. BUCKLAND,
Acting Resident Agent at San Francisco.

W. Gray, Esq., Secretary, Post and Telegraph Department,
Wellington, New Zealand.

Enclosure.

FISH-CULTURE.—SHIPPING WHITEFISH-EGGS TO AUSTRALIA.

THE Government of the United States has attempted on two occasions to assist in populating the waters of the Australian Colonies by the shipment of fish-eggs. Some six months ago F. N. Clark, Superintendent of the United States Fish-hatchery at Northville, Michigan, shipped two million whitefish-eggs to Sir Julius Vogel at Wellington. The eggs were repacked here, and great care was taken to follow the instructions given by the experts at the hatchery. This work was carried out under the direct instruction of Mr. Buckland, who represents the New Zealand Government in this city. The eggs arrived in good condition at Auckland, but in their transfer from the steamer "Zealandia" to Wellington by rail the temperature was so radically changed that the eggs were destroyed. This was a sore disappointment, on account of the great care which had been taken, and in the next attempt a special messenger will be sent from this city to look after the fish-eggs. The steamer leaving this port on the 16th of December will carry 2,500,000 eggs from the United States hatchery to Auckland, and arrangements for a large supply of ice have been made, so that there will be no trouble regarding temperature. It is probable that at Honolulu the eggs will be repacked.

No. 3.

The Acting Resident Agent, San Francisco, to the Secretary, Postal and Telegraph Department.

Sir,— San Francisco, 13th December, 1886.

I have the honour to enclose a letter just received from Mr. Frank N. Clark, Superintendent of Fisheries at Northville, Mich., relative to the shipment of whitefish-eggs.

I am sorry that this has been postponed for another month, as the steward of the "Zealandia," Mr. Black, has had experience in shipping fish-eggs, and has taken them successfully direct from England to New Zealand.

I have notified Mr. Clark of the date of the January sailing, as requested.

I have, &c.,
Charles R. Buckland,
Acting Resident Agent at San Francisco.

W. Gray, Esq., Secretary, Post and Telegraph Department,
Wellington, New Zealand.

Enclosure.

Mr. F. N. Clark to the Acting Resident Agent, San Francisco.

Dear Sir,— Commission of Fish and Fisheries, Northville, Michigan, 7th December, 1886.

I wrote you some time ago the shipments of whitefish-eggs for New Zealand should go on the December steamer. As the fish spawned later than usual this year, and as the water has been very cold, the eggs have developed very slowly; consequently I think it would be better to ship them on the January steamer. Please write me the date of the January sailing.

Yours very truly,
Frank N. Clark.

Chas. R. Buckland, San Francisco, California.

No. 4.

The Acting Resident Agent, San Francisco, to the Secretary, Postal and Telegraph Department.

Sir,— San Francisco, 15th January, 1887.

I have the honour to inform you that by the R.M.S.S. "Alameda" I ship to Sir Julius Vogel, Postmaster-General of New Zealand, two cases containing 1,500,000 whitefish-eggs. They were received here almost a week before the departure of the steamer; but they have been properly cared for, and, I think, are none the worse for the delay. I have handed to Mr. Frazer, the Mail Agent, a copy of all instructions in my possession relative to the handling of the eggs, and I have asked him to give the same to whoever may be appointed to receive them in Auckland. The expenses incurred this time are more than formerly, because there are two cases, which involved a heavier freight bill and, as I found out later, the use of double the quantity of ice. I enclose herewith a copy of all the instructions, as it may be useful to you upon some future occasion, and I have retained a copy for myself. I have not been able to obtain receipts for some of the items expended. I sent some money to the steward to-day, but was unable to see him and get a receipt. He has charge of the ice-chambers, and has been most careful and attentive in looking after all our requirements. The item for "moss" may seem large, but, in accordance with Mr. F. N. Clark's letter, I thought it best to obtain moss, and had to telegraph several times to the country for it. The several amounts charged for moss include telegrams and special freights, so as to get it here on time. Acting upon the advice and recommendation of Mr. J. D. Redding, the United States Fish Commissioner for California, I engaged the services of Mr. Richardson to attend to the eggs from the time of their arrival until the departure of the steamer. His reports you will find enclosed; and he has further given verbal instructions to Mr. Frazer, the Mail Agent. All the work done I superintended personally. I forwarded to-day the following cablegram: "Postmaster-General, New Zealand.—Two boxes, 1,500,000 whitefish ova, 'Alameda.'" The total amount of my draft, sent through the New Zealand Loan and Mercantile Agency, is $252 82c. The item for moss in Mr. Richardson's account is for moss obtained after the first consignment, which was not sufficient. Some lumber has been placed on board, so that extra cases may be made before the steamer arrives in Auckland, and that no delay there may be occasioned in transhipment.

I have ascertained that the probable cause of the failure of the former shipment was due to the fact that it was made two months later, when the eggs were much more fully developed. It is certainly the case that they are not so much alive now. When the last shipment took place most of the fish were visible in the eggs, which is not the case now, and, as it occurred two months later, the temperature was warmer and more suitable for hatching. At the present time I believe that everything is perfect and promising for success.

In conclusion, I beg to state that every possible courtesy and facility has been offered me by the Messrs. Spreckels and their employés. In fact, they have done more, and gone out of their way to assist me more, than I could reasonably have expected. It is their determination, as also that of Captain Morse, the steward, and his subordinates, that this shipment of eggs shall go through successfully if possible. Sincerely hoping that it may be so,

I have, &c.,
Charles R. Buckland,
Acting Resident Agent at San Francisco.

W. Gray, Esq., Secretary, Post and Telegraph Department,
Wellington, New Zealand.

Enclosure 1 in No. 4.

EXTRACT of LETTER from R. J. CREIGHTON, dated the 27th March, 1886.

WHITEFISH-EGGS.—You did not tell me how you packed them, and, as the papers announced that you had employed experts to help you, I thought all would go smooth. No neglect on ship-board was possible if the eggs remained on the ice. What is needed is to pack them properly on ice and leave them undisturbed to their destination. I fancy, however, the experts do not know any thing about it, and Craig always lost his "experted" eggs. The way I did was this—and you can send fish-eggs all around the world, if you follow my instructions, provided they are sound when you ship them: Arrange with the Fish Commissioner to send a man in charge to Council Bluffs to ship them on the west-bound train, giving instructions to keep them away from the stove in Wells, Fargo, and Co.'s express car, but not exposed to the frost, although that would make little difference the way Frank Clark packs them in sawdust, to prevent a jar on the cars or in handling. W. Clark, of Northville, Mich., from whom the eggs are obtained, did that for me. Paying travelling-expenses, &c., and for time, it amounted to $120 or $130, I think. When the eggs arrive in town, send them to the ice-house. Then secure storage-room in the ice-house for two tons of mountain-ice. The day before the steamer sails, get your ice on board and make a level floor of slabs of ice. In the centre of this your eggs are to be packed as follows: Put the trays on tiers one above another, first boring small holes carefully in the bottom of each for the ice-drip or moisture to pass through from top to bottom, so preserving even temperature and circulation of air. Should the trays be without wooden bottoms of course holes are not needed. Be sure that the trays are carefully placed, so that the frame of each protects the eggs from pressure. Above all about an inch, resting upon the ice-wall which is to be built up around the trays, place the lid of the case in which they came overland, perforated with holes, upon which pile up the ice. This prevents pressure, supplies the eggs with moisture and air, which are essential. Packed in this way they are safe. When you get the big case on board, take it asunder and carefully remove the sawdust-packing and take out the trays one by one, carefully sprinkling each with ice-water—that is, with fresh water in which broken ice has been dumped. Do not trouble about picking out "blind eggs." Look and see if the black spot is in the bulk of them, and that is all that is needed. In artificial fish-breeding not a few eggs fail to be impregnated. They are white, but not necessarily rotten. They will be preserved during the voyage, but will not hatch out. I spoiled two suits of clothes packing fish for the colonies, because I would not trust anybody to handle the eggs but myself: when I did they "went bad." You will, of course, have to pay the men who help you to pack the ice-house and clear up the mess you make on deck. It always took me three hours of hard, dirty, and cold work. You may rush it through sooner, but I doubt it. If you send the fish through in the original package they will "spoil sure." Send the case, however, in charge of some one, with instructions how to repack at Auckland, surrounding the trays with broken ice and placing a block or two on top of the lid.

Enclosure 2 in No. 4.

Mr. McDONALD to the AGENT, New Zealand Government, San Francisco.

United States Commission of Fish and Fisheries, Washington, D.C.,
16th December, 1886.

DEAR SIR,—

I am directed by the Commissioner to say that instructions have been sent to Mr. F. N. Clark, Superintendent, Northville Station, Michigan, to forward to you, at San Francisco, for the New Zealand Government, 1,500,000 whitefish-eggs. He is instructed to give you ample notice of shipment. Please arrange to receive and forward the same. Mr. Clark is also directed to give you instructions in regard to handling and reshipment of the eggs.

I have, &c.,
M. McDONALD, Chief Div. District.

C. R. Buckland, Esq., Agent, New Zealand Government,
San Francisco, California.

Enclosure 3 in No. 4.

Mr. F. N. CLARK to Mr. C. R. BUCKLAND.

DEAR SIR,— Northville, Michigan, 23rd December, 1886.

I have instructions from the Commissioner to forward to you 1,500,000 whitefish-eggs for the New Zealand Government. I will therefore ship them to you by express on or about the 5th of January, which will be in time for the sailing of the 15th.

With reference to the care and handling of these eggs, I would respectfully offer the following suggestions: On arrival at San Francisco the case should be transferred at once to the steamer, and the package of trays removed from the case and placed in the ice-chambers in a much smaller case, having a few small perforations in the sides to admit the cold, damp air, the intervening space between the trays and the case being filled with hardwood shavings, or, better still, damp, fresh moss. This case should then be kept covered or surrounded with sufficient ice to keep the temperature as nearly as possible to the freezing-point without actually freezing, the ice being so disposed, or the case so protected, as to prevent any dripping or drainage entering the case. These conditions should be maintained until the eggs are placed in hatching-vessels at their ultimate destination. It is important that the temperature be kept uniformly low—very close to the freezing-point—especially

during the latter part of the journey and transfer to the hatchery. They will then be much further advanced, in which condition a higher temperature is quite apt to hatch them out on the trays.

I have, &c.,

C. R. Buckland, San Francisco, California. FRANK N. CLARK.

Enclosure 4 in No. 4.

Mr. F. N. CLARK to Mr. C. CREIGHTON.

United States Commissioner of Fish and Fisheries, Northville, Michigan,

DEAR SIR,— 9th January, 1886.

Your letter to Professor S. F. Baird relative to care of eggs in transit to New Zealand has been referred to me for reply.

I could advise more specifically had more definite information concerning the eggs you propose to forward been furnished me. I do not know the kind of eggs, their source, age, present condition, nor the circumstances and conditions attending their incubation and shipment to you. However, the same general treatment will apply in all cases. Eggs for shipping from this station are first hand-picked—that is, the dead and unimpregnated are all picked out. This is a very essential point, as the dead imperil the living to that extent that a small percentage is sometimes sufficient to destroy them all, especially on a long journey. After picking, the eggs are spread on Canton-flannel trays and thoroughly drained. A piece of millinet, first dipped in ice-water, is then thrown over each tray and filled up with live moss, which has also been wrung out in ice-water. The trays are then placed one above the other and held firmly together by strips nailed to a top and bottom, making a firm, solid package. This is then placed in a case and surrounded by 4in. to 6in. of hardwood shavings firmly tamped in. The spreading and packing is done in a temperature of 32° to 35° Fahr. The colder the better so long as the eggs do not freeze.

I mention these details in order to show the essential points to be observed in packing and transporting eggs—viz., the importance of removing the dead and maintaining the proper degree of temperature and moisture.

Before forwarding to New Zealand I should inspect each tray and pick out with a pair of tweezers all the dead eggs. There will probably be a few that have died in transit. You can readily determine the dead ones, as they are white, or have a white spot on the surface. I should also sprinkle the moss very lightly with ice-water. The eggs and moss should be damp, but not dripping or saturated. This work should all be done in a temperature not exceeding 33° to 35°. Place the package of eggs (discarding the case and shavings) in the ice-room of the vessel, surrounding it with cakes of ice, but protected from dripping and drainage. This condition should be maintained the entire journey.

Should it be necessary to transfer to another vessel at New Zealand for further transportation, or to ship inland, special care should be observed, as a rise of a few degrees, even for a short time, would then be liable to cause them to hatch on the trays and prove a total loss. This occurred last season with a shipment from this station to Australia *via* San Francisco. They reached the first Australian port in good condition, but in the subsequent transfer to destination they were exposed to a much higher temperature and all hatched on the trays.

Very truly yours,

FRANK N. CLARK.

C. Creighton, Esq., 606, Montgomery Street, San Francisco, California.

Enclosure 5 in No. 4.

Mr. J. A. RICHARDSON to Mr. C. R. BUCKLAND.

DEAR SIR,— San Francisco, California, 14th January, 1887.

The 1,500,000 whitefish-eggs which arrived by Wells, Fargo, and Co.'s express on the 11th January, were at once transferred to the ice-chamber of the steamship "Alameda," bound for Auckland; the ice-chamber having previously been filled with ice. The trays containing eggs were removed from their cases of hardwood shavings and inspected one by one, with the exception of the lower ones, the moss of which was full of frost, causing the frames to adhere firmly, so that it would take considerable force to separate them. As the upper trays were in good condition, I thought it best to leave the lower trays alone. The trays were returned to their proper places and repacked in a smaller case of Mount Shasta moss, and surrounded with ice according to directions.

I have, &c.,

Mr. C. R. Buckland. J. A. RICHARDSON.

Enclosure 6 in No. 4.

Mr. J. A. RICHARDSON to Mr. C. R. BUCKLAND.

DEAR SIR,— San Francisco, California, 14th January, 1887.

As regards care of whitefish-eggs stored in ice-chamber of steamship "Alameda," I would respectfully suggest as follows: First, that the ice-chamber be filled as nearly as possible with ice. Second, that temperature of ice-chamber be kept below 38°. Third, that the crates of eggs be completely surrounded and covered with ice. This is very important. More care must be taken in the last stages of the journey, as the eggs are maturing all the while, and the rise of but a few degrees would hatch them all. When the crates are transferred from the ship, let them first be packed in a case 6in. larger every way with sawdust, hardwood shavings, or hay, tamped in very hard in the space

between. If they are to be sent any great distance after their arrival at Auckland, ice should be mixed with the packing above referred to. If they cannot be sent on immediately to their destination, let them be placed in an ice-house. On moving from the ice-house, and at any other time, be sure and keep the crates right side up, and handle with care.

I have, &c.,
J. A. Richardson.

Mr. C. R. Buckland.

Enclosure 7 in No. 4.

The Acting Resident Agent, San Francisco, to — Frazer, Esq.

Sir,— San Francisco, 15th January, 1887.

I beg to inform you that I have placed on board the "Alameda" two cases of whitefish-eggs for Sir Julius Vogel, Postmaster-General of New Zealand. In accordance with instructions received from Mr. W. Gray, Secretary of the Post and Telegraph Department, I hand you herewith copies of all instructions in my possession relative to the care of the eggs while on board the steamer and when landed in Auckland. Some lumber to build additional cases has been placed on board the steamer, so that there may be no delay in landing them at Auckland.

I have, &c.,
Charles R. Buckland,
Acting Resident Agent at San Francisco.

— Frazer, Esq., Mail Agent, R.M.S.S. "Alameda," San Francisco.

No. 5.

The Hon. the Minister of Marine, New Zealand, to the United States Commissioner of Fish and Fisheries, Washington.

Sir,— Marine Department, Wellington, 26th February, 1887.

I have much pleasure in informing you that the shipment of whitefish-ova which you so kindly caused to be forwarded to this colony arrived in good condition. The packing appears to have been excellent, some of the eggs in the two lower trays of one case alone showing signs of injury by pressure. The percentage of bad eggs on being unpacked was less than 1 per cent. The packages were forwarded to the hatcheries without any delay, and the ova were placed in the water within four days after arrival at Auckland. On being placed in the water the ova did not separate freely, and I am sorry to say that on the second day nearly fifty per cent. was dead. The rest, however, has been hatched, and, notwithstanding that the losses have been so great, I trust that a good number of fry will be turned out.

I should feel glad if you could suggest any way in which I might show the appreciation that I have of your kindness in this matter, either by forwarding any specimens of the natural history of New Zealand or otherwise. Again thanking you, I have, &c.,

W. J. M. Larnach,
Minister of Marine.

The Hon. Spencer F. Baird, United States Commissioner of Fish and Fisheries,
Washington, D.C., United States of America.

No. 6.

Telegram to Agent-General, London, dated the 13th July, 1886.

Salmon-ova, herring-ova, repeat shipment.

No. 7.

The Agent-General to the Hon. the Colonial Treasurer.

Sir,— 7, Westminster Chambers, London, S.W., 14th July, 1886.

I had great pleasure in receiving your telegram yesterday directing me to renew the shipment of both salmon- and herring-ova this season, and will do my best to carry out your wishes. I take this opportunity of acknowledging the receipt of your letter of the 2nd June last, No. 65/48, with the enclosed report by the Curator of the Otago Acclimatization Society, and I need not say how glad I was to hear that the ova by the "Ionic" were turning out so well.

I have, &c.,
F. D. Bell.

The Hon. the Colonial Treasurer, Wellington.

No. 8.

The Minister having Charge of the Marine Department to the Agent-General, London.

Sir,— Marine Department, Wellington, 9th September, 1886.

Adverting to my letter No. 75/49, of the 26th ultimo, I have the honour to forward herewith, for your information, copy of a very interesting report by the Curator to the Southland Acclimatization Society respecting the results of the operations at the Wallacetown Hatchery on one of the boxes of salmon-ova ex "Ionic." I have, &c.,

W. J. M. Larnach,
Minister of Marine.

The Agent-General for New Zealand, 7, Westminster Chambers, London, S.W.

Enclosure.

The CURATOR, Southland Acclimatization Society, to the COMMISSIONER of TRADE and CUSTOMS.

SIR,— Southland Acclimatization Society, Invercargill, 20th August, 1886.

I have much pleasure in furnishing you with the final result from the box of salmon-ova ex "Ionic," received by me at Dunedin from Mr. Farr on the 23rd March.

Next day, on arrival at Invercargill, I drove to Wallacetown, eight miles, with the ova, and, having placed all the ice I had in one of the hatching-boxes, removed the trays containing the ova from the box and placed them in the water below the ice, where they remained all night. This would gradually bring the ova to the temperature of the water, which always stands at 50° in the hottest day of summer or the coldest of winter. Next day, the 25th March, with the kind and valuable assistance of Mr. Howard, I unpacked the ova. We carefully counted all the good ova, and placed in the boxes 14,500. Of these 12,656 hatched out. The packing of the ova was all that could be wished for, with one exception, and to that I would beg to call your attention. In each tray there were three layers of ova, with moss intervening, and in each layer about 1,200 ova. The two upper layers turned out splendidly, fully 95 per cent. being good; but in the lowest layer in every tray the ova was in a very bad condition, in some trays not 10 per cent. in the bottom layer being good. If there had been only two layers of ova in each tray of the box I received, I am certain there would have been 95 per cent. of good ova. The impregnation of the ova was perfect, not near 6 per cent. being unimpregnated. There were only 150 deformed fish in the lot, which is a very small number. After hatching, a much greater number of fish died than I had expected, a great many of them from dropsical swelling, and the rest from what I can only describe as lack of constitution. They simply pined away, and, even after the umbilical sac was absorbed, a number never attempted to feed, and ultimately died. I can only account for this by the supposition that the box was exposed to too great a degree of cold on the voyage—not enough to destroy vitality, but sufficient to fatally impair the constitution of the young fish.

The first of the alevins were hatched on the 27th March, and the last on the 13th April. I commenced feeding on the 12th May with water-fleas, for which the fish were very keen; but, as I could not procure enough of them, I had to supplement the fleas with raw liver. On this diet all the healthy fish throve remarkably well. I regret to say that, owing to the sudden melting of nine inches of snow during the night of the 27th June, the spring which supplies the boxes was backed up so as to flood the boxes, and about 3,000 fish escaped. These fish are not lost, however, as they are in an excellent nursery, and will eventually make their way into the New River. It is only a matter of regret insomuch as I should have much preferred to have turned all into one river.

On the 9th July I turned out 3,000 in the Aparima without any loss, and on the 16th July 2,500 in the same river. The following is a condensed statement of the result:—

Deaths during hatching	1,844
Deaths after hatching	4,081
Turned out in Aparima	5,500
Escaped from boxes	3,075
Ova placed in boxes	14,500

In conclusion, permit me to state that I am convinced that the Government have adopted the best and cheapest means of procuring salmon-ova—namely, purchasing eyed ova from Howietoun Fishery. I trust the Government will continue to get yearly shipments of ova on the same system, for I will never be satisfied that salmon will not succeed here until I have turned out a large number of healthy fish in the same river for a series of years.

I have, &c.,

ARCHD. N. CAMPBELL,

The Hon. the Commissioner of Trade and Customs, Wellington. Curator.

HATCHING of Salmon-ova ex "Ionic" at Wallacetown Ponds, Southland. (Temperature of water always stands at 50°.)

Date.	Dead Ova.	Date.	Dead Fish.	Date.	Dead Fish.	Date.	Dead Fish.
1886.		1886.		1886.		1886.	
March 26 ...	428	April 10 ...	23	April 25 ...	50	May 10 ...	62
" 27 ...	260	" 11 ...	42	" 26 ...	46	" 11 ...	87
" 28 ...	266	" 12 ...	48	" 27 ...	57	" 12 ...	93
" 29 ...	296	" 13 ...	74	" 28 ...	60	" 13 ...	86
" 30 ...	90	" 14* ...	121	" 29 ...	56	" 14 ...	95
" 31 ...	89	" 15 ...	36	" 30 ...	60	" 15 ...	120
April 1 ...	32	" 16 ...	105	May 1 ...	90	" 16 ...	132
" 2 ...	32	" 17 ...	89	" 2 ...	108	" 17 ...	102
" 3 ...	30	" 18 ...	100	" 3 ...	73	" 18 ...	98
" 4 ...	24	" 19 ...	47	" 4 ...	51	" 19 ...	72
" 5 ...	13	" 20 ...	63	" 5 ...	81	" 20 ...	43
" 6 ..	24	" 21 ...	32	" 6 ...	46	" 21 ...	42
" 7 ...	25	" 22 ...	52	" 7 ...	51	" 22 ...	48
" 8 ...	22	" 23 ...	61	" 8 ...	80	" 23 ...	43
" 9 ...	26	" 24 ...	46	" 9 ...	88	" 24 ...	40

* After this date deaths in fish.

HATCHINGS of Salmon-ova, &c.—*continued.*

Date.	Dead Fish.	Date.	Dead Fish.	Date.	Dead Fish.	Date.	Dead Fish.
1886.		1886.		1886.		1886.	
May 25 ...	30	June 7 ...	52	June 20 ...	26	July 3 ...	3
" 26 ...	23	" 8 ...	55	" 21 ...	30	" 4 ...	5
" 27 ...	29	" 9 ...	60	" 22 ...	20	" 5 ...	10
" 28 ...	21	" 10 ...	33	" 23 ...	21	" 6 ...	9
" 29 ...	20	" 11 ...	21	" 24 ...	23	" 7 ...	8
" 30 ...	21	" 12 ...	23	" 25 ...	21	" 8 ...	4
" 31 ...	21	" 13 ...	35	" 26 ...	13	" 9 ...	10
June 1 ...	32	" 14 ...	30	" 27 ...	12	" 10 ...	4
" 2 ...	42	" 15 ...	23	" 28 ...	20	" 11 ...	5
" 3 ...	39	" 16 ...	20	" 29 ...	10	" 12 ...	2
" 4 ...	47	" 17 ...	40	" 30 ...	8	" 13 ...	1
" 5 ...	50	" 18 ...	30	July 1 ...	3	" 14 ...	2
" 6 ...	67	" 19 ...	22	" 2 ...	5	" 15 ...	6
Total number of deaths in hatching-boxes							5,925

No. 9.

The AGENT-GENERAL to the Hon. the MINISTER of MARINE.

SIR,— 7, Westminster Chambers, London, S.W., 2nd October, 1886.

I received in due course your letter of the 16th July last, No. 485/48, relating to the renewal of shipments of salmon- and herring-ova this season, and also your memorandum of the 17th July, No. 493/48, directing me to send you the most recent works on fisheries.

I am in communication with Sir James Maitland and Professor Cossar Ewart, and shall be able shortly to report the progress made. The Tweed Fishery Board have given me permission to take ova, and the Tay Board will do so at an early day. I have also accepted an offer from the Seewiese (Bavaria) Fishery of 100,000 salmon-ova, 50,000 stream salmon-trout ova, and 25,000 great lake-trout ova, at 10s. per thousand.

I hope to be able to send you more than half a million salmon-ova from Scotch rivers, and in order to do this Sir James Maitland will have to enlarge one of his hatching-houses. We propose to net the Tay twice for two separate shipments, and then to net the Tweed for a third.

Her Majesty's Inspector of Fisheries, Mr. Berrington, has been kind enough to give me a list of the works to send you, and I hope to forward these in an early mail-box.

I shall be very glad to get back the ova-boxes I sent out by the "Ionic."

In looking through the papers presented to Parliament during the late session (1886, H.–7) I notice several points in the letter of the President and Secretary of the Waitaki Acclimatization Society which require correction, especially on the two questions of sending Home an expert and of the relative cost between that method and the one I have pursued. But this can wait.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. BELL.

Enclosure.

MY DEAR SIR FRANCIS BELL,— Home Office, 22nd September, 1886.

With further reference to your letter of the 13th instant, I have now the pleasure of enclosing a list of works and statutes on the subjects to which you refer. The list of books is not so formidable as it appears, since the eleven first are pamphlets. I also enclose a copy of a return with reference to the protection of seals which may interest you.

Believe me, &c.,

Sir Francis D. Bell, K.C.M.G., &c. A. I. BERRINGTON.

THE following works on fish-culture, &c., are published by W. Clowes and Son (Limited), Charing Cross (under the authority of the Commissioners for the Fisheries Exhibition of 1883): Fish-culture, by F. Day; Oyster-culture in the Netherlands, Professor Rübrecht; Culture of Salmonidæ, Sir J. R. Gibson Maitland; Coarse-fish Culture, R. B. Marston; Artificial Culture of Lobsters, W. Savile Kent; Seal Fisheries, Ca. Temple; Propagation of the Salmonidæ—(1) V. Stirling, (2) F. Andrews, (3) W. O. Chambers; Propagation of Fresh-water Fish—(1) R. B. Marston, (2) W. O. Chambers; Oyster-culture—(1) Commander C. V. Anson, (2) S. Hock; Best Means of Increasing the Supply of Mussels, &c.—(1) T. R. Carr, (2) J. C. Wilcocks; Introduction and Naturalization of Foreign Fish, W. O. Chambers. Published by Wegand, Hempel, and Carey, Berlin: Die Auster und die Austemwirthschaft, by Karl Neöbins. The Act regulating seal-fisheries is 38 Vict., c. 18 [Seal-fisheries Act]. The Acts relating to oyster-fisheries are—24 and 25 Vict., c. 96; 31 and 32 Vict., c. 45; 32 and 33 Vict., c. 31; 38 and 39 Vict., c. 15; 40 and 41 Vict., c. 42; 44 and 45 Vict., c. 11.

No. 10.

The MINISTER having Charge of the MARINE DEPARTMENT to the AGENT-GENERAL, London.

SIR,— Marine Department, Wellington, 26th August, 1886.

Adverting to the shipment of salmon-ova received by the "Ionic," I have the honour to forward for your information extracts from a letter received from Mr. S. C. Farr, the honorary secretary of the North Canterbury Acclimatization Society, on the subject of the size of the ova. I forward these extracts without comment, as I am unable to form an opinion as to whether Mr. Farr's statements are correct or not.

I have, &c.,
W. J. M. LARNACH.

The Agent-General for New Zealand, 7, Westminster Chambers, London, S.W.

Enclosure.

EXTRACTS from Letter, dated the 16th August, 1886, from the HONORARY SECRETARY, North Canterbury Acclimatization Society, to the SECRETARY, Marine Department.

. . . . From the first they have been small and sickly, a fact proving that they were taken from very young fish, which is a great mistake; especially so to send a long voyage subject to great variations of temperature. . . . The eggs received ex "Ionic" measured twenty-five to a square inch, while those ex "Kaikoura" were sixteen to the square inch. The latter were strong from the time they were hatched out until they were put into our rivers, and the smallest fish they were taken from weighed over 16lb., smaller fish being refused. . . .

No. 11.

TELEGRAM to AGENT-GENERAL, London, dated the 17th December, 1887.

SEND salmon-ova Dunedin.

No. 12.

TELEGRAM from the AGENT-GENERAL, London, dated the 18th December, 1886.

SALMON-OVA: Yours yesterday. Impossible provide beforehand that times netting rivers coincide steamers going particular port. Unluckily "Tainui" and "Kaikoura" both make Auckland first. 200,000 salmon-ova, Rhine, also 100,000 trout. "Tainui;" 200,000 salmon-ova, "Kaikoura;" remainder to Port Chalmers, "Doric." Please prepare.

No. 13.

TELEGRAM from AGENT-GENERAL, London, dated the 24th December, 1886.

SALMON-OVA: First shipment "Kaikoura."

No. 14.

The AGENT-GENERAL to the Hon. the MINISTER of MARINE.

SIR,— 7, Westminster Chambers, London, S.W., 6th November, 1886.

I have received your letters of the 26th August, No. 75/49, and 9th September, No. 221/49, relating to the ova sent out by the "Ionic," and now beg leave to notice a few of the points which may perhaps be worth keeping in mind.

Adverting, in the first place, to Mr. Farr's statement of the 16th August as to the size of the ova he took out, Sir James Maitland tells me that last season's eggs from the Tay were generally small compared to others, though larger than the Tweed ova of the year before. Sir James has kept the measures in which the "Ionic" eggs were counted, and can therefore tell exactly how many went to the square inch; but, as Mr. Farr says that his eggs measured ·25in. we should like to know the number and capacity of the jars in which he carried them from the Tweed to Linlithgow, because such a size gives less than 18,000 to the gallon, whereas 25,000 may be taken as the usual number.

With regard to sending an expert Home to get ova, I should, personally, be very glad of it, for I should be saved a large correspondence and a great deal of work; but, all the same, I must repeat what I said a year ago, that it would be a mere waste of money to send any one here to do what is done every day by people of the highest skill and experience, and with the most perfect appliances in the world. I am not supposing that Mr. Farr, and the other gentlemen who advocate sending some one Home, really mean to say anything as foolish as that a colonial expert knows better how to take ova than the Superintendent of the Scotch Fishery Boards, or better how to treat them afterwards than Sir James Maitland. Howietoun Fishery is famous, as you know, not only for rearing *Salmonidæ* on a greater scale and a more thorough system than at any other establishment of the kind in Europe, but for having found out many things that used to be mysteries, and for having brought together knowledge of incalculable value, for practical no less than for scientific purposes.

Let me take one or two points in the Waitaki Society's letter. Referring to Mr. Farr's statement that not 10 per cent. of ova sent out to Canterbury had been impregnated, the President and Secretary say that "if this is the case with ova supplied by fishery establishments having such perfect appliances, and charging on an average £1 per thousand for 10-per-cent. impregnated

ova, no stronger argument could be furnished for the absolute necessity of sending Home an expert." So that those gentlemen not only supposed that I was going to get unfertilized ova from one of the great fisheries, but that any great fishery would ever send out ova at all with only 10 per cent. impregnated; whereas everybody knows that nothing of the sort could happen here, and that ova in that state must have been sent out by inexperienced amateurs. From this the Waitaki Society goes on to calculate that to buy eggs at £1 per thousand with only 10 per cent. of impregnation really means that 100,000 ova would cost the colony £1,000, whereas the fact is that the whole cost of getting the 200,000 "Ionic" ova was under £60, or an average of 6s. per thousand, and this season's incubation of ova at Howietoun will not cost much over 1s. per thousand. Moreover, the society evidently mistook my meaning altogether, as they supposed me to be advocating the purchase of ova at £1 per thousand, whereas I was really showing why that system should not be pursued.

Then, again, the society attributes the success of the shipment of trout-ova by Sir James Maitland in the "Ionic" (in 1884) to the "incessant care and minute attention paid to them by Mr. Pringle Stoddart;" whereas Mr. Stoddart did not go out in that ship at all, but in the "Aorangi."

Some of the other figures given in the papers are also puzzling. For instance, Sir James points out that the note at the bottom of page 5, in H.–7, is instructive when read together with the report of the Otago Society for 1885, because in the case of a box of Mr. Farr's ova, which was said to contain originally nearly 28,000 eggs, and which was counted by Mr. Dean, only 11,000 were accounted for.

But, after all, these are trifles, and I only notice them to prevent mistakes hereafter. Looking at the results shown by most of the reports, Sir James Maitland and myself are quite content with the success of the "Ionic" shipment.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

No. 15.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 18th November, 1886.

Since writing to you on the 2nd October, No. 1,247, I have been in frequent communication with Sir James Maitland and Professor Cossar Ewart respecting this season's shipment of fish-ova.

1. *Salmon-ova.*—Complete arrangements have been made for getting eggs from the Forth, Tay, and Tweed Rivers as soon as the rod-fishing is over. I enclose copy of a letter which I received from His Grace the Duke of Roxburgh giving permission to take ova in his Kelso water, and we shall net there as well as higher up the river. The South Kensington Museum authorities have given me the services of Mr. Eden, who, you will remember, was assistant to the late Mr. Frank Buckland: he will presently go to Scotland and take his general directions from Sir James Maitland. Sir James has made every arrangement for the Forth District, and for bringing the ova to Howietoun; and the Superintendents of all the districts will do everything they can to help us. In addition to the supply of Rhine ova from Seewiese Fishery, which I have mentioned before, I shall send 30,000 exceptionally fine *S. fontinalis* eggs from Solway Fishery.

2. *Herring-ova.*—Professor Cossar Ewart's interest in the renewal of last season's work has not in the least abated, and he has made many experiments during the summer and autumn towards insuring success. You will remember that our great difficulty was about getting sea-water at the proper temperature; but we may be able to get over this by making enough sea-water ice, to be stored in the refrigerator for the voyage. We shall most likely decide to get the herring-ova this time from the southern coast, off Plymouth. The Marine Biological Association are forming an establishment there which is expected to be at work next season; and we shall have no difficulty in making use of their station, because one condition of the Government grant to Plymouth is that the Scottish Fishery Board may make use of the station when required. We are not yet certain whether we shall be able to send any herring-ova in the early part of 1887, but if we do Professor Cossar Ewart will himself direct and watch over all the work at Plymouth.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell

Enclosure.

Dear Sir F. Bell,— Floors Castle, 14th November, 1886.

It will give me great pleasure to allow my water in the park to be fished for ova for the New Zealand Government. The water is let until December, when the rod-fishing closes, so it will be impossible for it to be fished before that time; but at any time after that it is much at your service

If you would kindly communicate with James Tait, Esq., W.S., Kelso, clerk to the Tweed Commissioners, he will make every arrangement, and obtain permission for a net being used during close time.

I am, &c.,

Sir F. D. Bell. Roxburgh.

No. 16.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 17th December, 1886.

I have received your telegram of this morning, desiring me to send this season's salmon-ova to Dunedin. It is, however, impossible to provide beforehand that the time for netting rivers

and incubating ova shall depend upon steamers going to a particular port; and it unfortunately happens that the two first ships by which this season's ova can go make Auckland their first port. We have now got altogether over half a million ova, 400,000 of which are salmon, and the rest trout and *fontinalis;* and we are still netting every day on the Tay, Forth, and Tweed. The first shipment, consisting of 275,000 Rhine ova (200,000 salmon, 50,000 brook-trout, and 25,000 great lake-trout) and 30,000 *fontinalis*-ova from Solway, goes by the "Tainui" to Auckland on the 31st instant; the second shipment, of 200,000 Tay and Forth salmon-ova, goes by the "Kaikoura" on the 14th January, also to Auckland; and it is only the third shipment, of Tay and Tweed salmon-ova, which can go to Dunedin direct, by the "Doric," at the end of January.

I have, &c.,

The. Hon. the Minister of Marine, Wellington. F. D. Bell.

No. 17.

Telegram from the Agent-General, London, dated the 26th January, 1887.

Salmon-ova: 330,000, "Doric."

No. 18.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 30th December, 1886.

The day after I wrote you last (17th December, No. 1,673), about this season's shipment of fish-ova, I thought it advisable to send you a telegram to the same effect as I had written, in order that you might have the earliest intimation of what we should be sending, and be able to make the necessary preparations. At that time I expected that the first shipment would be made by the "Tainui" to-morrow, consisting chiefly of Rhine ova; but a few days afterwards I was asked by the Seewiese Fishery to put off sending theirs until February. Herr Zenk had laid down 300,000 salmon-ova so as to have them well eyed at the end of December, in which he succeeded, though with great losses; but, wishing only to send the best eggs, he now proposes to lay down another set. I am not sure whether I shall consent, as we have as many Scotch ova already as I think your societies can well manage this season.

The first shipment will accordingly go by the "Kaikoura" on 14th January, when we shall send about 200,000 salmon-ova and 30,000 *fontinalis*. Then, there will be a second shipment, also of about 200,000 salmon-ova, by the "Doric," on the 27th January; and a third, of perhaps the same number, by the "Tongariro," on the 10th February. Both the last-named vessels make Otago their first port.

We have been very fortunate in the Scottish rivers. Superintendents Napier, Lumsden, and Donaldson have all worked hard and been successful, notwithstanding the severity of the weather. Nearly all the ova have been taken from big fish of 20lb. and upwards; and Mr. Eden, whom I sent up to Superintendent Donaldson, reports the fish there as being very handsome and producing fine eggs.

Up to the 27th there were 550,000 on the grilles at Howietoun; and Sir James Maitland, whose invaluable services I must again acknowledge with gratitude, tells me the eggs are larger this year than the last. He has room yet for, perhaps, 250,000 more; but we shall not get anything like so many, as the fish are pretty well spawned out now.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

No. 19.

Extract from Telegram from the Agent-General, London, received 12th February, 1887.

Salmon-ova and trout, 335,000, "Tongariro." Please note Rhine portion hatch very quickly.

No. 20.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 14th January, 1887.

In continuation of my letter No. 1,742, of 30th December, I have now to report that we have placed eight boxes of salmon-ova and two boxes of *fontinalis* on board the "Kaikoura," in the same insulated case as took out the "Ionic" ova last year.

Altogether we have got 600,000 eggs at the nettings that were carried on all through December on the Tay, Forth, and Tweed. We should have got some more, but the severity of the frosts obliged me to cease work for this season.

I have been able to arrange, in accordance with your wishes, that the bulk of the ova should be sent to Otago. Accordingly, only about 160,000 are going by the "Kaikoura," about 300,000 more (now on the grilles at Howietoun) will go by the "Doric" on the 27th, and the remainder by the "Tongariro" on the 10th February. The eggs are in very fine condition, and Sir James Maitland is confident of the shipment being as successful as last season's. I was rather afraid the *fontinalis* were too forward, but Mr. Armistead (Solway Fishery) assures me that they are quite safe for the voyage, though they will hatch out very soon after being placed in their water. Sir James Maitland opened one of the boxes with me, and considers them to be fine eggs.

I should be much obliged if you would give orders that the ice-house, as well as the Howietoun boxes, be carefully handled, and shipped back to me, as was done last year. The lids of the empty boxes were nailed down for return, which the people who handle them should be told not to do again: it will cost them but little trouble to put in the screws, and with care the boxes will do over and over again.

You will have been glad to hear that precautions were taken only to spawn big fish. The following are extracts from the reports sent to me by the Superintendents:—Lumsden (Tay): "Nearly all the ova we have got have been taken from salmon 20lb. and upwards, only three grilse having been spawned." Donaldson (Tweed): "The female fish were in the best possible condition for spawning. . . . The average weight of twenty-one fish was 20lb. . . . The present are undoubtedly the largest and finest ova taken from the Tweed. . . The fish we spawned this season are considerably larger than those spawned for Mr. Farr in February, 1885."

According to the rough estimate by the Superintendents (in accordance with Mr. Frank Buckland's formula) the total number taken would be over 750,000; but Sir James Maitland's count does not make more than 600,000. That, however, is a very good number for one season. Certainly the experience we have had of a whole month's netting of three rivers by most experienced men has made me think the work a much less easy one than was supposed.

I have not yet decided whether to take the Rhine ova, but shall be able to say when the "Doric" ova go, a fortnight hence.

I am sending a careful man in charge of the ova-chamber, and a copy of his instructions is enclosed. Three tons of ice have been put on board, so that he will have an ample supply during the voyage. He has also a prepared journal, for him to keep, of the temperature of the chamber and insulated case; and I should be much obliged if you would give orders for this journal to be returned to me, as it is important on many accounts.

I wish to bring under your notice the services of Mr. Thomas Johnson, who has fitted the insulated case and chamber. He has been engaged for years past in almost every shipment of salmon-ova to New Zealand and Tasmania, and his careful work has contributed greatly to whatever success has been obtained.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

No. 21.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 27th January, 1887.

I have now to report that Sir James Maitland and myself yesterday put sixteen Howietoun boxes of salmon-ova on board the steamship "Doric." Sir James had packed all the boxes himself, and certainly I have not seen any ova in such good condition.

This shipment amounts to about 330,000 eggs, which I believe is the largest number ever sent at one time to an Australasian Colony. It was necessary, therefore, to take especial care about the insulating-cases. The one sent last year in the "Ionic" (and again sent in the "Kaikoura" a fortnight ago) was rather large for handling, and I therefore had four smaller cases made for the "Doric," each of which holds four Howietoun boxes. This will much facilitate whatever distribution of the ova you may have decided to make.

I trust that the officers whom you may appoint to take charge of the cases on arrival will see to their careful handling and reshipment here; and I need not say that special care should be given to the Howietoun boxes, so that they may come back to us in good order. All the lids of the boxes are loose for the voyage on account of replenishing the ice-trays; but when the insulating-cases are unshipped the number marked upon each lid should be checked with the number marked on the box to which it belongs, so as to make sure they correspond; for, although the boxes are all made to the same templates, there is sure to be a little shrinking or expansion in passing through the tropics.

I have put plenty of ice on board for the voyage; but, as you will get this letter before the "Doric" arrives, it would be well to see that a supply of ice is ready at Otago. Each of the insulating-cases has places to hold ice, and any one not intended for Otago can be safely transhipped or sent by rail, if care is taken about properly charging it with ice around the ova-boxes.

Sir James Maitland took great pains in arranging the incubation so that the ova should hatch out as nearly as possible at the same time; and, as they may be expected to hatch out in ten days after the "Doric" arrives, everything should be done to expedite such of the boxes as are not for Otago to the place of their destination. I am sending a careful man in charge, copy of whose instructions will go to you by the "Doric" to-morrow.

These two shipments by the "Kaikoura" and "Doric" come to 490,000 salmon-ova and 30,000 *S. fontinalis*. The last portion of the Scotch-salmon ova will go by the "Tongariro" in a fortnight, together with 100,000 Rhine-salmon ova, 75,000 Rhine trout and Alpine char, and perhaps 30,000 Loch Leven trout.

My shipping officer, Mr. E. A. Smith, deserves great credit for his careful arrangements on board both ships, and the same is due to Messrs. Johnson and Gregson for the insulated cases. I wish also to mention specially my obligations to both shipping companies for the facilities they have given throughout.

I sent you a telegram yesterday to report the shipment. I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

No. 22.

The AGENT-GENERAL to the Hon. the MINISTER of MARINE.

7, Westminster Chambers, London, S.W., 28th January, 1887.

I ENCLOSE herewith extract of a report from Mr. Johnson, who fitted up the cool chamber of the ova in the "Doric," and copy of the instructions to the attendant (Dowsett) in charge of the ova.

The Minister of Marine. F. D. BELL.

Enclosure.

EXTRACT from Mr. JOHNSON's Report on Shipment of Salmon-ova per Steamship "Doric."

26th January, 1887.

. . . . The chamber being placed in the 'tween-decks and adjoining the refrigerating-engines, great care has been taken by efficient insulation to guard against danger arising from the high temperature of the engine-room and from the exposed surfaces of the ship's main deck and top-sides, which during part of the voyage will be subjected to a very high temperature. As an extra precaution, a cold-air blast, fitted with a regulating-valve, has been taken from the main cold-air delivery-trunk, supplying the provision-chamber, so as to keep the cool chamber at a temperature of 33° to 34°. The wells of the four insulated cases containing the sixteen ova-boxes were thoroughly charged yesterday with pulverized ice, and large blocks of ice were placed within to obtain a low, moist temperature before the ova-boxes were finally placed and secured. The attendant, Dowsett, has been well instructed as to his duties during the voyage, and full written instructions have been given to him for his guidance. I also gave him a prepared journal, to enter daily, with observation if necessary, the temperature in the 'tween-deck, inside of the cool chamber, inside of each refrigerating-case containing the ova-boxes on the main deck, and the sea-water, at 8 a.m., noon, and 4 p.m. . . . . I have, &c.,

Sir F. D. Bell, K.C.M.G. THOMAS JOHNSON.

No. 23.

The Hon. the MINISTER of MARINE to the AGENT-GENERAL.

SIR,— Marine Department, Wellington, 7th April, 1887.

I have the honour to acknowledge the receipt of your letters of the 30th December, 14th January, 27th January, and 10th February last, on the subject of the shipments of salmon- and trout-ova forwarded by the "Kaikoura," "Doric," and "Tongariro."

I have read with much interest the account of the various steps you took to insure the shipment of the ova. The Scotch-salmon ova appears to have been of very good quality, and, I am glad to say, arrived in fair condition, between 60 and 70 per cent. being good. I will forward you further particulars on receipt of detailed reports from the acclimatization societies. The *fontinalis*-ova by the "Kaikoura" were not in good condition—only some 4,000 being good out of the total quantity of 30,000 shipped. You will remember that the boxes containing it were in the cool chamber, but not in one of the insulated cases. The Rhine-salmon and trout ova by the "Tongariro" arrived in very bad order, the stench on opening the cases being quite perceptible. A considerable quantity of the ova appears to have hatched out in the trays, and, as far as can be seen at present, only a few will hatch out in the boxes in which they have been placed. The Scotch salmon and Lochleven trout, on the contrary, were in very good order: With reference to the Rhine trout, no marks were placed on the trays to indicate to which particular kind—namely, Rhine brook-trout, Alpine char, and Carpione trout (*Trutta lacustris carpione*)—the ova belonged, nor has any communication been received giving these particulars. The societies to which this ova were given have been requested to keep each tray separate, in order that the various kinds of fish may not be mixed; and I should feel obliged if you would forward a diagram showing where the different kinds were placed.

As far as I am at present advised, the method of packing adopted by Sir James Maitland appears to be decidedly the best. It has, however, been found that the third or bottom layer of ova in each tray is invariably in the worst condition, the weight of the two layers of ova and moss being apparently too great, the ova showing marks of the moss and the perforated zinc below. It has been suggested that only two layers should be placed in each tray, and more trays put in each case, and that scrim should be substituted for the perforated zinc. However, on receipt of the societies' final reports I will be able to communicate with you.

As requested by you, great care has been taken of the insulating-chambers and Howietoun boxes, and they will be forwarded to you shortly—some, probably, by the barque "Hudson." The attendants appear to have carried out the instructions given, and the gratuity of £5 was paid in each case. I have forwarded under separate cover the journals of temperature kept by each attendant.

I have, &c.,

The Agent-General for New Zealand, 7, Westminster Chambers, London, S.W. JOS. A. TOLE, (For Minister of Marine.)

No. 24.

The AGENT-GENERAL to the Hon. the MINISTER of MARINE.

SIR,— 7, Westminster Chambers, London, S.W., 10th February, 1887.

In continuation of my letter by the "Doric" on the 27th January (No. 113), I beg to state that Sir James Maitland and myself yesterday put on board the s.s. "Tongariro" six boxes con-

taining about 120,000 Tweed salmon ova, and two boxes containing 40,000 Loch Leven trout ova. In addition to this I had also put on board 100,000 Rhine-salmon ova, 25,000 Rhine brook-trout ova, 25,000 Alpine-char ova, and 25,000 Carpione-trout ova *(Trutta lacustris carpione)*. The latter is said only to be found in the Lago di Garda, and is well known for its fine flavour. Altogether, therefore, the "Tongariro" takes out 335,000 ova. This concluding shipment brings up the numbers to 710,000 salmon-ova, 55,000 char and 90,000 trout, making a total of 855,000 ova that I have sent you this season.

The Rhine ova are placed in two cases, and the Scotch ova in two other cases. These, and the insulating-chamber, have been very carefully built. The cases containing the Scotch ova are on the same principle as those in the "Doric;" the Rhine cases are on a different plan, each ova-tray having a drip of cold water from an ice-tray above it. By either or both of these methods Sir James Maitland and I now feel sure the problem is solved of a safe transport of ova to New Zealand. The Howietoun boxes, in which the Scotch ova are packed, are well known to your officers; the boxes in which the Rhine ova came over have also been put on board the steamer, in order that the eggs may be packed again in them if necessary to be sent to their hatchery quickly, as I expect will be the case.

The salmon-ova are particularly fine, both from the Tweed and the Rhine. I do not feel so sure of the Rhine trout, though I hope they will do well too. All the Rhine ova are far advanced in development, and it will be necessary to give attention to them forthwith, as I think they will hatch out almost immediately after arrival.

I am sending a careful man (James G. Smith) in charge of the ice-chamber; and a copy of his instructions is enclosed. He has worked under Mr. Johnson at all our ova-shipments, and intends to settle in the colony. I also annex a report from Mr. Johnson as the ship was leaving the docks.

I hope you will give orders that the insulating-cases, which are made of a size to be easily moved, are carefully handled and returned to me in good condition, together with all the Howietoun boxes, as before.

I am sending you a telegram (copy annexed) to acquaint you with the shipment.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

Enclosure.

Extract from Mr. T. Johnson's Memorandum.

. . . . The ova from the Seewiese Fishery have been carefully unpacked and taken out of the transhipment cases, and placed within the special cases prepared on my own plan; and the eight boxes of ova from the Howietoun Fishery have also been placed within the refrigerating-cases, similar to those sent out in the steamship "Doric." The four cases containing the respective lots of ova have been securely fixed within the insulated chamber which has been built to your order in No. 2 'tween-decks, starboard side, of the above vessel. The chamber is leaded out, and fitted with a drainage-scupper leading to the ship's 'tween-deck after-scupper. The door is placed abreast the hatch, and a trunk-connection from the ship's provision-chamber has been made, fitted with slide-valve to provide for a cold-air blast, thus having the means to maintain a low temperature without freezing, and preserve the store-ice against wasting.

The wells of the two cases containing the eight boxes of ova from Howietoun have been well charged with pulverized ice, and the boxes securely fastened.

Two of the trays containing the ova from the Seewiese Fishery have had the upper layer of cloth removed and a covering of moss substituted: this was done so as to test the plan, within the cases, of moss as against the double fold of cloth. The remainder of the ova forming the Seewiese shipment have been placed within the trays in the same state as they were received, excepting that a layer of moss has been put at the bottom of each tray, so as to avoid pressure on the ova by the straining of the double layers of cloth.

As one of the Seewiese trout-trays contained a good number of dead ova, I examined it this morning and found an increased number of dead; so I took off the flannel covering and substituted moss, and gave instructions to Smith (attendant in charge) to take particular notice of the state of the ova in the tray thus treated, and explain on arrival in New Zealand why this had been done. The other trays examined looked remarkably well. The temperature in the cases containing the Seewiese ova, at 11.30 a.m., stood at 32½° and 33° Fahr. In the Howietoun cases it stood at 33° and 34° Fahr. The chamber-thermometer recorded 32° Fahr.

The attendant, Smith, has been fully instructed as to his duties, with full written instructions for his guidance during the voyage. He has also been specially directed to place on record in his journal the result of the experiment of substituting moss for cloth. Two prepared journals have been given to him, to enter daily, with observations if necessary, the temperature in the 'tween-decks, inside of the cool chamber, inside of each refrigerating-case containing the ova, on the main deck, and the sea-water, at 8 a.m., noon, and 4 p.m. . . .

10th February, 1887. Thomas Johnson.

No. 25.

The Agent-General to the Hon. the Minister of Marine.

Sir,— 7, Westminster Chambers, London, S.W., 28th February, 1887.

The expenditure connected with the three shipments of fish-ova made to you this year being now wound up, I beg permission to transmit the accompanying analysis of the same, which may perhaps be useful to you in coming to a decision as to whether any shipments shall be made next season.

Only a small part of the expense ever belongs to the collection of the ova. You will see that this item has cost £252, or a fraction under 6s. per thousand all round over the 855,000 ova shipped. Taking only the 610,000 salmon-ova got from the Tay, Forth, and Tweed, they cost £127 to get, or a fraction over 4s. per thousand.

The forty-eight boxes containing ova-trays, and the insulating-cases on board the steamers, cost £257; railway, steamer, and dock charges, £67; the ice-chambers on board each steamer, and ice for the voyages, £256; freight for the space occupied by the ice-chambers, insurance, passages of the caretakers, and supervision by the despatching officer, £490; and petty expenses, £30. It should, however, be noted that, as the ova-boxes and insulating-cases can be used over and over again, their cost should not be debited entirely to this season.

As to the freight, you will recollect that the New Zealand Shipping Company very handsomely made no charge for the space given to Mr. Farr in 1885; but, of course, this could not be expected to recur, and in any future shipment freight will always be the largest item in the total cost.

As I have had good reports from the Cape of all three shipments, I trust soon to hear that the ova reached the colony safely. Assuming this to be the case, you have a fair means of judging, so far as expense is concerned, whether to continue the shipments. The experience we have gained enables both the cost and the chances of success to be estimated now with a near approach to accuracy, for I think we may say with confidence that the Howietoun system of incubating and packing, and the method we have adopted for the ice-chambers and insulating-cases, have practically settled the question of safe transport of salmonidæ-ova to New Zealand. The following estimate of cost may accordingly be taken as very nearly correct:—

Salmon-ova from the Scottish rivers will always cost about 4s. per thousand to collect, and 1s. to bring up for shipment, or 5s. per thousand, apart from the cost of incubation. Eyed ova of any of the salmonidæ, obtained from fishery establishments, will cost from 10s. to 15s. per thousand delivered in London. Taking, for instance, a shipment of 100,000 ova, you may put the cost of collection at from £20 to £30; ova-boxes and insulating-cases, £30; ice-chambers and ice for the voyage, £30; freight and passage of caretaker, £50; railway- and dock-charges, and contingencies, £10: altogether, say £150, exclusive of cost of incubating the ova between the dates of collection and the time of shipment. This item I cannot at this moment speak of with the same certainty, but I should not put it above £10 to £20 per hundred thousand.

The colony has again been greatly indebted to Sir James Maitland. He not only prepared all the ova at Howietoun from the Tay, Forth, and Tweed, but devoted his own time and care throughout to making every shipment a success—even packing the ova and bringing them on to London himself. The count for nearly 700,000 of the ova is Howietoun count after allowing for loss during incubation. I have in vain asked Sir James to let me make him any payment; but, of course, this is out of the question, and I trust you will yourself insist upon his acceptance, as a business matter, either of a fair sum or its equivalent in a presentation of plate to him, and especially to Lady Maitland, who herself took a part in the work.

This letter being only on the question of cost, I propose to mention later on some other points which should be kept in mind when deciding whether further shipments are to be made.

I have, &c.,

The Hon. the Minister of Marine, Wellington. F. D. Bell.

Analysis of Expenses connected with the Three Shipments of Salmonidæ-ova, January and February, 1887.

	£ s. d.	£ s. d.	£ s. d.
1. *Collecting the Ova.*			
(1.) Salmon—			
Scotch ova (610,000)—			
Netting the Tweed	68 12 6		
Netting the Forth	26 19 10		
Netting the Tay	31 6 6		
		126 18 10	
Rhine ova (100,000)—			
Seewiese Fishery	50 0 0		
Less cost of boxes	6 0 0		
		44 0 0	
			170 18 10
(2.) Trout and char (145,000)—			
S. fontinalis, 30,000	33 0 0		
Alpine char, 25,000	12 10 0		
Lochleven trout, 40,000	20 0 0		
Rhine great lake-trout, 25,000	12 10 0		
Rhine brook-trout, 25,000	12 10 0		
		90 10 0	
Less cost of boxes	...	9 0 0	
			81 10 0
			252 8 10
2. *Ova-boxes and Insulating-cases.*			
34 Howietoun boxes	82 10 0		
6 Solway and Seewiese boxes	15 0 0		
Insulating-cases	160 0 0		
		257 10 0	

ANALYSIS of EXPENSES—*continued.*

	£ s. d.	£ s. d.	£ s. d.
3. *Railway, Steamer, and Dock Charges.*			
In Scotland...	31 6 11		
In London (Smith, £15 8s.; Johnson, £5 16s.) ...	21 4 0		
Transport of Rhine ova	14 12 6		
		...	67 3 5
4. *Ice-chambers.*			
Timber and material	77 6 10		
Lead and plumbing	53 15 11		
Labour	45 3 0		
Sawdust and charcoal	21 11 3		
		197 17 0	
Ice for the voyages	...	58 11 5	
			256 8 5
5. *Shipping Expenses.*			
New Zealand Shipping Co., space "Kaikoura" ...	91 9 11		
New Zealand Shipping Co., space "Tongariro" ...	156 16 1		
Shaw, Savill, and Co. space, "Doric"	138 4 2		
		386 10 2	
Marine insurance	...	9 7 6	
Passages of caretakers—			
"Kaikoura," two adults	30 0 0		
"Doric," one adult	15 0 0		
"Tongariro," two adults	30 0 0		
		75 0 0	
Despatching-officer, supervision	...	20 0 0	
			490 17 8
6. *Contingencies.*			
History of Howietoun	...	2 5 0	
Sphagnum moss	...	5 0 0	
Outfits of caretakers	...	4 8 0	
Petty disbursements—			
Johnson	8 10 9		
Howietoun	3 3 3		
Office	6 13 3		
		18 7 3	
			30 0 3
Total	...	...	1,354 8 7

No. 26.

The HONORARY SECRETARY, Wellington Acclimatization Society, to the Hon. the MINISTER of MARINE.

SIR,— Wellington, 5th April, 1887.

On behalf of the Wellington Acclimatization Society, I have the honour to thank the Government for their handsome donation of ova *ex* "Tongariro."

The case of Loch Leven trout ova from Howietoun arrived in excellent condition, fully 80 per cent. being alive and healthy. The packing of the case and the arrangement of the moss, especially the bottom layers, was the best I have ever seen. Sir James Maitland and our Agent-General deserve to be congratulated on the success of this part of their shipment.

The Rhine ova unfortunately opened up in bad condition, and, though every precaution was taken, by reducing the temperature of the water with ice, it is greatly to be feared that not many of the different varieties will be successfully reared. After placing the ova in the boxes disease was found to have spread so extensively that it was thought advisable to shift the live ova from several of the boxes into clean boxes, an operation requiring extreme care and much labour. Unfortunately, no information has been as yet received as to the varieties of trout- and char-ova, so the trays in each layer have been placed in separate boxes, and numbered, until such information arrives. The Rhine-salmon ova appear to have been shipped in rather too forward a condition, and to have partly hatched out during the latter part of the voyage. The effluvia from them was very strong, and probably it affected the trout-ova, as, though not so near hatching, it proved to be extensively diseased. The coarse kind of blanket was in many instances stuck together, and many of the ova apparently alive were covered with a light-blue bloom (a curious kind of fungus I have not observed before), and died shortly after being placed in water. There was, in my opinion, too much pressure on most of the layers of ova, and it was difficult to take the ova off the blanket without injury, while in taking it off, the water was filled with minute particles of disease-germs. As yet it is hard to say what proportion of the ova can be reared, but a further report will be sent in on our obtaining information as to the varieties of the ova given to us.

Before concluding this report, I should like to draw the attention of the Government to a difficulty that has always, I think, been underrated in dealing with imported ova. It arrives here at the latter end of summer, when even the spring-water is at a higher temperature than in the winter and spring, the natural time for ova to be deposited and hatched; and partly for this reason the fry hatched are generally weakly, and if they are kept till spring there is considerable loss in rearing for the first two months. On the other hand, if liberated as fry in the winter many perish with

floods and for want of the food which is plentiful in the water at the time when the fry would natur hatch out. It is a question which method will answer best; but, in my opinion, both should be tried. A number of young fry could be turned out in the small tributaries of a river to "find" for themselves, but the bulk of them held over, fed well, and liberated as strong fish in the spring of the year. This latter method requires constant care and attention.

I have, &c.,
ALEX. RUTHERFURD,
Hon. Sec., Wellington Acclimatization Society.

The Hon. the Minister of Marine, Wellington.

No. 27.

The CURATOR, Southland Acclimatization Society, to the SECRETARY, Marine Department.

SIR,— Invercargill, 23rd March, 1887.

I have the honour to report having duly received five boxes salmon-ova *ex* "Doric" from Mr. Smith, at Invercargill, on the 18th instant. I at once conveyed them to Wallacetown, and placed the trays from one box in the hatching-boxes, the temperature of the water in which had been previously lowered by filling an upper box with ice. Those trays we commenced to unpack next morning, and as the work went on I placed other trays in the iced water, so that the temperature of the ova was gradually raised to that of the water. I got all the ova unpacked, counted, and safe in the boxes on the second day, for which I was indebted to the assistance of Mr. Howard and Mr. Raap.

I am happy to say that this lot turned out much better than the previous one, *ex* "Kaikoura," yielding about 20 per cent. more good eggs. The number of ova in each layer varied very much, some containing only 850, while in one box some of the layers had nearly 1,100. This may partly be accounted for by the great difference in the size of the ova. Four of the boxes were marked "Tay," and one box "98, Tweed." This was a remarkably fine lot of ova, in splendid condition except the bottom layers of the bottom trays, and of a uniform large size. The bottom layers, as usual, yielded much the lowest percentage of good ova; but it was in the bottom layers of the lowest trays that the loss was most deadly, and in some cases almost total; and in the better ones the large number of ringed ova pointed to suffocation as the cause of death. There were more indented ova than I had observed in previous shipments, and, from what Dr. Day says, they will do no good. The packing was as careful as usual, and the impregnation was almost perfect. For the sake of comparison, I will assume that the number of ova in all averaged 1,000, although I think this is above the mark. On the whole they were a very satisfactory lot, and it was a pleasure to open them out.

The ova laid down *ex* "Kaikoura" have hatched out remarkably well, and there are now over 17,000 strong healthy alevins. Mr. Howard says they are the strongest fish he ever saw from imported ova. I enclose a statement in detail of the good ova laid down.

I have, &c.,
ARCHD. N. CAMPBELL,
Curator, S. A. Society.

DETAILED STATEMENT of good Salmon-ova *ex* "Doric"—received 18th March, 1887; unpacked 19th and 20th March, 1887.

Layers.	Trays.						
	T.	T.	M.	M.	B.	B.	Total.
Box No. 100, marked "Tay."							
Top	710	790	863	890	670	900	4,823
Middle...	918	830	856	895	873	950	5,322
Bottom	160	686	560	796	268	20	2,490
	1,788	2,306	2,279	2,581	1,811	1,870	12,635
Box No. 102, marked "Tay."							
Top	887	905	1,023	980	955	850	5,600
Middle...	1,006	780	972	1,016	937	960	5,671
Bottom	898	530	400	333	188	675	3,024
	2,791	2,215	2,395	2,329	2,080	2,485	14,295
Box No. 93, marked "Tay."							
Top	857	910	826	886	752	882	5,113
Middle...	856	844	865	975	879	867	5,286
Bottom	610	832	650	515	67	35	2,709
	2,323	2,586	2,341	2,376	1,698	1,784	13,108

DETAILED STATEMNNT of good Salmon-ova, &c.—*continued.*

Layers.	Trays.						
	T.	T.	M.	M.	B.	B.	Total.
Box No. 99, marked "Tay."							
Top	867	815	877	831	800	849	5,039
Middle...	826	768	854	916	806	875	5,045
Bottom	727	360	592	782	197	246	2,904
	2,420	1,943	2,323	2,529	1,803	1,970	12,988
Box No. 98, marked "Tweed."							
Top	832	789	921	896	780	772	4,990
Middle...	816	835	855	856	821	837	5,020
Bottom	797	600	666	582	31	123	2,799
	2,445	2,224	2,442	2,334	1,632	1,732	12,809
Grand total							65,835

Percentage of good ova in the whole lot, 73·15; top layers, 85·21; middle layers, 87·81; bottom layers, 46·42.

ARCHD. N. CAMPBELL,
Curator, Southland Acclimatization Society.

No. 28.

The CURATOR, Otago Acclimatization Society, to the SECRETARY, Marine Department.

The Otago Acclimatization Society's Report on the Salmon-ova ex *"Kaikoura," "Doric," and "Tongariro."*

DEAR SIR,— Opoho, 25th April, 1887.

It is now my pleasant duty to report to you the unprecedented success of what you kindly allotted to us of the three shipments of salmon-ova which arrived in Wellington per the "Kaikoura," "Doric," and "Tongariro." It will be unnecessary here to trouble you with the particulars respecting the unpacking, as the method adopted was similar to that on other occasions, every care being taken to bring the temperature of the ova to that of the water as gradually as possible.

On the 1st March we received six boxes of the "Kaikoura" shipment. One was marked "Forth Ova," and the others "Tay Ova." They averaged about 50 per cent. good, and hatched splendidly. The Forth ova began to hatch six days after being placed in the water. The Tay ova were a week later, and a good many of this lot were deformed; while those from the Forth were remarkably free from deformed fish. On the 18th March we received ten boxes of the "Doric" shipment. This lot turned out to be in splendid condition, about 70 per cent. being good. Two boxes of this lot, numbered 103 and 91, yielded about 90 and 95 per cent. respectively. These also hatched well, having very few deformed ones. And, again, on the 30th March we received five boxes and a half of the "Tongariro" shipment. This lot did not turn out quite so well as the last. I estimated there would be about 65 per cent. good. They commenced to hatch on the 6th April, and are now nearly all hatched. I see a few deformed ones amongst them, but I do not think there will be a great many. All the shipments hatched out most satisfactorily, producing strong and healthy fish, very few going bad in the hatching, as is often the case with imported ova.

The success which has attended these shipments of salmon-ova says much for the skill and care bestowed on this particular science by Sir James Maitland. I have on former occasions said a word in favour of his neat and convenient method of packing and transit, and it is very important that you should know the exact condition in which the ova arrived. I will endeavour to make this as clear as possible.

The ova were very neatly packed in clean, fresh, and well-selected moss. Each box contained six trays, and in each tray there were three tiers of eggs. The first two tiers of eggs in each tray were found to be in excellent condition; in some instances there were very few bad ones. But, with the exception of one or two boxes which turned out to be in excellent condition, the bottom tier of each tray was found to be very bad, sometimes a total failure. I do not know whether undue pressure would have anything to do with it, but Lieutenant Smith, of your department, drew my attention to the fact that some of the trays left their impression on the moss of the one immediately below, and in these cases it was noted that the bottom tier of eggs was entirely bad, the dead ova appearing as if they had partly collapsed. Probably this serious loss might be reduced to a minimum if the moss-pads were made slightly thinner. The material on the top of the lowest tier of eggs, consisting of three pads of moss and two tiers of eggs, could not weigh more than 3lb.; but this may not be the cause. I may here state that the salmon-ova which arrived here from California in 1878 were packed in trays 18in. square by 7in. deep, containing seven tiers of eggs, which were in splendid order; but, of course, the voyage was much shorter. Lieutenant Smith, who had charge of all the shipments along the coast, and who took a most active interest in the whole thing, will be able to verify these particulars.

On the 30th March I forwarded, by the Colonial Government steamer "Hinemoa," eighteen of Sir James Maitland's boxes, being six *ex* "Kaikoura," ten *ex* "Doric," and two that were on hand from previous shipments, which I hope you have received all right. The six boxes *ex* "Tongariro" I will forward by the earliest opportunity.

Whitefish.—I am sorry I cannot give such a good account of these fish. The ova arrived in splendid order, but, the weather being very warm, the temperature of the water was high—namely, 55° Fahr. The eggs began to die fast the day after they were placed in the water; but ultimately a good many hatched, estimated to be from ten to twenty thousand out of the fifty thousand, the number stated to be in the tray we received on the 9th February; but after they began to feed they died very fast, and on the 9th March we turned the remainder—about a thousand—into a new pond of considerable depth, where they have been seen by Ranger Burt occasionally since. I may say that I placed between two hundred and three hundred in one of the hatching-boxes at Opoho, and I was not a little surprised at the result of these. The native robins were in the habit of frequenting the hatching-house, and, as the box in which the whitefish-ova were placed was, of course, uncovered, the robins had taken the lot before I detected them. I caught them in the act, and, of course, quickly showed them the door after that. This was my reward for encouraging them about.

I have, &c.,
F. Deans,
Curator.

The Secretary of the Marine Department, Wellington.

No. 29.

Lieutenant Smith, R.N., to the Secretary, Marine Department.

Sir,— Wellington, 17th February, 1887.

I have the honour to report as follows on the transportation of whitefish-ova, per steamship "Alameda," from Auckland to Queenstown. In accordance with the instructions received, I proceeded to Auckland, per steamship "Waihora," on the 28th ultimo, arriving at that place on the 31st.

From the 31st ultimo to the 4th instant I was engaged in making all the necessary preparations for receiving the ova, and on the latter date they were all completed with the exception of removing the ice from the freezing-works, orders having been given for it to be sent direct from the freezing-room to the van on the arrival of the mail-steamer, the ice-chest having been previously sent to the freezing-works. I also engaged two carpenters (with the necessary timber) to accompany me in the tug "Awhina" to Tiritiri, on the evening of the 6th instant, for the purpose of boarding the mail-steamer, and making cases, if necessary, on the way up to the wharf. The "Alameda," however, arrived unexpectedly on the morning of the 5th instant, not being expected by the Postal authorities until late on the afternoon of the 7th instant. I found that the necessary cases had been made on board.

In company with Mr. Cheeseman, the Secretary of the Auckland Acclimatization Society, I went into the ice-room, and found the ova-cases embedded in solid ice, requiring the use of a pick to bring them to light. On opening the cases, and examining the top tray in each case, the ova was found to be in splendid condition, and the packing-arrangements so good that it was deemed undesirable to open all the trays. The ice packed in the moss in North America was still intact. The trays were placed one over the other with a thick layer of moss between each tray, the whole battened together with light battens, and placed in a packing-case with a space about 4in. between the trays and the case, this space being tightly packed with moss and ice.

On removing the cases from the icehouse they were placed in the large packing-cases on a thick layer of ice and sawdust, the side spaces being filled with ice and sawdust tightly packed, the top filled in with ice, and the lids screwed down. I would recommend that any future shipments of ova from America should, if possible, be sent by the "Alameda," not only on account of the perfect arrangements made for this consignment, but by so doing there would be a probability of there always being some one on board who had seen the arrangements for previous shipments. I gave the steward the full amount of bonus authorized in my instructions—viz., £5—a portion of which I saw him hand over to the butcher. I engaged three men and an express to transport the ova to the railway-station, the assistance that it had been arranged I should have from the Customs Department being unavailable on account of a sudden influx of shipping.

The ova and ice were placed in the forehold of the "Rotorua" at 3.30 p.m. on the afternoon of the 5th instant, and the cases wrapped round with blankets. I may add here that every assistance was given me by the Collector of Customs and the Chief Postmaster at Auckland. Mr. Cheeseman and Mr. Brewer, of the Acclimatization Society, also agreed to asist me all they could in examining the ova.

The following forenoon, at Taranaki, the cases were repacked with ice, and again at midnight at Wellington, when I handed over ten trays to Mr. Wilson for transhipment to Nelson. A further supply of ice was taken in here, and a start made again in the "Hinemoa" at 3.30 a.m. on the morning of the 9th instant. The cases were repacked with ice again at 3.30 p.m., the "Hinemoa" arriving at Lyttelton at 9. p.m. The cases were here removed to a special van, and a further supply of two sacks of ice taken in, a start being made from Christchurch at 9.30 p.m. The cases were then repacked with ice, and a supply of 6cwt., packed in sawdust, was received at Oamaru. On nearing Dunedin I had one case ready to hand over a tray to the Dunedin Acclimatization Society; but on arriving there I was met by Mr. Wilkie, the secretary, and Mr. Deans, the curator, the latter of whom accompanied me to Clinton to take over the tray there. The cases were repacked on leaving Dunedin, and again on leaving Clinton, also between Gore and Lumsden. At Lumsden a special engine was attached to the van, and I arrived at Kingston shortly after 9 p.m., where a steamer was waiting to proceed to Queenstown. I arrived at Queenstown at midnight on the 8th

instant. The cases were taken up to the hatching-house the following morning, and during the 9th the whole of the ova was satisfactorily placed in the hatching-boxes, the unpacking and removal of dead eggs being performed by myself, the placing in the boxes, by the curator and his assistant. The work was concluded at 5 p.m. The appearance of the ova was healthy in the extreme, not more than one in a thousand being dead, and the fish visible in the eggs. There appeared, however, to be one defect, for on placing the eggs in the water (which had been previously reduced with ice to 48°) the eggs did not fall apart, as they should have done, but hung together in groups, which required a slight agitation with a feather to separate them. A close examination of the eggs in the trays pointed to the conclusion that there had been too much pressure on the eggs from the super-incumbent moss, in some places the shape of the lumps of moss having been imprinted on the eggs. With the exception of the two bottom trays in one case, the condition of the eggs was, with little variation, the same throughout. Attached herewith is a statement of the condition of each tray unpacked at Queenstown. The temperature inside the cases was always 32° on opening them to repack, and the North American ice was still intact at Queenstown. The normal temperature of the water at Queenstown is 50°. This was reduced to 48° with ice, and, as the 6cwt. taken from Oamaru was untouched, and a considerable amount remained in the ice-chest, there was every probability of the hatching being a success. All the water at this place was filtered through flannel before going into the boxes. I handed over to Mr. Firth, the secretary of the society, the copy of the parliamentary papers I had with me on the introduction of the whitefish, with a request to give them to the curator when read.

The following morning at 8 a.m. I left Queenstown for Clinton, in order to see the hatching-arrangements there. Before leaving the curator informed me that the fish were hatching out and were lively. Through there being no connection beyond Lumsden on the 10th I did not get to Clinton till the 11th. Ranger Burt met me on arrival, and drove me out to the hatching-house, situated about two miles from the station. This place seems eminently suited for the rearing of salmon and trout, but not so for whitefish. The supply-race is twenty-four chains long, and, at present, is uncovered, so that the water is considerably raised in temperature before reaching the hatching-house. The supply of water is all that could be desired, and the soil—clay—suitable for ponds. The slope of the ground gives a good fall of water, securing perfect aëration, and there is plenty of room for future extension. I found about 50 per cent. of the whitefish-eggs were dead, but those hatched out were lively and strong. The filtering-arrangement had been removed, and consequently a considerable amount of sediment was in the boxes. Not the least important feature about the Clinton Ponds is the fact that young fish can go straight from the ponds to sea without any manipulation whatever. Trees were being planted for shade and shelter, but it cannot be gone into as extensively as it should be, on account of insufficiency of funds. I left Clinton on the morning of the 12th, and on arrival in Dunedin wired to Queenstown for result. The reply was that about 50 per cent. of the ova had gone bad.

On the morning of the 14th instant I went to the Opoho hatching-ponds with Mr. Wilkie, the secretary of the society, and examined the whitefish there, Mr. Deans, the curator, having brought about four hundred back from Clinton with him. About 50 per cent. appeared to be dead.

From the fact that the percentage of dead to live ova at the three different hatching-houses was the same under different conditions, I have come to the conclusion that the loss is due to some defect inherent or acquired in the eggs themselves, notwithstanding the good condition in which they appeared to be on examination. I returned here on the 16th instant.

In conclusion I beg to state that all the arrangements for the transportation of the ova from Auckland to Queenstown were perfect, and that no hitch occurred anywhere, and that every facility was given me for successfully transporting the same.

I have, &c.,

The Secretary, Marine Department. GEO. F. SMITH, Lieut., R.N.

Whitefish-ova.—Condition of Trays.—Case No. 1: Ten trays transhipped to Nelson; one to Clinton; Nos. 12, 13, 14, 15 (very good) to Queenstown. Case No. 2: Nos. 1, 2, 3, 4, very good; Nos. 5, 6, 7, 8, 9, 10, 11, first-class condition; Nos. 12, 13, not so good; No. 14, bad round corners; No. 15, very bad round corners. G. F. SMITH, Lieut., R.N.

No. 30.

Lieutenant SMITH, R.N., to the SECRETARY, Marine Department.

Wellington, 7th March, 1887.

SIR,—

I have the honour to report as follows on the transhipment from Wellington to Clinton and Invercargill of the salmon-ova per steamship "Kaikoura."

Leaving Wellington at noon on Monday, the 28th February, Lyttelton was reached at 6 a.m. the following day. The boxes were at once transferred to a van which was attached to the southern express, Dunedin being reached the same night. The cases were iced up frequently, and left well filled for the night. A start was made for Clinton and Invercargill the next morning, six cases being handed over to Ranger Burt at the former place, and the two remaining cases being delivered to the Secretary of the Southland Acclimatization Society at the latter place, they being immediately placed in an express and conveyed to Wallacetown. I returned to Dunedin the next day, Thursday, and to Lyttelton on Saturday, taking the Rotorua to Wellington, arriving here on the 6th inst.

I have, &c.,

The Secretary, Marine Department, Wellington. GEO. F. SMITH, Lieut., R.N.

No. 31.

Lieutenant Smith, R.N., to the Secretary, Marine Department.

Sir,— Wellington, 23rd March, 1887.

I have the honour to report as follows on the salmon-ova *ex* "Doric" conveyed by me to the southern acclimatization societies:—

Leaving Wellington at 11.30 a.m. on the morning of the 16th instant by the "Stella," Lyttelton was reached at 7.20 next morning, too late to catch the ordinary train to Christchurch. A special was in waiting, and by delaying the south express four minutes the ova-van was attached to it. At Oamaru I handed over one box of ova to Dr. Delatour, the President of the Waitaki County Acclimatization Society. During the short interval allowed there I opened the case in the presence of the President and Vice-President. Fungus had apparently made headway in this case; but, owing to the short interval allowed at Oamaru, and the dim light of the van, no thorough inspection could be made. The cases were filled three times on the journey with ice; but, as the weather was cool, the loss never amounted to more than a pound in the intervals, the ice-trays being practically full all the time. A start was made from Dunedin on the morning of the 18th, and at Clinton I handed over ten boxes to the curator of the Otago society, who accompanied me from Dunedin. The ova was examined *en route*, and was found (so far as the top layers were concerned) to be in first-class order. At 6 p.m. the same evening the remaining five boxes were handed over to the curator of the Southland society. On my return I visited the Clinton and Opoho hatcheries. The young salmon resulting from the "Kaikoura's" shipment of ova were in first-class condition. I returned to Wellington per "Hawea" to-day.

I have, &c.,

The Secretary, Marine Department, Wellington. Geo. F. Smith, Lieut., R.N.

No. 32.

Lieutenant Smith, R.N., to the Secretary, Marine Department.

Sir,— Wellington, 4th April, 1887.

I have the honour to report as follows on the transhipment from Wellington to Lyttelton, Dunedin, and Oamaru of the consignment of trout- and salmon-ova per steamship "Tongariro:"—

Leaving Wellington at 6.30 p.m. on the evening of the 28th ultimo, Lyttelton was reached at noon the following day. I there handed over to Mr. Farr a large case containing Continental ova, and one Howietoun case containing Scotch ova (*Salmo salar*).

Lyttelton was left at 2.30 p.m., and Dunedin reached at 10.30 a.m. on the 30th. Mr. Deans there took charge of the six cases of Scotch ova, one case containing only half the usual amount, the remaining half being despatched to Oamaru by the 3.10 p.m. train.

I personally assisted at the unpacking and placing of all the ova in the Opoho hatching-boxes, and found the result, as concerns the bad eggs, to be precisely the same as in the shipments per "Doric" and "Kaikoura." The bottom layer in each tray was seldom less than 50 per cent. bad, the majority being fully 75 per cent. bad; and in one tray the whole of the bottom layer was bad, although the superincumbent layers were in very good order.

With a small spring-balance I found the weight of the saturated moss and ova resting on the bottom layer to be 2½lb. This weight appears to be excessive, as the ova frequently had a crushed appearance. The moss also throughout each tray was dense enough to roll off in a sheet, forming a thick pad, and the bottom layer, being close to the perforated-zinc bottom of the tray, received the effects of any concussion resulting from jarring of the case.

I would respectfully suggest that Sir J. Maitland's attention be drawn to this important defect. A lessening of the number of layers in each tray, and increasing the number of trays in a case, or substituting white scrim for perforated zinc, appear from the result of the recent unpacking to be different ways of gaining the same remedial effect.

The unpacking was completed by 1 p.m. on the 31st instant, and I returned to Wellington per "Hinemoa," leaving Lyttelton on the 2nd instant.

The supply of water at Opoho is now excellent, and, Mr. Deans informs me, will remain so until close on the end of the year.

The "Kaikoura's" fry were in fine condition. It may be noted, however, that a larger percentage of deformed fish existed in the fry from Tay ova than from the others.

I have, &c.,

The Secretary, Marine Department, Wellington. Geo. F. Smith, Lieut., R.N.

No. 33.

The Secretary, Lakes District Acclimatization Society, to the Secretary, Marine Department.

Sir,— Office Lakes District Acclimatization Society, Queenstown, 9th February, 1887.

I have the honour to report that the consignment of whitefish-ova arrived here last evening in care of Lieutenant Smith, who has given every attention to his charge. The ova was allowed to remain on the steamer until daylight this morning, when the boxes were taken up to the hatchery. The ova, on being opened out, proved to be in splendid condition, with the exception of the two bottom trays, in one of which one-half of the contents was bad. The percentage of bad eggs in the other trays was virtually nil, not more than two or three in a thousand. The packing has been most carefully done, and the only fault to be found with it is that there has been a little too much pressure, making the eggs stick together in lumps: this, however, I think, can be got

over with a little time and patience. So far, I have no hesitation in saying that the consignment is an unqualified success. I have no need to say anything further, as, no doubt, Lieutenant Smith has written you fully on this matter. I will report progress from time to time.

I have, &c.,
H. Nelson Firth,
Secretary, Lakes District Acclimatization Society.

The Secretary, Marine Department, Wellington.

No. 34.

The Curator, Otago Acclimatization Society, to the Secretary, Marine Department.

Sir,— Opoho, Dunedin, 12th May, 1887.

I returned from the Clinton ponds last night, and, as I omitted in my last to state the number of salmon we calculated to have from the recent shipments, I was about to write to you again, when Mr. Wilkie handed me your telegram.

I have much pleasure in informing you that the young salmon are progressing most satisfactorily. There were in all twenty-one boxes and a half, and I believe each box contained on an average about 20,000. This would give us a total of about 430,000 ova. Six boxes per "Kaikoura" gave 50 per cent. of good eggs, ten boxes per "Doric" 70 per cent., and five boxes and a half per "Tongariro" about 65 per cent.; so that I estimate we will have about 270,000 young salmon. The first hatched have been feeding for some weeks, and are doing remarkably well.

The salmon hatched from box 91, *ex* "Doric," have got a singular peculiarity about them: there are a number of them—probably 20 or 25 per cent.—which have a small portion of the sac hanging at a considerable distance from the body by a fine thread. This part is quite globular in shape, and eventually drops off as the fish gets older. As it is difficult to describe, I forward per mail a few specimens for examination. I observed about half a dozen amongst those we got last year, but I did not take sufficient care to ascertain whether it resulted fatally. It will be interesting to note whether this will be the case this time.

I have, &c.,
F. Deans,
Curator.

L. H. B. Wilson, Esq., Marine Department, Wellington.

No. 35.

The Honorary Secretary, Waitaki County Acclimatization Society, to the Secretary, Marine Department.

Sir,— Waitaki County Acclimatization Society, Oamaru, 21st March, 1887.

I have the honour to acknowledge the receipt, on Thursday, the 17th instant, of a box, numbered "94," of Tay-salmon ova, from the Howietoun Fishery, *ex* steamship "Doric," and delivered at the Oamaru Station by Lieutenant Smith, R.N. The box was in good order when delivered, and was at once conveyed to our hatchhouse. On being opened it contained six trays of ova, in two rows of three trays each. Each tray contained three layers of ova separated by moss. A large proportion of the ova were dead, and attacked by fungus. Those attacked in this way were adherent to the moss, the threads of the fungus extending to, and causing to adhere to it, all the adjacent healthy ova. Some of the latter—*i.e.*, apparently healthy ova—were separated and watched. They have since died. It is satisfactory to note that even a small proportion have survived and are healthy.

The dead and fungussed ova were separated, and these were weighed and counted. It was found that a tablespoonful weighed exactly half an ounce, and contained 150 eggs, and that the dead ova from the six trays weighed rather more than 21oz., which would amount to 6,300 absolutely bad ova on the first inspection. A quantity of ice had been previously prepayed to lower the temperature of the water in the hatchhouse, the temperature being, outside, 60° Fahr., and in the boxes reduced to 52°. Since Thursday last at least six thousand more have perished, and we expect to lose a few more. The ova are so far advanced, some few hatching out on the day after their arrival. They appear to have been well fertilized, and all show the eyes, and thus require gentle handling and great care.

With regard to the packing, in every tray containing three layers of ova it was found that the lowermost layer was the worst, as though it could not stand the pressure of the moss, and the two upper tiers of ova and the middle layer was the best in each tray. The bottom trays were the worst, and in both cases the lowermost layers of ova were so bad that the whole had to be condemned. The box seems admirably designed for its purpose, and the only suggestion we have to offer is that there should be a separate tray for each layer of ova, in order to avoid crushing, and also that the trays might be so arranged that each tray can be examined *en route*, and the dead eggs removed from time to time, to avoid the contagion of fungus.

I have, &c.,
Jas. Field Crawford,
Honorary Secretary.

The Secretary, Marine Department.

No. 36.

The Honorary Secretary, Waitaki County Acclimatization Society, to the Secretary, Marine Department.

Sir,— Waitaki County Acclimatization Society, Oamaru, 15th May, 1887.

In reply to your telegram of the 12th instant, the Waitaki County Acclimatization Society has received two allotments of salmon-ova this season—one box *ex* steamship "Doric," and two

boxes *ex* steamship "Tongariro." We have already advised the Marine Department of the receipt and progress of hatching of the first allotment, by letter dated the 21st March. The young fry of this lot we now estimate from four to five thousand. They are in our races, and look very healthy.

The second shipment, *ex* "Tongariro," were sent to us by Lieutenant Smith, and consisted of one box containing about nine thousand ova in better condition than the previous shipment. Of these, between three and four thousand have hatched out. They are now in the hatchhouse, and have not yet absorbed their umbilical bags. They look healthy. There are, however, a large proportion of deformed fish. This we attribute to the rapidity with which they hatched out after being placed in our hatchhouse. The temperature of the water did not at any time exceed 58° Fahr.; but there is a sudden transition from the cool chambers of the ship to the water in the hatchhouse. To meet this, for some days we kept ice in the filter-boxes. We estimate the number of deformed fish at from 10 to 12 per cent. of those hatched out. If this be the cause of the deformity, it would arise from the more rapid development of certain tissues at the expense of others, in consequence of the sudden change from great cold to a warm situation; or, on the other hand, the cause of deformity may be at the other side, and then be caused by arrest of development of certain tissues in the ovum by a sudden change from warmth to great cold.

If the ova of the second shipment were of the same age, impregnated at the same date as the ova of the first shipment, this latter would probably be the correct reason of there being a larger proportion of deformed fish in the second than in the first shipment. We may add that we have accommodation for more than twice the quantity of ova allotted to us, and if necessary could increase that accommodation.

I have, &c.,

JAS. FIELD CRAWFORD,
Honorary Secretary.

The Secretary, Marine Department, Wellington.

No. 37.

Dr. HECTOR to Hon. Sir JULIUS VOGEL.

Colonial Museum of New Zealand, Wellington, 29th July, 1886.

Memorandum re *Introduction of Lobster.*

I THINK it important to draw your attention to some recent experiments, by Captain H. C. Chester, at the United States Fish Commission station, Woodshall, Massachusetts, as described in *Science*, 11th June, 1886, demonstrating that it is possible to hatch the ova of the lobster in unlimited quantities, and that adult lobsters can be kept alive for an almost indefinite period in a moist, cold atmosphere, especially if packed between layers of wet seaweed and placed in an icehouse. Males and females in pea, or with eggs attached, can be, I believe, easily conveyed

This important discovery is to be utilized for the propagation of lobsters on the Pacific coast of America, where there are none at present. The first experiments with the European lobster were made by Mr. G. M. Dannevig, Flodevig, Arendal, Norway; and it might be useful to ask the Agent-General to communicate with that gentleman as well as with the United States Fish Commission, as it is possible that the difficulties which he mentions as attending the transport of lobsters in his letter of the 18th November, 1885 (see Parliamentary Paper H.–7, 1886, p. 4), have been now overcome. Of course, it would still be necessary, as I pointed out last year, to afford sufficient time before the shipment of lobsters (and also edible crabs) for making proper arrangements for receiving and hatching them at this end.

The best place for a station, in my opinion, would undoubtedly be Stewart Island. I would also suggest that a shipment of the large crabs from the south coast of Tasmania might easily be obtained, as the direct steamers, with freezing-chambers, call there, and the time occupied in transmission will be so short that there will be little risk of failure.

The Hon. Sir J. Vogel, K.C.M.G.

JAMES HECTOR.

No. 38.

The SECRETARY, Marine Department, to Dr. HECTOR.

(Memorandum.) 7th October, 1886.

WITH reference to your memorandum of the 29th July last, addressed to the Hon. Sir Julius Vogel, I have been directed by the Minister having charge of this department to thank you for drawing attention to recent experiments by Captain H. C. Chester, of the United States Fish Commission, as described in *Science*, 11th June, 1886, demonstrating that it is possible to hatch the ova of the lobster in unlimited quantities, and that adult lobsters can be kept alive for an almost indefinite period in a moist, cold atmosphere; and I am to state that by the outgoing San Francisco mail the United States Fish Commissioner and the Deputy Minister of Marine and Fisheries of Canada will be asked to supply further particulars hereon, with the view, if possible, of introducing the lobster into New Zealand.

Dr. Hector, the Museum, Wellington.

WILLIAM SEED.

No. 39.

The Hon. the MINISTER of MARINE to the UNITED STATES COMMISSIONER of FISH and FISHERIES.

SIR,— Marine Department, Wellington, 7th October, 1886.

The attention of this department having been drawn to some recent experiments made by Captain H. C. Chester at the United States Fish Commission station, Woodshall, Massachusetts,

as described in *Science*, 11th June, 1886, showing that it is possible to artificially hatch the ova of the lobster, and that adult lobsters can be kept alive for a long period in a moist, cold atmosphere, I should feel much obliged if you would be kind enough to inform me whether any further experiments have been made hereon, and whether the result of such experiments would justify the expectation that lobster-ova or live lobsters could be successfully transferred from San Francisco to this colony, the voyage lasting about twenty days. Any further information that you could give on this subject would be highly esteemed. I have, &c.,

Jos. A. Tole,
(For Minister having charge of Marine Department.)

The Hon. Spencer F. Baird, United States Commissioner of Fish and Fisheries, Washington, D.C., United States of America.

No. 40.

The United States Commissioner of Fish and Fisheries to the Hon. the Minister of Marine.

United States Commission of Fish and Fisheries, Washington, D.C.,
Dear Sir,— 5th February, 1887.

Your letter of the 7th October was duly received, and was referred to Mr. Rathbun, who has charge of the lobster experimental works. His reply (herewith enclosed) will explain the facts as known to him, and the cause of delay in answering. Yours truly,

Spencer F. Baird.

The Hon. J. A. Tole, Marine Department, Wellington, New Zealand.

Enclosure.

Mr. Rathbun to Professor Baird.

United States National Museum under direction of the Smithsonian Institution,
Sir,— Washington, 4th February, 1887.

I have been holding this communication from the Marine Department of Wellington hoping that Mr. Ryder's report on the lobster-experiments of last summer would soon be published and serve as a partial answer to the questions asked. I presume, however, that a reply should be made at once in view of the fact that the lobster spawning-season is now approaching.

I think that the success of carrying lobsters thirty days, especially when the first ten days involve a tedious railroad journey, is exceedingly problematical. None of our experiments as yet prove that lobsters can be kept more than fifteen or twenty days even under the most favourable conditions. It also appears probable, from the experiments made, that the immature eggs kept in confinement for a long time become choked with dirt and are apt not to hatch; they also require a constant change of water. It is possible they might carry better attached to the parent. The transporting of a lot of lobsters to Australia would require a considerable outlay of money, the very best of facilities, and an experienced attendant constantly on hand. Would it not be best to recommend a delay on the part of the Wellington authorities until we have made further experiments? If so, shall I prepare letter? Respectfully,

Professor Baird. R. Rathbun.

No. 41.

The Hon. the Minister of Marine to the United States Commissioner of Fish and Fisheries.

Sir,— Marine Department, Wellington, 19th March, 1887.

I have the honour to acknowledge the receipt of your letter of the 5th ultimo forwarding a report by Mr. Rathbun as to the possibility of introducing lobster-ova or live lobsters into this colony from America; and I beg to express my warmest thanks to you for obtaining and furnishing this report. I shall esteem it a great favour if you will acquaint me of the results of further experiments which may be made by Mr. Rathbun. I have, &c.,

W. J. M. Larnach.

The Hon. Spencer F. Baird, United States Commissioner of Fish and Fisheries, Washington, D.C., United States of America.

No. 42.

The Secretary, Marine Department, to the Deputy Minister of Fisheries, Canada.

Sir,— Marine Department, Wellington, 7th October, 1886.

The attention of this department having been drawn to some recent experiments made by Captain H. C. Chester at the United States Fish Commission station, Woodshall, Massachusetts, as described in *Science*, 11th June, 1886, showing that it is possible to artificially hatch the ova of the lobster, and that adult lobsters can be kept alive for a long period in a moist, cold atmosphere, I should feel much obliged if you would be kind enough to inform me whether you have any information on this subject that would enable this department to ascertain whether there is a probability of lobster-ova or live lobsters being successfully transferred from San Francisco to this colony, a voyage lasting about twenty days. I have, &c.,

The Deputy Minister of Marine and Fisheries, Ottawa, Canada. William Seed.

No. 43.

The Deputy Minister of Fisheries, Canada, to the Secretary, Marine Department, Wellington.

Sir,— Ottawa, 6th November, 1886.

I have the honour to acknowledge the receipt of your letter of 7th ultimo, and to state that this department regrets its inability to give you any information with regard to the possibility of successfully transporting lobster-ova or live lobsters from San Francisco to New Zealand.

I have, &c.,
John Tilton,
Deputy Minister of Fisheries.

William Seed, Esq., Wellington, New Zealand.

No. 44.

The Curator, Southland Acclimatization Society, to the Secretary, Marine Department.

Sir,— Invercargill, 14th May, 1887.

In accordance with instructions received from the Honorary Secretary of the Southland Acclimatization Society, I beg to submit to you the following statement of the number of young salmon now in the hatching-boxes at the Wallacetown ponds.

Permit me first to state that the fish now in the boxes are very strong and healthy, feeding well, and with a very small death-rate.

The first lot I laid down—19,777 *ex* "Kaikoura"—did not commence to hatch for ten days, as I anticipated, but then they came very quickly, and hatched clean out without any tail of bad ova. In fact, hatching commenced on the 13th March, and was finished on the 20th. From them I removed 450 deformed fish. I commenced to feed water-fleas to them on the 19th April, but they did not feed freely till the 1st May. Now they are feeding greedily on both fleas and liver. In the second lot laid down—65,835 *ex* "Doric"—general hatching commenced on the seventh day, but was very uneven—some boxes being almost finished when others were commencing; and in this lot there was a large tail of ova that would not hatch, and eventually died.

I removed the last 3,000 ova and put them by themselves. From them I did not get fifty good fish; and yet there were fish in all of them, but they seemed unable to burst the shell. They commenced to hatch on the 27th March, and it was the 26th April when I removed the last of the ova. A very great contrast to the first lot; but those that did hatch proved the better fish and with the smallest death-rate. From them I removed 2,500 deformed fish, which is a large percentage. These fish have only been feeding a few days, and are looking as well as I could desire, with a very small death-rate. The deaths among the alevins in both lots have been caused chiefly by dropsy and constitutional weakness.

I have, &c.,
Archibald N. Campbell,
Curator, Southland Acclimatization Society.

William Seed, Esq., Secretary, Marine Department, Wellington.

Salmon-ova ex "*Kaikoura.*"

Ova laid down 3rd and 4th March, 1887			19,777
Ova died during hatching	2,527		
Alevins died since hatching	2,002		
Deformed fish removed	450		
		4,979	
Live fish in boxes, 14th May, 1887			14,798

Salmon-ova ex "*Doric.*"

Ova laid down 19th and 20th March, 1887			65,835
Ova died during hatching	9,136		
Alevins died since hatching	2,470		
Deformed fish removed	2,500		
		14,106	
Live fish in boxes, 14th May, 1887			51,729
Grand total			66,527

No. 45.

The Honorary Secretary, Canterbury Acclimatization Society, to the Chief Clerk, Marine Department.

Sir,— Canterbury Acclimatization Society, Christchurch, 20th May, 1887.

I am now enabled to report to date the results of the ova *ex* R.M.S.S. "Tongariro," and allotted to the Canterbury Acclimatization Society, Christchurch. Of the supposed 50,000 Rhine-salmon ova only 3,620 good ones were picked out, from which we have 3,250 alevins. Of the Rhine brook-trout, Alpine char, and Carpione trout, I can only say I believe we have a few of two of them, but, not knowing what they are, we must wait for their development. Loch Leven trout ova, of which there was 17,760: 13,140 hatched out, many being unimpregnated, and 1,935 of those hatched

were deformed, which, with 1,405 sickly ones, have died, leaving 9,800 healthy alevins. Tweed-salmon ova: Counted out of trays 2,220 eggs: 670 were dead and covered with fungus; 1,550 hatched, out of which 170 were deformed and died, leaving us on hand 1,380 alevins. I shall be glad to receive the particulars *in re* char and trout, descriptive their habitat, &c., as soon as you can oblige.

I have, &c.,
S. C. Farr,
Honorary Secretary and Treasurer.

L. H. B. Wilson, Esq., Chief Clerk to Marine Department,
Government Buildings, Wellington.

No. 46.

The Honorary Secretary, Wellington Acclimatization Society, to the Secretary, Marine Department.

Sir,— Wellington Acclimatization Society, Wellington, 31st May, 1887.

Referring to former correspondence on the subject of ova imported by the steamships "Kaikoura" and "Tongariro," which was presented to the Wellington Acclimatization Society this autumn, I have now the honour to supplement former reports by giving net results.

American Brook-char (Salvelinus fontinalis) *Ova* ex "*Kaikoura.*"—The two cases of this ova from Mr. Armistead's Solway Fisheries, at Dumfries, that were given to this society, arrived, as you are aware, in bad condition last February (*vide* letter of the 1st March). About four thousand five hundred ova were placed in the hatching-boxes, but, in spite of very careful treatment, a large number died subsequently from disease. After considerable labour there is a net result of about two thousand five hundred healthy fry, which are feeding and doing very well in one of the races at the ponds. It is intended to reserve five or six hundred for parent stock to change the breed, liberating the remainder in our rivers.

Loch Leven Trout (Salmo levenensis) *Ova* ex "*Tongariro.*"—The second lot of ova we received arrived on the 29th March. I have, in my letter of the 5th April, given details of the condition in which this ova arrived. The case of Loch Leven trout ova from Sir James Maitland's Howietoun Fishery arrived in capital condition. Considering the unfavourable time of year at which it arrived—a time at which the temperature even of spring-water is at its highest—the hatching was very good. As a result, we have about fifteen thousand fine healthy fry in one of our races, out of which it is intended to keep a number of parent fish, distributing the remainder in various rivers.

Rhine-salmon Ova ex "*Tongariro.*"—The extremely bad condition in which these ova arrived rendered the task of dealing with it a difficult one; but, after considerable loss among the live ova that were saved, there are about five thousand good healthy fry left in the rearing-race, feeding and doing well. The question as to what river is most suitable to liberate these fish in has engaged the attention of several members of this society, and it is proposed to try the experiment of turning them into the Otaki, a river rising in the heart of the Tararua Range, and running for the greater part of its course in deep gorges, hence very cold and pure in its water. A few young salmon have been preserved from each shipment, so as to test the possibility of raising in our waters a landlocked variety, such as the *Salmo salar* variety—*sebago* of America—an interesting and valuable experiment. There are a few fish about 1ft. long saved from Mr. Farr's shipment, but no ova has yet been obtained.

Rhine-trout and Alpine-char Ova ex "*Tongariro.*"—No particulars have as yet been obtained from your department as to the particulars of these ova. Though the contents of the trays we received were kept separate, it is not known yet what they are. But a few of these ova could be saved, owing to the bad condition they arrived in; but we have managed to hatch and place in rearing-races about five hundred fry of the larger trout-ova, fifty of which have been sent to the Auckland Acclimatization Society for use as parent stock. The small white ova, supposed to be Alpine char, were in very bad condition, and only about twenty sickly fish hatched out, three of which are still alive.

Owing to the bad condition in which much of the imported ova arrived, its manipulation was an easy task, and much credit is due to Mr. Ayson, the painstaking curator at the fish-ponds, for the success achieved in spite of many difficulties.

The "egg-harvest" at the ponds has commenced early this season, and already upwards of fifty thousand ova of the American brook-char have been taken. It is expected that a large number of Loch Leven and brown trout ova will be secured this spawning.

The magnitude of the work required to be done to stock the rivers on the West Coast is so great that diligence and hard work will be necessary. To enable the work to be properly carried out more pond-accommodation and a storehouse are required; but no funds are forthcoming for this object, as the income received from fishing- and shooting-licenses is too small to carry on current expenses without appealing to the public for subscriptions. After a considerable struggle the nucleus of a splendid fish-hatchery has been established, and it is to be hoped that the Government will in every way in their power assist in carrying on a work which provides a valuable economic food-supply, a possible future article of export, and a means of healthy recreation for our population and for tourists, the advantages of which the highest authorities have recognized.

I have, &c.,
Alex. J. Rutherfurd,
Hon. Sec., Wellington Acclimatization Society.

The Secretary, Marine Department.

No. 47.

The Secretary, Marine Department, to the Honorary Secretary, Southland Acclimatization Society.

(Telegram.) Wellington, 12th March, 1887.

Am directed to inform you that Government are strongly of opinion that all the salmon-fry hatched from ova imported this season should be placed in one river, that river to be the most suitable one for salmon that is in the Otago-Southland District. They therefore rely upon your society joining the Otago society in the selection of a river in which to place the fry. Further shipment salmon-ova will arrive by "Doric" on Tuesday. Please wire promptly how many you can take.

Lewis H. B. Wilson,
(For Secretary.)

The Honorary Secretary, Acclimatization Society, Invercargill.

No. 48.

The Secretary, Marine Department, to the Honorary Secretary, Southland Acclimatization Society.

Sir,— Marine Department, Wellington, 25th May, 1887.

Referring to my telegram of the 12th March last, I shall feel obliged if you will let me know whether the Southland and Otago societies have made any arrangements as to the river in which the salmon-fry is to be liberated, and, if so, what the arrangements are.

I have, &c.,
Lewis H. B. Wilson,
(For Secretary.)

The Honorary Secretary, Southland Acclimatization Society, Invercargill.

No. 49.

The Secretary, Marine Department, to the Honorary Secretary, Otago Acclimatization Society.

(Telegram.) Wellington, 12th March, 1887.

Am directed to inform you that Government are strongly of opinion that all the salmon-fry hatched from the ova imported this season should be placed in one river, that river to be the most suitable one for salmon that is in the Otago-Southland District. They therefore rely upon your society joining the Southland society in the selection of a river in which to place the fry. Further shipment salmon-ova will arrive by "Doric" on Tuesday. Please wire promptly how many you can take.

Lewis H. B. Wilson,
(For Secretary.)

The Honorary Secretary, Acclimatization Society, Dunedin.

No. 50.

The Secretary, Marine Department, to the Honorary Secretary, Otago Acclimatization Society.

Sir,— Marine Department, Wellington, 25th May, 1887.

Adverting to your letter of the 29th March last, I shall feel obliged if you will let me know whether the Otago and Southland societies have made any arrangements as to the river in which the salmon-fry is to be liberated; and, if so, what the arrangements are.

I have, &c.,
Lewis H. B. Wilson,
(For Secretary.)

The Honorary Secretary, Otago Acclimatization Society, Dunedin.

No. 51.

The Honorary Secretary, Otago Acclimatization Society, to the Minister having Charge of the Marine Department.

Sir,— Otago Acclimatization Society, Dunedin, 1st June, 1887.

I have the honour to acknowledge receipt of your favour of the 25th ultimo, *re* river for salmon-fry.

We have not yet come to any arrangement with the Southland society. Some time ago they wrote us that their Council deemed the Waiau the most suitable river. Yesterday I had advice that they now decide in favour of the Aparima. We are of opinion that, taking all things into consideration, the Molyneux is the most suitable river. I beg to enclose copy of letter to the Southland society, giving some of our reasons for making this choice.

I have, &c.,
James Wilkie,
Honorary Secretary.

The Hon. the Minister of Marine, Wellington.

Enclosure.

The Honorary Secretary, Otago Acclimatization Society to the Honorary Secretary, Southland Acclimatization Society.

Dear Sir,— Dunedin, 1st June, 1887.

In reply to your wire of this date, I have to advise you that the Council of our society had the matter under consideration yesterday. We are of opinion that the river most suitable for turning out the young salmon is the Molyneux. This river is in direct and unimpeded communication with Lakes Wanaka and Hawea. In its course it receives innumerable tributaries, many of them in themselves important rivers eminently suited both for spawning- and fishing-requirements. The main river, as well as several of its tributaries, are most conveniently situated as regards railway-communication. Further, our hatchery is in direct communication with it. We have simply to allow the fish to escape from the ponds, neither cartage nor railage being required. This, in the case of two-year-old fish, is an important matter.

We are strongly of opinion that the success of the experiment would be greatly imperilled by turning out the young salmon a year or so before they are ready to go to sea. During that year their numbers would be very much reduced by the many enemies they would meet with. We propose keeping them until they assume their smolt-livery, which they do at from eighteen months to two years old. When liberated at this stage they are likely to go straight to sea, and, being then of a considerable size, they are better able to take care of themselves.

The above are some of the reasons which have guided us in our choice of a river.

I have, &c.,
James Wilkie,
Honorary Secretary.

Aaron Black, Esq., Honorary Secretary, Southland Acclimatization Society.

No. 52.

The Secretary, Lakes District Acclimatization Society, to the Secretary, Marine Department.

Sir,— Office, Lakes District Acclimatization Society, Queenstown, 7th June, 1887.

I have the honour herewith to enclose copy of our curator's report on the whitefish-ova consigned to this society. I am glad to state that some of the young fry are often seen in Lake Wakatipu, and they appear to be thriving very well.

I have, &c.,
H. Nelson Firth,
Secretary, Lakes District Acclimatization Society.

The Secretary, Marine Department, Wellington.

Enclosure.

The Curator to the Secretary, Lakes District Acclimatization Society.

Sir,— Queenstown, 1st June, 1887.

I have the honour to furnish the following report *re* whitefish-ova consigned to the Lakes District Acclimatization Society:—

The whitefish-ova arrived in Queenstown on the night of the 8th February, 1887, and were placed in the boxes on the 9th, the temperature of the water being 47°, lowered from 50° by ice. I was able to keep the temperature at 47° for two days with ice; after this, when the ice was finished, the temperature remained at 50°, and never rose higher. Some of the fry were moving in the boxes on the 10th, but the greater portion died in the egg, not more than 50,000 hatching out of the 920,000 ova. When unpacking the ova it was found that too much pressure had been used, making the ova stick together in one mass; the ova, however, looked perfectly healthy, and were all alive, but it was impossible to separate them. If the ova had not been so far advanced there would have been a much greater chance of success. When the fry were fifteen days old I observed the sac absorbed on most of them. I liberated about six thousand in Lake Wakatipu on the 28th February. On the 5th March about twenty thousand were liberated in Lakes Wanaka and Hawea, under the supervision of L. Hislop, Esq., Vice-Chairman of the society. I then began to feed those remaining on bullock's blood. They appeared to thrive well on it for a time—say, for about a month; after that the fry appeared to be not thriving so well. I therefore liberated the whole of them in Lake Wakatipu about the 31st March. I am glad to inform you that the fry have been seen on several occasions, and are doing very well apparently, being 1½in. long. I consider they are established without a doubt this time. I have liberated quite fifty thousand in healthy condition.

I have, &c.,
Robert Davidson,
Curator.

H. Nelson Firth, Secretary, Lakes District Acclimatization Society, Queenstown.

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