1880.

NEW ZEALAND.

INTRODUCTION OF WHITEFISH OVA FROM AMERICA

(CORRESPONDENCE RELATIVE TO THE).

[In continuation of H.—14A., Sess. II., 1879.]

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

No. 1.

Mr. G. S. COOPER to Messrs. J. C. FIRTH; the SECRETARY, Acclimatization Society, Napier; the SECRETARY, Acclimatization Society, Christchurch; A. M. JOHNSON, Christchurch; the SECRETARY, Acclimatization Society, Queenstown; the SECRETARY, Acclimatization Society, Dunedin; the SECRETARY, Acclimatization Society, Invercargill; A. GREENFIELD, Nelson.

SIR,— Colonial Secretary's Office, Wellington, 21st April, 1880.

With a view to laying before Parliament full information as to the result of the recent attempt to acclimatize whitefish in New Zealand, I have the honor, by direction of the Colonial Secretary, to request that you will furnish me with an account of the steps taken with respect to the ova forwarded to you, and of the result so far as at present known of the experiment.

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

J. C. Firth, Auckland; the Secretary, Acclimatization Society, Napier; the Secretary, Acclimatization Society, Christchurch; A. M. Johnson, Christchurch; the Secretary, Acclimatization Society, Queenstown; the Secretary, Acclimatization Society, Dunedin; the Secretary, Acclimatization Society, Invercargill; A. Greenfield, Nelson.

No. 2.

Mr. J. C. FIRTH to Mr. G. S. COOPER.

SIR,— Auckland, 3rd May, 1880.

In reply to your inquiry relative to the success of the recent attempt to acclimatize whitefish in the Auckland Provincial District, I regret to have to report unfavourably of the 50,000 ova hatched in the fish-house of the Acclimatization Society of this place. The arrangements and apparatus, with the exception of the temperature of the water, were very good. The fish hatched out very well indeed, but the temperature being 65° they died day by day, and in a few days all but two had died. This unfortunate result I ascribe entirely to the high temperature of the water. With regard to the results of the deposits of whitefish ova made by me in Lakes Rotorua, Tarawera, Okataina, and Taupo, I am not as yet in a position to report, the deposition having been made in the gravelly and shingly margins of the lakes. I am not, however, sanguine of a favourable result, owing to the temperature of the various lakes, with one exception, being much too high. My experience so far induces me to concur in Dr. Hector's opinion, that the whitefish cannot be acclimatized in the lakes in the northern part of New Zealand owing to the temperature of their waters being too high.

I have, &c.,
J. C. FIRTH.

G. S. Cooper, Esq., Under-Secretary, Wellington.

No. 3.

Mr. F. SUTTON to the Hon. the COLONIAL SECRETARY.

SIR,— Napier, 19th January, 1880.

I have the honor to report that the "Hinemoa" landed one box of whitefish ova, said to contain 50,000, on Thursday last, at 2 p.m. The ova was immediately conveyed to Hastings, and before 6 p.m. was placed in the Society's ponds. The general appearance of the ova is satisfactory, and already hatching has commenced. The coldest water we could hatch them in is about 52 degrees,

and it is therefore probable that a large measure of success will not attend the experiment here. On Saturday, when I inspected them, there were, I should say, at least two hundred hatched, and a large proportion of the ova looked healthy.

I have, &c.

F. SUTTON,

Honorary Secretary, Acclimatization Society.

The Hon. the Colonial Secretary,
Wellington.

No. 4.

Mr. F. SUTTON to Mr. G. S. COOPER.

Napier, 30th January, 1880.

ALL whitefish dead but twelve. Will report fully by mail.*

G. S. Cooper, Esq., Wellington.

F. SUTTON.

No. 5.

Mr. A. GREENFIELD to Mr. G. S. COOPER.

Whitefish Ova.

SIR,— Nelson Acclimatization Society, Nelson, 11th May, 1880.

In compliance with your request, I have to report that, on receipt of your promise that 250,000 ova should be sent to Nelson, the Society at once set about making preparation to receive the ova. They had a large box prepared, 12 ft. long by 2 ft. wide and 10 in. deep; above this box were four smaller boxes used for hatching trout ova. These boxes were arranged so that a very steady stream of water passed from one to the other and then into the large box; about 2 inches of gravel was placed at the bottom of all the boxes. The water was supplied from the Nelson waterworks, and the temperature ranged from 60° to 63°. On arrival of the ova it was carefully landed, taken to the Society's ponds and unpacked. Much of it was found to be bad and stinking, apparently hatched and dead. Care was taken to separate the good from the bad, and most of the good ova was placed in the large box. The box was shaded by boards and a calico awning. The weather was exceedingly hot even for the time of year, and the temperature of the water was then 62° in the boxes. On looking at the ova in the afternoon most of it that had in the morning appeared good had turned colour, and on the following morning it was all dead, with the exception of some forty or fifty fish, which had hatched. With the exception of some eight or ten these young fish quickly died off; those that were alive were put into one of the ponds, where they appeared to thrive; but I regret to say they suddenly disappeared. I do not think they died, as they were constantly looked at; and they were large enough to be seen if dead in the pond, as the water was quite clear. I cannot account for their disappearance.

It is to be regretted that the ova remained so long at Auckland: the Dunedin Society received their share of the ova before the Nelson portion arrived here; had it been sent on here at once there is reason to believe the hatching would have been much more successful.

I have, &c.,

ALFRED GREENFIELD,

The Under-Secretary, Colonial Secretary's Office, Wellington. for Honorary Secretary.

No. 6.

Mr. S. C. FARR to the Hon. the COLONIAL SECRETARY.

Report on the Whitefish Ova allotted to Canterbury, 1880.

SIR,— Canterbury Acclimatization Society, Christchurch, 1st May, 1880.

In compliance with Dr. Hector's suggestion, contained in your memorandum of 16th December, 1879, I have the honor to report upon the whitefish ova received through the Government from America by the Canterbury Acclimatization Society.

Upon the receipt of your letter, steps were immediately taken for the reception of the ova at the Society's fish-house.

When your telegram announced the arrival of the shipment at Auckland, arrangements were made with the Commissioner of Railways for a special train to convey the ova to Christchurch on the arrival of the "Hinemoa" at Lyttelton.

Your telegram of the 16th January warned me that the "Hinemoa" would reach Lyttelton about 6 a.m. on the 17th, in consequence of which I started with two assistants by "special" at 5.30 on the morning of the 17th, and on reaching Lyttelton at 5.55 I found the steamer at the jetty. A van was at once taken alongside the vessel, when the crew by Captain Fairchild's directions placed the chest containing the ova, together with the ice, in the van, and an immediate start was made for Christchurch, which we reached at 6.20 a.m. A spring van provided for the purpose was awaiting our arrival, to which the chest was transferred, and immediately conveyed to the fish-house at the Society's gardens. Unpacking commenced at 6.45 a.m., and continued without intermission until the whole of the ova was placed in the hatching-boxes, precaution having in the meantime been taken to reduce the temperature of the water flowing through the boxes by means of ice, from 55° to 52° Fahr.

The packing was as follows: At the bottom of each tray was found a thin layer of moss, covered with a piece of white scrim, and upon this a layer of ova, regularly distributed, then a second piece of scrim. Another layer of moss followed, and the scrim with the ova repeated, thus completing two layers in each box or tray, five of which were found in the chest received.

When unpacking commenced, it was discovered that a large quantity of ova was affected with

* Report has not been received.

fungus. I am of opinion that undue pressure from tufts of moss, which might have been more carefully manipulated, materially contributed in bringing about the unhealthy condition of some of the ova, and, while testifying to the great care shown in the packing, I consider that in packing ova of any kind only the spray or feathery part of the moss should be employed.

During the hatching process, which commenced on the third day after the ova were placed in the water, unremitting attention was given from daylight to dark. The temperature of the water was kept at about 54° Fahr., until the whole of the healthy ova were hatched out, care being taken from time to time to remove those attacked with fungus.

Hatching commenced on the 20th of January, and the whole of the healthy ova were hatched out by the 29th of January. A smaller quantity of ice was used each day, and the temperature gradually allowed to rise to its normal condition—namely, 55°. The number of young fish were then estimated, when it was calculated that about 50,000 had been hatched out. Fungoid disease, however, made its appearance among them, although every precaution was taken to insure success, and daily the numbers were rapidly diminishing. It was consequently decided to form a new race outside the fish-house, and close to an artesian well. When completed, all the healthy fish were turned into the race, the number having been reduced to about 27,000. These looked very healthy, and were at once fed with fresh blood, as directed in Dr. Hector's memorandum. The temperature of the water in the new race averaged 56° Fahr. from the 2nd until the 15th of February, when, during a nor'-wester, it rose to 57°, but fell again the next day to 56°. A few of the fish died, and twice daily all the dead ones were carefully taken out. The whole of the fish were removed on the 24th of February, when the number was estimated at 25,000. It was decided to take 20,000 to Lake Coleridge, and the remainder to Lake Pearson, believing that by such division the chances of success would be increased. Owing, however, to the darkness of the night when the fish were removed from the race, all were caught, with the exception of about a dozen, consequently the whole of the whitefish were taken to Lake Coleridge.

Having arranged with the General Manager of Railways, a special train consisting of one van for the fish, horse-box for pair of horses, truck to carry a spring-van, and composite carriage to convey the party having charge of the fish was placed at our disposal, and a start was made for Glentunnel, the nearest station to the lake; a good supply of ice being provided to govern the temperature of the water. We left Addington Station at 12.40 a.m. on the 24th of February, the party consisting of Sir J. Cracroft Wilson (Chairman of the Society) and servant, Mr. E. C. Farr, Assistant Secretary, and myself. The fish were placed in two tin cans, each containing about six gallons of water. These cans were placed in an outer vessel about three inches larger and deeper, and so fixed that they could not move; the space between was filled with water, into which ice was dropped from time to time. We arrived at Glentunnel at 3.30 a.m., where we were met by Mr. Upton, of High Peak Station, who came expressly to pilot us. Rain was then falling, with a cold south-wester breeze. The morning was very dark, but with the aid of a pair of carriage lamps we were enabled to prepare for the trip. We left Glentunnel at 4.25 a.m., and succeeded in crossing the Selwyn before daylight. The temperature of the water in the vessels containing the cans was kept at 54° throughout the journey. At the River Hororata the water in the cans was changed, when it was discovered that about 200 fish had died *en route*, the roughness of the road doubtless contributing towards such result. At 9.45 a.m. we reached Snowden Station, and, while obtaining refreshments, secured a change of horses. We left Snowden for Lake Coleridge at 10.15 a.m. and reached the lake at 12.30 p.m., the weather being very cold, and the rain continuing. A boat, after some trouble, having been procured, and the fish conveyed about half a mile from the shore, they were at once liberated by myself into the water of the lake. After watching them for a few seconds we noticed that they took a spiral course to the depth of about eight inches, then dived suddenly downwards and were lost to sight in the deep azure water. The temperature of the water in the lake was taken, and to our astonishment was found to be 59° at a depth of 50 feet, and 60° at the surface. We retraced our steps to Snowden, changed horses, and left for High Peak Station, where we halted for the night. The next morning we started for Christchurch, which we reached at 7.5 p.m.

I cannot refrain from acknowledging the kind assistance and attention which we received from Messrs. Upton, Gerrard, and Cotton. In submitting this report, permit me to express the hope that not only will the Government be satisfied with the endeavours of the Society to acclimatize a most valuable fish, but that those who have in the future the conduct of similar experiments may profit by our experiences.

I have, &c.,

S. C. Farr,

Honorary Secretary and Treasurer.

The Hon. the Colonial Secretary.

No. 7.

Report on Whitefish for Opawa, by A. M. Johnson. 29th January, 1880.

Out of the two boxes of ova kindly forwarded me by the Government, the first box contained but very few good eggs, from which twenty-eight young fish have been obtained. The packing of this box was different from ordinary, and consisted of a frame with a piece of cloth nailed over, leading to the conclusion that the eggs were smothered and crushed during transit by not having the necessary air and elastic bed, as afforded by living moss. The second box, which really was a shallow wooden one, suggested the idea of perfection in packing, the eggs presenting a fine, healthy appearance in the layers of soft open scrim and moss. As soon as hatched a proportion of the young fish were counted out, and placed in various compartments under slightly different circumstances, and, on a careful inspection the second day, nearly two hundred fish were found to have disappeared, notwithstanding the special arrangements provided in accordance with Mr. Clark's admirably adapted hatching and rearing boxes; the conditions under which young trout and salmon have been so successfully reared appearing to be unsuited to the whitefish. The chief difficulty is probably the high temperature of the water, which, close to the well is 58°, many of the eggs dying off during very close hot weather; still many thousands of young

fish are alive and well, and have already visibly increased in size, and, although all anxiety as to future unseen losses is not entirely set at rest, the experiment may be regarded thus far as a success. A small proportion of eggs yet remain unhatched.

No 8.

Re Whitefish.

Mr. A. M. JOHNSON to the Hon. the COLONIAL SECRETARY.

SIR,— Trout Dale Farm, Opawa, Christchurch, 4th May, 1880.

I regret I cannot continue to report the same satisfactory progress as in my previous communication. After seven weeks of the time of hatching, the numbers continued to visibly diminish daily, in spite of every care and precaution, till the total number left cannot now be as many hundreds as they were thousands; those fish liberated in ponds full of crustaceæ and insect life appearing to share the same fate as the ones in deep and protected races, and, although there are still ample left for propagating purposes, the general result is by no means so good as the splendid condition in which the ova arrived would lead one to expect. Great preparations had been made and considerable expense incurred to facilitate success, yet, in practice, the arrangements were not all found to be exactly adapted to the peculiar requirements of these delicate fish, which are so small when hatched, and disappear so suddenly without leaving a vestige; that, had it not been for the many experiments carefully carried out as regards difference of temperature, depth of water, food, and other circumstances, I might be under the pleasant delusion that I was still the happy possessor of many thousands, or that the losses were entirely due to the high temperature, or the equally erroneous impression that the fish were of too delicate a nature to be ever successfully acclimatized to the New Zealand waters. The partial success attained may be briefly summarized as due to those arrangements, which have enabled the following plans to be efficiently carried out—namely, removal of the young fish as soon as hatched, into water at least 2 feet deep, and at a temperature not exceeding 58°; shade from the hot sun and protection from enemies, whose name is legion, the least suspected and most destructive of which may be considered the water spiders; regular feeding, blood being the best artificial food and microscopical insects the best natural food.

I have, &c.,

The Hon. the Colonial Secretary. A. M. JOHNSON.

No. 9.

Mr. W. ARTHUR to the Hon. the COLONIAL SECRETARY.

SIR,— Otago Acclimatization Society, Dunedin, 15th April, 1880.

I have the honor now to send you Mr. Dean's detailed report on the hatching-out of the American whitefish ova at Lake Wakatipu.

In doing so I may say that I sent specimens of Wakatipu Lake water, of Rowell's Spring water (in which our hatching-boxes were), and of Opoho Creek water, where our Dunedin hatching-boxes are, to Dr. Black, Professor of Chemistry in the Otago College, for analysis. Dr. Black has kindly sent me the result, which is—

	Organic Matter. Gr. per gal.	Hardness. Deg.
Lake Wakatipu	0·5 ...	3·1
Rowell's Spring	1·1 ...	7·1
Opoho Creek	2·3 ...	3·6

I do not know the analysis of the lake water whence these ova were taken; but Dr. Black reports that there is less salt in the Wakatipu water than in any he has ever examined. Rowell's Spring is harder than the Wakatipu water; but the other experiments were made in the Lake water, and in both cases the fish died. I am hopeful, however, that the ova and young fish turned out into Lake Wakatipu, by finding their way to the cooler and more sheltered water at the bottom of the lake, will yet come to maturity and propagate.

I have, &c.,

W. ARTHUR,

The Hon. the Colonial Secretary, Wellington. Honorary Secretary.

Enclosure in No. 9.

REPORT by Mr. DEAN of his disposal of the Whitefish Ova recently received in New Zealand.

4th February, 1880.

IN accordance with your request, I beg to furnish you with the particulars regarding the late shipment of whitefish ova.

On 16th January I started for the Bluff, expecting to find the "Hinemoa" there the next morning, but she did not put in an appearance until the 19th, when the ova were brought on to Invercargill by special train, and thence to Kingston by ordinary train. On our way up the lake by steamer we removed the ice from the boxes containing the ova, in order to allow the temperature to rise gradually to that of the lake. The latter, on applying the thermometer, proved to be as high as 56°. On opening the boxes at Queenstown, the ova in the trays packed with moss were in good condition, but those in the trays composed of calico alone, without any moss, were completely useless. By 6 p.m. the ova were all placed in the hatching-boxes, the temperature being 50°. A few young fish hatched out while being removed from the trays. 8 p.m.: Temperature down to 49°.

January 20th, 6 a.m.—Temperature of water 48°. The fish hatched last night all dead, some

more hatching and dying soon after. Towards noon found temperature rising. By applying ice kept it at 52°. Weather exceedingly hot. 7 p.m.: Natural temperature 52° (of water without ice).

January 21st, 8 a.m.—Temperature 49°. A few more fish hatched and died, some of the ova beginning to change colour and turn white; keeping temperature low as well as possible with ice, but very irregular; ice exhausted. 7 p.m.: Temperature, 52°; ova still going bad. Held consultation with Messrs. Howard and Worthington as to what should be done with the ova, there being such a variation in the temperature of the water. Decided it would be best to liberate them in 30 or 40 fathoms of water in the lake. Engaged steamer to start at 5.30 next morning, and take the ova to Beach Bay, about eight miles from Queenstown, the latter place being infested with trout and perch.

January 22nd.—Turned out all the ova in Beach Bay, with the exception of from 1,200 to 1,300, and about 30 fish. They were hatching out in the cans while going up the lake, and seemed quite lively when turned out. I regret to say I believe quite one-half of the ova have gone bad. I erected a box at the top of the spring on the hill, and placed the remaining fish and ova there, where the temperature is now equable and steadier—viz., from 47½° to 49°. I tried this by way of experiment.

January 23rd, 7 a.m.—Temperature at spring 48°. Found a few bad eggs, and some of the fish dead.

January 24th, 6 a.m.—Temperature 47½°. Found some more dead ova, and also some of the fish; the dead fish presenting a peculiar appearance, were crooked and drawn into different shapes, as if having died from cramp. Saved a few specimens.

January 25th.—Found a good many dead fish and eggs, some having died while in the act of hatching, others having the appearance of having been being attacked by fungus on the tail, which turned white while there was still life in the body.

January 26th.—Temperature keeping regular. Found a few more ova and fish dead, the number of live fish never increasing. They swim about very lively and healthy-looking for about thirty-six hours after hatching, then drop on the bottom, and occasionally struggle violently and die. Reported to Mr. J. P. Maitland.

January 27th.—Found a few more dead fish and ova. Seeing that, as they were doing, there was very little prospect of saving any out of this lot, I obtained the opinion of Mr. Worthington and several others, and we came to the conclusion that the only chance of saving any of them was to turn them out in the lake, when they would get into deep water, should they feel so inclined; also that the eggs still to hatch would do better, as they would be in a more natural position.

January 28th.—Put all the remaining ova, about 800 or 900, in can, also about 40 live fish, to take them to Half-way Bay, between Queenstown and Kingston, to be liberated there. Soon after being put in the can they began to hatch, and before they got to their destination some hundreds were hatched, and were swimming about very lively, and were turned out in a well-sheltered and cool place in Half-way Bay. The water in which they were carried being spring-water, it was gradually brought up to the temperature of the lake before they were liberated, the temperature of the lake keeping pretty steady, about 56°, with a slight rise sometimes.

I find the lake abounds with small Native fish, along the shores principally; they are from two to three inches long, and swim in shoals. I am afraid these fish will prove very destructive to the whitefish, until once the latter are thoroughly established. It is very possible that these Native fish will not be so plentiful near the snowy regions. If I might be allowed I would suggest that, if ever another opportunity occurs of trying this valuable fish, the hatching-box be removed to the head of the lake in the vicinity of the snowy ranges, if a suitable place could be found; the water might be lower in temperature, and when they would be liberated there might be less chance of their being devoured by these Native fish.

I believe there are some small lakes there that might be advantageously stocked with whitefish, with a view of getting a quick return, providing one could be got that has not being stocked with trout or perch. Or I might suggest that a few be hatched at the Society's hatching-ponds, Dunedin, and kept until the cold weather set in, when it would be more suitable for carrying them, and which I believe could be done: as two years ago a few hundreds were successfully hatched and kept for nearly four weeks in water ranging, I think, from 50° to 56°, when an attempt was made, unsuccessfully, to carry them to Wanaka Lake. I may here take the liberty of alluding to a report which appeared in Vol. xxix. of *Hansard* of 1878. It was to the effect that, while on my way to Lake Wanaka with the whitefish, I allowed them to escape in the night: such was not the case. Mr. Logan, Superintendent of Telegraphs, was with me all the way and saw the last of them. I was carrying them in the usual way I carry trout. The day was exceedingly hot and the road rough; and the result was that before reaching the Teviot they were all dead, except one or two, which I turned out in a lagoon close by.

But to return to the hatching of a few at the hatching-ponds. I believe suitable ponds could be made for retaining a few until they arrive at maturity; although this might be rather a doubtful experiment. Samuel Wilmot, Esq., of Canada, who made the first successful experiment with whitefish in 1867 and 1868, kept a few fry in very limited ponds till many of them reached a pound and upwards. I do not think it would be advisable to hatch large quantities in Dunedin, the distance to the nearest lake being so great that there would be a considerable amount of difficulty and danger in carrying them so far.

I have, &c.,

W. Arthur, Esq., Hon. Secretary, Acclimatization Society, Dunedin. F. Deans.

No. 10.

Mr. W. Arthur to the Hon. the Colonial Secretary.

Sir,— Otago Acclimatization Society, Dunedin, 5th May, 1880.

I have the honor to acknowledge your letter of the 21st April, regarding a report on the American whitefish ova sent to this society in January last by Government. On the 15th April I

sent this report, also full diary by Mr. Deans, our manager, as I anticipated you would want it. I can only add that our hatching-boxes at Rowell's Spring, Lake Wakatipu, were on a terrace about 150 feet above the level of the lake. The ground used was fenced-in, and had an awning thrown over it. The boxes were mostly from 10 to 12 feet long; total length used for the 250,000 ova being 60 feet. They were in capacity, 12 inches by 6 inches, and were set with the smallest possible inclination, just enough to maintain the passage of the water. No gravel was used; the depth of water was 5 inches, and every box had the light excluded by means of boards carefully laid on each. The other facts as to daily thermal readings are already recorded in previous report, as also analysis of the water.

I can only add my opinion that, seeing we were unsuccessful in keeping the young fish alive for more than a day or a day and a half, also that Mr. Worthington and Mr. Howard, who were carrying on similar hatching operations in the Lake Wakatipu itself of whitefish ova at the same time, were not successful, the failure is due to some obscure cause as yet unexplained. As already stated, I am by no means without hope that the ova turned adrift in the lake will yet reappear as whitefish.

I have, &c.,
W. Arthur,
Honorary Secretary.

The Hon. the Colonial Secretary.

By Authority: George Didsbury, Government Printer, Wellington.—1880.
Price 6d.]