

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.

C. R. Buckland, San Francisco, California.

I have, &c.,

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,  
9th January, 1886.

DEAR SIR,—

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.

Mr. C. R. Buckland.

I have, &c.,

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