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CONCISE HISTORY OF THE ACCLIMATISATION OF THE SALMONIDÆ IN TASMANIA:

BY P. S. SEAGER, SECRETARY TO THE FISHERIES BOARD OF TASMANIA.

Presented to both Houses of Parliament by His Excellency's Command.

CONCISE HISTORY OF THE ACCLIMATISATION OF THE SALMONIDÆ IN TASMANIA.

By P. S. Seager, *Secretary to the Fisheries Board of Tasmania.*

The idea of acclimatising the English salmon *(Salmo solar)* in Tasmanian waters was entertained by some of the colonists at a very early period in our history. In the year 1841, as recorded in Vol. 1, p. 281, of the "Proceedings of the Royal Society of Tasmania," the late Captain Frederick Chalmers, of Brighton, in Tasmania, applied to Dr. Mackenzie, of Kinillan-by-Dingwall, Rossshire, Scotland, for salmon fry to bring to Tasmania. The fry were not supplied, but the correspondence is interesting, and shows how little was then known of the subject when Dr. Mackenzie suggested that artificially impregnated ova deposited in a basket of fine gravel and plunged in a tank would require no more attention until it was landed in Tasmania, where it could be put into a pail and carried to any stream and there deposited. Dr. Mackenzie's last letter to Captain Chalmers, of 12th July, 1841, says:—"Next year you can have some fry sent south to you in better time if you like, or if you will give me the address of some careful confidential friend, I will send him south two baskets containing impregnated roe, say in September, one basket to be sunk in water in England to produce live fish for your next year's trip, and the other to be shipped to your address in Australia, where it is probable you will receive it long before the fry begins to chip the shell. All that will be necessary is to direct your friend to keep the basket under water in some fresh stream till the ship is ready to sail, when one can be transferred to the ship's tank." Dr. Mackenzie had evidently a very limited knowledge of the difficulties which had afterwards to be overcome in the transport of salmon ova before success was secured. There is no record that Captain Chalmers proceeded further with his experiment.

In the year 1848 Mr. James L. Burnett, of the Tasmanian Survey Department, when on leave of absence, visited the Duke of Sutherland's salmon fisheries in Invernesshire, and consulted the manager, Mr. Young, on the practicability of introducing salmon and trout into Tasmania. Mr. Young suggested two methods—one to bring out the spawn, and the other to bring out young fish, giving the preference to the latter. In a letter to Mr. Burnett, of 23rd October, 1848, he says:—"It would be a grand undertaking, and perfectly practicable, if it could be accomplished during the time between extracting the eggs and their hatching; but unless that could be done, I fear the delicate state of the new-hatched fish could not endure the fatigues of a long voyage." Mr. Young's plan was to erect boxes or tanks about 18ft. long by 4ft. deep and broad, in which salmon smolts were to be placed, and regularly and slowly supplied with water from the sea and fed with salted liver, boiled, and coarse flour bread, broken up small. A paper on Mr. Burnett's visit to Mr. Young, written by Captain C. E. Stanley, R.E., with the correspondence, was read before the Royal Society of Tasmania on 12th September, 1849, and is recorded in its proceedings, Vol. 1, p. 135. With reference to Mr. Young, Mr. Morton Allport, in his "Brief History of the Introduction of Salmon to Tasmania," says:—"Mr Young gave the preference to the latter method (young fish), which is the more remarkable, as from the account of one of his experiments it is clear that he had accidentally been upon the verge of discovering the very method which, after many years, led to success. In the experiment alluded to, Mr. Young caused the fecundated ova packed in baskets of gravel to be hung in a running stream at different distances from the shore. During a severe frost one or two of the baskets nearest the bank, and those which were in comparatively still water, were frozen hard on the surface, and Mr. Young supposed that the vitality of the eggs was destroyed; but he let them remain, and discovered that the only effect of the reduced temperature was to delay the hatching of the ova for several days."

The result of Mr. Burnett's enquiries was, that the then Lieut.-Governor of Tasmania, Sir William Denison, whose name is associated with so many important undertakings in the colony during the term of his governorship, and who had already evinced the greatest interest in the salmon question, wrote to the Secretary of State to allow of tanks constructed for the purpose, and supplied with salmon fry or smolts taken at the right reason, being placed on board some of the convict vessels and brought out under the immediate care and supervision of the surgeon-superintendent.

Some such efforts must already have been made, for on 13th August, 1849, Sir William Denison, writing to Earl Grey on the subject of the introduction of salmon, says:—"Several attempts have been made to bring out the spawn, but they have all failed;" but there is no record of such experiments. A long correspondence between Sir W. Denison, the home authorities, and Mr. A. Young, appears in the "Proceedings of the Royal Society of Tasmania," Vol. 2, p. 40, wherein the employment of a welled fishing smack to convey adult salmon and smolts to the colony was advocated, and it is closed by a despatch from Earl Grey, in which he states that it was impracticable to carry the fish in tanks on the decks of the prison ships, "while, on the other hand, the alternative of using a welled smack for their conveyance has for the present at least, been abandoned as being attended with too much expense."

In the year 1852, through the efforts of those interested in the subject, and at the instance of the Governor, Sir William Denison, an attempt was made to introduce both salmon and trout by means of ova. This effort is the first of which any detailed record exists. A paper read before the Royal Society of Tasmania (see its Proceedings, Vol. 2, p. 288), by Mr. J. L. Burnett, describes the arrangements made, and gives details of the voyage of the vessel selected—the *Columbus*. The ova were shipped on the 31st January, 1852, and the plan adopted is thus described by Mr. Burnett:—"About 50,000 ova of salmon and trout were placed in a large oval tub or vessel with a false bottom, 4ft. 6in. by 3ft. 4in., 1ft. 8in. deep, double-sided, made of wood, cased in lead, and capable of containing 60 gallons of water, besides the requisite quantity of gravel. * * * The tub was slung just under and on one side of the fore hatchway, with directions that every six hours a fresh supply of six gallons of water should be added by means of a funnel inserted in a tube entering below the false bottom, the old or original quantity (or the greater portion of it) being drawn off by a stop-cock placed for that purpose in the upper part of the tub, and that the six gallons of water were to be supplied six times a day as the vessel approached the Equator, making 36 gallons in the 24 hours, and to be again reduced in the cooler latitudes to the original quantity of 24 gallons per diem."

Mr. Gottlieb Boccius, who was employed by the Home Government, through the Land and Emigration Commissioners, to procure the ova, fixed the 15th and 20th April as the dates upon which the trout and salmon respectively would hatch, but the hatching commenced on 1st March, in latitude 14° 30′ north, longitude 26° west, and the fry were seen in the tub until the water became thick and putrid. On arrival of the vessel at Hobart the tub was examined by Dr. Milligan, the then Secretary of the Royal Society of Tasmania, and Mr. J. L. Burnett, and, it is not surprising to read, "without finding any traces of either spawn or fish."

Mr. Burnett in his paper gives his opinion as to the causes of failure, and his suggestions as to future efforts, one of which was that the temperature of the water should be regulated by means of ice. This is the first recorded suggestion for the regulation of temperature, the importance of which appears previously to have been entirely overlooked.

The cost of this experiment is stated to have been about £300, and it appears from a despatch from the Duke of Newcastle to Sir W. Denison, dated 2nd of June, 1853, which covered a detailed account of the *Columbus* experiment by Mr. Boccius (see Proceedings Royal Society, Vol. ii., p. 437), that instructions were given to renew the experiment under the same supervision.

Arrangements for this further experiment were made with Mr. Boccius, who provided the necessary appliances, which were placed on board the *Duke of Roxburgh*. The sailing of the vessel was delayed, but owing to a severe frost having set in when the ova was required, artificial spawning could not be successfully completed. The attempt was therefore abandoned, and the spawn-tub landed from the vessel.

The interest of the Royal Society of Tasmania in the subject still continued, and the matter was frequently referred to at its meetings, at one of which, held on 11th August, 1852, the Secretary read a letter from Mr. J. C. Bidwell, Commissioner of Crown Lands in New South Wales, to Sir William Denison, covering "Notes on the Establishment of the Salmon and other Fish in the Rivers of Tasmania and New Zealand" (see Proceedings Royal Society Tasmania, Vol. ii., p. 326), in which he thus writes upon the introduction of salmon:—

"Now, to do this it would be necessary to bring and hatch the spawn; and I think that by packing spawn in ice there would be no difficulty in preserving its vitality for a much longer time than would be required. It is not probable that the vitality of fish spawn would be destroyed even by freezing, but by merely packing it in ice there would be no danger of actual freezing, as the ice would always be in a melting state."

Mr. Bidwell, in writing, explains that he would have written long before, but that he had suffered a long and severe illness, and it is more than probable that his health failing prevented his practical views being more prominently considered and carried into effect. However much we may be indebted to those who afterwards adopted, to a large extent, the same method which Mr. Bidwell suggested, it is due to the latter gentleman that the credit of first suggesting the packing of spawn in ice should be prominently mentioned in any history of the subject.

On 9th February, 1858, the then Colonial Secretary of Tasmania submitted certain questions to the Royal Society "relative to the introduction of salmon into Tasmania," and the payment of a Parliamentary reward of £500 for such introduction, and a committee, consisting of the Hon. E. S. P. Bedford, M.L.C., J. W. Agnew, Esq., M.D., Morton Allport, Esq., and Joseph Milligan, Esq., F.L.S., was appointed, whose report appears in the Proceedings of the Society, Vol. iii., p, 283.

The idea of the introduction of living salmon was still prominent, as the committee state in the first paragraph of their report "that the mere introduction of spawn, even though properly fecundated and in a state of vitality, ought not of itself to entitle the person introducing it to any portion of the reward." Members of this committee lived to learn that the most successful means of conveying salmon to distant parts is by means of spawn, and that the introduction of living fish, as then strongly advocated at the time, proved to be a failure. This committee also advocated the use of ice to regulate temperature during the voyage, and they recommended the construction of breeding ponds, which recommendation was afterwards carried out.

Sir Thomas Brady has, however, recently demonstrated the possibility of carrying live salmon to the colonies by successfully conveying some fish, twelve months old, to the south of the line, where their deaths were caused by improper food.

The next experiment was made in 1860 through the efforts of a body of colonists then in England, known as the Australian Association—amongst whom was Mr. Edward Wilson, President of the Victorian Acclimatisation Society—working under the guidance of Mr. James Arndel Youl, who from this date was closely associated with every succeeding shipment of ova from England to Australia and New Zealand, with, I believe, one exception only, and who has displayed the most praiseworthy zeal and self-denial in his efforts. It is said that Mr. Youl's attention was drawn to this work by the experiment of Mr. Boccius, and that in the year 1854 he commenced to study the artificial propagation of salmon and transport of their ova. The Association raised by subscription a sum of £600, and the experiment made under their management cost nearly that amount. The vessel selected for the experiment was the *S. Curling*, which sailed from Liverpool for Melbourne on 25th February, 1860, with 30,000 salmon ova, collected by Mr. R. Ramsbottom, from the River Dovey, in Wales. The shipment was under the care of Mr. Alexander Black. The apparatus consisted of a supply tank on deck of 200 gallons water, the water being conveyed from this tank by means of a ¾in. pure block-tin pipe, which passed through the deck into an ice-house containing, when the vessel sailed, 15 tons Wenham Lake ice; the pipe was taken twice round this house, a length of pipe of from 80 to 100ft., when it found its exit into the vessels for the ova, which comprised a stout framework 4ft. square, surrounded on all sides by a continuous wooden trough, 1ft. wide, 6in. deep, lined with pure block tin, with stops at intervals to divide and regulate the depth of water, the stops acting as falls for the purpose of aeration, and a further fall of 1ft. from the upper series of troughs to the lower was made to aid in the same direction. The bottom of this trough was covered with fine gravel, in which the ova was placed. The ova apparatus was swung with chains and pulleys to keep it steady and counteract the pitching and rolling of the vessel. The water, after passing through the ice tank, flowed over the ova, fell into a tank below, from which it was pumped up again to the tank above, thus maintaining a regular stream. 1800 gallons of spring water was shipped, with a supply of charcoal for purification. The experiment failed, as on the 24th April, and the 59th day out, the last of the ice melted and the last ovum died.

In anticipation of the arrival of this shipment the Tasmanian Government caused ponds to be constructed at North-West Bay for the reception of the ova; but these ponds were never used, and the site was afterwards abandoned in favour of the present position at the River Plenty, where hatching-boxes and ponds, after the model of those at Stormontfield, in England, were constructed, the sketches of Stormontfield ponds having been supplied by Mr. Curzon Allport, then in England, to his brother, Mr. Morton Allport. Although this experiment failed, Tasmanians should always acknowledge their gratitude to the subscribers to the fund and the Committee of the Australian Association, who bore the whole expense of the shipment, and consigned it to the Royal Society of Tasmania as a gift to the colony.

This effort is also memorable from the fact that Mr. Black's journal was submitted to Mr. (now Sir Thomas) Brady, of the Irish Fisheries, for his opinion as to the causes of failure. From this time up to the present date Mr. Brady has been closely connected with each shipment to Tasmania. In the year 1860 a joint committee of both Houses of the Tasmanian Parliament, consisting of Mr. William Archer (chairman), Messrs. Maclanachan, Henty, Chapman, Dr. Butler, Dr. Officer, and the Colonial Treasurer, was appointed "to take into consideration the report of Mr. Black on the introduction of salmon into the rivers of Tasmania. In their report, dated 31st August, 1860, they

stated that "they deem themselves justified in coming to the conclusion that our rivers and the adjacent seas are adapted in point of temperature and in all other respects to the habits and constitution of the salmon," and that they "have good reasons for believing that it is quite possible to introduce the salmon by means of their ova." Their estimated expense of the introduction was £2400, and they recommended that its conduct and the appointment of a manager, &c., should be confided to the Australian Association which had managed the previous experiment. The report appears in Tasmanian Parliamentary Journals, 1860, No. 87.

Up to this date the more active portion of the work in Tasmania had been carried out by the Royal Society; but now a wider interest was being felt in the subject with stronger hopes of success. The Government, on 21st October, 1861, appointed a body of gentlemen as Honorary Commissioners in Tasmania, and entrusted to them the management of the whole subject.

The Commissioners at once entered heartily into their work. Prior to their appointment, however, the Government of Tasmania, acting in accordance with the recommendation of the Parliamentary Committee last referred to, had authorised another experiment under the direction of the Committee of the Australian Association in London, and the Commissioners found upon enquiry that all such arrangements were completed. The association in England derived great assistance from Mr. Edward Wilson, of Melbourne, but the chief worker was Mr. James A. Youl, who really directed all matters in connection with the experiment. Mr. Youl's great desire was that the shipment should be direct to Hobart, and possibly to some extent the giving effect to this desire contributed to the failure which followed, as at the time he had under offer a larger vessel bound to Melbourne, in which the apparatus required would probably have worked more satisfactorily. After much difficulty he secured a small iron steamer of 120 tons (the *Beautiful Star*) at a cost of £500, which was, however, to sail to the colony under a jury rig, and not use her steam power. The apparatus used consisted of trays, one set hung on gimballs, and another large swinging tray, in each of which the ova was laid on gravel, over which iced water flowed at the rate of 500 gallons per day. Mr. William Ramsbottom, a son of Mr. R. Ramsbottom, of Clitheroe, had been brought to England from Melbourne and appointed to conduct the experiment. He sailed in the *Beautiful Star* from London on 4th March, 1862, with about 50,000 salmon ova. Full particulars of the voyage and its disasters appear in the report by Mr. R. Ramsbottom, which discloses that the gimbal apparatus proved a complete failure from the outset, the ova dying in great numbers on the first day at sea, caused by the violent rolling of the apparatus keeping them continually in motion. The swinging apparatus worked successfully, so far as the limited space in the vessel would permit it to do so. Ova hatched, and the fry survived for a limited period only, owing principally to a succession of severe gales, and finally to the failure of the ice supply, which was exhausted at 12·30 on 17th May, on which date the whole of the remaining ova died at 1 p.m., with the exception of a few taken from a small box in the ice-house, which lived for eight hours beyond this time, 74 days after the date of sailing, and 88 days from the time of the ova being taken from the parent fish.

Notwithstanding this failure, the experience gained was such that in reporting to the Chief Secretary the Commissioners wrote "they were justified in expressing a confident opinion that that experiment, though unsuccessful, had demonstrated the perfect practicability of the project, and the certainty of success under proper conditions easily attainable." This shipment was the last failure and the cause of future successes. The little box already mentioned containing ova packed in layers in moss and charcoal, which had been placed in the ice-house by Mr. Youl, and forgotten by Mr. Ramsbottom until he stumbled against it 60 days after the *Beautiful Star* had left England, led to further experiments, and the institution of a similar system of packing ova adopted afterwards in most of the future shipments. It is only natural to suppose that there would be many claimants for the credit of this discovery. The suggestion to retard the development of ova by the use of ice was made long before by Mr. Bidwell, as already mentioned, and there exist many records of somewhat similar suggestions by other individuals at various times in this colony and elsewhere prior to the experiment in the *Beautiful Star*. The credit of the first practical attempt to test what had previously been many times suggested lies, therefore, with Mr. Youl, who had stated that the idea was first mentioned to him in Paris by M. Girley, who showed him how fish ova packed in wet moss in earthenware jars were sent long journeys. But prior to the shipment of ova per *Beautiful Star* our present guest, Sir Thomas Brady, then Secretary to the Fisheries Board of Ireland, had by his practical views on pisciculture attracted the attention of Mr. Youl, and the latter gentleman several times visited Dublin to consult with him. Mr. Brady was much impressed with the packing of ova in moss, and, writing to Mr. Youl on 24th December, 1861, he says:—"It strikes me that you ought to try the ova in moss also. I got it up the other day in beautiful order in moss, and it kept very good for several days in the damp moss, and might keep so for a very long time, I think. I send you a sketch of what I would propose." [I have this sketch, which shows a box of ova packed in layers in moss, with a tank for iced water at top and a false bottom, with tap to draw off the water after it passed through the moss.] "If by means of the iced water you can retard the hatching of the ova I think it will be the easiest way of preventing them being tossed about by the rolling of the ship, as the moss will keep the ova steady. I never saw any ova in such good condition as that lately I received in the moss, and I am trying an experiment with it, and also purpose sending some ova to Italy in this way; *at any rate a small trial in this way would do no harm*, and it can

easily be watched to ascertain if they are coming to life. *If they don't hatch before the arrival it will be a decidedly safe way of transporting them.*" Mr. Youl sent the letter to Tasmania with an endorsement: "Requested Mr. B. to have made for me an apparatus such as he describes to hold from one to two hundred ova. I will feed them with ice-water from the melted ice drawn from ice-house."

This letter was written on 24th December, 1861, and the *Beautiful Star* sailed on 5th March, 1862, with a box packed almost exactly as per Mr. Brady's sketch, but without the water tank. Mr. Youl, writing some years afterwards, 26th March, 1867, thus refers to Mr. Brady's value to him at the time. "So important did I think Mr. Brady's instructions that I paid three visits to Dublin to learn all I could on the subject, and it was there I consolidated all I had read and previously seen on the subject." It affords me the greatest pleasure in stating my belief that Sir Thomas Brady's advice had much to do with the experimental box placed in the *Beautiful Star*, and also to place on record the fact that, from the date of his letter thenceforward to the present time Sir T. Brady has worked zealously, heartily, and gratuitously with Mr. Youl and others in relation to all or nearly all the shipments of ova to this colony, and that his interest in the acclimatisation of salmon in these Southern waters has never flagged, but has now culminated in the most successful shipment of salmon ova ever made. In recording this tribute to Sir Thomas Brady let it be well understood that I do not in any way ignore the self-denying work of our good friend, Mr. J. A. Youl, C.M.G., whose value in this cause I so well know, and whose work can never be forgotten by those acquainted with the history of salmon acclimatisation in the Australian colonies and New Zealand. I feel sure that should Mr. Youl read this paper he will be pleased to think that the services of his coadjutor, Sir Thomas Brady, are appreciated so well by the colonists of Mr. Youl's former home, who have so many times admitted their indebtedness to himself in the same direction.

The experience gained in the *Beautiful Star* experiment was a matter of much consideration by the Commissioners and Mr. Ramsbottom, who were equally anxious that the method of packing ova in moss and ice should be practically and thoroughly tested. The Commissioners forwarded a report to His Excellency the Governor T. Gore Browne, on 1st September, 1862—(Parliamentary Paper No. 82, 1862)—in which they recommended the immediate return to England of Mr. Ramsbottom to arrange another experiment, and "during the approaching winter Mr. R. would be able—first to put to the test of further experiment the preservation of the ova in moss, of which his late experience in the *Beautiful Star* has led him to think so favourable; and secondly, to ascertain whether and for what period the ova can be preserved alive in a state of congealation." At the date of this report it was considered that the latter method would be supplementary to the main plan. At the same time, Mr. Youl was also working in a similar direction, as shown by a letter addressed by him to a member of the Salmon Commission, dated 27th October, 1862, in which he writes: "So impressed am I with the little experiment in the box with moss that I mean to try an experiment at my own expense this year, to test it by placing some 20 small boxes, with from 300 to 500 ova in an icehouse, containing 25 tons of Wenham Lake ice;" the experiment was to be made, if possible, in a ship direct to Hobart. Mr. Youl was afterwards in treaty for space in the s.s. *Great Britain*, but the expense involved being greater than he anticipated, and being afraid of the effect of the vibration of the screw on the vitality of the ova, this shipment did not take place, but he afterwards secured necessary space in the *Dunrobin Castle*, sailing for Hobart direct, had everything arranged, and orders given for the construction of the ice-house, when the owners, fearing injury to the cargo from the melting ice, withdrew their promise, and the shipment was abandoned.

In the meantime, with the use of the Wenham Lake Ice Company's vaults in London, and the assistance of Messrs. R. Ramsbottom, W. Ramsbottom, Thos. Johnston, and others, a series of experiments were being carried out under the direction of Mr. Youl with ova packed in moss in boxes similar to the box placed in the ice-house of the *Beautiful Star*. The boxes were covered with ice and examined at different periods of 45, 57, 90, 120, and 144 days, with perfect success, the vitality of the ova having been in no way impaired, and ova of each lot being successfully hatched. Thus, at last, the long cherished hope of the successful acclimatisation of the salmon species in distant lands was in a fair way of accomplishment, the expensive and somewhat cumbersome mode hitherto adopted by means of trays with gravel, &c., was at once abandoned, and Mr. Youl, writing on 25th May, 1863, says:—"It does, therefore appear that the best way of making another attempt next year would be with ova in an ice-house, and not to attempt it again by placing them in a running stream, which not only entails a much greater outlay, but is attended with so much risk."

The Salmon Commissioners again entrusted the management of a further experiment to the Australian Association in England, who delegated to Mr. Youl "the sole superintendence of the necessary preparation of the renewed experiment about to be tried." Mr. Youl found great difficulty in procuring a suitable vessel, the desire of the Commissioners being that the experiment should be made in a ship sailing direct to Hobart. Although arrangements were nearly completed with the owners of a barque named the *Alfred Hawley*, circumstances arose which rendered this impossible, and Mr. Youl fearing the loss of another year, sought the aid and assistance of Messrs. Money Wigram and Sons, who generously allotted to him 50 tons of space in their well known clipper ship,

the *Norfolk*, advertised to sail for Melbourne on the 20th January following. Messrs. Wigram first intimated that the space was without charge, but Mr Youl offered them 100 guineas from his private purse, which were subsequently declined, Messrs. Wigram being desirous that the service should be entirely gratuitous. Mr. Youl having overcome one great obstacle, was almost immediately met by another. He had engaged Mr. Robert Ramsbottom, the well-known pisciculturist, of Clitheroe, to forward a supply of salmon ova from the Ribble for shipment per the *Norfolk*, but every fish captured in the Ribble was found to have shed its spawn. In this dilemma Mr. Youl published in *The Times* an appeal for assistance, and despatched Mr. Ramsbottom with his son to the Dovey, in Wales, and Mr. Johnston, another experienced pisciculturist, to the Tyne, and their efforts were successful, about 100,000 salmon ova reaching London on 18th January. The ova was at once packed and shipped in the *Norfolk*. The mode of packing at that time adopted has been repeated with little alteration in each succeeding shipment, and is thus described by Mr. Youl:— "A couple of handfuls of charcoal are spread over the bottom of the box, then a layer of broken ice; after this, a bed or nest of wet moss is carefully made and well drenched with water. The ova are then very gently poured from a bottle, which is kept filled with water. The box is now filled up with moss, and pure water poured upon it until it streams out from all the holes. Another layer of finely pulverised ice is spread all over the top of the moss; the lid is then firmly screwed down. The boxes used measured 11¾in. long, 6¾in. wide, and 5¼in. deep, perforated top and bottom.

In addition to the salmon ova, a small consignment of trout ova (*Salmo fario*) was placed in the ice-house, contributed by Admiral Keppel through Frank Buckland and by Francis Francis. All the boxes were placed in the ice-house; the remaining space was filled with blocks of Wenham Lake ice, and the house securely closed. The *Norfolk* sailed from the London Docks on 21st January, 1864, arriving at Melbourne on 19th April following. Before stating the procedure on the vessel's arrival at her destination it may be well to here enter into rather full details in relation to this shipment of ova, as the produce formed the first stock of salmon and trout liberated in Australian waters. Many theories are now advanced as to the various species to be found in these waters, and doubts have frequently been raised as to whether true salmon ova were ever received; various opinions have also been expressed upon different specimens of trout (*S. fario*), which have been called *fario eriox*, &c. Under these circumstances I have thought it well to record all available information in my possession, which may help to set at rest unfounded theories and incorrect assumptions upon so important a matter. The salmon ova were obtained from the following rivers in England and Wales:—

River Dovey, 17,000, obtained by R. Ramsbottom.
Rivers Ribble and Hodder, 35,000 to 45,000, obtained by Westell Ramsbottom.
River Severn, 30,000 to 40,000, obtained by W. Ramsbottom and Allies.
River Tweed, 20,000, obtained by Johnston.

With regard to the salmon the names of those who collected the ova are well known as men of experience who were not likely to err in the choice of fish for stripping; that the greatest caution and care were exercised does not admit of a doubt. Mr. Youl has always indignantly repudiated the suggestion that any mistake could possibly have been made by sending for salmon ova that of another species.

I have a newspaper clipping which thus refers to Mr. Ramsbottom's proceedings at the River Dovey:—

"The Dovey Fisheries at Machynlleth.—Mr. Ramsbottom, who has been so successful in the artificial propagation of salmon, has lately visited the Dovey for the purpose of obtaining salmon ova to send to Tasmania. He commenced netting in Mr. Bulkeley's water on the upper part of the Dovey, but here only succeeded in getting two fish suited to his purpose. These he put in a small piece of water near the river at Mallwyd, secured by a cord to their tails; but, although he had paid the men very liberally, and explained throughout the neighbourhood the great object the fish were to be used for and the enormous expense already incurred, and that the ship that was to convey the ova was on the eve of sailing, some scoundrels actually cut the cords and stole the fish during the time of service on Sunday. He subsequently, with the permission of the Preservation Society, succeeded in getting from the lower part of the Dovey at Derwenlas two splendid female salmon of 28lbs. and 14lbs. weight, laden with spawn, from which he obtained all that he required. He captured numbers of very large salmon, both in the upper parts of the Dovey and at Derwenlas, but all had spawned."

I have also a clipping from *The Times* of 18th January, 1864, with reference to the ova obtained from the Severn:—

"Salmon Spawn for Tasmania.—Mr. Youl, who has been deputed by the Tasmanian Government to procure from the English rivers a supply of salmon spawn for the purpose of introducing that fish into his own country, has, after many difficulties, at last succeeded in obtaining a supply from the Severn, which the Inspectors of Fisheries pronounce one of the best salmon rivers in England. Last week he went down to Worcester, and on Friday a number of fishermen were employed, under the direction of the officers of the United Association for the Protection of the Severn Fisheries, in netting the river near Worcester. The

result was that 18 salmon were taken, from which five were selected as being fit for the purpose required. These were fish of from 15lb. to 18lb. each, three spawners and two milters just ready to shed their spawn and milt. The fish were kept until Saturday, when the spawn was pressed from them and the milt of the male fish also shed over the spawn, which was deposited in a vessel prepared for the purpose. When this was done—and it was accomplished very successfully—the fish were returned to the river apparently none the worse for the operation. The spawn thus impregnated was to be conveyed to London to day, and will be at once despatched to its destination, a vessel having been detained on its voyage for the purpose. It is hoped that the experiment will be crowned with success. Some interesting facts in connection with the salmon came out in the conduct of this experiment. In a tributary of the Severn—the river Teme, which falls into the Severn near Worcester—all the fish taken were found to be spent fish. We believe that neither a new river fish nor an unspent fish was taken. In the Severn, out of 18 fish taken several were spent, some were not sufficiently advanced in spawn for the purpose of the experiment, and only two were fresh river fish. The last named fact at once affords ample proof of the good policy of making January a close month, as it was done under the last Salmon Fisheries Act. In order that the fishermen might perfectly understand the object of the netting on Friday last, they were assembled and a local magistrate explained to them that it was only legal to capture salmon for the purpose of artificial breeding, and that even if fresh river fish should be taken they must be returned to the water. The fishing was witnessed by many."

Can it be seriously suggested in the face of these extracts that the ova obtained on these occasions was other than that of *S. salar*. The trout ova were obtained from the river Itchen, from the Wey and High Wycombe, Bucks. The former are thus described by Frank Buckland: "I have obtained about 1000 eggs, regular beauties, of 'Itchin Trout;'" and the two latter are referred to by Francis Francis in a letter to Mr. Youl: "The ova sent is the finest trout ova I ever saw, and was taken from 8lb. and 10lb. fish which had all but finished spawning." These trout ova were the first and only lot which reached Tasmania alive, a second consignment in the *Lincolnshire* being all dead on arrival in Melbourne. From the produce of the *Norfolk* trout ova the rivers of Tasmania and the adjacent colonies have been stocked, and it will be at once seen that, beyond the changes produced by food and water, it is a popular error to suppose that many varieties of brown trout are to be found in our rivers.

The *Norfolk* arrived in Hobson's Bay on 15th April, after a voyage of 84 days. She was immediately boarded by Mr. Edward Wilson, the president and other members of the Acclimatisation Society of Victoria, in whose presence the ice-house was opened and an ova-box examined, a considerable portion of the ova being found alive. Steps were at once taken to tranship the ova-boxes and ice to the Victorian sloop *Victoria*, which was placed at the disposal of the Tasmanian Government for the purpose of conveying the ova to Hobart; 170 boxes were distributed in 11 strong wooden cases, each being covered with a quantity of ice and enveloped in blankets; 11 boxes of ova were retained by the Victorian Acclimatisation Society for the purpose of being hatched in Melbourne. Of these the first egg hatched on 5th May and ultimately from 200 to 300 fry appeared, the temperature of the water having been kept at from 50° to 54° by means of ice, and the fry were afterwards transferred to a tank, 120 being ultimately liberated in Badger Creek and never heard of afterwards.

The *Victoria* sailed for Hobart on 18th April, arriving at her destination on 20th April. The cases as packed in Melbourne were at once transferred to a barge, which was towed by steamer to New Norfolk. Intense excitement existed in the locality, and the greatest desire was evinced by the residents to render assistance in transporting the boxes to the ponds on the Plenty. The larger cases, containing the ova boxes, were slung on bamboos and placed on the shoulders of men, who thus carried them to the hatchery where Mr. Ramsbottom, with the assistance of Mr. Morton Allport, at once proceeded to unpack the ova and place them in the hatching boxes, where they were deposited on the 91st day after embarkation in the *Norfolk*. The temperature of the water was reduced by means of the remaining ice to 42°, and averaged about 47° up to 12th May, from which date to 5th July the average was about 41°. It was estimated that there were about 35,000 living ova, including trout ova. On the 4th May the first trout ova hatched, and on the following day the first salmon; the hatching of the trout continued until the 25th May, and of the salmon until 8th June; the salmon fry were kept in the hatching boxes until early in August, when they were permitted to pass into the rill attached to a large salmon pond. The trout were kept in the boxes until the end of August, when, owing to several deaths and the appearance of disease amongst them, they were removed to a specially prepared rill, when their number was found to be nearly 300. The mortality amongst the fry was very trifling, and the fish continued to feed and thrive well in their new home. The prospect so long hoped for of establishing the salmon in these southern seas seemed about to be realised. So much has been said and written of late years in relation to this experiment, and so many misrepresentations and misstatements made in reference thereto—frequently by those who should have hesitated to make assertions without due enquiry, and assertions which could not be supported—that it seems desirable to give in rather full detail the number of fish liberated from the ponds, and the date of liberation.

A statement has been made that all the fish resulting from the *Norfolk* shipment died before reaching the Derwent, but this statement has arisen from the circumstance that on 4th October following the hatching, when the fry were about five months old, a leak was discovered from the salmon pond communicating with the River Plenty, through which it was found that the fry were

escaping, as one was captured in a box placed at the outlet of the leak. A trench was at once cut, and the leak repaired, which occupied 19 days, and during that period 240 fry passed from the pond into the leak, and were captured and returned to the pond. A very large number must have already reached the Plenty, the number escaping being estimated at 1500. This estimate was arrived at from the fact that upwards of 3000 fry were admitted to the pond from the breeding boxes, that the mortality to the discovery of the leak was trifling, and that owing to the careful watch kept night and day by Mr. Ramsbottom and his assistants, the natural enemies in the shape of water rats and platypi were destroyed. Mr. Ramsbottom, in his diary, referring to the water bursting upon them when repairing the leak, which necessitated the immediate filling up of the trench, writes:—"As to how many of our young fish passed away with this terrible flow of water, I cannot give the shadow of an idea, only that a vast number must have found their way into the Plenty." Owing to a rather heavy mortality amongst the salmon parr in the pond, it was determined to liberate in the River Plenty those remaining. The mortality could not be accounted for by Mr. Ramsbottom, who said the fish affected, "when dead, look as bright and as healthy as any I ever caught with the fly and gentle in the Ribble; fine plump fish they are, and I may say I never saw any so large for their age." The water in the Salmon Pond was lowered and from the 19th to 22nd March, 1865, 419 young salmon, 10 months old, measuring from 5 to 6 inches long, were liberated in the Plenty, 14 parr were retained being immature, and it was afterwards discovered that others were unintentionally kept back, as on 30th January, 1866, 33 smolts were taken from the pond and liberated in the Plenty, and on 6th August, 1866, 76 smolts were also liberated.

The result of the *Norfolk* shipment of salmon ova was 528 salmon counted into the Plenty, and an estimated number of at least 1500 by the rush of water when the leak in the pond was being repaired. In January, 1866, 38 trout were liberated in the Plenty, and 133 were retained in the pond; these fish formed the stock from which and their progeny the rivers of this colony, Australia, and of New Zealand, have been supplied. It is well to bear in mind, as already stated, that these trout were the first and only importation of *S. fario* into Tasmania, and that the very common opinion that there are several species of brown trout in the colony is thus manifestly inaccurate. Any variability existing must arise from local causes connected with the water and food of the rivers in which the fish are found.

The Salmon Commissioners having strongly urged the necessity for a further supply of salmon ova, the Government provided the necessary funds, and the task of management again fell to Mr. J. A. Youl, who, through the aid of Messrs. Ramsbottom, sen., Westell Ramsbottom, F. Allies, and Thos. Johnson, procured the following lots of ova from the rivers Ribble, Hodder, near Clitheroe, the Itchin, and its tributaries, near Southampton, the Severn, and Teme, near Worcester, and the Tyne and Tweed:—

Mr. Ramsbottom, sen.	41,000
„ Westell, sen.	16,000
„ Allies	500
„ Johnson	45,000
	102,500

There were also obtained 15,000 ova of sea trout (*S. trutta*), and a box of trout ova, *S. fario*. The ova were packed in 161 boxes, in the same manner as in the previous shipment per *Norfolk*, and were shipped in an ice-house on board the ship *Lincolnshire*, which sailed from England on 8th February, 1866, arriving in Hobson's Bay, 30th April, 1866, where the boxes were transhipped to the Government steamer *Victoria*, with the ice remaining, and sent to Hobart, which was reached on 4th May, and on the following day the ova were all placed in the hatching boxes at the Plenty, it being estimated that 50 per cent. were alive. The hatching was complete on 30th June, the first salmon ova having hatched on 8th May, 1866, and the first sea trout on 12th May, 1866. In October, 1867, it was determined to liberate the young salmon and sea trout, as they had assumed the small form, and they were permitted to pass into the Plenty. In the Commissioners' report, dated 2nd September, 1869, the numbers liberated are stated to have been nearly 6000 salmon and 900 salmon trout. A few pairs of sea trout were detained as a breeding stock.

For many years subsequently to this date the work of acclimatising trout and salmon trout was carried on at the breeding ponds with great success as to trout, but with only modified success as to salmon trout, which spawned for the first time in Tasmania in fresh water, without having been to the sea, in June, 1869; as after a few years it was found that although the few salmon trout detained, and their increase, continued to deposit ova, their fertility ceased, and at last the fish were liberated.

But, in 1882, a Royal Commission having been appointed to enquire into and report upon the fisheries of the colony, it was recommended by that body that further importations of salmon ova should be procured. Parliament, acting upon their recommendation, provided the necessary funds, and the Hon. J. W. Agnew, a member of the Salmon Commission, visiting Europe in 1882, was entrusted by his brother Commissioners with the uncontrolled direction of a further shipment of

salmon ova. Dr. Agnew, from various causes, was unable to carry this object to completion, but he was able to correspond with and to visit Mr. J. A. Youl and Mr. T. F. Brady, whose co-operation he secured, and those gentlemen, with the assistance of Mr. Richard Philpott, Merchant, of 3, Abchurch Lane, London, were afterwards appointed a Committee of Management to conduct the next shipment, the latter gentleman acting in finance, and the two former in packing and collecting the ova. Through the co-operation of R. L. Moore, Esq., Molennan, Londonderry, R. J. Mahony, Esq., Dromore Castle, County Kerry, and Samuel L. Alexander, Esq., Roe Park, Limavady County, Londonderry, Mr. Brady was enabled, with the assistance of his son Mr. Herbert Brady, and Mr. Nevin, head-keeper to Mr. Moore, to secure upwards of 80,000 ova, presented by these gentlemen through Mr. Brady to the colony, which were conveyed to London and there packed by Mr. Youl in the usual manner in moss, and shipped in an ice tank in the s.s. *Abington*, sailing for Hobart on 19th February, 1884; she arrived in the Derwent 1st May, after a passage of 71 days; the ova being deposited in the hatching boxes at the Plenty on the following day. The following tables extracted from the Salmon Commissioners' report, dated 15th July, 1884, (Parliamentary paper No. 68, Session 1884), furnish full particulars relating to this shipment:—

The hatching continued up to the 1st July, and on that date there were in the boxes 1825 fry.

The following return shows the mortality of ova and fry from the date of the first count, 5th May, to the end of the hatching, 1st July.

Markings on boxes.	Ova died.			Fry died.			Total deaths, Ova and Fry, to 1st July.	Total Ova alive on 5th May.	Living Fry at Ponds on 1st July.	Total Ova shipped.	Percentage of Fry to Ova shipped.
	May.	June.	Total.	May.	June.	Total.					
Kerry	321	48	369	64	49	113	482	1095	613	20,000	3·06
Erne and Erne Top	267	83	350	9	51	60	410	518	108	27,000*	·4
Limavady	854	284	1138	21	17	38	1176	1274	98	10,000	·98
X	205	108	313	1	25	26	339	1331	992	20,000	4·96
Eyed ova	—	—	—	7	4	11	11	25	14	Unknown	—

* Not including 3000 sent to Launceston.

Markings on boxes.	Number of Ova shipped.	Living on May 5.	Percentage to total shipped.	Date of taking Ova from Parent.	Date of hatching first Ovum.	Period from taking of Ova to hatching.
Kerry	20,000	1095	5·47	17 & 22 Dec., 1883	6 May	142 days
Erne and Erne Top	30,000	518 165*	2·27	15 Jan., 1884	5 May	112 days
Limavady	10,000	1274	12·74	15 Jan., 1884	5 May	112 days
X	20,000	1331	6·65	28 Jan., 1884	29 May	123 days
Eyed ova	Unknown	25	—	1 Dec., 1883	3 May	155 days

* At Launceston.

The cause of comparative failure on this occasion was a defect in the drainage of the ice-house, which became choked with débris, thus preventing the exit of the melted ice and causing the ova boxes to float and knock about with the rolling of the ship, and also saturating the moss and decomposing it and killing the ova. From this shipment, 229 smolts were liberated in the River Plenty during 1885, and 730 in October, 1886.

Thirty fish of the *Abington* shipment were retained in a special pond at the Plenty hatchery, and although their growth has not been very great they were artificially spawned during last season, producing 3,140 ova, from which 300 fry were liberated, the majority being forwarded to the Northern side of the colony under the care of the Hon. James Smith, M.L.C., whose attention to his charge was so great that he succeeded in liberating 300 in the rivers selected, and 50 were also placed in the Plenty. It is hoped that for a time, at least, ova will be obtained from the stock detained which, however, through deaths is now reduced to 9 fish.

Parliament having supplied a vote for another shipment, Messrs. Youl and Brady again offered their valuable services, and Mr. Brady gave his personal attention to the fertilising of the ova from

carefully selected fish from the rivers Erne and Blackwater, Messrs. Mahony, Moore, and Alexander having a second time generously granted the use of their waters for the purpose and presented the ova to the colony. The Salmon Commissioners had also made suggestions to Mr. Youl as to improvements in the ice-house, profiting by the experience of the defects on the previous occasion in the *Abington*. Mr. Brady succeeded in securing about 160,000 ova, which were packed by himself and Mr. Youl in 101 boxes, and shipped in an improved ice-house in the s.s. *Yeoman*, which sailed from London on 27th February, 1885, arriving at Hobart on 4th May. On arrival the ice-house was opened, and the result found to be highly satisfactory. The ova were at once removed to the ponds at the Plenty, and the hatching was completed in June with greater success than had hitherto been obtained, and much of this success may fairly be attributed to the improvements in the ice-house. Ten thousand ova of this shipment were "eyed ova," *i.e.*, ova arrived at such a state of development as to have the eyes visible in the ovum, and the unpacking of this lot revealed so few dead eggs that in their report to Parliament upon the shipment, the Commissioners wrote:—"This circumstance would seem to indicate that in future experiments ova alone which have arrived at the 'eyed' stage should be packed."

Prior to the shipment per *Yeoman*, a small lot of about 10,000 ova had been shipped to Hobart per s.s. *Tainui*, in an insulated case placed in a small room adjoining the refrigerating machinery. The case had a series of six trays for ova, with an ice tray above each, the ice being supplied from the refrigerator during the voyage. The care of the room was entrusted to a gentleman passenger travelling to Hobart, who was fully instructed in his duties, and faithfully performed them. Although on arrival a large precentage of the ova were alive, the result after hatching was very indifferent. It is, however, impossible to assign accurately any satisfactory reason for this result, which may have arisen from one of several causes. When writing of this experiment to Sir Thomas Brady, while advocating the old system of shipment in an ice-tank, I admitted that the refrigerator boxes in the hands of a skilled attendant would be a great success, and the recent great success of Sir T. Brady's shipment per *Kaikoura*, conducted upon somewhat similar principle to that adopted in the *Tainui*, but upon a larger scale and improved arrangements, bears out what I then wrote. I am still, however, inclined to support the old method of the ice-tank, as providing an even temperature and requiring no supervision or attention during the voyage, in preference to the insulated cases, which really need the attention of a skilled attendant, thereby adding considerably to the outlay. The fry from the *Yeoman* and *Tainui* being so large in number could not be conveniently detained in the ponds, and it was determined to liberate them when the umbilical vesicle was absorbed, and 27,000 salmon fry were placed in various rivers of the colony between 18th August and 2nd December following. For the first time in the history of salmon acclimatisation in Tasmania *S. salar* were liberated in other rivers than the Derwent, the allotment being as follows:—

River Derwent and tributaries	10,950
South Esk (71) died)	6000
North Esk	250
River Huon (10 died)	4000
River Mersey (40 died)	4000
River Pieman (all died)	500
River Leven (25 died)	2000
River Inglis (86 put in Inglis, about 25 put in South Esk)	200
	27,900

735 therefore died in transit.

This shipment was the last carried out under the direction of the Salmon Commissioners; but before closing the record of their work it should be stated that in addition to *S. salar*, *S. trutta*, *S. fario*, they have successfully introduced to the waters of the colony the American brook trout, *S. fontinalis*, ova of which were obtained from New Zealand in 1883, the increase from which has been distributed amongst many streams and lakes in Tasmania. The fish is a great acquisition, being a handsome, plump fish, very game and taking the fly readily; it is in great demand, and justifies all that has been reported of the species prior to its introduction at the instance of Mr. W. Tarleton, a member of the Commission, whose attention was drawn to the fish in New Zealand when visiting that colony.

The Commissioners tendered their resignation on 20th June, 1887, and closed a history of 26 years' useful and valuable work, performed amidst many difficulties and discouragements. They have often been assailed as incompetent, but when the names of the more prominent are considered such charges entirely fail. Who would have dared to have challenged the scientific knowledge and attainments of the late Morton Allport, who was so closely associated with the experiments until success was attained, and whose memory still lives in the records of his work amongst the papers of this Society! Self-denying, an ardent lover of nature in every form, his death created a blank which has not yet been supplied. I speak thus feelingly of him, having had the privilege of his friendship, and a personal knowledge of the zeal he threw into the work of salmon acclimatisation.

He was also the means of introducing other fishes to the colony. Sir Robert Officer, for many years Chairman of the Commission, was also well known as a man of science and a zealous worker. Mr. R. M. Johnston, F.L.S., etc., another member, needs no eulogy from me. He is the author of the only complete catalogue of Tasmanian fishes, and his general scientific attainments are universally acknowledged. Mr. Matthew Seal's practical knowledge in fishery matters are also admitted by all. The Hon. J. W. Agnew, the last Chairman of the Commission, and Hon. Secretary of this Society, and a member of the committee which reported on the subject in 1858, is a worker of no mean order; and the other members of the Commission at different times—the Hon. Captain Langdon, Thos. Giblin, the Hon. W. Archer, W. A. B. Jamieson, the Hon. Dr. Butler, R. C. Read, John Swan, A. G. Webster, A. Riddock, W. Tarleton, H. Weedon, R. F. Irvine, Bernard Shaw, J. H. Wedge, J. Buckland, C. E. Beddome, the Hon. W. A. B. Gellibrand, and Ebenezer Shoobridge—make up the roll to whom Tasmanians should be glad to acknowledge their indebtedness for years of self-imposed labour. If all the success desired has not been attained, it is from no lack of zeal or labour on their part.

I may be pardoned for having thus referred to the members of the late Commission, having worked with them as their Secretary for many years, and I submit with confidence that an impartial study of what they performed during their tenure of office well entitled them to the commendation they received from His Excellency the Governor on their retirement, which was conveyed to them by the Chief Secretary as follows:—"His Excellency accepts with regret the resignation of these gentlemen, and the members of the Government desire to join with him in expressing the high sense entertained of the valuable services rendered by the Commissioners in their efforts to introduce the salmon into the waters of Tasmania. The services thus voluntarily rendered to the colony for so lengthened a period, during which the Commissioners had to combat with difficulties and discouragement of no ordinary character will, it is hoped, result in the acclimatisation of the true salmon, as it has already in the propagation and distribution of the salmon trout."

Thus ended the labours of the Salmon Commission; but the work was not to stop there, as by a singular coincidence its further prosecution has again fallen into the hands of this Society, whose 1st volumes of records of 1841 contains correspondence on the subject of salmon acclimatisation. Dr. Agnew, Hon. Secretary to the Society, the only surviving member of the Committee who reported on the subject in 1858, was so much impressed by the success of the last shipment of "eyed ova" that he generously proposed to the Royal Society of Tasmania, that if they would appoint a Committee to undertake the conduct of another shipment, to consist of "eyed ova" only, he would personally meet all the expense of the undertaking. The Society willingly accepted so noble an offer, and appointed a Committee of Management, consisting of Messrs. A. G. Webster, Matthew Seal, R. M. Johnston, C. T. Belstead, R. C. Read, and A. Morton, to which committee I had the privilege and honour of being elected a member. It was Dr. Agnew's express wish that the whole management in relation to the collection of ova was to be entrusted to Sir Thomas F. Brady, who was invited to accompany the shipment to the colony. His Excellency the Governor also lent his willing aid to further the object. It is unnecessary for me to do more than allude to the shipment per *Kaikoura*, as our guest Sir Thomas Brady has, so recently at the opening meeting of the session, given the fullest details of his work. Those who, like myself, have been many years connected with the Salmon Commission, know well how to appreciate the work Sir Thomas Brady has done for the colony on this occasion. Those unacquainted with the subject know little of the privations to be undergone in the collection of salmon ova during the most inclement season of the year—the many miles of travelling to be endured, and the anxiety in relation to the numerous minute details necessary to ensure success: were such difficulties more widely known the great value of such work would be more highly appreciated. Sir Thomas has received a hearty welcome, and I trust he will carry away with him from our colony the most pleasing recollections of his visit, and live long to learn of the success attending his recent labours and the establishment of a valuable salmon industry in the colony.

Before closing this history I must draw attention to the important fact that although large sums of money have been expended by this colony in the work of salmon acclimatisation, great assistance was rendered at various times by other members of the Australasian group; the following sums of money having been contributed:—£995 by the Government of Victoria, £200 by the Acclimatisation Society of Victoria, £300 by the Provincial Government of Canterbury, New Zealand, £200 by the Provincial Government of Southland, New Zealand, and £150 by the Provincial Government of Otago, New Zealand. The Victorian Government also on two occasions generously gave the use of their sloop *Victoria* to convey ova from Hodson's Bay to the Derwent.

I regret that I do not feel myself competent to enter scientifically into the result in relation to the efforts made to acclimatise salmonidæ in Tasmanian waters, but in this respect I am somewhat relieved by my friend Mr. R. M. Johnston, who has prepared an exhaustive paper dealing with the matter from several standpoints, I can, however, claim that success has been secured in the thorough and unquestioned establishment of salmon trout and brown trout, both of which species are now abundant. The establishment of the true salmon, however, is still to some extent a matter of uncertainty. It must, however, be borne in mind that more than one specimen submitted for

scientific examination to Dr. Gunther and others have been pronounced *S. salar*, and that Sir Thomas Brady has publicly stated his belief that specimens shown to him are of the same species. In speaking of them commercially, Sir Thomas states that such specimens in a salmon producing country would be accepted as salmon without a doubt. This being so, I may almost claim that the establishment of *S. salar* is an accomplished fact, and express my earnest hope that the grand result attending Sir Thomas Brady's shipment per *Kaikoura* will be the means of so establishing the species as to admit of no doubt in the future. The question of a change of character to some extent in *S. salar* by a new environment is so ably dealt with by Mr. R. M. Johnston in his "General and Critical Observations on the Fishes of Tasmania," that I may be pardoned for concluding my short history of the subject by quoting the following extract from that work:—

"With respect to the exact nature of the Derwent migratory Salmonoids, there has been much discussion as to whether the *S. salar* has really established itself or not. The handsome fish which is now so numerous in the estuary of the Derwent is, within certain limits, a most variable form—some individuals being almost identical in all specific characters with the grilse form of *S. salar*, while others partake more of the character of the equally valuable *S. trutta*, and its still more closely allied congener, *S. cambricus*. It is clear to me, however, that the prevailing form found in the salt water is a mean between these, and it is this overlapping of the closely agreeing characteristics of these so-called species which renders it so puzzling to determine to which of them any one individual belongs. The question, which has excited much interest in Tasmania, is confused by the notions of imperfectly informed persons, who, by the use of such a misleading common name as 'bull-trout,' have led many to think that we have only succeeded in acclimatising the common brown trout and its varieties in our waters, and they often, in ignorance, speak of our fine migratory fish as if it were a coarse, destructive fish of no value. It is to be regretted, where legislation may be concerned, that erroneous notions should be circulated in this way. By such people the fanciful views of amateur pisciculturists or sportsmen are deemed to be of equal value to the utterances of learned ichthyologists such as Dr. Gunther, whose profound knowledge forces them to speak with extreme caution.

"We only know as yet that we have a fine non-migratory trout (the brown trout), and a splendid sea-going migratory salmonoid. The question is, not *S. fario* versus *S. trutta*, or *S. fario* versus *S. salar*, but the more difficult one of determining whether the variable, handsome, migratory fish, which is frequently captured far out at sea, is (1) *S. trutta*, (2) *S. cambricus*, (3) *S. brachypoma*, (4) *S. salar*, (5) all of these in variable numbers, (6) a hybrid partaking in varying degrees of the characters of the four named species, or (7) one or other of those named but modified by transfer to a new environment. If the individuals which prevail agreed with or fell within the classified limits of any one species we would not have the slightest difficulty in determining their specific value; but when no one individual comes exactly within the limits of the written characters, it is necessary that the seven propositions advanced by me should be answered satisfactorily before any one can pronounce with confidence on the subject.

"Mr. Allport, who knew very well the niceties of distinction between *S. salar* and *S. trutta*, inclined strongly to the opinion that our Derwent salmonoids are grilse of the former, and not *S. trutta*. Dr. Gunther and Professor M'Coy have had the disadvantage of determining the nature of the species from single individuals sent to them at odd times. They consequently, from such disconnected points, could have no means of determining the curve of variability, and I am not surprised therefore that, respectively, at different times, they have pronounced certain individuals to be *S. salar*, *S. trutta*, *S. cambricus*, and a hybrid between *S. salar* and *S. trutta*. Odd specimens cannot determine the curve of variability, nor can they determine whether the four fish, so differently named, were not after all the progeny of the same parents."

Mr. Johnston's observations are also supported by the Chief Inspector of Fisheries of England, Mr. A. D. Berrington, who in his report to the Board of Trade, dated 31st March, 1887, thus writes:—

"The artificial propagation and acclimatisation of fish is one of the hobbies of the day; and the results which it is producing are of great value. It has added much to our knowledge of the life history of fish, and consequently of the lines on which their increase may be promoted. It has served to show us more clearly how small are the differences which separate the varieties of our salmonidæ, and has furnished proofs that in many instances these varieties are not of a permanent character, but depend upon food and other circumstances of position. These are facts which must be borne in mind if we would hope to avoid disappointment when introducing fresh strains into our rivers. According to all analogy it must be advantageous to cross the existing breed, and in so doing to bring in the best form of the race we desire to improve and multiply; but it must not be expected that the special characteristics of the fish we turn out will necessarily be perpetuated in the offspring, as under changed conditions these peculiarities are apt to disappear."

I trust, therefore, that with these opinions, strengthened by the views of Sir Thomas Brady, we will in the future hear of fewer doubts upon the subject, and accept the one broad fact which is beyond dispute, that a fish has been acclimatised in Tasmania which is of considerable commercial value, that it is the means of attracting visitors to our shores, and that with proper care and attention, it will in the future afford profitable employment to our fishermen, and add wealth to our Island home.

APPENDIX.

RETURN showing the Number of the various Species of Salmonidæ hatched from Ova imported from the United Kingdom liberated in the Rivers of Tasmania.

Ship in which Ova arrived.	Date of liberation.	Name of River.	Number liberated.	Fry, Parr, or Smolts.	Remarks.
Norfolk.....	7 to 25 Oct., 1864	River Plenty	1500	Fry, S. salar	This is an estimate, the fish escaping through a leak
	19 to 22 Mar., 1865	Ditto	419	Parr, S. salar	
	30 Jan., 1886	Ditto	33	Smolts, ditto	
	Jan., 1886	Ditto	38	S. fario	A number were retained as a breeding stock
	6 Aug., 1886	Ditto	76	Smolts, S. salar	
Lincolnshire...	Oct., 1887	Ditto	6000	Ditto	This number is an estimate. The fish were allowed to pass from the pond into the river
	Ditto	Ditto	900	Do., S. trutta	Estimate. These are the only salmon trout produced from imported ova which have been liberated in the colony
Abington.....	Nov. & Dec., 1885	Ditto	229	Smolts, S. salar	
	27 and 28 Oct., 1886	Ditto	730	Ditto	
Yeoman.....	18 Aug., 1885, to 2 Dec., 1885	River Derwent and tributaries	10,950	Ditto	
		South Esk	6000	Ditto	
		North Esk	250	Ditto	
		River Huon	4000	Ditto	
		River Mersey	4000	Ditto	
		River Leven	2000	Ditto	
		River Inglis	200	Ditto	
		River Pieman	500	Ditto	These all died in transit

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