

MAY, 1888.

The usual monthly meeting of the Royal Society of Tasmania was held on May 14th, when there was a moderate attendance of Fellows. Amongst others present were His Excellency the Governor and Lady Hamilton, Sir Thomas Brady, Sir Lambert Dobson, and Col. Legge, R.A.

The President (His Excellency the Governor) took the chair at 7.30.

NEW MEMBERS.

The PRESIDENT said the first business on the paper was the nomination of Mr. R. A. Bastow as a corresponding member of the Society. They were all aware of Mr. Bastow's position as a scientist, his work in connection with the Society being of an extremely valuable character, but it was necessary to go through the form of an election.

Mr. Bastow was elected a corresponding member, and the following new Fellows were elected:—The Rev. Mr. McDowall, Canon Dicker, Mr. F. M. Young.

THE SALMONIDÆ IN TASMANIA.

Mr. P. S. SEAGER read a paper, entitled "A concise history of the acclimatisation of the *Salmonidæ* in Tasmania." He pointed out that the subject of acclimatising English salmon in Tasmanian waters was first considered by Captain F. Chalmers in 1841, but the experiment failed through entire want of experience. The matter next engaged the attention of Mr. James L. Burnett, of the Tasmanian Survey department, and Sir William Denison warmly interested himself in the matter. In this second attempt, which took place in 1852, when 50,000 salmon trout ova in a tub were imported, the ova hatched on the voyage, but there was no trace of either spawn or fish on arrival at Hobart. It then occurred to Mr. Burnett that the temperature should be regulated by means of ice. In 1858 the Government referred the matter to the Royal Society, and had already taken great interest in it, with a reward of £500 from Parliament for the successful introduction. At this time the idea of introducing the living salmon was prominent, and the committee recommended the use of ice to lower temperature, and the construction of breeding ponds. The next experiment was made in 1860 through the efforts of the Australian Association in England working under the guidance of Mr. J. A. Youl, who, from that time, became closely associated with every succeeding shipment; but this attempt also failed, as the ice melted before the voyage was over. In anticipation of the arrival of this shipment the Government had caused ponds to be constructed at North West Bay, though these ponds were never used, and the site was abandoned in favour of the River Plenty site. In 1862, 50,000 ova were shipped for Tasmania in the Beautiful Star, with iced water flowing over the trays containing the ova. Severe gales and the failure of the ice supply made this attempt another failure. In October 1861 the Government had appointed a body of gentlemen as honorary commissioners, to whom the future management of the whole business was entrusted. In the failures up to the date experience had demonstrated the perfect practicability of the project under proper conditions easily attainable. A little box containing ova, packed in layers of moss and charcoal, had been placed in an ice-house by Mr. Youl, and forgotten by Mr. Ramsbottom, until 60 days after the Beautiful Star had left England, led to further experiments, in which there were many claimants for the credit of the discovery that ice retarded the development of ova. Mr. Brady, who was much impressed with the idea, sent a sketch of

ova packed in damp moss under an ice tank, and with a tap to draw off water, to Mr. Youl. The original of this sketch the writer of the paper produced. Mr. Brady recommended a small trial in this way, adding that if they did not hatch before arrival it would be a decidedly safe way of transporting them. In 1862 a number of experiments in this direction were made by Messrs. R. and W. Ramsbottom, Thos. Johnston, and others under the direction of Mr. Youl, and after some difficulties in obtaining ova and proper accommodation on board ship, Messrs. Money, Wigram, and Co. placed 50 tons of space on the clipper ship Norfolk at Mr. Youl's service gratuitously. Mr. Youl has been enabled to ship 100,000 salmon ova packed in the following manner, which has since been repeated with little alteration:—"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 11 $\frac{1}{2}$ in. long, 6 $\frac{1}{2}$ in. wide, and 5 $\frac{1}{2}$ in. deep, perforated top and bottom." As doubts had been expressed whether the true salmon had ever been received, Mr. Seager gave full particulars of where the ova were taken, and the names of the different persons of well-known experience who obtained it from the various rivers, also an article from *The Times* of January 18, 1864, giving particulars with reference to what had been done. The Norfolk arrived in Melbourne after a voyage of 84 days, and the ova were transhipped in the Victorian Government sloop Victoria, and brought on to Hobart. They were deposited at the hatchery on the 91st day after shipment, when it was estimated that there were 35,000 living ova. The ova hatched out well, and the mortality amongst the fry was very trifling. It was estimated that 1,500 of the fry escaped through a leak, and that gave rise to a statement that the Norfolk shipment had died; but upwards of 3,000 fry were admitted to the pond from the breeding boxes, and fish in a more mature stage were subsequently liberated. In 1866 another 102,500 salmon ova with 15,000 ova of sea trout were shipped in the Lincolnshire, and 50 per cent. were deposited at the ponds. Of this shipment the commissioners reported on September 2, 1869, that 6,000 salmon and 900 salmon trout had been liberated. In 1882 Dr. Agnew, then in London, was entrusted by his brother commissioners with the direction of a further shipment, but that gentleman was, from various causes, unable to carry the object to completion, though he visited and secured the co-operation of Messrs. Youl and Brady, who secured and packed 80,000 ova, which were despatched in the Abington on the 19th February, 1884. On July 1 there were 1,825 fry of this shipment in the boxes at the ponds—a comparative failure in this shipment arising from a defect in the drainage of the ice-house. Thirty fish of this lot were retained in the ponds for breeding purposes, and 300 fry of their progeny were liberated last season. In 1885 Messrs. Brady and Youl packed 160,000 which were sent direct to Hobart in the Yeoman, and resulted in a greater success than any of the preceding shipments. Of this lot 10,000 arrived in such a state of development as to have the eyes visible, and revealed so few dead eggs that it was decided to ship ova in the "eyed" stage in future. After paying a high compliment to the Salmon Commissioners who resigned in 1887, Mr. Seager referred to the noble offer of Dr. Agnew and the last shipment under the charge of Sir Thos. Brady, and concluded by quoting some passages from the writings of Mr. R. M. Johnston and others as to the character of the fish we have succeeded in acclimatising.

Mr. R. M. JOHNSTON followed with a paper on the same subject, dealing in a scientific manner with the evidence as to the fish we have secured. He was not aware, in preparing his paper, that Mr. Seager was engaged in writing such an important paper, and would therefore omit the brief reference he had made to the history of the subject, which Mr. Seager had already so exhaustively dealt with. Taking up the subject from the discovery of the proper means of conveying the ova, he spoke in very high terms of the services rendered by Sir Thomas Brady and Dr. Agnew, and said the problem to solve was whether the progeny of the real *Salmo salar* when liberated perpetuated their species in Tasmanian waters; for no specimen hitherto caught in Tasmania could be decidedly classified with the *S. salar* of Europe. But if the fish in the water here referred to as *S. trutta* and *S. fario*, liberated in 1866, what had become of the far greater number of *S. salar* then liberated? The theories advanced to account for the supposed non-appearance of *S. salar* might be briefly referred to as the hybrid theory; the extinction theory—that the environment, food, climate, and enemies had killed them; and the exodus theory—that they had wandered away from our shores and had not returned. That hybrids of *salmonide* existed was confirmed in other parts of the world, but the facts of the history of acclimatisation here would not admit of the assumption that hybrids were introduced, as there were five shipments obtained at different times, different places, and by different people all skilled in the work. Granting that a few mistakes might occur, it was preposterous to assume that hybridism should have resulted in all the cases, and the facts stated were sufficient to dismiss it at once. The extinction theory was more reasonable, as it was conceivable that extremes of temperature, or such enemies as the barracouta, might account for the extinction. Still, the variation in the temperature of deep water was not very great, while in the shallow ponds of the Plenty they had the undoubted progeny of *Salmo salar*, not only surviving, but actually bred in the ponds. There was no means in the colony of obtaining accurate information of temperature at a depth, and it was absurd to gauge isotherms on shallow sand flats, where in England an equally high temperature will be discovered. At the Clyde sea area and other places a series of temperatures had been taken with deep sea thermometers, revealing the fact of very slight variations at a depth. Looking at the characters of the waters here, there was every reason for distrusting the temperature taken on a sandy shallow. Regarding the presence of enemies such as the barracouta, there was no reason for supposing that the *Salmo salar* should fall a prey to these fish, while others survived. The exodus theory also depended upon temperature. It was not unreasonable, but the evidence was against it. Mr. Kent had suggested that the fish had wended their way towards Japan, but this was improbable, and opposed to the known instincts of all animals who were prompted to return, if they wandered, to the homes of their ancestors. If the heat caused them to migrate they would travel south, and be lost in the wilderness of waters in the Antarctic Ocean. The question then was, had the *Salmo salar* migrated to the waters around the South Pole, or was the migratory fish now in our waters the true descendants of the *Salmo salar* of Europe, modified by the difference of environment. The classifications of museums were not reliable when applied to the various intermediate forms of the fish market, where the doubts of the classifiers were set aside as the vivialities of naturalists and the fish bought and sold as salmon. Nor did individuals agree on the points of determination. What naturalist was prepared to declare the limits of individual variation in form, colour, etc., in the growth of one fish through its various stages, under changes of food, climate, and other circumstances of environment? He did not urge these remarks against the classification

of museums, but against the arbitrary adoption of fixed forms, and then applying them to fish under such changes as those presented in acclimatisation here. He pointed out the undoubted variation existing in the trout, and asked how naturalists could affirm the non-variation of salmon in Tasmanian waters, where they were preserved from the interfusion of other local types to break down the developing variations. In this respect European opinions were not of much value, as they were not aware of the limit of rareability in the new environment of Tasmanian waters. Classification had undoubtedly failed to deal with the difficulty, as Sir Thomas Brady had instanced the case of an ichthyologist with a European reputation, who had plainly said that if a specimen shown him from Tasmania were taken to six different authorities, six different opinions would be given. What, then, was the verdict? Between extinction or exodus, and modification produced by environment he would decide in favour of the latter. He had prepared a table of measurements, which would show that all the classifications overlapped, except as to the number of scales to the adipose fin. Not only did the characteristic overlap in different species but individuals exhibited in different specimens the extreme of variation. We had two classes of fish here known, and a third, a migratory fish partaking of the characteristic of the other two, but differing from the English *S. Salar*. He could not say definitely that the fish caught by His Excellency was the English *S. Salar*, but he would suggest that it be designated *S. Salar Tasmanicus*.

Mr. MORTON said the difficulty Mr. Johnston had laid before them had been dealt with by Ramsbottom in 1854, who quoted Lyell's opinion that "future inquirers have yet to determine the number of species of *Salmonidæ*." The true salmon kept in the ponds did not agree with the measurement of the maxillary bone, but the scales did agree. Few had gone so closely into the ichthyology of Tasmania as Mr. Johnston, but he (Mr. Morton) could not quite see that Gunther and other authorities had disregarded all the facts advanced. The fish presented by the Governor, after the opinion of Sir Thos. Brady and Mr. Johnston, he intended to label *S. Salar*, but paying due regard to the criticism which might be brought to bear upon the specimen, he intended to add *Tasmanicus*, because the fish would not fit with the classification of *Salmo salar*. The subject was beset with difficulties, but Mr. Johnston's paper would be printed, and he would see that Gunther, Day, and other authorities received it.

Sir THOMAS BRADY spoke in the highest terms of the papers, and looked upon Mr. Johnston's as important, not only to the colonies, but to every salmon producing country. He had noticed such variations in fish from different rivers that fishermen could pick out of a sea catch the fish that came from the Foyle, the Ban, or the Ballycastle Rivers. As to colour, he had seen a haul of 2,100 salmon and fish picked out, the flesh of which were both white. He intended to send one of these and the salmon sold in the public markets out to the Museum.

Sir Lambert Dobson thought a few words would sum up Mr. Johnston's paper. It seemed to him that Mr. Johnston had gone back to first principles, and abolishing the terms *salar*, *trutta*, and *fario* he simply said—"We have the salmon in different variety."

The PRESIDENT, in proposing a vote of thanks to the readers of the papers, and Sir Thomas Brady for his valuable remarks, spoke very highly of the value of the papers and the interest he had in listening to them. He thought Mr. Johnston had disposed of the various theories very ably, and had almost ruled that we have the salmon in some variety.

The vote of thanks was carried, and owing to the lateness of the hour the reading of some other papers was postponed.