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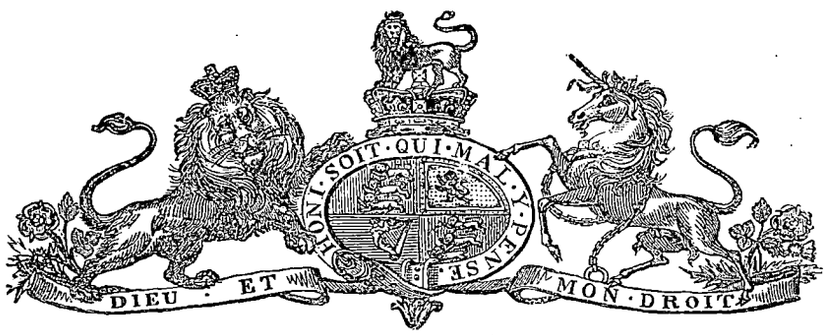
PARLIAMENT OF TASMANIA.

FISHERIES DEPARTMENT:

REPORT FOR THE YEAR ENDING 31ST JULY, 1885.

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



FISHERIES DEPARTMENT.

REPORT for the Year terminating 31*st July*, 1885.

SIR,

I HAVE the honor to lay before you my Report of the operations that have been conducted in my department since submitting to you my last General Report, dated September 9th, 1884. In this Report I likewise beg leave to incorporate such suggestions and recommendations as I have to make for the further improvement and development of the Fisheries of Tasmania.

SECTION A.—MARINE DEPARTMENT.

1.—*The Oyster Fisheries.*

Since the date of my last Report I have devoted considerable time to an investigation of the formerly more famous Oyster-grounds of this Colony, with the view of obtaining precise information as to their present condition, causes of unreproductiveness, and prospects of resuscitation. This investigation has corroborated my earlier anticipations that the decadence of the Oyster Fisheries of Tasmania must be attributed chiefly to overfishing. There are localities, however, where natural causes have produced a like result. This is notably the case with reference to the Oyster-beds formerly flourishing in the estuaries of many of the larger rivers, such as the Derwent and the Tamar, and where undoubtedly an excess of fresh water and of sedimentary deposits brought down by floods have been the most important destructive factors. Even in these instances, however, human agency is indirectly responsible for the results produced. Through the constantly extending cultivation and drainage of the watersheds of these rivers, with their innumerable tributaries, floods are discharged into them with much greater rapidity and force than obtained when the land was in an uncultivated state. The limit of salt water, or of water sufficiently saline for the well-being of marine animals, is, with the recurrence of the abnormal floods now produced, pushed further back towards the sea, and in the case of a sedentary form such as the Oyster, that cannot migrate so as to bring itself into relation with more congenial conditions, it necessarily involves the extinction of the species.

During my recent visit to the estuary of the Tamar, June, 1885, I obtained some very positive evidence showing that the causes above referred to materially influence the vitality and distribution of the Oyster in that district. Information was then furnished me by local fishermen and others to the effect that Oysters had entirely died out in the Middle Arm, the East Arm, Whirlpool Reach, and all higher portions of the Tamar estuary owing to the excessive floods of recent years. My visit happened, fortunately, to be timed immediately after the incessant rainfall of the five or six preceding weeks, the river being consequently in a state of flood, and the various bays and inlets containing an abnormal amount of fresh water. It was under these conditions that I made an examination of various Oyster-beds in the neighbourhood of the West Arm, and in certain of these found Oysters, both old and young, in a dead or dying state. These Oysters had, beyond doubt, succumbed to prolonged immersion in water containing an insufficient amount of saline ingredients. By testing the water at different points with a hydrometer I ascertained that its density was even then much below that in which marine organisms usually thrive. As a further practical illustration of the comparative freshness of this water, and also of the abnormally low temperature of the past winter, I have to record that at 6 A.M. on June 30th, when passing over the Oyster-bed in question to inspect a more remote one at extreme low tide, my boat was rowed through a continuous sheet of ice fully one-eighth of an inch in thickness. The deduction that might be arrived at with relation to the above record, viz., that the frosts were responsible for the mortality of Oysters, is disposed of when I mention that shore Oysters attached to the rocks in the immediate neighbourhood, completely exposed at low water, and which for examination had to be

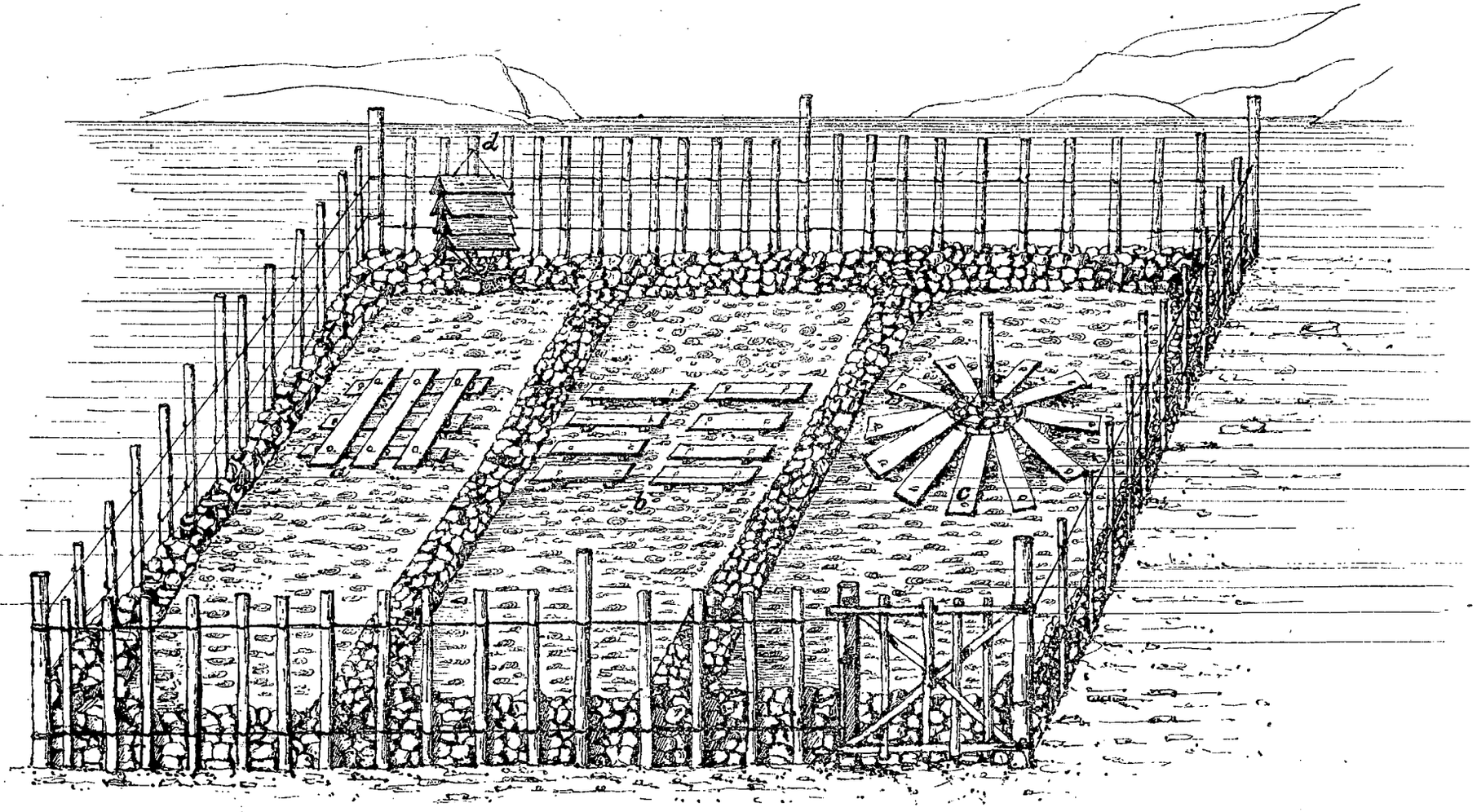
broken out of a crust of ice, were in a perfectly sound and healthy state. That Oysters can live, and indeed thrive, when subjected to short periods of immersion in not only brackish but quite fresh water, I had an opportunity of satisfying myself in connection with a bed that exists at the mouth of a small creek falling into the Tamar estuary. Here, at ebb-tide, the water flowing over the Oysters, and tested with the hydrometer, was found to be perfectly fresh. This submersion in fresh water, however, only lasts for a few hours, at half-tide the Oysters being again covered by almost pure sea water. This exposure to short intervals of immersion in salt and fresh water, as at the mouths of creeks and rivulets, is well known to be particularly favourable to the growth of Oysters, and is not comparable to those conditions previously referred to, and in which, in consequence of extraordinary floods, their submersion in fresh water is extended over a period of many days, and with the consequent result of their destruction. Various marine fish, I was informed on good authority, were observed floating dead or dying on the surface of the water during the recent flood in parts of the Tamar usually sufficiently salt for their well-being, and a similar phenomenon was observed by my informants during an abnormal flood a few years ago.

So far as my general investigation has proceeded, I am in a position to report to you that although in the majority of the districts visited the Oysters have been practically exterminated through over-fishing, many localities yet remain in which they are struggling to re-establish themselves, and with proper care and protection may be expected in the course of a few years to develop to such an extent as to again constitute a remunerative fishery. Without particularising, for obvious reasons, the precise localities in which this re-growth of Oysters has commenced, I may generally indicate the districts of the D'Entrecasteaux Channel, the Carlton and Tamar estuaries, and Spring Bay, on the East Coast, as furnishing evidence upon which this statement has been based. Among those localities visited by me in which, on the contrary, Oysters formerly abounded but are now totally exterminated through over-fishing, I may more especially refer to the two famous lagoons of Cloudy Bay and Little Swanport. These two districts in bygone years have exported conjointly as many as seven million oysters in a single season. The ground and surrounding conditions in those lagoons still remain eminently suited to the growth of the Oyster, and would form excellent stations for the establishment of both Government and private Oyster fisheries on an extensive scale.

It was pointed out in my last year's Report that the most certain and substantial assistance that could be given towards the restoration of the Oyster Fisheries of Tasmania would be through the establishment of a series of efficiently protected Government Oyster Reserves, in which breeding stocks of Oysters of the best quality should be carefully cultivated and permanently retained. Such Government Reserves I further contemplated, would serve as models for the benefit of private individuals, who, owning suitable portions of foreshore, would gladly take up Oyster culture as a subsidiary source of income, and which, if conducted on sound principles, would prove a remunerative investment and contribute yet further towards the replenishment of the adjacent waters with this valuable mollusk. In response to my recommendation, the sum of £100 was included in the Supplementary Estimates for expenditure this year upon the formation, under my direction, as a commencement, of one or more such proposed model Reserves. I am pleased to be in a position to report to you that I have found this sum sufficient for the establishment of no less than three such Reserves, one of which is already constructed and stocked with Oysters, the remaining two being in a state of progress. The localities chosen by me for these initial experiments are Little Oyster Cove in D'Entrecasteaux Channel, Spring Bay on the East Coast, and the entrance of the West Arm at the mouth of the River Tamar. The general plan upon which these several Reserves are constructed being identical in all cases, and representing the one I recommend as the most practical and economical pattern for imitation by private Oyster cultivators, it may be briefly described in conjunction with the accompanying sketch.

In choosing and preparing the ground, attention is directed in the first instance towards imitating or reproducing as nearly as possible those conditions under which Oysters are found thriving in a state of nature in the adjacent waters. The French system of cultivating Oysters on extensive flats known as parks and clairs, which are left dry or scarcely covered by water when the tide goes out, tiles being laid down for the collection of the spat, is not generally applicable in Tasmania owing to the circumstance that the rise and fall of the tide on these coasts is not usually sufficiently marked as to allow of such operations. The climate, however, with its immunity from severe frosts, is well suited for the adoption of this French system, and there are many localities, especially towards the north, where it might be experimentally introduced.

Following out that method of cultivation which most nearly assimilates itself to their natural growth in this Colony, a portion of the foreshore is selected, well sheltered from the prevailing gales, and having a tolerably hard shelly bottom, over which a depth of two or three feet of water is usually left when the tide recedes. The area chosen is, in the first place, enclosed by stakes of from four to six inches thick, driven into the ground at a distance apart of eighteen inches, and which project about two feet above extreme high-water mark. These stakes are further strengthened and kept in position by two or more horizontal lines of galvanised wire interlaced between them, and secured by wire staples. The stakes, with their wiring, mark the boundaries of the Reserve, and serve also as a protection against the incursions of Stingrays and other large fish destructive to Oysters, and for the



Diagrammatic Plan of Model Oyster Bed. Shewing at "a" "b" "c" methods of placing the "single-pale" collectors illustrated by Fig 2. and at "d" a set of collectors on the "ridge tile" system suspended to the boundary fence.

support of the "Collectors" presently described. The boundary line inside the stakes has laid down upon it throughout its length, a belt of loose rocks and stones three or four feet wide, and of a suitable description for the Oyster-brood to adhere to. Additional belts of stones for a similar object are distributed in various directions, and in such a manner as to subdivide the Reserve into rectangular areas upon which the stock of breeding Oysters are deposited. On the approach of, and throughout the spatting season, special forms of "Collectors" are hung round the boundary fence and distributed among the Oyster layings for the further retention of the embryo brood. These Collectors are cheaply constructed of split palings three or four feet long, nailed together at right angles so as to resemble the ridge-tiles of a roof. A series of from three to half a dozen such segments are fastened with wires at a distance of a few inches one above the other, as indicated in Figure 1 over leaf. A stone or brick sinker is attached to the lower end of the series to anchor it in its place, the upper one being raised up and secured to the connecting wires between the stakes, or to an independent buoy or float.* The under parts of these Collectors should be roughly plastered with a mixture of lime, sand, and Portland Cement, which, hardening, makes a natural rock-like surface for the adherence of the Oyster-spat. The brood when sufficiently matured can be readily detached with the cement from the collecting-boards, and laid down on suitable portions of the bed. This form of Collector, it should be mentioned, was originally invented and used in France, by a M. Achille Thomas.

Still further utilizing split palings as the most economic and readily accessible material to be obtained throughout the Australian Colonies for the construction of oyster-spat Collectors, I have devised a yet simpler form than that, on the "ridge-tile" or Achille Thomas's system just described. As represented by Fig. 2 in the corresponding illustration, it consists of a split paling, having a brick attached underneath near the two extremities, the whole under-surface being then coated with cement. The wires with which the bricks are attached should be so fastened as to leave a loop on the upper surface at either end, and by means of which the Collectors can be easily placed in position or raised to the surface for examination with the aid of a boat-hook. Some of the various plans upon which these "single pale" Collectors may be most advantageously distributed over the oysters are shown at *a*, *b*, and *c* in the annexed diagram of a model oyster-bed. To meet the taste and requirements of the cultivator, these plans of distribution may be varied in an infinite number of directions. The greater durability of the split palings used in the formation of these several forms of Collectors may be ensured by seasoning them with a coating of tar before adding the cement.

The bed being completed and stocked, the attention it henceforward requires is comparatively trifling and inexpensive. In the case of the Government Reserves a caretaker is appointed, who, residing close at hand, and having other occupation in the district, undertakes to guard the bed from molestation, and to devote time not exceeding one day per week to working on it for the wage of five shillings per week. Extra labour that is periodically bestowed upon the beds is remunerated by extra pay. The routine work needed under ordinary circumstances is simply to keep the bed clean from growing or drifting seaweed; to periodically raise up and redeposit the oysters if they show a tendency to sink into their bed or become covered up by sedimentary matter; and to make any needful repairs to the fencing caused by storms or by ordinary wear and tear. The cost of the preparation and stocking of a Government Oyster Reserve in the manner here described, and of, say, the dimensions of one acre, averages from £20 to £30. In the case of a private individual residing in the vicinity of the area he leases for oyster cultivation, and who assists personally in the construction of the bed, the cost is very much less, and need not exceed £10. In and after the third year of the establishment of the bed the cultivator may expect to reap a substantial return from his investment, three years representing the time taken by the oyster to grow to a marketable size.

The stock of oysters at present laid down upon the Government Reserve at Little Oyster Cove numbers about 6500. Over three thousand of these were obtained from the D'Entrecasteaux Channel, the series including some remarkably fine specimens measuring no less than six inches in diameter. These large examples, locally known as the "mud" variety, were taken from comparatively deep water, while the greater remaining number were collected in shallow water close in shore, and growing under conditions which I have adopted as a model for reproduction in the establishment of the Government Reserves and private fisheries. These shallow water, or inshore oysters are commonly distinguished by the title of "rock oysters," but they must not be confounded with the irregular shaped rock oyster, *Ostrea angulata*, of the neighbouring colonies, which will not apparently grow or reproduce its kind in Tasmanian waters. Both the inshore and deep-water oysters of this colony may be defined as varieties only of one and the same species, and which differ in no essential structural detail, nor, as I have ascertained by dissection and observation in its reproductive phenomena, from the typical oyster, *Ostrea edulis*, of the British and other European seas. About 1200 of the oysters now under cultivation at Little Oyster Cove were recovered from the beds originally laid down there by the Tasmanian Oyster Culture Association, and the remainder were imported from New Zealand. A brief explanation may be appropriately given here of the fact that no marked success attended the attempts at oyster culture previously initiated

* An economic form of buoy may be improvised out of an old kerosene tin, the aperture being first securely corked or soldered up.

in this locality by the above-named Association. The ground chosen by the Association for their operations, which is not identical with that selected for the Government Reserve, was for the most part of too soft and yielding a nature, the oysters in course of time, and not having sufficient attention paid them, gradually sinking into or becoming suffocated by the mud and sedimentary deposits brought down during floods from the adjacent land. The non-productiveness of the beds as originally planned must be largely attributed, again, to the circumstance that no suitable objects for the spat to adhere to were supplied at the proper season, the faggots or fascines, and hurdles laid down for this purpose having apparently been placed too early and became covered by the arrival of the spatting season with slime and vegetable growths, to which the young oysters will not adhere. There was also an almost entire absence in the immediate neighbourhood of rocks and stones, which represent the most natural and attractive fulchra for the adhesion of the embryo brood, and which appears to have more or less completely floated away and perished. That a certain amount of spat was produced by this original stock may be gathered from the fact that isolated examples of young oysters have been found attached to stones some distance from the original beds, while spat in an advanced state of development was discovered in examples collected from the beds and dissected by me last summer.

It is with much gratification that I find myself in the position to inform you that, even at this early date, the project of establishing Government Oyster Reserves has commenced to yield fruit in a most desirable direction. Numerous applications for leases of suitable areas of foreshore for the formation of private Oyster-beds and fisheries in the neighbourhood of the Government Reserves have already been received, and certain of these beds are well advanced towards completion. Of one of these I have to record an interesting and highly important fact. Since its enclosure with stakes upon the plan already described, the area so enclosed has been found to abound with flounders of very diminutive size. It provides, in fact, a safely protected breeding-ground and nursery for this valuable food-fish. An important step is thus gained, in a totally unexpected direction, towards the protection and development of the sea fisheries through the establishment of Government and private Oyster-beds. The prospects of re-establishing the Oyster Fisheries of Tasmania are to my mind so greatly encouraged by the results of the tentative operations of the past six months, that I have every confidence in recommending, for the year 1886, that the larger sum of £400 be expended upon the formation and maintenance of ten or twelve additional Government Reserves, to be judiciously distributed along all the most suitable portions of the coast-line. Each of these Reserves, it may be anticipated, as in the case of those already projected, will form a centre for the development of many adjacent private beds, and, as a whole, give an impetus to the revival of the Oyster fisheries that cannot fail in due season to produce substantial results.

In connection with the leases of portions of the foreshore to be henceforward granted to private individuals for the purpose of Oyster culture, I have suggested that certain modifications should be made. More especially I have advised the introduction of a clause making it incumbent upon the lessee to permanently maintain on the area leased by him, a breeding stock of Oysters bearing a ratio of not less than four thousand Oysters to the acre. Such a clause I have recommended as expedient in order to get rid of an abuse associated with prior leases, through certain lessees using their beds simply for the storage of Oysters taken ostensibly for cultivation, and by special privilege, in the close season, but which, in place of being cultivated, have been sent to market immediately the close season ended.

With respect to the terms upon which areas of the foreshore should be leased to *bonâ fide* cultivators, I have suggested that no rent should be payable for the first three years, this being the interval during which no substantial returns may be anticipated, and after that date a rental of £1 per annum per acre for every acre or portion of an acre leased. With reference to the conduct of the Oyster Fisheries generally, it is, I think, desirable that greater encouragement than hitherto should be given to the discoverers of Oyster-beds in the deeper waters off the Tasmanian Coast, and, where there is substantial reason for believing, many such beds exist. Under present Regulations the discoverer of a deep-sea bed, who may have spent many days in searching for it, reaps but small advantage from his discovery, any other fisherman being at liberty to dredge over it and obtain probably the greater bulk of the Oysters. The privilege should, I think, be granted to the discoverers of such beds to buoy off and exercise an exclusive right to dredge thereon for a certain number of days, after which it might be again thrown open to the public. Such a concession would be very acceptable to the fishermen, and give a new impetus to the Oyster industry.

2. *Saltwater Hatchery and Laboratory.*

In my last year's Report I recommended that a certain sum should be devoted to the construction of a Marine Hatchery and Laboratory, furnished with tanks, pumping apparatus, and all appliances requisite for the experimental culture of marine fish and other organisms possessing an economic value, and of those species whose association with them may be found on investigation to have an important bearing upon their welfare. Such a Hatchery was, moreover, indispensable for the successful conduct of the experiments I propose to initiate in the direction of introducing to this Colony various of the more important European and other exotic food fishes. The ova of such

COLLECTORS FOR OYSTER SPAT.

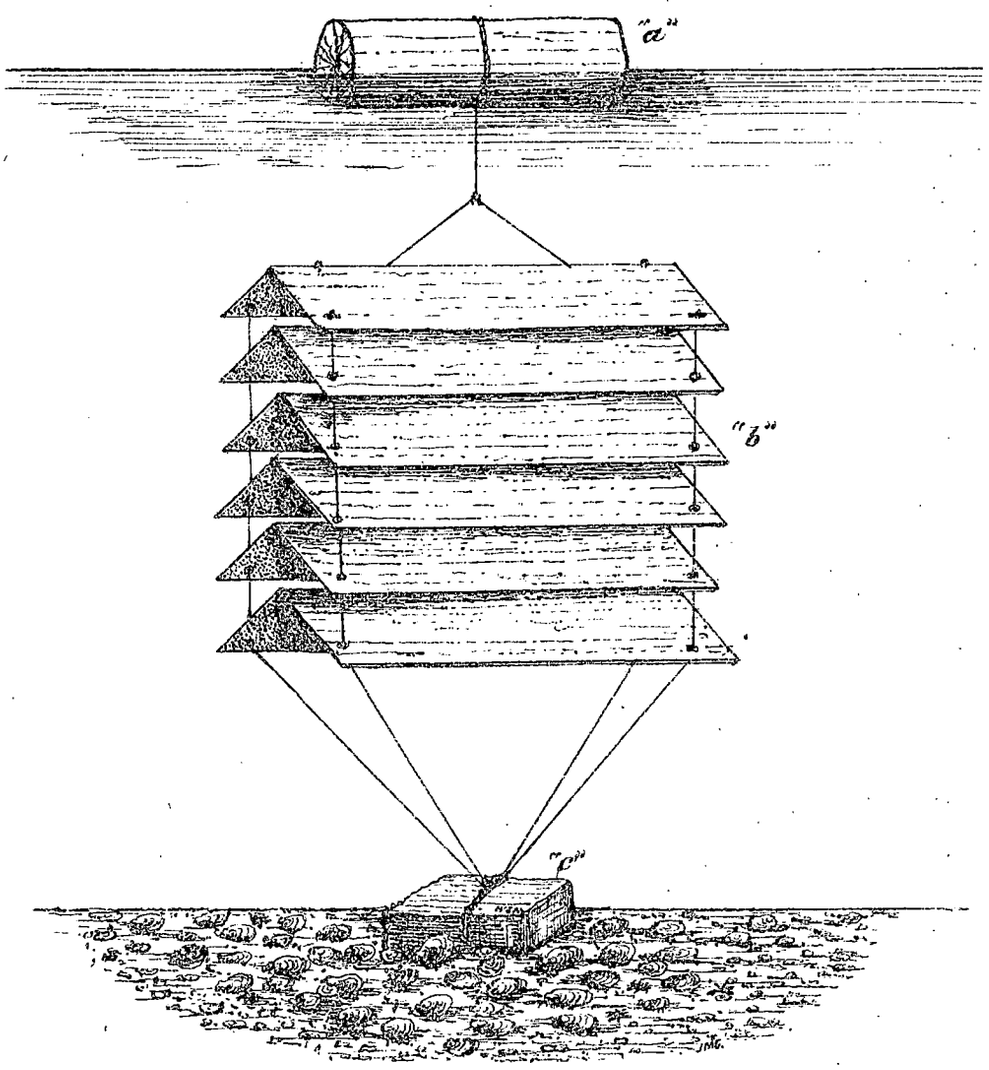


Fig. 1.—*Compound, or "Ridge-tile" Collector.*

a. Cork or Buoy, represented by a log of Huon pine or other light wood. In place of this the Collectors may be suspended to stakes or to the fence round the Bed.

b. Boards (split palings) fastened together by wire nails or galvanised or copper wire, and coated with cement underneath.

c. Brick or Stone Sinker for securely anchoring the Collector.

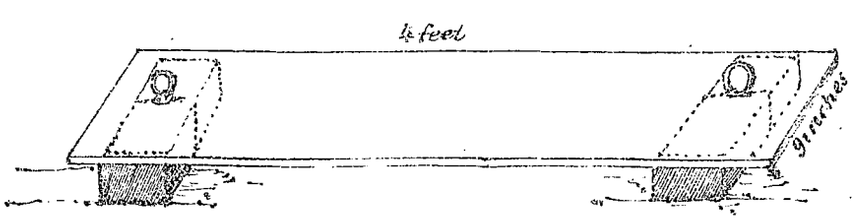


FIG. 2.

Fig. 2.—*Simple, or "Single-pale" Collector.*

Composed of a split paling with two attached bricks, the under surface being coated with cement.

species, I am of the opinion, might be successfully transmitted here, the fry developed in the tanks of the Hatchery, and ultimately turned out in suitable parts of the adjacent coast. In response to my suggestions, a sum of £250 was included in the Supplementary Estimates for the Fisheries Department, 1885, for the construction and equipment of the proposed Hatchery.

This Hatchery has been completed within the last few weeks, and is now in a state of working order, but requires a brief period of seasoning before fish and marine animals generally can be successfully cultivated in the tanks. The general structure of this Hatchery, which has been erected under my personal supervision (I may add, considerable personal labour), and, in a miniature scale, upon the same principle as the several large public Aquaria built to my designs in England, is as follows :—The building, composed entirely of wood, measures forty-six feet long by twelve feet wide, and eight feet high to the slant of the roof. Wooden tanks, with plate-glass fronts, each eight feet long and two feet wide, but varying in depth from eighteen inches to two feet, extend for a length of thirty-two feet on each side of the building, giving a total tank length of sixty-four feet. A quadrangular space of twelve feet diameter left at one extremity of the Hatchery serves for the reception of the apparatus employed for circulating the water and maintaining it in that state of thorough oxygenization necessary for the well-being of the inhabitants of the tanks. For this purpose a reservoir, improvised out of a 200-gallon cask, is sunk beneath the floor. A pump, with attached driving machinery, raises the water from this reservoir and delivers it into troughs constructed above the level of the tanks throughout the building, connecting taps apportioning to each tank its share of the water circulated. After passing through the tanks the water is conveyed by a second series of troughs below the tanks back to the reservoir, thence to renew the circuit. The apparatus used for working the pump is a half horse-power hot-air engine, by Bailey & Sons, of Manchester, which happened fortunately to have been imported from England as a speculation by Messrs. R. G. Warner & Co. of Hobart, just at the time when I was making enquiry for some suitable machine. So far as a trial has been given it, I have found this engine admirably adapted for the purpose required, it being simpler and safer to manipulate than a steam or gas engine, and at the same time much more economical. Refuse coke or breeze is well adapted for burning in it, and, using this description of fuel, the average daily cost of driving the engine amounts to less than threepence. The pump at present used in conjunction with the engine is nominally of gun-metal, but as other metals enter more or less into its composition, from which the sea water passing through it absorbs chemical matters of a deleterious nature, it is proposed to replace it by one of vulcanite, which is the material out of which all pumps and fittings are composed that are used for a similar purpose in the large English and Continental Aquaria.

In addition to the salt-water tanks enumerated, one tank, eight feet long, and other small portable tanks in the hatchery, are set apart for fresh-water fish. This series has been already turned to practical account in connection with the artificial culture of the ova of the Cucumber Mullet or Herring *(Prototroctes marena)*, referred to in the Fresh-water Section of my Report, and at the present time contains some two hundred young Salmon in a vigorous state of growth, developed from ova imported by the s.s. *Yeoman*, and kindly placed at my disposal by the Salmon Commissioners. A certain number of these Salmon I propose to keep until they assume the smolt condition and are prepared to descend to the sea, and to then gradually acclimatize them in the salt-water tanks of the hatchery, and, if possible, preserve them there until they are ready to migrate back to the rivers for spawning purposes. If this operation could be successfully accomplished a breeding stock of Salmon might be permanently retained, and the necessity of importing further supplies of ova from England would be done away with. In order, however, to ensure the fullest chances of success in connection with such a scheme, it would be desirable to have salt-water ponds of some extent in close vicinity to the hatchery, as presently suggested.

A great drawback is, in fact, at present associated with the chief, or marine, department of the hatchery, in consequence of its remoteness from the sea and comparative difficulty of access, on the premises of my private residence in Gore-street, which happened, at the time of my arrival here last winter, to be the only one in any way suitable then to let. So as to fully develop the utility of such a hatchery it is essential that it should be situated close to the shore, with ground adjacent to it on which might be constructed a series of ponds communicating with the sea, and in which fish of large size or in considerable numbers might be experimentally cultivated. Such suitable ground exists at the end of the Public Esplanade, upon, or in the immediate vicinity of the premises on which the Smelting Works were originally located, and which has for many years been lying waste. There are also suitable premises for sale, but not to let, in the neighbourhood of Battery Point. The removal and re-erection of the hatchery, which has been purposely constructed in a portable form, would be but a trifling cost. Under present circumstances the conveyance of salt water to the hatchery in Gore-street is an arduous undertaking, and would have been almost insurmountable had it not been for the courtesy of the Corporation, through Mr. James, the Town Surveyor, who have kindly supplied me from the main in Harrington-street, and placed a water-cart at my disposal for its transport. The water so obtained is pumped up from the sea through iron pipes, a process which renders the risk of importing with it a certain amount of iron oxide almost unavoidable. Hitherto, in fact, this iron contamination has been so marked that but few animals would live in it. Some phenomena of interest have, at the same time, been observed and recorded by me concerning the

varying capacities of the different animal groups to adapt themselves to these abnormal conditions. With the majority of the ordinary fish, Shellfish *(Mollusca)*, Starfishes *(Echinodermata)*, Worms *(Annelida)*, and Zoophytes *(Cœlenterata)*, this iron oxide has proved fatal in the course of a few days, and notwithstanding the vigorous circulation of the water maintained. Those organisms which have successfully resisted the action of the iron include more especially the class Crustacea, represented by many varieties of crabs and prawns. To these have to be added various species of the larger ascidians or sea-squirts, and also sponges and the microscopic infusoria. From the observations recorded, it would appear that the action of the oxide of iron upon the organisms affected is essentially mechanical, its minute particles adhering to and clogging up the gills or other respiratory surfaces. The higher Crustacea, which are most conspicuous for their immunity from ill effects, probably owe their escape to the circumstance that they are provided with limbs specially adapted for brushing, combing, and keeping every portion of their bodies clean from adventitious matters. This interpretation is substantially supported by the fact that the lower crustacean forms, known as barnacles or cirrhipedes, which lead a sedentary life, and possess no such toilet adjuncts, perished at an early date. A circumstance that further militates against the welfare of fish in the hatchery as at present located is its elevation on the hill-side, and the associated lower temperature of the surrounding atmosphere and of the water in the tanks as compared with that at the sea-level. During the recent frosts the respective temperatures, tested synchronously, showed a difference of as much as 12 degrees Fahrenheit. As a result of this lower temperature, I may mention that it caused the death of various species of the semi-tropical Plectognathous fishes, represented by small examples of the porcupine fish *(Diodon)*, leather jackets *(Monacanthus)*, and trunk fishes *(Ostracion)* that had hitherto been thriving in one of the portable tanks.

Until the marine series of tanks are thoroughly seasoned, or until, in fact, an unlimited supply of pure sea water can be depended on, I shall scarcely feel justified in incurring the expense of importing the ova of valuable exotic marine species for development in the hatchery and acclimatization in Tasmanian waters, and which represents in fact the prime object for which I advised its establishment. So soon, however, as these conditions are fulfilled, I have made arrangements to start with the importation of the European Lobster *(Homarus vulgaris)*, and for the growth of which the Tasmanian coast line is eminently suited. The question having been put to me on more than one occasion as to whether the European Lobster and the Native Crayfish *(Palinurus Edwardsi)* would flourish side by side, it may be mentioned here that this lobster and an almost identical species of crayfish are so found in the British seas, the lobster, however, being so much more esteemed as an article of food, that the crayfish commands a relatively restricted sale. Successful operations having been recently conducted in England and America concerning the artificial fertilization and development of the ova of the Herring, Cod, Sole, and Turbot, I anticipate no insurmountable difficulties in importing to, and developing the eggs of these fish in this Colony, so soon as the conditions in the hatchery are suitable for their reception and healthy culture.

In the course of the coming summer I propose making some practical experiments in the tanks of the hatchery relative to the artificial development of Oyster spat. In the Dutch publication, *Tijdschrift van de Nederlandsche Dierkomdige Veereensging*, it has been announced by Dr. Horst that he has at length succeeded in securing the attachment to artificial collectors of the spat of the European oyster produced in the tanks of an aquarium. Further developing the methods used by Mr. J. A. Ryder in his experiments with the American species, Dr. Horst succeeded in inducing the spat to adhere to plates of glass coated to a certain extent with hydraulic cement, and suspended in the tanks in which the spat was evolved. This experiment, which was made for the purpose chiefly of scientifically investigating the metamorphoses and development of the young oyster, will probably have a very important bearing upon the future of oyster culture. Every spawning oyster produces two or three millions of spat, and in their natural state a very small percentage of this spat, even under the most favourable conditions, becomes attached and grows to maturity. If under cultivation in the tanks of an aquarium or analogous conditions the spat can be induced to adhere and develop on a wholesale scale, as important a step will have been made in the art of oyster culture as was achieved in that of trout and salmon by those who first demonstrated that the ova of these fish could be fertilised and reared artificially. To quote the words of Professor Huxley, in his very important lecture upon "Oysters, and the Oyster Question," delivered at the Royal Institution in May, 1883—"The only hope for the oyster consumer is, first, in oyster culture; and, secondly, in discovering a means of breeding oysters under such conditions that the spat shall be safely deposited." It is upon the lines thus indicated that I look forward in future to report substantial progress. The above dictum, while spoken with special reference to the English oyster fisheries, may be applied with equal force to those of Tasmania, and which, in a precisely identical manner, are impoverished and almost depleted, mainly through overfishing.

Reference has been made on a preceding page to the circumstance that practical information concerning the influences acting for or against the welfare of any species of economic value may be obtained through the culture and observation in the tanks of a hatchery or aquarium of the various living organisms with which they are found associated. In this direction I have to record an interesting discovery with respect to an animal commonly found in the oyster beds in Tasmanian

waters, popularly known as the Sea Cucumber, or Bêche-de-mer, and referred by naturalists to the genus *Holothuria*. During my dredging expeditions I have brought up a considerable number of these organisms from the sea bottom, and placed them in the tanks of the hatchery to observe their habits. They are elongate, wormlike animals, of a dark brown or purple hue, measuring when extended as much as a foot or eighteen inches long, and about an inch in diameter. Adhesive tubular appendages "pedicels," with which the animals creep over submarine objects, are developed in five equidistant rows throughout the length of their bodies, and from the anterior extremity are protrusible at will a series of tufted tentacles, which represent the organs with which these creatures seize their food and convey it to the mouth, which is in the centre of the tentacles. It has been observed by me of these Sea Cucumbers, and also of smaller species examined in England, that, when feeding, the tufted tentacles are protruded and passed brushwise over the surface of all objects with which they come in contact. In successive order the tentacles, with such adherent matters as they may have gathered up, are then turned inwards and thrust out of sight down the animal's throat, and having safely deposited their burden there they are extended in search of further prey. Sometimes but a single, and at others two or more food-laden tentacles disappear into the aperture of the mouth at the same time. Dissections made by me to ascertain the precise nature of the food substances devoured by the Sea Cucumbers common on the Tasmanian coast, elicited the fact that it consists chiefly of the microscopic forms of animal and vegetable life known respectively as *Foraminafera* and *Diatoms*, the shells of which, being composed for the most part of either lime or silica, withstand the action of the digestive juices. Scattered among this lowly organised material I further detected a no inconsiderable proportion of the almost equally minute shells of embryonic Mollusca, nearly related apparently to the common cockle. This circumstance has an important bearing upon the oyster question, tending to demonstrate that in the Sea Cucumber we have another enemy of the oyster in the earlier stages of its growth. The habit of the animal to feed on all minute forms of organic life, including embryonic Mollusca, being verified, it may be logically predicted that the large examples, more especially, with their relatively powerful mop-like tentacles, would make a clean sweep of any newly attached oyster spat that might be adhering to the stones, shells, or other objects over which they creep in quest of food. In common with Starfish, Dogwhelks, and other recognised injurious organisms, I have therefore to advise that Sea Cucumbers be eliminated as far as possible from the neighbourhood of oyster-beds.

3. *Anchovies and Sardines.*

Within the course of the current year I have received samples of fish for identification that I have recognised as being closely allied to the English sprat (*Clupea sprattus*), and suitable for preparation in like manner in the form of Sardines. In June last numerous other small fish were consigned to me that I identified with the Southern form of the Anchovy (*Engraulis encrasicholus, var. antartica*). The specimens sent were selected from a large shoal that was stranded on the shores of the Derwent near Bridgewater, and that had probably been driven up the river by the porpoises. In my last year's Report I suggested that attention might be profitably directed to the capture and preservation of the last-named fish. It has been since represented to me that the migrations of these fish to these shores are too infrequent and uncertain to form the basis of a distinct fishery, or, indeed, to warrant an outlay upon special nets and gear for their capture. It is at the same time much to be deplored that the vast shoals literally cast ashore at uncertain intervals—as, for instance, the estimated quantity of upwards of three hundred tons of sprats driven ashore in Simmons's Cove in the year 1867—should not be turned to practical account. The chief obstacle in the way of utilising the Anchovy, which is the more valuable of the two species, but not palatable or fit for consumption in its fresh condition, appears hitherto to have been a want of knowledge of the methods adopted in other countries for its preservation, and which may be thus summarised:—To preserve them in bulk, the head, which has an exceedingly bitter flavour, and likewise the viscera, are removed. The fish are not washed or wiped, but are packed in quantities of from five to twenty pounds in small casks in alternate layers, with a mixture of *sal prunella* or saltpetre, from which the water of crystallisation has been removed by heat. They are then well pressed down and the air excluded. Smaller quantities are preserved in tins or bottles, either in oil or simply in strong brine. The famous Anchovy Sauce is prepared by bruising the fish and simmering them with melted butter over a slow fire, a little vinegar and flour being added; the fish, it will be found, dissolves in the process. These several methods are so simple that they might be carried out on a small scale in any private household, while at the same time the profits that would attend their conduct on a wholesale one should be a sufficient temptation to fish-curers, or others experienced in the preparation of preserved meats, to secure and operate upon them in bulk. The ingredients required for their treatment might be kept ready to hand, and with suitable inducements the fishermen would no doubt be prepared on the first opportunity to bring in sufficient supplies for preliminary experiments. For the assistance of those desiring to undertake the conservation of this fish, but who are unacquainted with its precise shape, it may be added that, as compared with the Sprat, the body is much rounder, and, in fact, nearly cylindrical. The most readily distinguished feature of the Anchovy, however, consists of the snout-like prominence of the upper jaw, the mouth being consequently, as in a shark, quite beneath the surface of the head.

4. *The Crayfish Fishery.*

In my last Report I drew attention to the desirability of an Act being formulated for the prohibition of the capture and sale of Crayfish measuring less than 10 inches long, and of females bearing eggs or spawn. The unchecked destruction of fish belonging to these two categories, I pointed out, could not fail in the course of time to exert a very prejudicial influence upon the productiveness of this important fishery. In accordance with the recommendation made, a Bill providing for the protection of the above-mentioned fish is in course of preparation, and will be shortly submitted to Parliament.

5. *Sponges and Corals.*

During my visit last summer to Spring Bay and Maria Island, some examples of sponges washed up from deep water in the neighbourhood came under my notice. The texture of these sponges was so fine and pliable as to warrant my opinion that if sponges suitable for commercial purposes are not to be found in the vicinity, the surrounding conditions would probably be found favourable for the growth of the true sponge of commerce *(Euspongia officinalis)*. The specimens examined approach most nearly in form and texture to that commercial variety known as the "reef" or "glove" sponge that grows in the neighbourhood of the Bahama Islands, and that passed through my hands among a large series from the same district, upon which I was requested to draw up a Report for the London International Fisheries Exhibition, 1883. This Report made special reference to the successful experiments that had been made in the direction of propagating sponges artificially, suggestions being added as to the methods by which the finer Mediterranean varieties might be transported to and acclimatized in the Bahama Seas. The suggestions and experiments there made or recorded are, I am inclined to anticipate, equally capable of realisation in Tasmanian waters. I propose, at all events, to prosecute further investigations this coming summer, when dredging with a steamer for oysters in deep water, with the view of ascertaining the precise habitats, range of variation, and conditions of growth of the species to which my attention has been directed, and with the object,—if the conditions observed should prove sufficiently favourable,—of suggesting the establishment of sponge culture in Tasmania as a new industry.

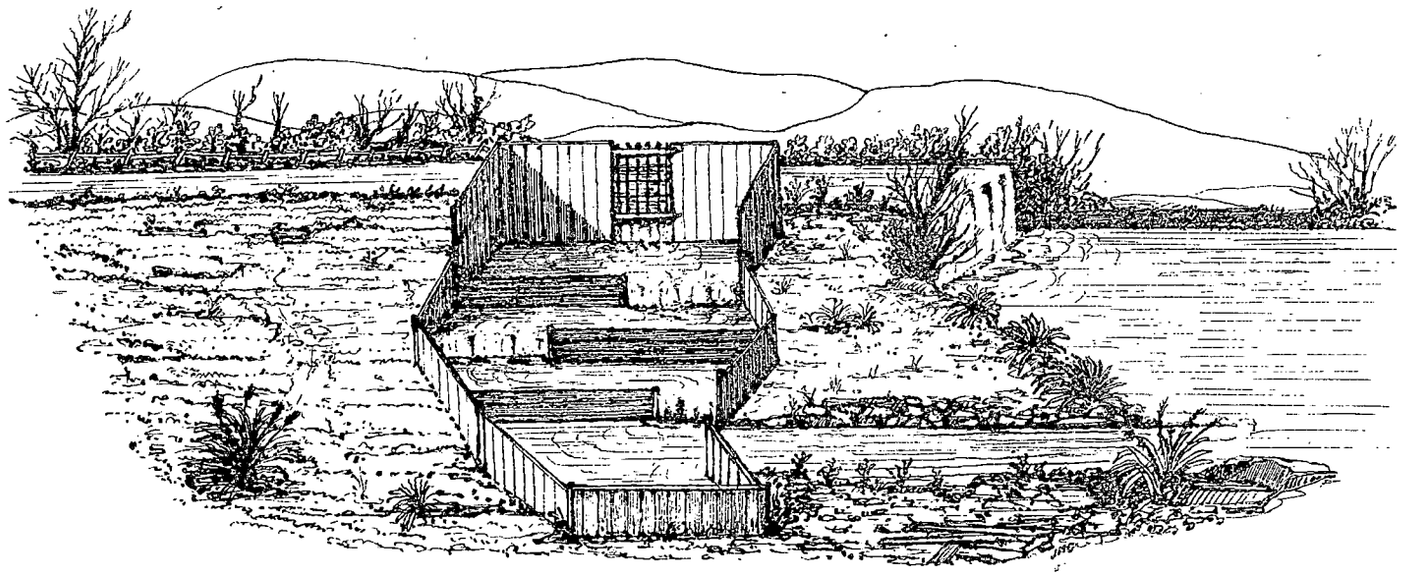
Mr. R. M. Johnston, F.L.S., has recently presented me with a specimen of coral, also obtained from deep water on the East Coast, which I have identified with the *Melithœa retifera* of Lamarck. This coral is plentiful in many parts of the Australian coast, other species being found in the Mediterranean and Red Seas and in the neighbourhood of Mauritius and the Sandwich Islands. As a genus it is a particularly interesting one, since it is very nearly allied to that most valuable species the *Corallium rubrum*, or Precious Coral of Commerce. *Melithœa*, in fact, occupies a position midway between that species and what are known as the Gorgonias, Sea-fans or Flexible Corals. The temperature and conditions of growth of *Melithœa*, as compared with those under which precious coral flourishes, are so closely identical that there can be but little doubt that if once introduced this last-named species would also thrive in Australian waters. The Precious Coral of Commerce and the Commercial Sponge have been acclimatized in the tanks of the Naples Aquarium, and through that source supplies of living examples of both kinds might, under skilled direction, be imported and planted in suitable locations. The same isothermal lines, of from about 60° to 70° Fahr. mean annual temperature, embrace the head-quarters of both the sponge and coral fisheries in the Mediterranean and the coast lines of New South Wales, Victoria, South Australia, and a portion of Tasmania; and it would be well worth the while of the Governments of the first-named colonies more especially, to devote some time and expenditure to laying the foundation of new fisheries that might ultimately prove to be a very important source of revenue.

Section B.—Fresh-water Fisheries.

1. *Salmonidæ.*

The result of my practical acquaintance with the acclimatised *Salmonidæ* in the lakes and rivers of Tasmania since the date of my last Report has been a further confirmation of my opinion then expressed, that no true Salmon are as yet established therein. Evidence that has been recently submitted to me throws grave doubts upon the question as to whether the 3000 salmon fry developed from ova imported by the ship *Norfolk* in the year 1864 left the breeding ponds in the Plenty in a healthy or even a living state. This suggestion, if founded on fact, enables me to modify my opinion previously expressed, in the absence of any such evidence, that the ova of *Salmonidæ* other than those of the true Salmon must have been originally imported to this Colony.

The fish of large size, weighing up to as much as 20 lbs. or more, that abound in the Great Lake and other large sheets of water in the interior of the Island, and reported by some authorities to be true Salmon, have, as I anticipated, proved on examination to be large examples only of the ordinary Brown Trout *(Salmo fario)*, corresponding in all essential points with that variety known in England as the Great Lake Trout, or *Salmo fario, var. ferox* or *lacustris*.



SKETCH OF PROPOSED POUND AND FISHWAY - RIVER PLENTY.

The prospects of establishing the true Salmon in Tasmanian waters are, at the present date, I consider, more promising than they have been at any time since the initiation of their attempted acclimatisation. The safe transport this year by the s.s. *Yeoman* of ova, resulting in the production of over 35,000 healthy fry, must be recorded as a most successful operation, and reflects the greatest credit on Messrs. T. F. Brady, J. A. Youl, and other gentlemen associated with their collection and packing for shipment. It is worthy of remark here, that out of the total of 150,000 Salmon ova originally shipped, the most successful results were associated with that portion of them which before shipment had been placed in a private hatchery, and had developed there to what is known as the "eyed" condition, or in which the eyes of the embryo fish are distinctly visible through the membraneous eggshell. Out of a total of 10,000 belonging to this series, almost every egg hatched out, and I have consequently recommended the Salmon Commissioners to arrange, if possible, for the importation of "eyed" ova alone in the event of future shipments. The practice of retaining trout and salmon eggs in hatcheries until they have arrived at the eyed condition before transporting them for even short distances, is, it may be mentioned, the common practice in all European and American Fisheries, and has also always been followed here with reference to trout ova exported to the neighbouring colonies.

Since my last Report I have devoted my attention to the enlargement and improvement of the hatching-house on the River Plenty, with the view of providing space for the reception and successful development of a much larger number of Salmon ova and fry than have hitherto been dealt with in Tasmania. In accordance with my plans, it has now been enlarged to twice its original dimensions, and equipped with a series of hatching-troughs constructed on the most modern principles, and capable of providing accommodation for upwards of a million ova. Up to last year the hatching-troughs consisted simply of oblong boxes placed in streams conducted across the floor of the house, and containing a layer of gravel upon which the ova were deposited. The position of these troughs was very inconvenient for the examination and manipulation of the ova and fry, while, as the result of the ova being deposited among the gravel, they were subject to becoming covered up with sedimentary matter, a circumstance which exerts a very prejudicial influence upon both their vitality and upon the development of the newly-hatched fry. The new hatching-troughs, measuring 16 feet long by 2 feet broad and 1 foot 3 inches deep, are raised on tressels to a convenient height, and are furnished for the reception of the eggs with tiers of wire-gauze bottomed trays, coated with a waterproof varnish composed of asphalte and gutta-percha dissolved in naphtha. To ensure the even percolation of the water through the trays, partitions extending alternately to completely to and to within a few inches from the bottom of the troughs are interposed at even distances, the general plan adopted being a modification of the form extensively used in California and other parts of the United States, and there known as Williamson's "Double Ripple" system. These various alterations and improvements in the hatching-house were completed by the arrival of the consignment of ova by the s.s. *Yeoman* on May 4th, and the working of the new apparatus in connection with this importation has proved eminently satisfactory.

Regarding the ultimate distribution of the young Salmon developed from this latest consignment of ova, I have impressed upon the Salmon Commissioners the desirability of arriving at a speedy decision. Among Salmon cultivators I have further pointed out that two opinions are held as to the most suitable epoch for the liberation of the young fish. With certain of these it is considered desirable to retain them in captivity, and to feed them artificially until they are one or more years old and ready to descend to the sea. With the second, and probably larger section of Salmon culturists, it is maintained that the fry should be liberated in the rivers it is proposed to stock immediately they have absorbed their umbilical vesicle and commence to take solid nutriment. My own views, having a special regard for the conditions and circumstances to which the fish are exposed in this colony, are in favour of the last-named period for their liberation. In support of this opinion, I have pointed out that young fish, if placed in suitable parts of the rivers selected soon after they are hatched and before they commence to feed, following their natural instincts immediately seek shelter under and among the stones at the bottom, and are exceedingly wary of exposing themselves to the attacks of larger predatory fish. If, on the other hand, they are brought up in an artificial state for a prolonged period, receive food regularly at the hands of a keeper, and are almost unacquainted with even the existence of danger, they become so domesticated and dependent as to fall a comparatively easy prey to the first enemy that attacks them. I have counselled, therefore, that the greater portion at least of the salmon fry now developing at the Ponds should be distributed before they become accustomed to artificial feeding. With reference to the most suitable localities for their distribution, I have recommended that while a large number of them might be liberated in the Derwent, the more considerable portion of them should be placed in streams which are not already overstocked with trout. Such streams being now difficult to find in Southern Tasmania, I have indicated the Rivers Mersey, Forth, and South Esk, in the North, as being well suited for the introduction of salmon, and as possessing the advantage of being both readily accessible for the transport of the fry and comparatively free from the predatory brown trout. The fact that in all of the above-mentioned rivers the Cucumber Mullet or Herring is still more or less abundant, may be accepted as an indication that Trout are not present there in sufficient quantities to interfere materially with the introduction of the true Salmon.

In view of the substantial prospects that now exist of establishing Salmon in the rivers of this Colony, it has become very desirable that provision should be made for the capture of the parent fish when ascending to the spawning-beds, and of securing their ova for artificial fecundation and development. It being further desirable that such facilities should exist in the neighbourhood of the present hatchery, I have, after a careful examination of the district, determined that the desired ends would be best attained by the erection of a combined pound and fish-way on the River Plenty at the irrigation dam close to Redlands House. The facilities for constructing a pound and fish-way at this point are greatly enhanced by the fact that a small waste stream already flows out of the Plenty just above the dam, and re-enters it a short way below. I have accordingly made a rough sketch indicating the general plan and location of the proposed structure, a copy of which is herewith annexed. This plan, with an accompanying recommendation, has been already laid before the Salmon Commissioners, and, as mentioned in their Report, meets with their cordial concurrence.

Among other practical operations conducted under my supervision at the Salmon Ponds during the current year has been the introduction of a more modern and more effectual method of fertilising the ova of Salmonidæ than the one hitherto practised at that establishment. This newer, or so-called "dry" method, consists of mingling the milt and spawn of the two fish together in a basin for some few minutes and then adding water to the mixture. In the older, or "wet," method the milt and ova are stripped into a basin already containing water. Here, as elsewhere, the dry method has proved very superior, the per-centage of well fertilised ova in the case of the Californian or American Brook Trout *(Salmo fontinalis)* experimented with, and where the operation had been properly conducted, being very much larger than had hitherto been accomplished at the Ponds, and much superior to the results obtained by leaving the fish to spawn naturally in their nests or "redds" in the adjacent streams.

2. *The Cucumber Mullet or Herring (Prototroctes marena).*

In my last year's Report I drew attention to the fact that it would well repay the trouble of artificially cultivating the ova of the above-named fish, and of turning the developed fry in large quantities into the Derwent and other Southern rivers, from which, for some unknown cause, they have of late years disappeared. I further intimated that nothing being then definitely known concerning the reproductive and developmental histories of this fish, I proposed to investigate the subject with the object of dealing with the ova and fry in the manner suggested. During the past autumn I have made some preliminary experiments in the direction indicated, the results obtained being highly successful, and such as to satisfy me that the artificial propagation of this species on an extensive scale might be accomplished with comparative facility. Assisted by my friend Lieut. C. E. Beddome, R.N., I last March captured a certain number of gravid fish at Latrobe on the Mersey, and treated the ova and milt on the "dry" system already referred to in connection with the artificial impregnation of the eggs of salmon and trout. The greater portion of the ova fecundated at Latrobe were transported to the Salmon Ponds, and a smaller quantity, numbering several hundreds, I retained, and successfully developed in the hatchery attached to my private residence. Personal observations conducted daily in connection with this series elicited the fact that the "eyed" condition in the most rapidly developed examples is arrived at by the end of the first week after impregnation; at the expiration of another fortnight the first fish appeared. The period occupied in the hatching-out of the eggs of Cucumber Mullet, as compared with that of the Trout and Salmon, which averages from 70 to 77 days, is very rapid. In this respect it more nearly coincides with that of the European Grayling, *Thymallus vulgaris*, whose eggs, however, take only fourteen days to develop. This fish, furthermore, so nearly resembles the Grayling in both habits, aspect, and structure, that it might much more appropriately borrow its popular name from that type than from those species from it has hitherto taken its title, but with which it is in no ways related. Living specimens of the newly-hatched fry of the Cucumber Mullet, developed at the hatchery in Gore-street, were exhibited by me at the meeting of the Royal Society of Tasmania held April 14th, 1885, and a few days subsequently I had the honor of submitting examples to your inspection.

As the result of the experiments now carried out, I have to report that the chief difficulty associated with the culture of the ova and fry of the Cucumber Mullet arises from their exceedingly minute size. The ova, which are pale yellow, measure about one millimetre, or the twenty-fifth part of an inch in diameter, while the developed fry are less than one quarter of an inch long, and scarcely exceed a horsehair in thickness. Being of a gelatinous consistence and highly flexible, the fry readily escape through screens of the finest wire-gauze, canvas, or even muslin if interposed in only a single fold across the outfall stream of the receptacle in which they are cultivated. In order to rear the fry of this fish on an extensive scale it will consequently be necessary to devise some special form of troughs or pans for their retention. For such special apparatus I have already prepared designs, which I have placed for execution in the hands of Messrs. Campbell & Co., of the Launceston Pottery Works, and anticipate having it ready for use against the ensuing spawning season. The fact of the success already achieved in hatching-out a considerable number of the fry of the Cucumber Mullet, though so far they have not been reared in captivity, suffices to demonstrate that its artificial propagation and distribution in other rivers and in large numbers might, with suitable means, be readily accomplished. The simplest method will undoubtedly be to

obtain the artificially fecundated ova in sufficient quantities from the localities in which this fish abounds, and to turn the fry immediately they are hatched into suitable parts of the rivers it is proposed to stock. In this direction I am much indebted to the kind promise of Messrs. R. F. Irvine, H. Weedon, and other gentlemen residing at Launceston, to assist me next autumn in the practical operations suggested. Having explained to them the manner in which the ova are stripped and fertilized, they will undertake to procure the quantity required, storing them in their small hatchery near the Launceston Reservoir until the eyes appear, and then remitting them to me for the further development and the liberation of the fry in the Southern rivers.

3. *Fresh Water Fisheries generally.*

As the result of my more extended acquaintance with the fresh-water fisheries of Tasmania generally, I beg leave to submit to you the opinion that the time has now arrived when the interests of these fisheries would be materially promoted by the appointment of local Boards of Conservators, to whom should be assigned the conservancy of the Salmon, Trout, and other protected fresh-water fishes of the rivers and lakes of their respective districts. For the immediate requirements of the Colony two such District Boards would probably be found sufficient, one of which, with head-quarters at Hobart, should be entrusted with the conservancy of the Derwent and other rivers, with their connecting lakes debouching upon the southern moiety of the island, or, say, south of and including Great Swanport Lagoon on the East, and Macquarie Harbour on the West coasts, and a second, or Northern Board, having its head-quarters at Launceston, who should undertake a like responsibility with reference to the rivers and their connecting lakes north of the two points indicated. Establishing these Boards upon the same lines as are followed with relation to the appointment of similar Boards in England, their chief functions and authority within their respective districts would be as follows:— I. To initiate legal proceedings against all persons violating the Salmon and Trout and other Fresh-water Fisheries Acts. 2. To appoint the water bailiffs or other duly authorised officers employed in the conservance of Salmon, Trout, and other protected fresh-water fish. 3. To execute such works and incur such expenses as are provided for in the yearly estimates for the protection and improvement of the Salmon, Trout, and all fresh-water fisheries. 4. To issue such licences for fishing as are provided for by the Acts. 5. To see that fish-passes are provided and maintained in a state of efficiency in association with all artificial dams and rivers, and in accordance with the Salmon Act, 1878.

In view of what I regard as the almost certain establishment of the true salmon in the rivers of Tasmania within the next few years, it is, I consider, very desirable that duly constituted authorities, as suggested by these Boards, should be in existence to give full effect to the Acts passed for the protection of the acclimatized Salmonidæ, but which, so far as the species already introduced are concerned, are very far from being rigidly observed. With relation to the formation of the two proposed Boards, I would suggest that the one for the Southern District should be selected from members of the present Salmon Commission. As regards the Board for the Northern half of the Island, I have already had the honor of submitting to you a list of the names of a select number of gentlemen who are fully prepared and specially qualified to act on such a Board, if appointed.

A great advance in the protection of the fisheries collectively would, I have further to suggest, be gained by the more extended co-operation of the local police. Such co-operation might be obtained, as in England, by the investment of the local constables with the authority of water bailiffs, a substantial reward being given to them for all convictions they obtained against transgressors of the various Acts.

I append, in conclusion, a Return of the various districts visited by me since entering upon the duties of my appointment in July, 1884, including a brief summary of the principal objects and results of these visits. In connection with this Return, I beg leave to point out that I find the limited sum of £50 per annum altogether inadequate as travelling allowance for the efficient inspection of the more remote districts of the Island, and, indeed, for but relatively few of those nearer home. I have therefore taken the liberty to apply in the Estimates for 1886 for an additional sum of £50 to be added to this allowance, and to be expended on a more extensive area of inspection and practical operations for the advantage of the fisheries of this Colony.

Trusting that the various subjects brought before your notice in this Report may meet with your approbation,

I have the honor to remain,
Sir,
Your very obedient Servant,

W. SAVILLE-KENT, *F.L.S., F.Z.S., Superintendent and Inspector of Fisheries.*

The Hon. the Chief Secretary.

Fisheries Department, August 12th, 1885.

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.