ON THE NATURAL ENEMIES OF THE SALMON IN TASMANIA.

[By Morton Allport.]

Having so far succeeded in the great work of the introduction of the salmon to Australia, it now becomes necessary to consider what difficulties we may have to encounter from the presence of creatures in our Tasmanian waters, likely to prey upon the ova, the fry in their early stages, or the full grown fish.

Many persons imagine that enemies will be more numerous here than in Great Britain; I do not think so, and have endeavored to make a list of our indigenous animals likely to prove injurious. And first as to those found in the fresh waters;—pre-eminent amongst which stands the beast with a bill, the platypus *(Ornithorynchus anatinus)*. This sleek creature will prove the chief scourge to the natural spawning beds in our rivers, for he is not only well fitted by nature with rapid powers of locomotion in water, and to hold his own in strong ripples, but he can remain under water for several minutes at a time, and whilst there can burrow to the bottom of the deepest spawning rids and avail himself of the beautiful spoon with which he was furnished at his birth, for the very purpose, one would think, of scooping up ova.

When the large fresh water lobsters found in the northern rivers are depositing their spawn (each ovum of which closely resembles in size and appearance the ovum of the salmon) the platypus is generally very busy in the neighborhood, and if caught and opened at this time, many of these creatures will be found to contain upwards of a pint of spawn each. I have little doubt that the young fish in its first helpless state would be taken just as greedily, though I have not yet been able to test this fact. When the Tasmanian grayling, the sole representative of the salmonidæ in our waters (erroneously called the fresh water mullet or herring) are spawning, I have repeatedly seen the shoals driven away by the unwelcome appearance of a platypus, probably on the look out for a supply of ova. It is in the quiet waters of our most secluded lakes that the platypus is now found in the greatest abundance, and it is in such places that he will, for some time, delay the natural increase of the trout which must before long be established there. The last time I visited Lake St. Clair the day was so bright, and the water so still, that the noble beech trees, which clothe the eastern slopes of Mount Olympus, seemed to be continued far down into the lake, and it was next to impossible to say where the trees ended and their reflections began; the result was that the slightest disturbance on the placid surface of the water, caused a ripple and was instantly detected. On approaching some of these ripples in a boat, I discovered that each was caused by a platypus rising to breathe. Once there were five of them on the surface together within a radius of a few hundred yards, and one dived immediately under the boat, from which I could see him most distinctly in the brilliantly clear water. On timing them I ascertained that they frequently remained under water more than two minutes when undisturbed, and, if alarmed, I have no doubt they could increase the time of immersion considerably.

The only other mammal likely to be destructive, and which is common to both fresh and brackish water is the yellow bellied beaver-rat or musk-rat (*Hydromys chrysogaster*). This creature, one of the few placental mammals indigenous to Tasmania, is nocturnal and piscivorous, and must be carefully excluded from all fish-breeding establishments. When the ponds in my father's garden were stocked with a small species of carp introduced here, many years ago, from the Mauritius, the beaver-rats made great havoc amongst the fish till I shot and trapped several, some of them in the very act of dragging their prey from the water. Though still numerous, these creatures seem, like our carnivorous marsupials, to retire rapidly before civilization. The presence of a few good terriers on the river banks will effectually clear them. On the rocky shores of the Derwent, between Risdon and Bridgewater, I have frequently tracked these animals to their shelter amongst loose stones by the peculiar and powerful scent from which they derive their name of musk-rats, and have sometimes killed three and four in a day; their muscular hind legs and webbed feet enable them to swim and dive with great rapidity. Since writing this account of the beaver-rat, Mr. Ramsbottom has shown me a letter from Mr. Henry Button, of Launceston, warning him to beware of the same creature, and giving a very conclusive instance of their piscivorous

propensities. Mr. Button says that having a beaver-rat in confinement, he used to place in its cage a vessel full of water, containing a number of our small speckled fish, and then retire to a distance; the beast would raise itself upon its hind legs, look into the vessel, suddenly plunge in and almost instantly emerge with a fish wriggling in his jaws; in this manner he would sometimes take more than 20 small fish at a meal.

Of the birds likely to be injurious, little need be said. The Black Swan (*Cygnus atratus*) is now rarely seen on the rapid rivers and is almost entirely confined to a few of our shallower lakes and salt-water inlets from the sea. The common wild duck (*Anas superciliosa*) is another enemy both to ova and young fish, but these birds, like all our other wild ducks, have greatly decreased in numbers during the last few years.

The black cormorant (*Phalacrocorax carboides*) will, I apprehend, prove a far worse poacher than any other bird. Even in our lonely mountain lakes, and on the upper sources of the large rivers this bird is found watching, from the dead limb of some gigantic tree, the very shallows which will some day be the chosen spawning beds of salmon and trout, and woe to the shoal of young fish that he gets amongst, for he is insatiable. I once shot a specimen, from which I released three living eels, each close upon a foot long.

The graceful slate-colored heron (*Ardea Novæ Hollandiæ*) is sometimes, though rarely, seen on the fresh waters, his feeding grounds generally being salt swamps or quiet reedy backwaters.

I feel scarcely inclined to mention our charming little kingfisher (*Alcyone azurea*) for who would not willingly give up the few fish he ever takes in return for the brilliant contrast he exhibits, to the sombre foliage overhanging the rivers, where he dwells in such strict retirement that the fisherman or naturalist seldom sees more than one in a day.

As we fortunately possess no piscivorous reptiles, I now pass at once to the lowest of the Vertebrata, the fishes; and I can safely affirm that no fresh waters in the world, so well adapted for salmon or trout, are more free from voracious fish than ours. It is true that the little speckled fish, (*Galaxias sp. ?*) erroneously called trout and two allied species, are very numerous in our rapid streams, and that these and the indigenous grayling may prove destructive to ova and to the young fish, during the first ten weeks of their existence, but that period once passed, the fry will be free from further attack.

A small percentage of both ova and fish will doubtless be taken by eels, as though never plentiful in such situations, they are occasionally found in the rapid gravelly parts of our rivers.

The large fresh water fish called by colonists the "black fish" only inhabits those rivers which run towards our northern and western coasts; it frequently attains a weight of four or five pounds, and may certainly prove a formidable enemy, but from personal inspection of one or two rivers in which they live, and from the accounts of those who have watched them, I am inclined to believe that during their nocturnal excursions for food, the black fish never roam far from their daily hiding places, namely, holes in banks, and under roots and logs.

In several rivers, formerly tenanted by great numbers of black fish, and which have been much fished (such, for instance, as the North Esk and Piper) they have steadily decreased in number for several years past.

Of crustaceans, fresh water shrimps of several species, and the small crayfish (*Astacus sp. ?*) are, as far as is at present known, all we need fear in the southern portion of Tasmania; but in the north and west, the latter fellow is represented by a monster, attaining a weight of six or eight pounds, whose powerful claws will prove of great service in removing gravel from the spawning beds in the search for ova or embryo fish.

Amongst insects the larva of various dragon flies (*Libellulidæ*) are both numerous and destructive.

The large water beetle (*Dytiscus sp. ?*) and its larva (abundant in deep weedy holes) are occasionally found in running water, and, be it remembered, they are never there for any good. The rapacity of these insects is something astonishing. I have seen the larva dart upon a large tadpole, weighing far more than a salmon three weeks hatched, and kill it almost instantly. Upon examination, the victim is found pierced through by the aggressor's long sharp mandibles. Fish, in their very early stages, would stand a poor chance against these monsters, if present in large numbers at the spawning rids.

The larva of our largest dragon fly has all the inclination to be just as wicked as that of the beetle, but luckily he wants the speed, and has to approach his would-be victims in a sneaking, cat-like manner, which greatly adds to the chance of escape.

Having now, to the best of my ability, completed the list of our fresh water enemies, I would call attention to the fact that, with but one or two exceptions, the attacks of all the creatures yet mentioned would be directed only against the ova or the fish during their early and inactive stage, the lesson to be learnt from which is, that to ensure success we must never leave off protecting the ova and young fry by artificial propagation, and from the interest hitherto taken by the Fellows of the Royal Society in this great work, I feel certain that they will do their utmost to support the Salmon Commissioners in their determination to carry on the artificial rearing till all suitable Australian rivers swarm with the King of fish.

With regard to the creatures inhabiting our brackish and salt waters, the difficulty of estimating the degree of injury they may do to the salmon is very great, from two obvious causes, one is our ignorance of the habits of the salmon when he leaves the fresh water, the other I regret to say, is our want of reliable information concerning the creatures inhabiting our coasts and estuaries. With reference to this last cause, I would urge the Fellows, to communicate to this Society any observations they may have made upon the habits of our voracious fish or other animals. Such information would add greatly to the value of our published transactions, and might prove of very great service to those who are personally superintending the salmon experiment.

If we knew whether the smolts, on their way to the sea, swim near the surface or near the bottom, along the banks or in mid-stream, we might predict with more accuracy, what their foes would be, but in the absence of this knowledge, all I can do is to take care that none of our predaceous animals, with which I am acquainted, and which could possibly interfere with the salmon, are omitted.

One fact in the natural history of the salmon in salt water, is well established, and that is the rapidity of his growth and corresponding increase in strength and speed,—and this increase in size, strength and speed will effectually remove him from the attacks of a host of enemies to smaller and more sluggish fish.

To commence, as before, with the mammals, Seals ; (*Stenorynchus leptonyx* and *Arctocephalus lobatus)* once common on our coast, are now all but extinct, two or three only having been seen in the Derwent during the last twenty years. It is not difficult to estimate this advantage, when we remember that amongst the worst enemies of the full-grown salmon of the Scotch and Irish rivers, are the troops of small seals which still periodically visit their rocky headlands.

I have already mentioned that the beaver-rat is found on the banks of rivers below the fresh water, but in these situations his nefarious practices are confined to rushgrown tidepools, and backwaters, rather than to the open river, and he is consequently little to be feared.

Of toothed cetacean the only one much to be dreaded is our common porpoise (*Phocœna sp. ?)* A shoal of these is always to be found in some part of the Derwent and I greatly fear they will often levy a toll on each batch of salmon passing up or down the river. Yet porpoises are no more numerous here than on the British coasts, and it must be borne in mind, that vast shoals of our indigenous fish, far less active than salmon are periodically subjected to the attacks of this formidable enemy without becoming extinct ; indeed, any one who has watched from the rocks at the confluence of the Rivers Jordan and Derwent, the myriads of bream, mullet, and other estuary fish, passing up and down with each tide, must be aware that the porpoises are amply supplied with the food to which they are accustomed, and that a large majority of the salmon will therefore certainly escape.

Outside the Derwent, in Storm Bay and on our coasts, another toothed whale, attaining a length of from 12 to 15 feet, and known to southern whalers as the "Black-fish" *(Globiocephalus macrorynchus)* occasionally makes its appearance in large shoals. Whether this "Black-fish" will prove an enemy or not will depend on how far the salmon proceed seawards. For my own part, I do not believe they will ever travel beyond the arm of the sea which forms the entrance to the Derwent, as the time occupied in the journey from the fresh water to the sea and back is so short, often not more than six weeks, and a large part of that time must necessarily be taken up in the search for food.

From sea-birds salmon would have little to fear. During a week or ten days of their first marine excursion, the smolts, if they swim near the surface, may be subjected to the attacks of gannets (*Sula Australis)*, but after that time the increased size of the fish will render them safe. Herons, terns, sea-gulls, &c., are not powerful enough to interfere with the smolts, even when they

first leave the fresh water; and pelicans, whose feeding grounds are shallow pools and mud flats, are now extremely rare.

All our sea fish (with two exceptions) are harmless; these exceptions are the Barracouta and Kingfish, closely allied forms, whose speed and ferocity are truly wonderful. They are both caught on our coasts in the autumn months, the barracouta in the daytime, the kingfish at night.

A short account of the means employed by fishermen to catch them will give some faint notion of their fierce disposition. When the boat is becalmed or going but slowly through the water in the neighborhood of a shoal, the fisherman arms himself with a light staff eight or ten feet long; attached to the end of this staff by a stout line two feet long is the jigger, a piece of cedar half an inch thick, one inch wide, and with a stout nail driven through it in such a manner as to form a rough hook without a barb. With this delicate tackle the fisherman (who stands up in his boat) next proceeds to create the greatest possible disturbance in the water close alongside by drawing the jigger rapidly along the surface with a waving or jerking motion; of a sudden the water becomes alive with long gleaming fish, and, if the fisherman is new to the sport, he will soon find himself engaged in a frantic struggle to remain in the boat, while a glittering monster of some 18 or 20 pounds weight is just as anxious to pull him out of it; however with a little practice the men engaged rapidly take an immense number of fish by this means, as they are just lifted over the side, shaken off, and the jigger again immersed. The visits of these fish to our coasts are, from unexplained causes, very irregular; the barracouta rarely comes far up the Derwent, and frequently a whole season passes in which they never come nearer than Storm Bay. Many years ago, I think in 1845 or 1846, barracouta came up the Derwent in great numbers, and were caught from the rocks in Sandy Bay; but even then they remained a very short time in the river. The visits of the king fish to the Derwent are more frequent than those of the barracouta. In the early part of 1854 king fish were caught in immense numbers, on both banks of the river, almost up to Bridgewater. On several occasions in different years they have been found left by the receding tide on the mud-flats at the mouth of the Jordan, 10 miles above Hobart Town. I believe they enter the creeks and rivers to deposit their spawn, as I have often come upon large shoals of young King fish in the nearly fresh water of creeks running into the Derwent near Bridgewater. On one occasion I caught a number of the fry, each about 8 inches long with spinning tackle baited with a small glittering fish. When the whole shoal darted in pursuit, I had a good opportunity of judging of their speed which, for short distances at all events, seems to be greater than that of salmon of the same size.

Is it not likely that the periodical visits of both Barracouta and King fish are regulated simply by the abundance or scarcity of their prey, always most numerous in our rivers after a long drought which causes the water to be salt farther from the sea than usual? I well remember that at the time the barracouta were caught in Sandy Bay, as I have mentioned, the whole river was alive with vast shoals of small fish such as I have never seen since —and at times of such abundance the salmon would probably be but little molested.

A gentleman asked me a few days ago, "How about your Conger eels?" My answer was," depend upon it so long as a Conger eel can get a good fat rock-cod close to his own door, he will never waste half his valuable night in chasing a fish which he can never hope to catch!" And the same remark will apply to all our sharks and dog-fish, which are no more numerous here, than on the British coasts, where they are not looked upon as at all injurious to the salmon.

Having now completed the list of our marine foes we may fairly conclude that a large per-centage of salmon will escape to return to our fresh waters, as, with the single exception of the porpoise, all the creatures mentioned pay us only temporary visits, often at long intervals, and even when such visits do occur, the instinct of the salmon will probably induce a large proportion of them to keep out of harm's way.