ARTICLE XXII.—OBSERVATIONS ON THE HABITS OF THE SALMON FAMILY, BY W. HENRY, ESQR. SURGEON 66TH REGIMENT.

[Read April 15, 1837.]

The physical structure of fishes, so beautifully adapted to the nature of the element in which they live, has been the subject of especial notice and admiration amongst Naturalists and Philosophers, ancient and modern. The wedge-shaped head—the gradual and well proportioned enlargement of the body—the skilful machinery of the fins—the mailed and glossy skin—the ballasting air-bladder, and the rudder-tail, evince the wisdom, as the magnitude of the Leviathans of the Ocean show the power, of their Creator. But the use of the delicate painting with which the skins of many fishes are so richly adorned is not so apparent; and on a superficial view, it would almost seem to be a waste of bright colours lavished amidst the dim twilight of the deep. Yet we may be well assured from all analogy, that even this rich tinting of the mute tribes inhabiting the waters has not been bestowed on them without an object: and, farther even, that it may serve purposes of the greatest importance in the economy of nature.

The tiny lamp of the glow-worm and the fire-fly is delicately beautiful; but it is also believed to be of great value as a minute beacon, governing and directing the movements of the male insect towards the female. Thus it is not improbable that the gorgeousness of the skins of many fishes is a point of attraction between the genders, keeping up the gregariousness of the different families amidst the vast aqueous spaces they traverse. However this may be, the painted skin of the fish, considered merely as ornamental, harmonizes with the rich fur of the quadruped, the brilliant plumage of the bird, the umbrageous foliage and blossoming glory of the tree; and, above all, the exquisite adornment of the flower. All should be viewed as boons from the great source of measureless beneficence. We can conceive that a dull monotonous uniformity of shape, and sombre, melancholy colours, might have characterized the animal and vegetable kingdoms; but it has pleased the Deity to fill the heavens and the earth, and even the waters under the earth with beauty, and to confer on his rational creature, man, the capacity to comprehend and enjoy it.

Conspicuous amongst the finny tribes, as well for the quality of the delicious flesh, as for great elegance of colouring and symmetry of form, are the *Salmonidæ* or Salmon-family: but principally, according to my conception, is the *Salmo Salar*, or common Salmon, which has been appropriately placed by Cuvier at their head. In fact, we can scarcely conceive anything more perfect than the *tout ensemble* of this noble fish. He is moulded in accordance with our notions of great muscular strength, combined with remarkable lightness of outline; and every quality of the animal corresponds with his appearance. His tunic of rich silver tissue is in the chastest taste; his movements in his own element are peculiarly easy and graceful: he is fastidious in his food, as a fish of such high blood ought to be; but he can on emergency bear hunger well, and even total abstinence for a long period without injury. His spirit is ardent, adventurous, and persevering, and his speed is great.

It has been my fortune to be conversant with the habits of the Salmon from early youth, in a river in the north of Ireland, on the banks of which I was born. This association has been extended in after life to many other Salmon rivers, in different parts of the world, where I have enjoyed the pleasures of "the angle." I am enabled, therefore, from personal observation, to communicate some particulars respecting the natural history of the fish, which, probably, are not generally known, and may be, to a certain extent, interesting to the members of our Society.

The *Salmo Salar* is placed by Cuvier at the head of the fourth family of the *Malacopterygii*, or soft-finned fishes. In a paper of this light and desultory nature, it does not appear necessary to describe its generic characteristics more minutely. It is an inhabitant of cold, or temperate climates, to the north of the Equator; having never been found in the south. Indeed, such is the dislike of this fish for a warm climate, that it is very rarely seen in Europe southward of the 45th or 46th degree of latitude, but it abounds in the northern waters of the old world as it does in the new. Salmon run from the Pacific up the Columbia river, as from the Atlantic into the St. Lawrence. The rivers of the Polar regions swarm with Salmon during the short summer, and they are caught there in prodigious numbers. Commander Ross obtained a ton weight of the fish from the Esquimaux in exchange for a Sailor's knife, value about six-pence; and his men afterwards took 3300 Salmon at a single haul of the seine.

The rivers of Newfoundland and the Labrador coast contain abundance of these fish, which are also caught, but in diminishing numbers, in the streams of Nova-Scotia and New-Brunswick. They are found in the Kennebec and Connecticut rivers, and a

stray fish may be sometimes taken in the Hudson and the Delaware; but this is a rare occurrence. Salmon never ascend the Mississippi.

Norway is said to be the finest salmon country in the world. These fish go up the Rhine as far as the falls of Schaffhausen, which they cannot surmount. They are found in the Loire, but I believe, do not frequent any rivers farther south. In Gascony I have fished numerous streams, the tributaries of the Garonne and Adour, adapted as they would appear to be, to the taste of the fish for cool waters, by the melting of the Pyrenæan snow, but never met with, or heard of, the *Salmo Salar*; and very seldom found any trout, the smaller members of the family. I have also fished with much care several of the Spanish and Portuguese rivers, but never found a salmon or trout in any of them.

No salmon are to be met with in the Mediterranean, nor any of its rivers. They are also strangers to the Caspian and Black Seas; though a large coarse fish, bearing some resemblance to the *Salmo Salar*, called the *Hucho*, is found in the Danube.

Most intelligent persons are aware that the salmon is a great and intrepid traveller, migrating annually from the sea to the fresh water, and ascending the largest rivers to their distant sources. Influenced by unerring instinct, it quits the deep sea in spring or early summer, and repairs to the estuary of its native stream. It remains some days in the brackish water; probably to prepare the gills for the great change in the fluid they will have to breathe. At the mouths of small rivers the fish generally wait for a flood; moving up and down with the tide until the stream swells. The salmon then boldly pushes on, dashing through rapids, and even overleaping dams or other impediments in its way. After the first rush from the salt water, it avails itself of the convenient resting place of a deep pool, or other spot where the current is gentle, to draw breath for some hours, or even a day, if the stream is strong and rapid. It there recovers its wind, and recruits its strength with a fly or a grasshopper as they float down the river. The fish thus gradually approach the upper and shallower parts of the streams they frequent; journeying by day when the weather is cloudy, or the water sufficiently muddy to mask their movements; but when the river is clear they travel by night—particularly if there is a moon; otherwise very early in the morning. They seldom move, I believe, in the evening; but then, when flies are most numerous, look out for food. At length the salmon reaches his destination high up the stream, where he may look out for a mate, and take measures for the important business of propagating his kind.

When a strong rapid, or even a fall of a few feet, occurs in the course of our adventurous traveller's voyage, the obstacle is surmounted without much difficulty. But when the stream is deep and full and the fall considerable, the impediment becomes a serious matter, and the poor fish stops and is sadly puzzled how to overcome it. He soon begins to reconnoitre his position, exploring in all directions for a passage, and leaping frequently several feet out of the water, apparently with the object of discovering the topography of the scene of his difficulties from this elevation. When he finds the obstacle insurmountable, he is obliged to wait till the river falls; or in the event of the place being within the range of the salt water, which sometimes happens, until a spring-tide comes to his assistance.

There are many salmon-leaps in Europe—particularly in the British Islands and in Norway. Two of the most remarkable are at Coleraine and Ballyshannon in the North of Ireland. With the latter of these I am very well acquainted.

The large and very beautiful Lake, Loch Erne, fifty miles long by ten or twelve broad, pours its waters into the Atlantic by a short and rapid river, which after an impetuous course from Belleek, and a last fall of fifteen or sixteen feet at Ballyshannon, meets the tide at the bottom of a perpendicular ledge of limestone rock. *En passant* I may remark that Sir Humphrey Davy in his "Salmonia" praises the Erne as the best salmon-river he ever fished; and I think very justly. The sea is only three miles distant from the fall; and in early summer innumerable salmon run up the river and assemble in "the pool," as the abyss below the rock is called, checked in their career by this formidable barrier. In the course of a week many thousands are here collected, waiting, as it would almost appear, for a spring-tide to raise the water in the pool and lower their leap. In the mean time they are taken in the seine in great numbers—sold on the spot, or shipped off, either pickled or in ice to London. In the year 1808 I saw six hundred salmon taken there in one haul: two of which, weighing fifty-four and fifty-six pounds, were afterwards exhibited as curiosities in the fish-house.

Men, however, are not here the only fishers. Seals follow the salmon from the sea and prey upon them in the pool, pursuing them with greater speed and success than the unwieldy appearance of these amphibious creatures would lead one to expect. But these daring poachers, who thus imprudently venture into the presence of the lords of the creation, are generally shot—very often in *flagrante delicto*, as they emerge from the froth at the bottom of the fall, with salmon writhing in their mouths.

The Ballyshannon salmon-leap is a scene of much curiosity and interest, particularly during spring-tides, when the weather is fine, and then attracts a great number of spectators. As the water rises the fish begin to leap—perhaps two or three hundred in an hour. The young salmon very generally miscalculate the direction they should take; leaping perpendicularly out of the water, and of course falling back immediately. But the older fish, many of which, no doubt, have been up before, and are besides better mathematicians, manage differently. These dart to the crest of the cataract in a line with the curve of the falling mass, and there cling for some seconds, wriggling themselves into the torrent. In this very difficult position they can only work on the water with the pectoral and ventral fins; the force of their powerful tail, by which they had sprung from the bottom, being now lost in beating the air. Many notwithstanding succeed, dip into the water at the top and shoot up the river: but the great majority—probably five-sixths of the number, fail, and after the most gallant struggle are tumbled back into the pool.

At some of the salmon-leaps in Scotland, men are accustomed to catch the fish in a large landing net, with a long handle, as they fall back after missing the leap. In Kilmarnock they tell a story of the eccentric, and somewhat savage Lord Lovat, who was beheaded on Tower-hill, which is characteristic of that Nobleman's peculiar disposition. He was wont to have a fire kindled in a cleft of the rock close to a salmon-leap in a stream of that neighbourhood. When it was approaching his dinner hour, he would direct a pot of water to be placed on the fire to boil, in the expectation that an unfortunate fish, after missing his leap, might tumble over the edge of the rock into the boiling water, and thus commit self-salmocide. The tradition is, that his Lordship often succeeded in this quaint but cruel experiment.

After the great effort of surmounting a considerable fall, the successful fish rest during several hours in the first gentle current they meet, before proceeding farther on their journey. Some Naturalists have estimated the first day's voyage of a salmon, after entering the fresh water, at fifteen or twenty miles; but it is evident that the distance cannot be calculated accurately, and must vary according to the nature of the stream. If the river is rapid and obstructed by falls, the fish's stages must be short; and vice versa.

It appears to be necessary for the salmon to remain from two to three months in the rivers for the due developement of the generative system, before pairing and the deposition of the spawn can be effected. In the mean time the quality of the ani-

mal's flesh deteriorates—the skin, which is a correct index of the condition of the fish, changes from a silvery white to a tinge of reddish brown, and then to a dirty black brown. The firmness of the muscles softens; the curd between their layers disappears, and the cutaneous fat is absorbed. As the excitement of the sexual passion increases, the appetite for food ceases, and the salmon emaciates daily. At length the flesh loses all its nutritive qualities as human food, and becomes to a certain extent poisonous.

The food of salmon in the sea, whatever it is, is eminently nutritive. The subject is still involved in obscurity, though some clever Naturalists have lately paid much attention to it. Dr. Knox, who has written a scientific and able paper on the Natural History of the fish, which was published in the transactions of the Royal Society of Edinburgh for 1834, believes that he has discovered the secret. He avers that salmon in the salt water feed principally, if not wholly, on the eggs of the *Asterias Glacialis*, or cross-fish, one of the *Entomostraca*, or testaceous insects. Now, from the animal's teeth, one might think he lived on more substantial food than almost microscopic ova. But there is positive evidence that cannot be doubted, of sand-eels and small fish being eaten in the sea by salmon. Sir Wm. Jardine,* who made an excursion to Sutherlandshire in 1834, for the purpose of examining the natural productions of the country, and paid particular attention to the habits of the salmon, states that they are often taken on the Sutherland shores at the haddock lines, *baited with sand-eels*, and in the Durness Firth with lines set on purpose with the same bait. And what is quite conclusive on the subject, my friend Dr. Kelly, of the Royal Navy, informs me that in the summer of 1835, when accompanying Capt. Bayfield, R. N., in surveying the Gulf, he saw some salmon, recently caught, opened by the fishermen at Gaspé, and *observed three sand-eels and two smelts in the stomach of one of them.* Dr. Kelly adds that the fishermen told him this was a common occurrence.

After entering the fresh water, it has been a question whether salmon eat any food at all; as the stomachs of many individuals have been opened at different times, by various persons, and nothing could be discovered in them.

According to my experience, the case stands thus. When they first ascend the rivers they will eat greedily enough—jump at flies of every description without hesitation—devour worms, grass-hoppers, and even small fish. In the Lakes of Killarney

* Fourth Report of the British Association, page 613.

they are caught under these circumstances by trolling with both natural and artificial minnow. At this period, as every salmon fisher knows, they will rise at his fly with eagerness. I have myself found, in at least a dozen instances, the larva of insects, remains of earth-worms, grass-hoppers and various kinds of flies, in the stomachs of salmon caught soon after quitting the sea. But, after a month or six weeks' residence in the rivers, when the sexual propensities and organs begin to receive their developement, the fish cease to eat, and then appear to be able to live for several weeks without any food whatever.

Even before this time, and when they first run up the rivers, salmon are capable of bearing a long fast without injury. At Dayrée's bridge on the Jacques Cartier river, nine leagues above Quebec, there is a tank, or reservoir, fed by a copious spring gushing out of the bank of the picturesque dell through which that fine stream runs. In this receptacle the fish which are not injured in being caught, are sometimes kept three weeks or a month, until a sufficient number are collected to be sent to the Quebec market. Under these circumstances, they continue in good health, and do not appear to lose flesh.

There is a ford on the river Esk, about a mile to the eastward of the town of Donegal in the north of Ireland, which in my young days was a favorite resort of salmon in the breeding season. The lower part of this ford, just above the commencement of a small rapid, was generally the chosen spot. Here the bottom consisted of loose gravel, the stream flowed gently, and, in ordinary states of the river, the water was about twelve or fourteen inches deep. Concealed in a thicket at the root of some willows on the bank, I have at this place, on more than twenty occasions, witnessed for hours the interesting manœuvres of the fish.

With admirable instinct these creatures never select a stream that is likely to dry up. It is essential, I believe, that the bed or nest of the ova should be at the bottom of running water of moderate depth,—not in too strong a current, which, during floods, would be likely to carry off and destroy the deposite ;—nor in a stagnant part of the river, where a mud sediment and the want of water sufficiently ærated might choke the embryo brood.

When the place is chosen, both fish set to work, to scoop out a proper hollow for the spawn. On every occasion I observed that the female commenced the operation, as she had in all probability selected the site of the bed. She is easily distinguished from the male by her large and matronly size, as he is conspicuous by the curious hooked appendage projecting upwards from the centre of the lower jaw. The female then, in curious ana-

logy with the hen-bird, begins to make her nest, by digging into the gravel with her belly and tail, sometimes poking a refractory pebble out of the way with her nose. The male fish all the time keeps watch in the immediate neighborhood of his wife; and although nature has denied him the power of serenading her with a song, after the fashion of the cock-bird, our gallant salmon does not the less tenderly guard the privacy of his spouse, but swims round her in a protecting circle, to prevent interlopers from disturbing her in her interesting employment. When the lady-fish has worked long enough, which may be from a quarter to half an hour, she rests for a little, and the attentive husband takes her place immediately and commences digging.—She then circles round and watches over him in her turn. Indeed, there is much moral interest excited by these proceedings; and I may venture to add, that the reciprocal punctuality and affection with which this labour of parental providence is carried on by the silent pair, are worthy of all imitation by more exalted husbands and wives.

Soon after the bed for the ova is finished, which is a trench five or six feet long, and about a foot and a half in breadth and depth, both fish remain for a short time in close dalliance immediately above it. The roe is then deposited by the female, and the fecundating milt shed over the eggs by the male. They then simultaneously commence pushing the gravel they had previously raised over the precious deposit; and generally continue thus occupied during the remainder of the day, filling up interstices and completing the work at their leisure. I believe they then retire, appearing to have done all that parental duty requires; and although I have watched carefully several times at the same spot, I have never seen either fish in the neighborhood the day after the spawning.

European salmon generally spawn in October or November, and the ova remain in their bed of gravel about 140 days. The increasing heat of March and April then vivifies the brood, and the young tad-pole fish work their way by degrees out of the nest, with the filmy envelope of the egg, like an umbilical cord, still adhering to the belly. They grow with great rapidity, eat with voracity, and will jump at a dragon-fly as big as one of themselves. In the latter end of April and the beginning of May, they gradually drop down the rivers, keeping in the shallow water near the edge, both to pick up their food and to avoid the attacks of pikes or other ravenous fish. By the end of the first week in June, they are all clear of the fresh water, under ordinary circumstances.

These little fishes are extremely delicate, and will not bear

rough handling. They are incessantly rising at an angler's flies, and I have caught some thousands of them and thrown them in again. If the hook has only a slight hold of the mouth, and is taken out with care and gentleness, they will swim away briskly, quite uninjured; but if the barb goes deep, or any roughness is used, they are destroyed. An accidental fall on the ground from a height of a foot or two, kills them immediately. Various attempts have been made to transport them to fish-ponds from their native streams, but, I believe, with uniform want of success. I have several times made the experiment of removing smelts, as the fry are called, in a bucket of water, to a fish-pond adjoining the river, but fed from a different source.—None of them lived two hours.

Under these circumstances, it is probable that the most of the stories we have been told of these delicate fry having been caught and marked, and afterwards discovered in the course of the same summer, grilses, or young salmon, four or five pounds weight, are fictions; though there can be little doubt of their growth in the sea being extremely rapid. In all probability the fry which enter the salt water in the beginning of June, return in September, or even earlier, small salmon. Shaw, in his Zoology, states that M. de la Lande fastened small rings of copper to the tails of different individuals, and found that they returned during three successive seasons. I have never been able to ascertain this fact from my own experience, though I have caught some dozens of fry, marked and liberated them, but in no instance had the good fortune to meet with any of my little captives afterwards.

The condition of the parent fish, after spawning, is very deplorable. They become so weak and thin that they can scarcely stem the current of the river, and then usually seek the repose of some deep hole where they may remain quiet, and to a certain extent, recover their strength. But they continue languid and torpid during the winter, in a condition little better than that of the hybernating animals. From the great emaciation of the body, the head appears disproportionately large, and looks as if it belonged to another fish. The flesh is white, or of a dirty yellow; tasteless and unhealthy. When hooked by the angler under these circumstances, they are quite passive and helpless, and suffer themselves to be dragged almost unresistingly to the shore. In early spring they fall down the rivers, and, like other valetudinarians, repair to the sea for the recovery of their health.

From the peculiar structure of their single heart the circulation of the blood in most fishes is weak aud venous, and without

the arterial vigour of terrestrial animals. Under certain circumstances, salmon will permit their body to be felt all over with the hand, and even appear to derive some gratification from gentle friction. I have repeatedly endeavoured to ascertain if there was any beating of the heart or pulse in any part of the body, but never could discover the least pulsation any where. Authorities state, notwithstanding, that the heart of a large carp beats 36 times in a minute. The salmon, being a larger fish, has probably a slower circulation, if we may judge from analogy with respect to the mammalia. Man's heart contracts 72 times in a minute—a horse's 36, and an elephant's (as I have myself ascertained) only 24 times. The respiration of fishes is, I believe, quicker than is generally supposed. From a mean of many observations made on seven salmon of different sizes, in a reservoir fed by a copious stream, I found that they breathe 54 times in a minute. Man's respiration is 20.

There is a peculiarity in the instincts of salmon worthy of notice, viz.; their almost invariable habit of returning from unknown distances and depths of ocean to the streams where they were bred. They may be forced by stress of weather, or the pursuit of some of their natural enemies, into the mouth of a strange river—like a ship driven by a storm into a hostile port —but the vast majority find their way back to their native waters. In the north of Ireland, and I believe all round the coast, the fishermen will immediately point out a stray fish. For, although the *Salmo Salar* is the same as to generic characteristics in every part of the British Islands, still there are minute variations of shape and colour between the fish of different rivers, only recognizable by the keen eye of an experienced fisherman.

Some recent experiments on one of the Duke of Sutherland's Scotch estates, if the accounts in the newspapers are correct, would appear to confirm the general belief as to this local instinct. It is stated, that in two branches of the Tay, no salmon had ever been found, although these streams appeared sufficiently favourable for their habits and propagation. In 1835, the Duke's agent placed a pair of breeding fish in each stream. The rivers were carefully watched and preserved—they bred; and, true to their instinct, the young fish in 1836 ascended those waters where a salmon had never been seen before.

Like travellers on bad roads, these fish undergo great fatigues, and often suffer serious injuries in forcing their way up a powerful and rapid stream. They are driven by the current against sharp and unseen rocks, and bruised and wounded more than

would be considered probable. The snout, with which they feel their way when the water is muddy, is, under these circumstances, always excoriated, and generally rubbed white. The fins too, particularly the pectoral fins, and even the tail, are often found split; the fine, but strong membrane that binds the rays, having been torn by the violent efforts their toilsome journey renders necessary. We have opportunities of seeing this every summer at Dayrée's bridge on the Jacques Cartier River, where almost every salmon in the reservoir is thus wounded or disabled. Indeed the poor fish have extraordinary difficulties to encounter in that beautiful but most rapid stream.

I may here observe, that, although the distinguished epicures of ancient Rome explored every known region for dainties to furnish their luxurious boards, our noble fish never graced their banquets. Apicius might load his table with wild boar, the brains of swans and peacocks, and the tongues of larks and nightingales; or even introduce mullet, turbot, or Colchester oysters as a third course—but one exquisite dish was wanting—he had no salmon.

Mutability is the characteristic of every thing human; and often, even the transition from the most distant extremes of luxury and penury is observable in nations, as in individuals. In the same country where the proud lords of the world were wont to give suppers to tributary kings, in saloons dedicated to Jupiter or Venus, at an expense of 30 or £40,000, the Patrician now dines on a modicum of macaroni, value a few pence. Whilst the descendants of the painted British barbarians, so despised by the haughty Romans, give, at the present day, the most sumptuous entertainments in Rome; and some years ago were wont to feed even their domestic servants, in their own country, with a dainty fish of far superior flavour to any that ever appeared on the table of Lucullus or Augustus.

It is a fact, that about a hundred years ago, such was the abundance of salmon in the Severn, the Humber, the Tyne, and several other English and Welch rivers, domestic servants stipulated with their masters, when hiring, that they should not be fed on this food more than twice a-week. In Scotland and Ireland the same agreement continued to be made to a much later period, even in the memory of some old persons now living on the banks of the Tweed, but with reference chiefly to the salted fish. In those days they were unacquainted with the mode of preserving the fish in ice, or even pickling them; and they had no steamboats to convey them in a few hours to London.

It has been doubted whether the *Salmo Salar* of Europe, and

the salmon of the North American rivers, are identical. As far as I am capable of judging, they appear the same fish. The shape, colour, habits, conformation of the branchiæ, number and position of the fins and of their rays, form of the tail, and number of the vertebræ (61) are, I believe, generically the same. The flavour, too, of the American fish, caught unfatigued and fresh from the sea, under equal advantages of cookery and appetite, is not inferior to that of his European brother.

About the middle of May the salmon begin to run up the St. Lawrence; but not in any considerable numbers, till the middle of June. They coast along on both sides, on the look out for their respective rivers, I presume; but ascend along the northern shore for the greater part, where the tributary streams are clearer and more rapid, and pour in cooler water than those in the south. They advance, I believe, with each tide, gradually feeling their way, and running up the small rivers as floods or other favorable circumstances invite them. Great numbers are caught in the stake nets, or in wooden traps, with which both shores are now thickly studded. The smaller branches of the St. Lawrence absorb a large proportion. Many thousands, no doubt, ascend the Ottawa, to breed amidst its remote streams unmolested by man. Still, a large body push up the main river, all the way to Lake Ontario. Arrived there, they move towards the head of the lake, keeping close to both shores, but preferring still the northern or Canadian side, in all probability for the reason mentioned before. They are very rarely found at Kingston, but are often speared along the shores of the Bay of Quinté, and at the mouth of the rapid river Trent. They are caught in considerable numbers every year about Toronto, and in the streams that run into the north-western extremity of Lake Ontario, still in tolerable condition, notwithstanding the distance from the sea and the difficulties of the journey. The flesh is a little softer than that of our Quebec fish—the colour a fainter pink, and the flavour not quite so rich; but enough of its good qualities remains to make it far superior to any of the Ontario fish.

There is a large trout, or pseudo-salmon, in this magnificent lake, which is sometimes confounded, by inexperienced persons, with the *Salmo Salar*. It certainly resembles our favorite fish a little in shape and colour; but the head is coarse and clumsy, and the number of the vertebræ and figure of the tail are different. There is also a generic difference in the fins, and the flesh is destitute of the rich red colour and genuine salmon flavour. I have never heard of this fish having been caught out of the lake, and am of opinion, it does not visit the sea. It is probably identical with the *Salmo Eriox*, or Bull-Trout, found in

Loch Aw, in Argyleshire, and three or four other lakes in Scotland.

The abyss, at Niagara, is the *ne plus ultra* of most of the Ontario fish; and innumerable sturgeon, bass, pickerel, pike, eels, white fish (a splendid corregonus,) cat-fish, chubb and mustheenongee, collect there every summer. Salmon, however, are not amongst the number, and, except a stray fish, very rarely now ever go up the Niagara River.

Some Naturalists have assigned fanciful reasons for this. It has been gravely asserted, that a tradition respecting the insuperable barrier of the Falls, has been transmitted from one generation of salmon to another—they, therefore, think it useless to ascend, or, what is equally improbable, the noise of the Cataract, fifteen miles distant, frightens them away.

The fact of the non-appearance of salmon, in the Niagara River, appears to be easily explained. That river is deep through its whole course, having no small branches, shallows, or shelving shores, adapted to the wants of the breeding fish. As salmon frequent only streams where they can prepare proper beds for the spawn, and this is impossible in the Niagara River—we do not find them there.

Individual fish do, however, occasionally make their way to the Falls. On one visit there, in 1833, I saw a salmon leap out of the water, in crossing at the ferry, and so near the boat, that I could scarcely be mistaken as to the fish. The fishermen, who sweep the fine beach on the Canadian side, at the mouth of the Niagara, with their nets, told me that they never take any salmon.

It is remarkable, that salmon will not rise at a fly, either natural or artificial, in salt water; nor is there any instance known, I believe, of their being caught there with any other bait. Swimming about in the brackish water of the estuaries of rivers, they will not touch the same fly at which they may rise greedily, perhaps, the next day, when they push up the fresh stream. The St. Lawrence fish will not take a fly in the tide-water of their own river, nor even in Lake Ontario.

Salmon, like many other animals, are subject to the attacks of parasitical enemies, which cling to their skin or infest their intestines. I have repeatedly caught fish fresh from the sea with the *monoculus piscinus* adhering to their skin. This insect drops off after a day or two's residence in the fresh water; but they often pick up another still more troublesome companion in the rivers—the *Lernæa Salmonea*, which clings to the gill, covers and often materially obstructs the breathing of the fish. They are freed from this annoyance as soon as they return to the sea. Tape worms are very often found in the stomach and intestines.

This fine fish is amongst the most cherished objects of the angler's pursuit; and successful salmon-fishing with the rod and line will, probably, always rank amongst the most exciting, absorbing, and delightful sports that mortals are permitted to enjoy.

A zealous angler may be allowed to eulogize his art even before a Literary Society, for his amusement is one of the handmaids of Science, and has already contributed not a little to increase the knowledge stored up in the department of Natural History. Besides, the nature of his sport is essentially quiet, contemplative and favorable to thought and reflection. "Because," as an old English writer expresses himself, "hawking and hunting are very laborious: much riding and many dangers accompany them; but this is still and quiet: and if so be that the angler catch no fish, yet hath he a wholesome walk to the brook-side, and pleasant shade by the sweet silver streams. He hath good aire and sweet smels of fine fresh meadow-flowers: he heareth the melodious harmony of birds—he sees the swans, herons, ducks, water-hens, cootes, and many other fowle with their brood; which he thinks better than the noise of hounds or blast of hornes, and all the sport that they can make." *

A salmon when first hooked by the angler, makes the most desperate efforts to escape. It darts away with prodigious velocity, spinning the reel merrily, and running out fifty, sixty, or even a hundred yards of line. It then leaps madly and repeatedly out of the water, shaking its head with great violence to get rid of the barbed torment within its jaws. Failing in this, it tries opposite tactics; descends to the bottom of the river, and there attempts to accomplish the same object by rubbing out the hook against the rocks. Next follows another course of some half-dozen or dozen leaps out of the water, requiring great care and tact on the part of the fisher to keep the line taught during these convulsive struggles. It is at this time that unskilful anglers generally lose their fish. If the salmon is unsuccessful in all these attempts to liberate himself, he very often, as a last effort, makes a rush down the stream.—Luckily for the fisher, but unfortunately for the poor fish, it is destitute of the instinct of the pike, which prompts that voracious creature to bite through the slender line to which he is a prisoner. The capture of a large and active fish weighing thirty pounds, has sometimes employed me more than two hours.

Trout are classed by Ichthyologists amongst the salmon family, and denominated the *Salmo Fario;* of which there are

* Anatomy of Melancholy.

perhaps a thousand varieties. A large proportion of these are found in Lower Canada; but the Canadian trout is much inferior in firmness and flavour to the same fish in Europe. Besides, it is often brought into market in very indifferent condition, and before it has had time to recover from the debilitating effects of the long winter; for when the ice disappears, all the fresh water fish here are in a state of great leanness and weakness from want of food. Trout in this country are in the best order about the end of July, when they have had time to fatten on the numerous insects with which the waters abound in summer, and before the season of pairing injures the flavour of their flesh. The Canadian trout are far less particular as to their food than their brethren in the old world. They are moreóver sluggish in their movements, make slight resistance when hooked by the angler, and afford but little amusement.

But there is an exception to this. A large, lively and beautiful salmon trout, called by Griffiths in his "Animal Kingdom" the *Salmo Canadensis*, is to be found in the lower branches of the St. Lawrence, on the North shore. This is unquestionably the most splendid trout I have ever seen, and is besides a fish of firm, pink flesh, and the finest flavour. It is voracious, strong and active, leaping out of the water like a salmon, and affording the fisher excellent sport. The dolphin's vaunted skin, (and I have seen and caught many) is far inferior to the superb colours of this fine trout; and the clustering and brilliant spots of red, yellow, blue, and gold on its rich coat, almost defy the pencil to represent them adequately. In the Malbay river, ninety miles below Quebec, I have frequently caught from two to three dozen of these literally glorious trout in a forenoon—many four and five pounds weight, but averaging about three. Last year I caught one enormous individual of the same kind, in the Jacques Cartier River, weighing seventeen pounds; but this fish was not in good condition, and had lost much of his beauty.

The *Salmo Salmulus* or Parr, is to be met with in some of the streams in this Province. I found a few last summer in the Jacques Cartier. This pretty little fish is often confounded with the salmon fry; but it is now ascertained to be a distinct species, never growing to more than six or eight inches in length.

The number of men and amount of capital employed in the Salmon Fisheries of Great Britain and Ireland are now so great, that they have become collectively an object of national importance only second to the Cod Fishery. The right of fishing certain rivers is leased for large sums. The fishery on the Erne at Ballyshannon, lets from £2500 to £3000 a-year, with a profit to the Lessee of from £1400 to £1600. Coleraine, I believe, is of nearly equal value. Many of the Scotch rivers also yield large rents; but the Fisheries of the Tweed far exceed in value any other British or Irish river, having been let only three years ago for £15,700 per annum. The produce of the salmon sent to London, was at the same time, estimated at £54,000, but the necessary expenses are very great. Seventy boats and three hundred fishermen are employed during the season at Berwick, on the English side of the river alone.

The consumption of salmon in London and the other large towns of the British Islands, as well as in the houses of the higher and wealthier classes in the country, has become of late years enormous, and the vast sums expended on this dear and luxurious article, could only be afforded by the immense wealth of England. To answer this great demand, new means of destruction were devised. Nets were made of such dimensions as to embrace the whole circle of the mouth of a salmon river, and the capture of the fish was highly stimulated every where, and undertaken in every way. One hundred thousand salmon per week, for several weeks in the summer, used to be exported from the Eastern Ports of Scotland alone—the greater part of which were sent to London.

But this over-stimulation of the fishery had the natural effect. The fish that layed such golden eggs ran the greatest risk of being herself destroyed, by the pernicious cupidity their great price excited; for the very existence of the race of salmon became seriously endangered in some of the most productive rivers. About ten years ago, great and general complaints were made by the river proprietors in Great Britain and Ireland, of an alarming diminution in the number of the fish: numerous petitions were presented to the Legislature, and in consequence, a Committee of the House of Commons was appointed to enquire into the matter. It sat three months—examined many witnesses, collected information from various quarters, and made an elaborate Report. The purport was, that the complaints respecting the great falling off in the productiveness of the salmon fisheries were well founded—that from the inefficacy of the laws against poaching the rivers, and its vast increase—the

more general employment of large nets at the mouths of salmon rivers, and the more numerous impediments of water machinery in their course, the fisheries were threatened with total destruction. They therefore recommended some more cogent legislative measures to prevent the approaching extinction of salmon in Great Britain.

A Bill founded on this Report, was brought into Parliament, and an Act passed in 1828. By this statute any fishing for salmon with nets, rods, or any other implements, between the 14th September and the 1st February, was made a misdemeanor punishable by a fine of from one to ten pounds, with forfeiture of fishing gear. Other protective provisions were also introduced, with additional penalties against poaching. It is stated on good authority, that this act has already had a very beneficial effect on the fisheries; though many well-informed persons think an additional month's "close time," as it is called, should have been enforced, and that no salmon fishing of any kind should be permitted until the 1st of March. Sir Humphrey Davy, a high authority on the subject, was of opinion that it should be forbidden until the 1st of May.

Some legislative protection for salmon, appears to be much required in the Canadas; for, although the number that run up this noble river is still great, there can be no doubt that it is sensibly diminishing. There are many causes operating to produce this effect. The salmon are killed at all times, in or out of season; and even the parent-fish, pregnant with some tens of thousands of ova, and absolutely half-poisonous as food, are wantonly destroyed. The very fulness of roe, and consequent large size of the fish, proving the flesh to be unwholesome, tends sometimes to raise their price in the market. Many of the salmon that are offered for sale in August, and I believe, all that are caught in the latter end of that month, and in September, are foul fish, unfit to be eaten.

The progressive settlement of the interior of the country is prejudicial to the salmon race in various ways. The stake nets and weirs or salmon traps, with which every promontory of both shores of the St. Lawrence is now armed, are more numerous and better arranged than formerly. As the population increases on the banks of the breeding streams in both Provinces, mills and dams are erected, and new impediments placed in the way of the fish; whilst the Canadian fishermen, and the Indians, their aboriginal enemies, become more skilful and successful every year. All this improvement is calculated to thin their numbers; and the increasing trade of the river, "furrowing its waters with a thousand keels"—or churning the

stream beneath the paddles of the numerous steam-boats, doubtless disturbs or frightens many of them away.

I assume then, as a matter of notoriety, that a serious diminution in the numbers of the St. Lawrence salmon has lately taken place; but for want of sufficient data, it is not easy to estimate its extent with any accuracy. My own impression is, judging from an angling experience of ten years in several of its branches, and from statements I have heard from intelligent persons, that there has been a falling off at least of a fourth—within the time mentioned. It is true that any legal prohibition of catching salmon within certain stated periods might be often eluded in this country, where a similar law with regard to bringing partridges into market during the breeding season is never, I believe, enforced. Still it appears to be the interest of all classes that some legislative protection should be given to the salmon, and rigidly carried into operation. For instance, a prohibition of catching or selling the fish after the 20th August, (we will say) each year, when they go out of season. A law to this effect, carefully enforced, would, to a certain extent, prevent unhealthy food from being imposed on the public, and tend to keep up an adequate supply of breeding fish. Indeed, if matters go on as at present, salmon, which are even now sold at a high rate in the Quebec market, will, in all probability, before many years pass, become so scarce and dear as to be quite beyond the reach of the community. With increasing means of destruction directed against them on the one hand, and no legal protection when breeding on the other, they will soon be banished from the St. Lawrence, as they have been already from the Hudson, the Avon, the Severn, the Trent and the Thames.