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## SOME OBSERVATIONS UPON THE GRAYLING

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The question as to whether the grayling (*Thymallus tricolor*) could be successfully propagated artificially being practically undecided by this commission, it was decided to prepare waters as nearly in accordance with natural conditions as possible and make as careful and systematic an attempt as we could to solve it. Accordingly ponds were made on the Buck Horn creek, of just sufficient depth to admit of screening and through which the whole creek followed, with the hope that if placed here they would in the spring--the spawning season--give us an opportunity to observe and handle them under less difficult circumstances than in their native streams. We hoped that as the Buck Horn had originally been a good grayling stream, it would place at our disposal the most advantageous conditions. The ponds being in readiness, the several members of the Michigan Fish Commission proceeded on the 20th of August to the west branch of the Manistee, fifteen miles from the railroad station at Kalkaska, with boats, cans and camp equipage, prepared to make a week of it. The fish were to be captured with rod and line, it having been demonstrated that this was more certain, and the results more satisfactory, than any attempt to use nets of any description. The result was that at the end of the week we had caught and had in excellent condition about one hundred fine specimens. From five to six of these were put into a can, the temperature of the water--which was comparatively low--kept down by the addition of ice, and nine of these cans loaded into a lumber-wagon and the journey to the station over a bouncing corduroy road commenced. Only one opportunity to change the water en route was afforded, but, notwithstanding all this rough handling, they reached their destination with only the loss of some four or five specimens.

During the winter they were watched and cared for, but the loss was about twenty-five per cent. When the spawning season arrived a close watch was kept to see when any signs of spawn-laying should commence, but we watched in vain. So far as could be ascertained there was nothing to indicate that they had, would, or could ever spawn, and to-day we are no nearer a practical solution of the vexed question than when we commenced. During this, and a subsequent visit to the same locality, I was enabled to make some observations upon their food and their habits in feeding, which may be of interest. Near the camp was a pool in which two small fish had their haunts, one about six inches in length, and the other half the size. The larger one when at rest was a bit of clean sand in plain view; the other lay under some sunken drift-wood, dark in color, and under which he concealed himself, only the tip of his nose being visible, and the contrast in color corresponded exactly with their resting places; the larger one was so nearly the color of the sand on which he lay as hardly to be distinguished from it; only when in motion as he arose to the surface for his food; the other was as dark as the sticks under which he lay, showing that the question of color is one of bottom locality and undoubtedly a circumstance of more or less light. I was somewhat surprised at the tenacity with which they adhered to a locality when once domiciled in it. Three or four times I drove them out of their haunts; one afternoon chasing the larger one several rods up the stream; only to find him in the same spot the next day, and when I returned to the same locality, after an absence of four weeks, I found the same fish apparently in the same places. In rising for food I never saw either of them more than a yard from their haunts, and only rarely but a few inches. They would detect their prey at a considerable distance and slowly rise to meet it as it floated to them, and then a sudden flash, and they were back to their respective resting places. The deviation from the point where they lay was, from side to side across the stream,

hardly even but a few inches up or down. One day, when they were rising with more than usual frequency, I carefully crept out on a projecting log until I was nearly over them, and could watch their every movement, and, with watch in hand, counted the "rises" of the larger one for fifteen minutes. In this time he came to the surface and secured his prey fifty times. Sometimes he would rise nearly to the surface and then slowly settle down again, but whenever he actually seized anything he was back to his haunt again with a motion so quick the eye could scarcely follow him. After considerable observation I could detect the particular insect I was sure he would rise for, sometimes before he would show any motion in that direction. Watching his quick, unerring sight, and his ability to detect what was food, and what was not, led me into some generalizations on what their food really was, that were new to me.

In eviscerating fish for any purpose, I have always been in the habit of examining the contents of the stomach, and the stomach of the grayling had always puzzled me by the quantity of vegetable matter so often found in them; but the a priori conclusion that he was necessarily a carnivorous, or insectivorous fish; the thought that he was a vegetarian as well, never occurred to me. I had observed that the fronds of the white cedar--arbor vitae--were quite usually among the contents of the stomach, but I had always considered it as something adventitious, an accident, occurring in the procuring of his food, and not deliberately taken. But a somewhat singular circumstance that occurred upon this last expedition staggered me somewhat. On the afternoon of the day of my arrival, after the tent was pitched, and camp life organized, I proceeded to a pool below a flooding dam near camp, thinking I could secure enough grayling for the supper of myself and little daughter, who accompanied me. I succeeded in securing two nice ones, weighing probably about six or eight ounces each, and upon dressing them and examining the stomachs as usual, judge of my surprise upon finding one of them full of oats; there were eight kernels stored away in first-class style, and my first question was, where in the name of the Prophet could they have come from, for I knew that there wasn't a spear of grain growing within a dozen miles of this pool and the condition the grain was in showed that they could have been in the stomach but a short time. I finally solved the mystery by remembering that the man who brought us out--we arrived about noon--fed his horse some oats at a point just above the pool, and the grain was either blown into the water or carelessly thrown in by some one. I frequently found in their stomachs portions of the leaves and seeds of the water plants growing in the streams. Among the latter was in several instances a round seed about as large as a No. 4 shot, which I at first thought was a mollusk, a species of spherium, but on examining it with a glass what appeared to the naked eye to be the striations of the shell proved to be the veination of the seed. It may be urged against the vegetarian theory that many fish take that which in no way resembles their ordinary food, as the artificial fly and the different varieties of spoon and spinning baits, and that this particular fish could in no way have had any previous knowledge of oats as food, and consequently the taking of it must be in the nature of a freak rather than a habit, but I do not remember to have ever found in the stomachs of other fish any substance other than their food but which could be accounted for as accidental, while in the grayling the presence of vegetable matter in some forms is of so frequent an occurrence as to point strongly to the fact, that a part of their food at least is vegetable.

Another point in favor of this theory is the peculiar flavor of the fish and that which has given it its specific name. It is a well-known fact that the flesh

of all animals is to a greater or less degree flavored by its food. Now, is this fish fed upon exactly the same materials as the brook trout, could there be a reasonable doubt but what its flesh would taste like that of the trout, while the fact is, that it is distinctly different.

You are probably aware of the difference between a liverfed trout and one caught in its native wilds; a difference so patent, that a person relying upon the taste alone would pronounce them an entirely different fish. One thing is certain, whatever its food is, it must have existed in unlimited quantities to have supported such a large multitude of this fish as absolutely swarmed in the northern streams of this State at an early day. D. A. Blodget, now living at Grand Rapids (and one of the pioneers of the Muskegon at the Hersey-branch), told me that when he first built a dam at the mouth of this stream, that in the spring, during the spawning season, when the grayling were trying to find their way to the spawning grounds, that he has seen the inhabitants fill the box of a common lumber wagon full of this fish in a few hours and carry them out into the country, not only one such load, but half a dozen of each spring for several successive years, while as many more must have been taken away in smaller quantities, and he estimated the quantity taken by tons each year; that during the first winter he spent there, he supplied his table with this fish by taking a common nail-rod and sharpening it with his ax, and cutting a barb on it with the same tool, and going to any of the bends in the stream, and cutting a hole in the ice, he could in a little while get all he wanted by thrusting this primitive spear at random into the waters beneath, and as the number of fish that any stream can furnish is to a great extent limited only by the food supply, it seems that so great a number as was then found, not only in this particular stream, but in most all the streams in which they were found, must have had some food in much greater abundance than what is usually found in our ordinary trout streams. (Grand Rapids, Michigan)

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MICHIGAN FISH COMMISSION