

67.—THE AMERICAN BROOK TROUT RECOMMENDED FOR SWISS WATERS.*

By HERMANN GOLL.

Thanks to the efforts of the German Fishery Association, it has become possible to acclimatize in European waters several kinds of American fish, such as the California salmon, the valuable American salmon trout (*Seelachs*, lake salmon), the whitefish, and the American brook trout (*Salmo fontinalis* Mitch.).† Von Claparède in the spring of 1883 sent a considerable number of the eggs of this fish to Switzerland; 4,000 were sent to the canton of Vaud, and were hatched in the small fish-cultural establishment of Roveray, near Allaman. Unfortunately the hatching troughs were one day flooded by violent showers, and in consequence a large number of the young fish which had been hatched were carried away. Of the small remnant, about 300 were placed in a pond near St. Prex, and 100 in a small pond in my garden. This pond has a long oval shape, and measures 4 meters in length, 2 in breadth, and almost $\frac{1}{2}$ meter in depth; its walls are of cement. It is fed from my house reservoir, containing good drinking water with but little lime in it, which comes from the Pierre-Ozaire. The temperature of this water is 6.5 to 7° C. [about 44° Fahr.]; in summer it exceptionally rises to 12° [53.6° F.]. As hidingplaces for the little fish, my pond has some small caverns of tufa, forming a sort of subterranean passage. The bottom is covered with mud from the lake, in which there is a dense growth of *Blodea canadensis* and *Potamogeton densus*.

The young brook trout, which had been placed in the pond, in the beginning persistently hid themselves, so that I began to doubt whether they were really there. Some articles of food which were thrown into the pond were not touched, and I therefore stopped throwing in any food. After about three months some of the little fish occasionally made their appearance, having grown considerably. When placed in the pond, they measured 18 to 20 millimeters [$\frac{3}{4}$ inch] in length, while now they measured 5 to 6 centimeters [$2\frac{1}{2}$ inches]. I now had frequent opportunities to see of what their food principally consisted. My aquatic plants were covered with great masses of *Gammarus roeselii*; and my little fish eagerly chased small specimens of this crustacean.

In September, 1883, my fish measured 9 centimeters [$3\frac{1}{2}$ inches] in length. To accelerate their growth, I placed in the pond a number of small *Phoxinus lavis*, and several small specimens of *Cobitis barbatula*. These fish all disappeared, and I presumed that the trout had devoured

* "*Der amerikantische Bach-Röthel.*" Translated from the German by HERMAN JACOBSON.

† In January, 1883, 25,000 brook-trout eggs were sent by the United States Fish Commission to the Deutsche Fischerei-Verein. See F. C. Report for 1883, p. xli,

them. As I had no more of these fish to give them, I commenced to throw earthworms into the pond. Two to three times a week I had a grand feeding-time, and convinced myself that the new food was eagerly taken by the trout. With the same relish they devoured small grasshoppers, gnats, caterpillars, &c. I am now able to explain how it came that I occasionally found early in the morning one of my little fish outside the pond; it had too eagerly chased insects flying over the water and leaped out of the water upon the bank.

When the cold season set in, I made an attempt to feed my fish with meat chopped fine, but it invariably remained on the bottom untouched. Possibly this was caused by the diminished voracity of the fish, resulting from the winter season.

In January, 1884, I again noticed the *Phoxinus laviois*. Nearly all of them returned; and I must presume that the brook trout does not chase fish, as both kinds of fish live, up to date, together in perfect peace and harmony. The *Phoxinus laviois* had grown considerably, and I began to throw little pieces of soaked bread to them. After a few hours these had disappeared; and I think I have occasionally seen the trout snap after this food.

In the summer of 1885 most of my trout had reached a length of 20 to 25 centimeters [about 9 inches]. About one-third of them had not grown so long; these were the ones which always came too late, when I threw food in the pond, and had to satisfy their hunger with some of the bread. Similar observations were made relative to the little fish which had been placed in the pond near St. Prex; only they remained smaller, because no food was thrown to them.

On the whole, I am very well satisfied with the growth of these fish. As, moreover, they are easily satisfied (my pond was often supplied with very little water, and was frequently polluted by rain-water) and manage to live on all sorts of animalcules, I think I can recommend them for many of our waters. In clear brooks, which contain a good many *Gammarus roeselii* and larvæ of insects, the American fish is found to be less predaceous than our brook trout; and as to its growth and the delicacy of its flavor, it is fully the equal of our trout. In my opinion, and after repeated trials, the American brook trout is in every way the equal of the char from the Lake of Zug, which enjoys a high reputation as a table fish.

The American brook trout is a genuine "Saibling," and can therefore justly be classed with the genus *Salmo*. We find in it the *os vomer* in the upper jaw, only with teeth in front, just as in the Zug char. Its body is thick-set, the snout short, and the color something like that of our char. The back and sides have a dark-green ground color; the belly has a beautiful rosy color, with a slight admixture of orange. On the sides there are numerous very bright red, white, and yellowish-white spots. The brownish-yellow dorsal fin has some intensely black streaks. The ventral, pectoral, and anal fins have a deep red color, and have a

shining white front edge. The caudal fin, which is cut off straight, is of a brown-red color. During the spawning season these colors become brighter, and at that season the brook trout compares favorably with some of the most beautiful of the finny tribe. In Zurich very successful experiments have been made with the *Salmo fontinalis*. Four of these fish, which were raised in the fish-cultural establishment of Dachsen, produced last autumn about 200 eggs, and from these there have now been hatched about 60 or 70 lively and healthy young fish.

We take occasion to express once more our hearty thanks to the German Fishery Association for its valuable present. Let us hope that there is a great future in store for this new citizen of Switzerland, which has come to us from far-off America.

ZURICH, SWITZERLAND, 1886.

68.—HABITS OF WHITING OR FROST-FISH (*MERLUCIUS BILINE-
ARIS*, Mitch.).

By WILLARD NYE, Jr.

These fish appear in our shallow waters during October or November,* according as the season is early or late. They come in to feed from sunset to sunrise, and are then seen, often where the water is not over two inches deep. During the daytime they are never seen alive near the shore, nor have I ever seen any at or near the surface in deep water.

They feed on the silver-sides or friar, which abounds here at this season, and which, being chilled, is easily caught. The frost-fish do not come in schools proper, but scattered along shore—from a few to many feet apart, and headed in all directions, moving slowly along—generally near the bottom, and now and then rising to seize a friar, which they do by shooting ahead two or three feet quite rapidly; if successful, they then sink to the bottom and slowly swallow the small fish.

Many frost-fish are speared by men and boys wading along shore with lanterns. Quantities are caught in the fish-traps, and if the night happens to be very frosty hundreds are left by the falling tide, this last more frequently happening on the outer beaches, where there is a little swash along shore. In size they vary generally from two or three ounces to one pound; those on the outside beaches are the largest, while inside the mouths of rivers they are small. When seen in the water at night they appear of a dull reddish color. Early in October, while fishing for codfish in five or six fathoms, I have caught frost-fish that would weigh two or three pounds; and in the trawl on the Albattross I have seen specimens that would weigh as much as eight pounds.

NEW BEDFORD, MASS., August 20, 1886.

* For a brief note on their appearance, see F. C. Bulletin for 1886, p. 137.