

REPLIES TO QUESTIONS OF HERR VON BEHR, CONCERNING *SALVELINUS FONTINALIS* AND *SALMO IRIDEA*.

By LIVINGSTON STONE.

I.—BROOK TROUT (*Salvelinus fontinalis*).

II.—CALIFORNIA TROUT (*Salmo iridea*).

1.—We always hear now that *Salmo fontinalis* is rather a *Salvelinus* (and there is no doubt about it), but don't you have our *Trutta fario*? You use the words *Salmo fontinalis* and brook trout as synonymous, while formerly we thought brook trout to be our *Trutta fario*!

A. It is true that the New England brook trout, sometimes called the American brook trout and commonly known by the name of *Salmo fontinalis*, is properly a *Salvelinus* (*Salvelinus fontinalis*), but the *Trutta fario* of Great Britain and the continent of Europe does not exist and has never existed in America. The common brook trout (*Salvelinus fontinalis*) of New England and other States of the Atlantic slope is not the common brook trout of Europe (*Trutta fario*).

My following questions are meant about *Salmo fontinalis* (*Salvelinus*):

2.—How heavy do they get?

A.—The *Salvelinus fontinalis* or common brook trout of the Atlantic slope varies very much in size and weight. Those found in high altitudes in the very small and usually cold rivulets that form the headwaters of the streams are the smallest, and often are of such diminutive size that they will not average over two or three ounces each. The larger and somewhat warmer brooks lower down, that are formed by the confluence of these little rivulets, furnish the next larger size of *fontinalis*, and so on till we come to the streams emptying into the ocean or the Great Lakes, where we find the largest of the species.

Brook trout were thought to attain the weight of 9 or 10 pounds until the famous 10-pound trout caught by Mr. George Sheppard Page in the Rangely Lakes was declared to be *Salmo oquassa*, since which time the reputed maximum weight of *fontinalis* has had to fall a little, though I still think it possible for *fontinalis* to attain a weight, under the most favorable circumstances, of 7 or 8 pounds; but Atlantic brook trout of 3 or 4 pounds are now getting extremely rare even in tidal streams, and in the brooks farther in the interior a pound or three-quarters of a pound is considered a good weight for *fontinalis*.

3.—Are they living in the same water with *Trutta fario* or *Salmo iridea*?

A.—*Salvelinus fontinalis* has never been found naturally living together with *Trutta fario* or *Salmo iridea*. But since the introduction by human agency of *fontinalis* in Great Britain, *fontinalis* has occupied the same waters with *Trutta fario*, and since the California brook trout have been brought to the Atlantic slope and Atlantic brook trout have been carried to the Pacific slope these two latter varieties (*Salvelinus fontinalis* et *Salmo iridea*) have lived together in the same waters.

4.—What time are *Salmo fontinalis* caught by angling?

A.—*Salvelinus fontinalis* can be caught by angling in the latitude of New York City from about the 1st of April to about the 1st of October, though I believe the close season begins somewhat before October 1. Before about the 1st of April the water is usually so cold that the trout do not feel much like biting, and after the 1st of October the spawning season is so near that they do not care then much about bait or any food. As one goes farther north the season for angling begins later and ends earlier. Trout are not found much south of the latitude of New York City, except at high levels.

5.—With what fly or bait?

A.—Trout fishing in this country is done mostly with artificial flies. The different varieties of flies used are innumerable. Those which are considered the most effective, taking the season through, are perhaps the "Professor," "Montreal," "Jenny Lind," "Coachman," "Black Gnat," and "Cowdung." When bait is used the common angle worm is the favorite lure for trout, but grasshoppers, various flies and insects, and particularly the grub worm, are used at different seasons and in various localities with good results. Salmon spawn also makes a good bait when it can be procured.

6.—Do they spawn also in lakes like other *Salvelinus*, or only in rivulets like *Trutta fario*? What months?

A.—Atlantic coast trout, like *Trutta fario*, spawn almost exclusively in brooks and rivulets, and manifest a strong impulse to ascend the streams to a considerable distance. When, however, they cannot do better, they will, like other charrs, spawn on the shores of lakes, always seeking either a springy spot or a clean gravelly one, or both. Their spawning months vary very much, probably according to the temperature of the water. At the Cold Spring trout ponds, at Charlestown, N. H., the trout almost invariably begin to spawn the second week in October, and end before Christmas. Farther north in ordinary brooks they spawn earlier. Farther south they spawn somewhat later, and in ponds or streams which are fed by springs large enough to keep the water of very even temperature through the cold months, the trout spawn from the 1st of November till some time in April.

7.—Are they thought good for pond culture?

A.—In America, *Salvelinus fontinalis* takes the first rank as a fish to be cultivated in ponds, provided the ponds are fed by springs or cold running water. Ponds not possessing these qualities are unsuitable for brook trout.

8.—There seem to be different kinds of *Salmo fontinalis* in United States, for when some time ago I received a box of eggs, which were first cabled as lake trout, but afterwards declared by you to be brook trout (*Salmo fontinalis*), you especially remarked that these *Salmo fontinalis* eggs were of a special excellent variety, and my German

breeders observe that these eggs are so very large that they indeed had believed them to be lake-trout eggs.

A.—There is, properly speaking, but one kind of *Salvelinus fontinalis*, but they vary very much in quality. For example, the small fish of the small, high rivulets, though very sweet and delicious when cooked, are not nearly as handsome and plump and tempting in looks as the trout lower down, say in the Cape Cod and Long Island streams. Neither do they ever grow as large, neither are their eggs as large. As to the eggs of the largest breed of brook trout are fully twice as large as those size of the eggs, I think I may venture the assertion that the of the fish of mountain rivulets.

9.—Of what State and lake were these? So I dare say you have different kinds of *Salmo fontinalis*. Is this the case? I bought, for some years, eggs of Mr. Annin and of the Charlestown Cold Spring trout ponds. Were these probably of the same kind as those you presented to me a short time ago?

A.—The eggs sent to Germany, and first by mistake called lake trout, were true "*fontinalis*." They were from Mr. Clarke's ponds in Michigan. They were eggs of the same variety of fish (*Salvelinus fontinalis*) as those received from Mr. Annin and from the Cold Spring trout ponds at Charlestown, N. H.; but Mr. Clarke's eggs were from exceptionally fine fish.

10.—You observed that you had a *Salmo iridea* hatching-house in one of your Eastern States. Do the *Salmo iridea* spawn there at the same time as in California—in the spring? Which months are the spawning time in California (McCloud River), and which in the Eastern States hatching-house?

A.—In the McCloud River they spawn from about the middle of January to the middle of May; but so varied in elevation, latitude, and temperature is the State of California that *iridea*, I have been informed, is spawning somewhere in the State every month in the year.

It is unquestionably true that the spawning season of *Salmo iridea* depends on the climate, that expression being understood to include all climatic influences of every kind.

Salmo iridea spawns in the McCloud River, as has been mentioned, from the middle of January to the middle of May. In the eastern hatching-houses the same fish spawns in March, April, and May.

11.—Does this *Salmo iridea* keep, in ponds, its stronger appetite and greater vitality they speak so much of in California?

I read in the small book "Fish Hatching, Fish Catching," that they are more vigorous in every way than the Eastern trout, but are not as handsome, have no carmine specks, but will live well in captivity and grow rapidly.

A.—*Salmo iridea* retains its capacity for eating voraciously when confined in ponds, and when confined seems to keep up its well-deserved reputation for having a hardy and vigorous organization, though I should

hardly want to admit that *iridea* possesses any greater vitality than *fontinalis*. I agree entirely with your quotation from "Fish Hatching and Fish Catching," that they are more vigorous in every way than the eastern trout, but are not as handsome, have no carmine specks, but will live well in captivity and grow rapidly, except that I should want to substitute the word "hardy" for "vigorous." It does not seem to me that the California brook trout are more vigorous than the Atlantic brook trout, but they are undoubtedly more hardy.

Mr. von dem Borne desires me to ask the following question :

12.—What kind of places do those four above-mentioned fishes select for spawning : running or still water, on plants, on stones, on gravelly or sandy or muddy bottom ; in deep or shallow water ?

A.—In reply to Herr Borne's inquiry, allow me to say that *Salvelinus fontinalis* and *Salmo iridea* always seek clear, running water and a gravelly bed where they may deposit their eggs.

13.—Is there only but one California trout, or is the trout of McCloud River the true rainbow trout, and has California another mountain trout ?

A.—There is but one California trout which has been introduced into the Atlantic States, and, indeed, but one that has been much cultivated. This is *Salmo iridea*, or the "rainbow trout," or the "California mountain trout," or "McCloud River trout," these four names last given being synonymous. Whenever any one hears anything about *Salmo iridea*, or "rainbow trout," or "California mountain trout," or "McCloud River trout," he may know that the same fish is always meant under all these different names. California has several other mountain trout, but they are not yet generally known or much cultivated.

14.—Which one do you intend to send us ?

A.—Consequently the California trout which Professor Baird intends to send to Germany is the fish (*Salmo iridea*) just mentioned.

15.—What month does it spawn ? Californian *Salmo quinnat* spawns at home much earlier than our *Salmo salar*, but I might suppose that this entirely depends on the climate, because the California salmon which our Mr. Schuester raised in his tanks up to spawning time did not spawn in the California time, but in our *Salmo salar* time (November), or very near so.

A.—This question has already been answered under 10, which see.

RESULT OF PLANTING SHAD IN THE OHIO RIVER.

By WILLIAM GRIFFITH.

The first white shad of the season was taken on the Falls yesterday. This makes the sixth consecutive run of white shad in the Ohio river.

LOUISVILLE, KY., May 7, 1881.