

92.—TWO SPECIES OF AMERICAN FISH IN THE AQUARIUM OF THE ROYAL ZOOLOGICAL SOCIETY AT AMSTERDAM.*

In the Netherlands slow but sure progress is being made both in artificial fish-culture and the matter of transporting living fish from one country to another. Experiments have recently been made in transporting such fish for a considerable distance; and these experiments have proved entirely successful. The aquarium of the Royal Zoological Society at Amsterdam can in this respect chronicle results which must be called entirely satisfactory. Not only have different kinds of fresh-water fish been brought to the aquarium from Germany in perfectly sound condition, but also several kinds of foreign fish have been raised in our aquarium and brought to a condition of complete sexual maturity. Thus the *Idus melanotus* var. *miniatus*, a beautifully colored variety of the *Idus melanotus* found in our rivers, which is found in large numbers in the ponds of Dinkelsbühl in Bavaria, has spawned in a basin of our aquarium, a circumstance which has thus far not occurred in any other aquarium. At present ten of these fish, hatched and raised in our aquarium, are in the ponds of Mr. J. Noordhoek Hegt's fish-cultural establishment at Apeldoorn, and have there likewise propagated their species. We desire, however, to call special attention to the fact that two species of American fish have been successfully transported across the ocean and placed in the Amsterdam aquarium. These two species of fish—namely, the American catfish and the American black bass—will doubtless stock many of our waters which at present contain scarcely any fish.

The American catfish (*Amiurus nebulosus* or *catus*) belongs to the *Silurus* family, and is therefore related to our *Silurus glanis*, the only variety of this fish found in Europe. This American catfish is originally found in the Schuylkill, the Delaware, the Hudson, and the large lakes of North America, but has also been transplanted to the Sacramento River, in California. The catfish is a good article of food. Owing to the transplanting of these fish to the Sacramento River large quantities are now brought into the San Francisco market, where they have become sought after. The question has been asked whether it would be desirable to acclimatize the catfish in Europe, especially as it has been sufficiently proved in America that the catfish cannot be called a predaceous fish in the full sense of the term, but lives both on animal and vegetable food.

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The first practical attempt in this direction was made in Belgium. Mr. Thomas Wilson, United States consul at Ghent, first suggested placing catfish in the Scheldt, a river which, owing to the large number of factories on its banks, does not contain many fish. It was presumed that the catfish would be particularly adapted to the River Scheldt, because it had been sufficiently proved in America that this fish is not much affected by the refuse from factories. After consulting with Prof. Spencer F. Baird, one hundred young catfish arrived at Antwerp in November, 1884. By the advice of Professor Baird, these young catfish were not immediately placed in the river, but first in the large basins of the aquarium. It is only after these fish have reached maturity in the aquarium and have spawned there that the young generation should be transferred to the river. This was done; and the young catfish received from America have provisionally been placed partly in a small pond in the Botanical Garden at Ghent, and partly in the Victoria-Regia basin in the same garden. The selection of the last-mentioned place we do not consider fortunate, as the temperature of the water in this basin is certainly much too high for these fish. At present there are in the Amsterdam aquarium 45 catfish brought direct from New York, and placed in a special basin with the hope that they will reach maturity and propagate their species. At present these fish measure from 4 to 6 inches in length.

As regards the mode of life, habits, and propagation of these fish, the following is known from the observations of Mr. John A. Ryder.* During winter the catfish lives at the bottom of the water, and prefers a clayey soil, in which it almost buries itself. During the first fine days in February some of these fish make their appearance, and in May they may be observed in rivers and lakes in large numbers. They prefer water which is muddy and does not have much of a current. No diseases or parasites have been noticed in the catfish. Their only enemies are bass, muskrats, and turtles. Mr. Ryder placed a male and a female separately in a basin of the Washington aquarium. The female laid about 2,000 eggs in a shapeless heap, and left them immediately after they had been laid. The male, however, acted very differently, and after the eggs had been impregnated, did not leave them for a moment, and by a regular movement of the pectoral fins caused a continual current of fresh water to pass through the mass of eggs. After a week the young fish slipped out of the eggs. On the thirteenth day after they had been hatched, the umbilical sac had disappeared, so that two days later the young fish eagerly took the food offered them, consisting of small pieces of liver. It is very remarkable that the eight feelers round the mouth begin to develop on the thirteenth day after the fish are hatched, at which time also the last traces of the umbilical sac have disappeared.

* See F. C. Bulletin for 1883, p. 225.

The black bass (*Micropterus salmoides*) belongs to the bass family, and is common in North America, especially in the Saint Lawrence River and the Mississippi. American ichthyologists distinguish two varieties, namely, the large-mouthed bass (*Micropterus salmoides*) and the small-mouthed bass (*M. dolomieu*). Both kinds are valued very highly for food, and fetch a good price in the market. They flourish best in broad flowing waters having considerable depth and not too low a temperature. In the northern part of North America, in the large lakes, they reach a weight of 4 to 8 pounds, and in the South a weight of 12 to 14 pounds. They prefer a rocky or pebbly bottom of rivers which have a strong current, but are also found in shallow lakes or ponds where there is but little current. They prefer to spawn on a gravelly or sandy bottom, where, by a strong movement of the fins, they make a sort of nest. Both the male and the female keep watch over the eggs and the young fish. The spawning season lasts from March till the middle of July, and varies a little according to the higher or lower temperature of the water. The eggs are hatched in 7 to 14 days, and the young bass remain in the nest from 2 to 7 days. Several attempts have already been made to acclimatize these fish in Europe; and both in England and in Germany these attempts have been successful. Max von dem Borne deserves great credit for having first introduced this fish in Europe; and next to him should be mentioned Mr. G. Eckardt, jr., of Lübbinchen, in Prussia, who took care of the fish during their transportation from New York to Bremen. But more than this, Max von dem Borne has succeeded in having three black bass spawn in his ponds. Several thousand young bass have by this famous fish-culturist been placed in a special pond, where they are fed with small crustaceans (*Daphnia*, *Cyclops*, &c.). Thus not only the transportation of these fish from America to Germany but also their propagation in German waters has been entirely successful.

The Amsterdam aquarium at present possesses four fine specimens of black bass, which grow well, and will, in all probability, reach sexual maturity. We owe a debt of gratitude to Prof. Spencer F. Baird, of Washington, and Mr. E. G. Blackford, of New York, and also to the captain of the steamship Edam, Mr. J. H. Taat, for the great care he took of the fish during the voyage from New York to Amsterdam; as to these gentlemen it is mainly owing that the experiment has proved successful. It will be of great importance to fish-culture in the Netherlands if the experiments made in the Amsterdam aquarium to propagate the American bass are crowned with success. Many of our rivers and lakes which at present contain hardly any fish could be advantageously stocked with American black bass.