54.—THE GERMAN CARP AND ITS INTRODUCTION IN THE UNITED STATES.

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[A paper read before the American Association for the Advancement of Science, at the Minneapolis meeting, 1883.]

1. SYSTEMATIC POSITION, VARIETIES, AND ECONOMIC RELATIONS.—The German carp belongs to the family *Cyprinidæ*, and genus *Cyprinus*. Of the *Cyprinus carpio* there are three varieties: the scaled, which is the most edible; the leather, which is the most prolific; and the mirror, which is intermediate between the other two. The common gold-fish, *Cyprinus auratus* Linnæus, is an allied species, with which the German carp very readily hybridizes.

The present purpose is not to speak of carp from a biological standpoint, but from an economic one, especially as there is little that is new with reference to its biology and much that is new when economically considered.

2. HISTORY OF ITS INTRODUCTION.—The carp was originally from Central Asia, whence it was introduced into Europe a few centuries ago: into England in 1504, and into Austria in 1227. It is alleged that Capt. Henry Robinson brought carp from Holland to the United States about 1830 and put them into his ponds at Newburg, N. Y., from whence they escaped into the Hudson.* As nothing practical came of this, the real introduction of carp into the United States dates from May 26, 1877, at which date Mr. Rud. Hessel arrived from Bremen with 345 carp of different varieties for the United States Fish Commission.† These were propagated under the direction of Prof. S. F. Baird. The distribution of their young commenced in the fall of 1879, and has continued to the present time in increasing quantities annually. The number distributed in 1879 was 6,203 to 273 applicants in 24 different States of the Union. In 1880, 31,443 were distributed to 1,374 different applicants in 34 different States and Territories. During the past season 113,605 have been distributed in lots of from 15 to 20 to each applicant.

3. NATURAL HISTORY.—The carp prefers a pond containing warm water and muddy bottom, but neither of these are absolutely essential. It feeds upon such worms and lower forms of animal life as are within its reach, but never upon other fishes. It will, however, eat its own eggs if forced to by hunger. It is very fond of vegetable food, such as lettuce, cabbage, leaves of various water plants, seeds, grain, meal, bread, crackers, corn-bread, &c. Most anything you would give to chickens you can give to carp to eat.

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* See Bulletin of the United States Fish Commission, 1882, page 25.

† Report of United States Fish Commissioner for 1877, page 43.

If the water is warm, the summer long, and there be plenty of food, either natural or artificial, the growth of the carp will be surprisingly rapid. There are well authenticated reports of it reaching 3 pounds in one year and 6 pounds in two years. If no artificial food is furnished, and there is also a scarcity of natural food, or if the climate be cold, the growth will be much less rapid. Indeed, when the water becomes quite cold it will partially bury itself in mud and lie in a dormant state through the entire winter and until spring fairly sets in. In the southern part of Texas it is probable that the carp will not be forced to hibernate at all except in case of an unusually severe winter. In the northern parts of Maine and Minnesota it may be expected to hibernate nearly half the year. As it cannot grow during its hibernation it is easy to see why so much more rapid growth is obtained in Texas than in Vermont. There is little danger, however, of it freezing to death, for carp have survived in tubs of water over which a thick film of ice has accumulated.

Carp usually spawn in cool latitudes the third year, in temperate latitudes the second year, and there are well authenticated instances of its having spawned in Southern Texas at the age of one year. These cases, however, are where carp are supplied with an abundance of food, well cared for, and protected from their numerous enemies.

The enemies of carp are legion, and in many cases exterminate the fish. Not only do all kinds of carniverous fish prey upon its young, but nearly all kinds of fish will eat its eggs. Frogs, snakes, and turtles will eat both eggs and young in numerous quantities. A snake was recently killed at the carp ponds in Washington in which was found over 25 young carp and numerous undigested skeletons of the same fish. One medium size snake, if furnished the proper facilities, can be depended upon to eat 40 carp per day, one thousand per month, or five thousand each summer. Divide your number of young carp by this figure and you can find out how many snakes it will require to exterminate your young. Various birds, such as kingfishers, bitterns, cranes, herons, and fish-hawks understand catching carp much better than the average farmer. About the 17th of July last a marsh hen was shot at the Washington carp ponds whose stomach contained 38 young carp, and a night heron whose stomach contained the heads of 78 young carp. In many cases where the carp have been left to the mercies of these enemies they have succumbed. The only proper method is to furnish protection to the carp until they reach such an age as to be well able to cope with these enemies. It is therefore best to separate the spawning carp from all other animals, and carefully protect the eggs of the young for as long a time as convenient.

In regard to the food qualities of carp, it ranks somewhat above the ordinary native fish, such as buffalo, mullet, suckers, mud-fish, croakers, mill-roach, perch, sunfish, &c., but it is hardly equal to the high-priced delicate class of fish which includes the bass, trout, and shad. And

yet many persons who are cultivating carp declare them equal to any fish they ever tasted. If carp are grown in muddy or polluted water their flesh, like that of any other animal, will be impregnated thereby. But the carp may be removed to pure water for a week during which the system will be purified, and at the end of which even these will be good eating. Some have alleged that salting such over night will greatly improve the flavor. During and immediately after the spawning season adult carp, like all other fish, become soft and unfit to eat. Some persons have ignorantly tasted of them at this season, and have therefrom very unjustly condemned them. Carp contain bones, of course, but in the adult the flesh flakes off from the bones very nicely. Even in the small ones the bones are no more objectionable than in the average fish.

4. THE METHOD OF DISTRIBUTION.—Several breeding ponds have been fitted up at Washington from the so-called Babcock lakes and from extensions into the Potomac marshes. These will present a very picturesque appearance, in addition to their usefulness, after the reclamation of the Potomac flats. These ponds are constantly watched by their superintendent, Mr. Rud. Hessel and his assistants, who have abundant facilities for destroying enemies, draining the ponds, supplying fresh water, food &c. At the proper season, which extends from October 15 to January or February, the young are sent out by one of two methods: first, they are put in five and ten gallon cans of water and loaded in the cars of the Fish Commission, of which there are two fitted up with suitable appliances for carrying all kinds of fish. These cars, which present an outward appearance of parlor cars, are dispatched on passenger trains to central points in all the different States of the Union, where installments may be delivered to State fish commissioners or the carp treated by the second method. Second, a quart pail containing a pint of water and 15 to 20 carp can be sent by express to any distance which will not require more than 36 to 48 hours, or even further, if the water can be changed meantime, always provided that water enough remains in the pail to cover the backs of the fish. Most of the States of the Union have appointed State commissioners, who receive installments from the United States Fish Commission and distribute them to applicants within their jurisdiction. Many of them have also established propagating ponds, in which they are already producing young by the thousands and tens of thousands. Some private speculators have received carp from the United States Fish Commission, reared young, and are now selling them at speculative rates. The price list of one of these gentlemen states that he will sell mirror carp ten months old at $75 per hundred, scale carp ten months old, at $70 per hundred. Large fish are even sold at five dollars a pair, and would perhaps be sold at higher rates were it not for the fact that the United States Fish Commission furnishes its small fish free of cost. The express charges constitute the only expense to the recipient.

5. ECONOMIC RESULTS.—The cultivation of fish is destined to become as important among the American farmers and planters as the cultivation of cattle, sheep, swine, poultry, or of grains, fruits, and berries. They have long since ceased to leave the latter to shift for themselves and to cope with their enemies, knowing that in such a struggle live stock, grains, and fruits come off second best or succumb. Fish should receive the same care and attention, both as to improving varieties, artificial propagation and growth. The practice which farmers will obtain in carp culture will probably open the way to the successful culture of various other kinds of fish. The hardiness and wide range of diet and the rapid growth of carp especially fit it to be the precursor in fish farming. Every rural community is destined to have its fish ponds in the same abundance that it has its pig pens or its poultry yards. This will enable every farmer, however remote from market, to introduce fresh fish into his bill of fare at a very trifling cost. The carp may be made a pleasurable pet, learning to come to its food at call, if habitually fed in one place, and in shallow water, or upon a plank submerged a few inches. From these places, by reason of its tameness, it can be taken even with the hands. Finally, there is no more tasteful and economic means of decorating a plantation or a country seat than by a carp pond neatly prepared and protected. If, however, any persons should imagine that these good results are to be attained merely by filing an application for carp and upon the receipt of the fish leaving them to shift for themselves, and unaided to cope with their enemies, it is well that their minds be disabused at the first, for there is no provision of nature anywhere whereby a man shall obtain his daily bread except by the sweat of his brow.

UNITED STATES FISH COMMISSION, *August* 21, 1883.

55.—PROCESS OF PRESERVING FISH.

By RALPH S. JENNINGS.

[Patent No. 273,094, granted February 27, 1883.]

CLAIM.—The process, substantially as described, of treating salted fish for the destruction or killing of the alga germs contained in the salt of such fish, such process consisting in rapidly passing, at or about at a speed as hereinbefore mentioned, the fish over a sufficiently heated surface, or through or in contact with heated air or superheated steam, at or about a temperature of 400° Fahrenheit, so as to superficially heat the fish to an extent required to kill the said germs, without heating the interior of the fish to the injury thereof.

BALTIMORE, MD., *August* 10, 1882.