V.—IMPROVEMENT IN THE SALMON FISHERIES OF SWEDEN.

EXTRACT FROM THE REPORT OF THE ROYAL SWEDISH INTENDANT OF FISHERIES. 1868.

In 1855, the state of the fisheries in Norway was taken into consideration, and establishments for fish-breeding were introduced. At the same time protecting laws were enacted, which, in 1863 and 1865, were further amended, in accordance with the experience acquired. The most important rivers and lakes were subdivided into fishery districts, and supervisors were appointed to insure the observation of the laws, one-half of their salaries being paid by the government, the other by the owners of the fisheries. By these means the same practical advantages have been obtained as in England. As early as 1865 the inspector of fisheries was able to present testimonials from Dramself, Langenself, and Mandalself in proof that the protecting laws and the fish-breeding establishments thus introduced had steadily increased the yield of the fisheries during the last five years; in 1868, testimonials of twelve more rivers and lakes were added. With every year the satisfaction with these regulations becomes greater and greater in Norway. If we compare the results obtained in France, where they endeavored to improve the fresh-water fisheries *solely* by artificial breeding, we find them quite different. From 1853 to 1865 great sums of money were expended; the central fish-breeding institution of the state at Hüningen, which in 1862 had already cost 600,000 francs, had distributed nearly thirty millions of young salmonidæ every year, and still the fresh-water fisheries were found in the same bad condition as before. It is maintained by some that by the establishment at Hüningen the stock of fish had not augmented in the Seine, the Loire, the Garonne, and the Rhine by more than a very few trout and other *Salmonidæ*. Consequently finding that breeding alone would not produce the desired improvement in fresh-water fisheries, it was decided to be necessary, even in 1865, to enact protecting laws in order to get a firmer basis and better results for the work done.

From this brief statement it is evident that, from fish-breeding establishments only and solely, a considerable increase of fish is not to be expected, and, at the same time, that fish-breeding, in connection with suitable protection and rational management, will produce equally favorable results as is the case with other industrial enterprises.

It will also be seen how important a position protection and proper system occupy in the several transactions, in co-operation producing the above-mentioned favorable results. Hence the conclusion is justified

that protection and rational management of fisheries will give satisfactory results, even without the labor and expense of artificial breeding; nevertheless, that artificial breeding, without any doubt, acts a very important part in promoting the improvement of fisheries. For everywhere in nature we find that in some years or seasons the propagation of certain plants or animals suffers from unfavorable accidental circumstances. The same is the case with the fishes; and it may be, at least in part, counteracted by artificial breeding-establishments, which offer some protection against destructive changes in temperature, against floods of muddy water, or the attacks of numberless enemies.

Furthermore, in many even extensive systems of waters, some species of valuable fish have disappeared almost entirely, and it would require many years to increase the stock from the few individuals left. In such cases artificial propagation will offer effective and useful means for obtaining more rapid and certain results from protection, &c., which will be always required for improving extensive fisheries.

The great importance of artificial fish-breeding undoubtedly consists in the facility of introducing new varieties, by means of artificial impregnation, transportation, and hatching of the eggs. It is, of course, necessary to success to select the water, nourishment, location, &c., so as to be adapted to the habits of the species to be transplanted. Norway, and more recently Sweden also, have thus obtained the most valuable results. In Norway salmon are now frequently caught, where they were introduced only a few years ago. *Schnepel* (*Coregonas oxyrhynchus*) of 6 pounds' weight are found in Jemtland, and red salmon *Salmo alpinus* of 13 pounds in the North Sea, Black Sea, Orange, where before 1860–'64 (*i. e.*, the time of their introduction) none were to be met with.

In the river between the Lakes Hunn and Tisnaren great numbers of young salmon are now to be seen, having been transplanted in 1866 and 1867. The interest in raising valuable fish is constantly increasing. Oestanbäck and Gullspang cannot supply the yearly demand of eggs. Three hundred and twenty-five thousand *schnepel* eggs were sent from Gullspang in 1868. At present five new fish-breeding establishments are about to be started.

As a lucky and, in its kind, peculiar transfer may here be mentioned, that *smelt* were, in 1866 and 1867, introduced into the Lake Walloxen, near Stockholm, and in the succeeding spring were found to have greatly increased in number. Since the occurrence of *smelt* in any water is so far of importance as it shows the water adapted for breeding *Salmonidæ*, &c., this experience of the Swedish fish-propagating establishment is in many respects remarkable.