

## 20.—STATISTICAL REVIEW OF FISH-CULTURE IN EUROPE AND NORTH AMERICA.

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During the last two years I have made a special study of fish-culture outside of my country, and visited many hatcheries of importance in Europe and North America. I have thus been enabled to collect some material, which is summarized in the following short review. The figures of North America were taken from the reports of the U. S. Fish Commission, State Fish Commissions, annual reports of the Ministry of Marine and Fisheries of the Dominion of Canada, and from the report of the superintendent of fisheries of Newfoundland. Those reports, regularly issued, are uniform, but do not include any information about private fish-hatcheries. For Europe the figures have been taken from scattered information in special literature, from official information furnished by the respective governments, and private information from the proprietors of fish-hatcheries which I visited personally.

I do not consider the following figures as absolutely exact; on the contrary I am sure that in one case, for want of regular reports, they are less than reality. Nevertheless I believe that a review of figures already known upon this matter may have some interest. Concluding these introductory remarks, I ought to say that I do not deal in this paper with pond-culture, the only object of comparison being the hatching of fish in the establishments specially constructed for that purpose.

The following table gives an idea of the number of fish hatched (in one season) in different countries of North America and Europe, with the date of information, number of fish-hatcheries, and expenses of the government for fish-culture.

Countries.	Date of information.	No. of fish hatcheries.	No. of fish hatched.	Annual appropriation for fish-culture.
<b>North America:</b>				
United States:				
State fish-hatcheries.....	1882-92	46	416,000,000	\$174,040.00
U. S. Fish Commission.....	1891-92	20	491,200,000	150,000.00
Total United States.....		66	907,200,000	324,040.00
Dominion of Canada.....	1890-91	13	128,000,000	39,496.50
Newfoundland.....	1890-91	1	581,000,000	6,100.00
Total North America.....		80	1,616,200,000	369,636.50
<b>Europe:</b>				
Norway.....	1890	58	214,500,000	4,166.50
Germany.....	1891	90	25,500,000	21,815.00
Switzerland.....	1890	84	13,700,000	2,207.00
Great Britain.....	1891	16	8,600,000	.....
Sweden.....	1891	34	5,400,000	.....
France.....	1891	17	4,200,000	3,960.00
Austria-Hungary.....	1891	96	2,800,000	.....
Italy.....	1891	5	1,100,000	.....
Netherlands.....	1891	2	1,000,000	2,084.00
Russia.....	1891	14	1,000,000	2,800.00
Total of Europe.....		416	277,800,000	37,032.50
Grand total.....	1891	496	1,894,000,000	406,669.00

Most of the figures relate to 1891, so that we are able to consider the grand total for this year. On the other hand, all the principal countries being included in the table, we may estimate this total as representing the figures of fish-culture in the entire world. 496 fish-hatcheries are registered in the record, 416 of them in Europe and 80 in North America. The fish-hatcheries of North America, included in the table, belong without exception to the respective governments. Most of the European fish-hatcheries are private establishments, and only 82 out of 416 are controlled by their respective governments, viz, 14 in Switzerland, 1 in Germany, 5 in France, 2 in Italy, 58 in Norway, 1 in Great Britain, and 1 in Russia.

The totals of the fish hatched in North America (1,616,027,192) as compared with Europe (277,973,016) show that only about 14 per cent are produced in Europe; among European countries, only Norway, thanks to the active part taken by its government, can be considered as a serious competitor of the countries of the New World. The average production of one fish-hatchery is 668,000 in Europe and 13,400,000 in North America. Such a striking difference in favor of the New World is mainly due to the difference in the character of the hatcheries on both continents. As before mentioned, the European fish-hatcheries, being private establishments, do not pursue the task of restocking public streams, but only the streams belonging to the proprietors, and very often produce fry for sale to other proprietors of fish ponds, etc. Another circumstance to be mentioned in connection with the small size of European establishments is that no hatcheries—or very few—exist here for hatching *Clupeida*, *Percida*, and salt-water fish; the hatching of these kinds of fish, to be successful, ought to be conducted on a large scale. The last and most important question is the financial one. While the Government of the United States, of different States, and of the Dominion of Canada, grant very considerable amounts of money for fish-culture and take direct interest in this work, in Europe, with the exception of Norway, Germany, and Switzerland, the respective governments do not pay much attention to it.

The Government of the United States has a very important bureau, known as the U. S. Fish Commission, with annual appropriations of \$298,000, viz: \$150,000 for propagation of fish, \$50,000 for distribution, \$53,000 for maintaining vessels, \$5,000 for compensation of Commissioner, and \$20,000 for scientific investigations and statistical work. Besides this regular budget, the U. S. Fish Commission receives for extraordinary expenses, as, for instance, the construction of new hatcheries, new vessels, fish cars, etc., a considerable amount of money.

The governments of separate States also engage in this useful work, making large appropriations for building hatcheries and distributing fish. I must particularly mention the State of New York with a yearly appropriation of \$34,000, the State of Michigan with an appropriation of \$22,500, and the State of Pennsylvania with a grant of \$15,000. The total amount of money granted for fish-cultural work by all the States is equal to \$169,040 (1891).\* The present appropriations are likely to be increased, because in very many reports I have examined the fish commissioners were asking for a larger amount of money.

The Government of the Dominion of Canada has been for a long time actively engaged in the propagation of fish. The expenditure for this work in 1891 was \$374,202, which includes \$39,496 for fish-breeding and \$83,050 for fish-propagation.

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\* General expenses of same States for fish-protection and carp-culture are not included in this total.

The Newfoundland Government works quite successfully with an appropriation of \$17,300, that is, \$6,100 for fish-culture and the remainder for fish-propagation and fishery administration.

In Europe, Germany expends the largest amount of money for fish-culture, say, \$21,815, which includes \$12,500 of subsidy to the Deutsche Fischerei Verein, the leading association of its kind in Europe, and \$9,315 for the governmental fish-hatchery in Hünningen. Many private hatcheries exist in that country, thanks to the orders for hatched fry given by the above association, which has no hatchery of its own. The Hünningen fish-hatchery—perhaps the largest on the continent—has no value from the standpoint of the modern fish-culturist, and, with regard to the accommodation for the work, many private establishments\* in Germany leave far behind this big, but inconvenient, old-fashioned hatchery, which, I think, has completed its historical rôle in fish-culture.

Norway is now one of the leading countries in regard to the work for all kinds of improvements in fisheries. Its government grants for this purpose an amount of \$57,788 yearly, which includes \$41,665 for fish-culture in particular.† One of the largest salt-water fish-hatcheries in the world, at Flodevigen, near Arendal (200,000,000 cod fry hatched in 1891), is controlled by a local fishery association and gets a subsidy of 9,000 kroners from the Government.

Next comes Switzerland, which operates, as compared with its area, on a very large scale. The Federal Government of that country has an appropriation of \$2,207 for the fry planted by private persons in the public waters. Besides that, almost every canton has one, two, and sometimes several cantonal fish-hatcheries.

France—the cradle of pisciculture, the country which has contributed toward the development of this new industry more work than any other country—now ranks far behind many European countries. The French Government does not pay much attention to fish-culture in general, having an appropriation of 19,860 francs (\$3,972) to maintain five not very large governmental fish-hatcheries and subsidize a private one (for shad-hatching at St. Pierre les Elbeuf, on the Seine River). Only quite recently, thanks to the statements made by the Société Centrale d'Aquiculture de la France, the attention of the French Government has been called to fish-culture, and I am informed that negotiations are being made to establish a special fish-culturist school at the Gremaz fish-hatchery, which belongs to M. Lugin (the inventor of the method of artificially propagating live food for fish fry).

Italy has only recently begun fish-cultural work under the control of the Government, which has appropriated 32,000 liras (\$6,500) for the construction of a large fish-hatchery at Brescia, now in operation, and has opened another small one at Rome.

The Netherlands Government appropriates only 5,000 gulden (\$2,084) for the salmon fry planted in the Rhine River. No appropriation is made by the Austria-Hungary Government, fish-culture being carried on by proprietors and associations.

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\*I can mention here the well-situated and nicely-fitted fish-hatcheries in Selzenhof, near Freiburg (8,000,000 trout eggs capacity), and in Scewiese, near Gemünden, Bavaria (4,000,000 capacity).

†The total of 208,040 kroners is thus distributed: For scientific investigation in fisheries, 5,200 kroners; subsidy to the fishery associations, 45,000 kroners (that includes 8,000 kroners for the hatchery at Flodevigen); maintenance of fishery schools in Bergen and Bodo, 11,500 kroners; fish-culture work, 7,250 kroners; and the remainder for fish-protection and administration.

The same remarks must be made in regard to Great Britain with the exception of Scotland, the fishery board of which erected last summer a salt-water fish-hatchery at Dunbar; no special appropriation was made for this purpose, the expenses having been covered by money assigned for scientific investigation (£1,800 yearly).

The Swedish Government contributes to some extent to the improvement of the fishery industries in its country, having a yearly appropriation of 47,000 kroners (\$13,155), but that does not include any expense for fish-culture in particular.

And finally Russia has an appropriation of \$2,800, which is, in comparison with its area, quite insignificant. That includes 3,000 rubles for maintaining one governmental fish-hatchery at Nicholsk, government of Novgorod, which was founded by the well-known Russian fish-culturist, Mr. Vladimir Wrasky, the inventor of the so-called Russian or dry method of impregnation, and 5,000 Finnish marks of subsidy to the Fishery Society of Finland.

When we compare the total amount of money spent for fish-cultural work by all European countries (\$37,032.50) with the appropriations of North American countries (\$369,636.50), we shall not be surprised by the enormous difference in the work done in this line in the Old and New World. Of course that is only an explanation of the fact, not an eulogy.

Europe has originated and developed the methods of fish-culture, but it becomes an industry only in America, and a very important one, from the standpoint of the Government. Only here is fish-culture carried on on a large industrial scale, and in connection with it here are invented and introduced in general practice methods suitable for large operations, quite different from those used in Europe.

There is no better testimony of the importance of fish-cultural work than the large appropriations made by the House of Representatives of the United States, and only in North America is this work duly appreciated by the Government as well as by most of the population.