

XXIX.—FISHERIES AND FISHERY LAWS IN AUSTRIA AND OF THE WORLD IN GENERAL.

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[The following article was prepared by Mr. Carl Peyrer, at the request of the department of agriculture of Austria, for the purpose of giving an account of the present condition of the fresh-water fisheries of that empire, and incidentally of Europe in general, as also to furnish an explanation of the causes which have made it necessary to provide by legislative enactment and by various methods of artificial propagation for the preservation and further increase of the fish.

The article concludes with an account of the legislation which has been adopted, and the general principles on which such legislation is founded. All the points brought forward by the author apply to a greater or less extent to the United States; and for the purpose of bringing the general history of the subject up to the present date, and of showing the necessities of other countries and what has been done to meet them, I have thought it proper to translate and publish the report of Peyrer, so as to prepare the way for a national system of uniform regulations for the protection and improvement of the fisheries of the United States.

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A—GENERAL CONSIDERATIONS.

1.—EARLY PROTECTIVE MEASURES.

Reports have been made at different times on the state of the fisheries, and on the existing fishing-privileges, in the different provinces of Austria, as well as on the means of improving them, and especially upon changes or complete reforms in the fishery laws. Draughts of new laws have repeatedly been made, and have been thoroughly examined and discussed by committees appointed for the purpose, these committees being assisted by persons who had made fishing a special study, by representatives of the central government, by the provincial authorities, and by agricultural societies.

In looking over the reports made at different times on one and the

* Fischereibetrieb und Fischereirecht in Oesterreich. Eine vergleichende Darstellung des oesterreichischen Fischereiwesens mit dem Fischereibetriebe und der Fischereigesetzgebung anderer Lander, insbesondere Deutschlands, verfasst im Auftrage des k. k. Ackerbauministeriums von Carl Peyrer, Sectionsrath im k. k. Ackerbauministerium. Wien. Druck der k. k. Hof- und Staatsdruckerei. 1874. 8 vo. pp. iii, 159.

same fishery-law, one is struck by the peculiar changes of views regarding the most important points in question.

Prior to the year 1848, the fishing-privileges were nearly everywhere considered as an essential part of the rights belonging to every land-owner, and a strict fishery-law would have appeared as an attempt to give renewed stability to the claims of land-owners, which, even at that time, were frequently attacked, and considered as untenable; the desire for such a law, which was expressed by several persons, consequently found but little support.

In the following years, after the fishing-privilege had come to be considered as only an individual claim, which any one might obtain, when new landed properties had been formed and were still forming, such a law appeared to many as an unjustifiable infringement on the rights of individuals, while most people thought it an unnecessary measure, justified by no actual want; others thought it a very small matter that the government should make laws regarding the size of meshes, the size of fish which might be caught, the seasons for fishing, &c. Such laws, they said, could never be fully carried out, and would only produce a hateful and inefficient police surveillance; the government, in its zeal to promote the fishing interests, should confine itself to the diffusion of useful information, to money-grants, and similar favors. But even at that time, these views found their opponents. Zealous naturalists and sound political economists joined the intelligent proprietors in showing the pernicious consequences of neglecting the fisheries, and also showed the possibility of improving them by laws based on sound scientific principles. The certain hope was expressed that the constant growth of intelligence among the population would make the belief in the usefulness and the necessity of such laws more universal, and increase the possibility of carrying them out. These views, however, did not succeed, as their opponents were still too powerful.

2.—IMPROVED APPRECIATION OF THE INTEREST.

The reports of the last few years are in every respect more satisfactory. Natural sciences, which have become better known, having taught men not to surrender unconditionally to the powers in nature, but to combine them in a practical manner with human activity, this principle was also applied to the fisheries. Here, more than in many other fields, have the scientific and economical interests, which called to life the artificial propagation of fish, and the consequent system of scientific fish-culture, produced a radical change. The growing productiveness of the fisheries in those countries in which the right to fish is restrained by strict laws; the better knowledge of the actual condition of the fisheries and of the historical development of the fishing-privileges in the several provinces of Austria; the acquaintance with foreign laws in all their details, and the manner in which they are carried out;

and the glaring evils in the Austrian system: all these causes have combined to eradicate the former indifference and have, among those men in Austria who take an interest in the subject, produced an overwhelming majority in favor of suitable laws for protecting and improving this branch of industry.

The objection that such laws could not, under existing circumstances, be carried out, has become powerless; on the contrary, it is fully expected that the laws themselves will pave the way for more correct views, for greater energy in carrying on the fisheries, for order and respect for law; and that, through the better understanding and the awakened interest of the population, the laws will gradually grow in efficiency.

At first we shall have to be satisfied with small beginnings, and leave it to the educating force of legislation gradually to produce a better state of affairs. In some parts of the country the fishery-law may even now bear its full fruit, and be put into practical execution in all its details; in other parts, however, where, for the time being, the conditions are not so favorable, individual intelligence and perseverance will no doubt secure a firm footing for the more important regulations.

The greatest change of views, however, is observable not only regarding the question of the necessity and feasibility of a fishery-law, but also regarding the extent of such a law. While the former laws did not go beyond sporadic regulations, having the character of police-ordinances, such as might seem desirable to a local observer, the more recent reports have aimed at a thorough exposition of the object and basis of the new legislation, as well as of the several conditions on which the healthy development of the fisheries depends; they endeavored to define clearly all the judicial points growing out of these conditions, and to urge the settlement of all these points by a fishery-law which should be as nearly complete as possible. They also aimed to call into life institutions calculated to improve the fisheries still further. From a mere police ordinance, the fishery-regulation is to rise to the dignity of an organic law.

3.—THE OBJECT OF FISHERY LEGISLATION.

The object of fishery legislation, as of all other economical enactments, is to make a lasting and advantageous use of the waters containing valuable food-fishes, and to place this interest in its proper relation to all the other industries, *i. e.*, to increase the quantity of fish as much as the due regard to other industries will permit. As, according to Roscher, every industry rests on scientific, technical, and economical principles, which are combined for reaching a certain definite, practical object, *viz.* the most advantageous carrying on of this industry, therefore must all economical legislation, with a view to the right adjustment of these, be made scientific, technical, and economical principles.

Fishery legislation must have due regard to the teachings of science

concerning the nature of fish, their different species, propagation, growth, location, migrations, &c. ; to the teachings of technology concerning the different methods of catching fish, the implements employed, the contrivances for protecting fish against hurtful influences, for favoring their migration, &c. ; but no less must it study the principles of political economy, the ways and means of carrying on business in the most advantageous manner, the mode of holding property and the uses made of it which are hostile to modern civilization, in order to replace them by such as will suit the fisheries and further their interests ; it must likewise study the true relation toward each other of all the industries carried on by means of water, the effect of laws on industrial pursuits so as not to make laws which would decrease the net profits and would deter people from engaging in fishing industries.

Fishery legislation must also have due regard to judicial and administrative considerations ; it must be based on a thorough knowledge of the condition of fisheries in other countries, of the fishery-laws of these countries, as well as of the laws and administrative regulations of all branches of industry related to fishing ; and it must study the manner in which laws are carried out in foreign countries and the effect of such laws on the fishing interests.

These several elements of fishery legislation had, therefore, to be studied as thoroughly as possible, and made perfectly clear, before a law could be drawn up.

All the legal questions regarding fisheries cannot be settled at once by passing fishery-laws, since many of them will have to be solved by different forms of legislation, such as penal laws, special laws, &c. ; but even for such laws, the study of the above-mentioned principles will be of great use.

Although the passing of fishery laws is an important step toward furthering the fishing interests, it is neither the law nor the government which calls fisheries into life ; the law would be powerless if it were not energetically supported by the will of the people ; the activity of those persons who possess fishing-privileges, and the spirit of enterprise in individuals can alone, under the protection of the law, bring about continued improvements ; and further changes in the fishing-privileges will favor the formation of societies, produce equitable methods of renting out the fisheries, and common regulations for their protection and improvement. Such individual activity must then be followed by further administrative measures on the part of the communities, the provincial assemblies, and the central government, for clearing away hinderances and creating new means of promoting the fisheries.

From the government, we must, above everything else, expect that it will strictly carry out the laws made for protecting the fisheries against illegal encroachments, and against the unwise exhaustion of the waters by those who possess fishing-privileges, as well as against interruptions in fishing by the unlimited extension of the rights of third parties ; to

the government we must likewise look for those general, far-reaching, and, therefore, successful measures which the fishing interests require from time to time even where there is a good fishery-law. Such measures likewise demand a thorough knowledge of the principles on which the fishery-laws are based.

The sad experiences of the Austrian fisheries, which are related in every one of the reports of competent men from all the provinces of the Austrian empire, and which could not be passed over silently in this report, will increase conviction that the former neglect and the consequent exhaustion of the rivers and lakes cannot go on without this indispensable harvest of the waters dwindling down to utter insignificance, and the supplies of this wholesome and cheap food diminishing. It must become a question of vital interest to the whole population to put an end to the exhaustion of the waters by cultivating them.

B—THE FISHERIES.

4.—THE FORMER CONDITION OF THE AUSTRIAN FISHERIES.

In olden times, the waters of Austria were rich in fish of every kind, supplying the population with a considerable quantity of cheap and wholesome food, and the fishers with a fruitful source of income. On all the more important waters, there were well organized fishing-associations, guilds of fishermen and traders; in all the larger towns, there were fish-markets, the names of which are alone left in many cases. Old account-books giving the quantities of fish used and sold, market-statistics and service-lists of the number of fish to be paid to landed proprietors, convents, cities, and markets, by their dependents, show in figures the immense wealth of fish in the olden times; not to mention the many almost legendary reports of enormous hauls of fish, of the complaints of servants that they were nauseated by the too frequent appearance on the table of salmon and trout, which are found in the often quoted regulations and service-compacts of many cities on rivers flowing into the Baltic and the North Sea, as well as on the Danube, in Salzburg, Bohemia, and in other provinces of Austria. As late as the first decades of our century, the wealth of fish in the several provinces of Austria was very considerable. Some rivers of Moravia, as late as thirty years ago, furnished so many trout that these fish formed the common food of the laborers, a good sized tubful being sold for about 5 cents.

Even during the period 1850-'58, trout were so numerous in the rivers and rivulets of the Böhmer Wald that an observer counted one trout to every fathom, the breadth of the water being 4 feet and its depth 1 foot, (Woldrich, Ueber die Fische und ihr Leben in den Waldbächen des Centralstockes des Böhmerwaldes, 1858,) while the same observer, in 1870, found the same streams almost without any fish whatever, on account of fishing during the spawning season.

Twenty-five years ago one might have seen, in the Vienna markets, immense sturgeons, frequently 10 to 15, each weighing 250 to 500 pounds.

The wealth of fish in our beautiful mountain lakes and in the numerous rivers and streams in the Austrian Alps was world-renowned.

The saying of M. Coste, who, imitating a well-known wish of Henry IV, promised, after the introduction of artificial fish-breeding, a trout to every Frenchman, seemed to be fulfilled in Austria.

5.—THE PRESENT CONDITION OF THE FISHERIES AND ITS CAUSES.

In our day, most of the waters are almost depopulated; salmon and trout formerly nearly worthless, being counted among dainties which only the wealthy can enjoy. In many waters formerly visited by migratory fish, especially salmon, these migrations have ceased entirely; fishing-privileges, once highly valued, have in most places become worthless, and the fishing trade is languishing. Not only has the quantity of fish decreased, but the number of fine and full-grown specimens of the better kind of fish has also diminished considerably. In former times, when fishing in our rivers and lakes was carried on with due regard to the protection of the younger generations of fish, they grew to a considerable size, and the pictures in some of our old castles and town halls, of fish caught in the olden times, represent them of astonishing dimensions. In many cases, the cause of this depopulation of the waters must be found in the advance of human civilization, driving back animal creation.

The waves produced by steamers disturb and drive away the fish, throw a large number of eggs and young fish on shore, or cover them with mud in the spawning places. Embankments and other river improvements made in the interest of navigation, or as a protection against inundations or the formation of marshes, make the water-courses narrower, destroying many favorable spawning and breeding places, and drying many sheets of water entirely. The lowering of lakes destroys many of the old overgrown spawning places among the reeds and bushes on the shores; the increased number of water-works, especially of weirs and sluices for industrial purposes, likewise disturbs the propagation of fish, and makes their migration to the spawning grounds either very difficult or entirely impossible. Of the so-called salmon and trout paths, so successfully introduced in other countries, so far but little use has been made with us.

The constantly increasing devices for irrigation and for draining, made with a view to heightened agricultural productiveness; contrivances for floating lumber down the streams; the introduction into the water of hurtful salts, coloring matter, and other refuse of industrial and agricultural establishments; the filth of cities; the innumerable small particles of coal from steamers and factories, gas-works, &c., are all injurious to the fisheries, as they are apt to kill the young fish. After every violent rain, which washes out the old heaps of rubbish near alum

and vitriol works and other manufacturing establishments, masses of dead or stunned fish may be seen floating on the surface of the waters.

Still more does the decrease of food in the fishing waters, which is brought about by various causes, diminish the number of fish to a great extent. The number of fish is in due proportion to the quantity of organic matter which annually passes into the water. The cultivation of the banks; the felling of trees; the clearing away of bushes; the frequent cleaning of the river beds; the rooting out of aquatic plants, which purify the air in the water and develop oxygen; the taking away of sand and mud; all these causes tend to diminish the conditions under which alone a healthy growth of fish can be expected. The consequent want of food, as supplied by aquatic plants and by the numerous insects living in the mud, decreases the number of fish, even in such waters as had the reputation of possessing inexhaustible wealth of fish. As man takes away more and more grain and straw from the fields and grass from the meadows, rain and snow-water can no longer bring as much organic matter into the lakes and rivers. Such organic matter as is carried along by the water is, moreover, hurried on in its rush, made more rapid by river improvements, and not permitted to become food for fish by settling in calmer waters and undergoing a series of chemical changes.

The combination of all these unfavorable conditions, which cannot be entirely removed, will always keep the productiveness of the fisheries in most of our waters below the average of former times. But even that degree of productiveness which *might* be reached has never been attained; and it can boldly be affirmed that the inland fisheries owe their decline more to themselves than to those outward causes mentioned above. The destruction of fish even extended to those numerous waters which had either entirely or partly escaped the hurtful influences described above, or which could, by suitable arrangements, be freed from such influences, and, even in spite of such unfavorable circumstances, still contain all the conditions necessary for successful fish-breeding.

The number of bodies of waters and rivers which are rich in fish is, even now, very considerable in several provinces of Austria; by proper care and cultivation, their number can be increased; and, considering the almost inexhaustible strength which nature develops in the increase of fish, even the smallest body of water can, from a state of poverty and neglect, be changed into a rich harvest field for the proprietor. We are sorry to see that hitherto but very little has been done in the way of caring for and cultivating the waters, for keeping away hurtful influences, and for taking proper steps to promote pisciculture.

The want of the spirit of industry on the part of those who possess fishing-privileges, especially among the poorer and more ignorant, neither permitted the employment of the proper means for promoting

the fishing interests, nor would it allow any clear light to be thrown upon the hurtful character of most methods now in use.

The young fish, amounting to millions, are carelessly thrown on shore or allowed to perish, when their preservation would be an easy and inexpensive matter. Everywhere the business is carried on with hurtful implements, destroying the eggs and the young fish. Because there is no season when fishing is prohibited, the fishermen destroy millions of eggs by catching during the spawning season, thus sacrificing great future wealth for the sake of inconsiderable present gain.

Nowhere are any efforts made to neutralize the hurtful influences of industrial pursuits on the life and propagation of fish; scarcely anywhere has an attempt been made to harmonize conflicting interests by such measures as are suggested by the advancement of science.

The legal relations of the fisheries, especially those pertaining to their renting or farming, are everywhere arranged in such a miserable manner as to lead to the total exhaustion of the waters. In no portion of political economy do we find so many antiquated legal forms, which are hostile to civilization, and so many unpractical and useless regulations, as here. Such a state of affairs not only encourages individual proprietors either to make the most reckless use of their privileges or to neglect them totally, but makes a rational fish-culture in larger bodies of water by all other privileged persons almost a matter of impossibility.

There are privileges for employing certain specified fishing implements, fish-weirs, automatic traps, &c., and for small spaces in larger bodies of water; privileges extending only over one-half of a stream, and those which change their possessor every year; privileges of a doubtful or disputed character in private bodies of water; fishing waters where any one or where all the members of a certain village or town may fish; and fishing waters which do not go beyond the extent of the shore, &c. The fisheries are nearly everywhere leased in small portions and on short time, thus preventing the lessee from making any improvements. Large estates possessing fisheries lease them frequently to their officials, to foresters, &c., who catch a few fish for their own use, or lease the fisheries to others. Even sheets of water belonging to the state frequently find no lessee on account of the arduous conditions of the lease. In some parts of the country, where fishing has been carried on in a reckless manner by the farmers or proprietors of the banks, the fisheries have, even in brooks that formerly possessed an endless wealth of trout, dwindled down to a mere pastime for boys, or are frequently carried on by vagrants, poor day-laborers, and mechanics not at all in a concealed manner, but quite openly and with the knowledge of the proprietors.

But very rarely are the fisheries in the hands of men who, by the intelligent and persevering application of sound principles follow a

practical aim that is likely to preserve them from exhaustion. Legislation in our country so far has not endeavored to transfer the fisheries to a better class of men by regulating the system of leases, and by limiting the powers of possessors whose titles to property are drawn up in a form which is hostile to general civilization.

The state itself has hitherto set a bad example by leasing its waters in small portions and on short time to ignorant fishermen. Nowhere has the lease been made on scientific principles; frequently, the reeds of lakes and ponds are leased separately, or they are given away to poor peasants, in payment for work done, who capture the fish at all times, even during their spawning season, thus destroying even the very germs of a rational protection.

Nowhere have new species been introduced into waters rich in inferior fish and suited for the finest breeds, nor has any care been taken to increase the quantity, to improve the breed by crossing it, or to establish places where fishing should be actually prohibited, in which places artificial propagation might be utilized, or, in fact, to take any practical measures for bringing to greater perfection this important industry.

The organization of companies on a legal basis has not been attempted anywhere; associations of all the persons privileged to fish, such as existed in great number in olden times, have nowhere been formed, although they had proved eminently useful for making good fishing regulations, for organizing the fisheries either for the purpose of carrying them on in common or only for taking uniform measures for protecting and increasing the fish, for doing away with obnoxious privileges, for establishing fish-passages and places where fishing was prohibited, for stocking the waters with a superior breed of fish, for common protection, and for common sales.

No wonder that our beautiful lakes, even those where no steamer nor factory disturbs the fish, have gradually become just as depopulated as our large rivers and streams.

The increase of population and the easier means of transportation have produced a much larger market for fish, and made them the object of an eager pursuit by privileged and non-privileged fishermen. Instead of satisfying the increased demand brought about by the increase of population, through greater care in the breeding of fish and by strict protective measures, a perfect system of plunder has been introduced and is tolerated. Only the immediate demand is looked to and is satisfied by every means; fish-thieves of every kind plunder the waters, especially peddlers, traveling musicians, and actors, who seek the placidly flowing waters, the old river beds, and stupefy the fish by the seeds of *Cocculus indicus* mixed with other bait. Since the building of railroads has made blasting with dynamite more frequent, not only the laborers on the railroads, but, to their disgrace be it said, persons possessing fishing-privileges and farmers, have made great havoc by using explosives for catching fish. Those which have been

killed or stunned in this manner or by the use of *Cocculus indicus* float on the surface, the larger ones are taken out, and the smaller ones perish uselessly.* Carl Vogt, the well known naturalist, says, in his work on artificial fish-breeding, † "As far as the article of food is concerned which is found in our waters in the shape of fish, we occupy entirely the stand-point of the hunter, or at best that of the roving shepherd, who seeks safe retreats for his flocks, but leaves all the rest to nature. Our fishery-laws do not even go as far as our game-laws, which at least protect the animals of the forest during their breeding time."

In reviewing all of the above-mentioned facts, we must, to our deep regret, consider the reproach justified, "that the present state of our fisheries and the manner in which they are carried on, are one of the most unpardonable crimes against bountiful nature, against our own palpable advantage, against the welfare of the nation, and the civilization of our age." Men have actually, in their inexcusable blindness, done everything to destroy not only the treasures of nature, but even the fountains from which these treasures flow, while the means of preserving, protecting, and increasing them are nowhere applied with true understanding, with energy, and perseverance.

6.—ARTIFICIAL FISH-BREEDING.

The power of propagating is extraordinarily developed in fish. Of the food-fishes trout deposit 6,000 eggs per annum; salmon, 25,000; tench, 70,000; pike, 100,000; perch, 200,000; sturgeon, upward of 2,000,000. This circumstance, as well as the high price of fish, but more particularly the invention and further development of artificial fish-breeding, have again awakened the desire for an extensive and well-regulated fish-culture; and in spite of all the hinderances mentioned above, which cannot be obviated, and in spite of the demands for the most unlimited use of the waters which navigation, industry, and agriculture are making, there is a possibility of again gradually making pisciculture a remunerative source of income in our country.

It would, however, be a delusive hope if, from the "mere possibility of multiplying young fish," we would at once deduct its practical realization on an extensive scale, and expect that the artificial impregnation of thousands of eggs, which, by means of a couple of fish, had

* From Danbrawka, near Pilsen, in Bohemia, the "Nar. Listy" communicates the following as the result of catching fish by means of dynamite: "The effect of the dynamite thrown into the water soon became apparent. A large number of fish floated on the surface; these, however, were such as had only been stunned by the explosion. When after the lapse of about half an hour the water had again become calm, so that one could see the bottom, a large number of dead fish could be seen, which, when taken out, proved useless, as they had spots and smolled very disagreeably. On the second day, the place became almost impassable, because the fish had commenced to putrefy. The result of this attempt was that the lessee of the fishery got about 40 pounds of fish, while at least 400 pounds had been killed and become useless."

† Die künstliche Fischzucht, Leipzig: Brockhaus, 1859, p. 2.

proved astonishingly successful, would immediately tend to restock all our lakes and rivers.

The law of nature by which fish are increased by the enormous fruitfulness of a single pair is counterbalanced by another law of nature, which permits the destruction of equally large numbers of fish during their period of development, thus restoring the proper balance in the household of nature. Hitherto, man has only disturbed this balance, and no endeavors were made to counteract destruction by taking measures for preservation and increase.

On the continent of Europe, many races of animals that were hostile to man, or at least useless, have, by this continued war of destruction, either been entirely annihilated or very much diminished, in numbers; those, however, whose preservation and propagation are protected by human laws and customs, those which have enjoyed the care of man, have not only been preserved and increased, but also considerably improved. Just as man in the care of his domestic animals does not leave everything to nature alone, but rears them on practical and scientific principles, he must also carry on fish-breeding in a similar manner.

It is the object of artificial pisciculture to make use of the spawn which nature provides in rich profusion, and to protect it against all hurtful influences in nature, as well as to provide the fish in a plentiful manner with the food which they require for their development.

Of the enormous number of fish-eggs, a large portion is never fertilized, the cause of this being the peculiar manner of impregnation, which takes place outside of the body, as the female lets the eggs (roe) drop into the water, and the male pours the semen (milt) over them. The eggs of most species of fish lie free on the bottom, only covered a little by pebbles and sand, or are by some, as is the case with the perch, pasted on aquatic plants and stones. During the breeding-season, which lasts several weeks, the eggs are exposed to numberless enemies. Wherever the spawning places have not been properly prepared, many of the eggs are either washed away by the water, or thrown on the dry land by the waves, or scattered by removing the plants or the sand. Some fish, which are in the habit of gliding along the bottom, such as the turbot, the groundling, and likewise the perch, feed almost entirely on fish-eggs during the spawning-season. No less hurtful are the numberless larva of insects, diminutive crabs, water-mice, and all aquatic birds, such as ducks, geese, &c. The vegetable kingdom also contains many enemies of the fish-eggs, such as the small plants of which mold is composed, whose germs sticking to the outer skin of the egg, soon commence to sprout forth, and destroy enormous quantities of them. The eggs of those fish which spawn in winter, among which there are some of the finest species, are frequently exposed to the danger of freezing to death. The young fish during the period when they lie helpless at the bottom, and receive their food from the umbilical bag, are threatened by numberless enemies such as fish of prey, insects

and their larvæ, water bugs and their larvæ, salamanders, wagtails, &c., so that by computation out of 1,000 eggs laid by the trout or salmon under favorable circumstances, only one young fish reaches the age of one year. Nature scatters the seed with inexhaustible prodigality, but seems to make the least use of it in the water. Besides this it must be remembered that during the spawning season most fish come in large schools to the surface and to shallow places, and are therefore more exposed to the persecutions of man in the spawning places than anywhere else. It is, therefore, all the more the duty of legislation to protect these places in every possible way, and, wherever it can be done, to prepare them in a suitable manner.

As in artificial impregnation the roe and milt of the spawning fish are pressed out by human hands, and brought into contact by stirring them carefully in water, the fertilization becomes more complete than in nature; by suitable breeding-apparatus the further development of the eggs and the young fish are cared for. The better science succeeds in finding out the conditions of life of the several species of fish, the nearer nature can be imitated in this respect in the fish-breeding establishments, the better one succeeds in removing all hurtful influences from the fish, the richer will be the harvest, and the greater the economical usefulness of such establishments.

In selecting the species of fish, the quality of the water, as well as local and commercial conditions, have to be taken into account.

For artificial breeding, the finest and healthiest specimens of fish should always be selected. Brook-trout, for instance, should weigh at least a pound and be without a blemish. As with other useful animals, so especially with fish, the species selected is of the utmost importance for a favorable result of the trial, since it often requires long experience to find out the proper places from which to get breeding fish.

Streams or springs which have a considerable fall, fresh pure water, and even temperature, are essential conditions to a favorable result of artificial fish-breeding; before entering the establishment, they should have run for some time above the ground, and received the oxygen, which is necessary for the respiration of the fish; they should likewise be located near to good means of communication, especially railroads, so that the impregnated eggs can be rapidly shipped to their destination; favorable places for catching small fish should be near; clear brooks, which are not so deep as to allow the entrance of large fish of prey, into which the fish are to be transplanted from the hatching-houses, either in the immediate neighborhood or at least so located that they can easily be reached; finally, larger bodies of water, in which the fishing-privileges are regulated in such a manner as to insure to the proprietors of the hatching-houses the full benefit of their efforts. The chief and most essential point in artificial fish-breeding, however, is in all cases to supply the growing fish with cheap and sufficient food. The gain will be greatest in those places where the food grows as it were

in the same water with the fish. This result is most easily obtained if, besides the breeding fish, small fish are raised to serve for their food. The eggs of the pollard, the ray, the minnow, &c., develop during the summer months, up to July, in as many days as during the winter season it takes weeks for the eggs of trout to develop. The manner of feeding with water insects and plants is a very simple one. Care should therefore be taken that they should be protected during the spawning season; that the banks should be planted with trees or bushes; that the water should contain aquatic plants, to which insects come of their own accord; that the scum of the water, which always attracts numerous insects, should not be allowed to escape, &c. At a later period, other food is used, such as various refuse, horse-flesh, coagulated blood, &c. The views of pisciculturists on the best manner of feeding fish still vary a great deal; many attempts, especially in feeding large numbers, have been made in vain; but, as a general rule, it can be said that a great deal of inventive genius has been displayed in procuring articles of food, which nearly everywhere vary according to local circumstances, (see the numerous propositions in the circulars of the *Deutsche Fischereiverein*.)

Never were fish more plentifully supplied with food than by the lakew dwellers. All the refuse of the kitchen, remains of vegetables, and of wild and domestic animals, which the inhabitants had brought from the shore into their villages built over the water, became the food of the fish or of those aquatic animals which formed part of their food. This explains the fact, which Herodotus relates in that passage of his works which has become so famous since the discovery of the remains of lakew dwellings where he says that the inhabitants let down a basket into the water, which, after a short time, they drew out filled with fish.

Fish-breeding has also made it possible to stock bodies of water with water with fine species, which hitherto were not found there. Although acclimatization is not yet entirely founded on scientific principles, many of the questions pertaining thereto are being gradually solved by continued experiments. Instances of magnificent results in experiments on fish rearing are not wanting.

The breeding-establishment founded by the French government at Hüningen, on the Upper Rhine, possesses vast arrangements, so that eight millions of eggs of various species of trout are hatched at the same time; these eggs are partly obtained in the establishment, but the larger number come from Switzerland, the Vosges Mountains, the Black Forest, from Bavaria, and even from Upper Austria, and are shipped when properly matured. The raising of fish is here only a secondary consideration; the chief object in view is to collect the largest possible number of fish-eggs, and when these have become impregnated to send them to all parts of the world either as an article of merchandise or as presents. The eggs sent to Hüningen by agents of the establishment are carefully counted, which is done by weighing, and registered,

they are then put into the breeding-boxes which are covered by fresh running water protected against all hurtful influences, and they are shipped as soon as the eyes of the little fish can be seen through the skin of the egg. Up to the autumn of 1864 more than 110,000,000 eggs of fresh-water fish, among these 41,000,000 salmon and trout, had been impregnated at Hüvingen, and shipped from there. This number has no doubt since then increased more than double.

The new German government, recognizing the beneficial influence which this establishment has had on the increase of fish in France, through the *Deutsche Fisherei-verein* takes all the necessary measures to make this new acquisition a benefit to the German fisheries. It has been made an imperial establishment, and the shipping of eggs is continued, no longer gratis, however, but at a moderate price—60 cents per thousand for impregnated eggs of the salmon-trout.

Recently successful experiments in sending fish-eggs to a considerable distance have been made in other establishments, as at Freiburg in Baden, but especially at Salzburg. From England, 100,000 salmon and 3,000 trout eggs, packed first in moss, and then in ice, were some years ago sent to Australia, where they arrived safely. In the autumn of 1869, 110,000 salmon-eggs were sent to New Zealand. Now they have in Australia trout measuring $19\frac{1}{2}$ inches in length and weighing $3\frac{1}{2}$ pounds; two-year-old salmon have also been seen, and some of them have been observed spawning. (*Zeitschrift für wissenschaftliche Zoologie*, 1869.)

The most famous British fish-breeding establishment is at Stormontfield, on the river Tay, where the young salmon raised from artificially-impregnated eggs are cared for and fed in several ponds till they are able to commence their journey to the sea as smolts. Originally calculated for 300,000 eggs, this establishment has been considerably enlarged. A similar establishment is located on the river Dee, in Scotland, which makes a business of raising and selling eggs and young fish, and realizes a considerable profit, although the managers pay an annual rent of \$6,000.

The Irish "salmon-factory" of Thomas Ashworth, in Galway, likewise raises millions of eggs every year, and increases in importance from year to year. The establishments founded by private individuals, by associations, or joint-stock companies, seem to flourish most, while those which have been founded and are supported by the government have not in all cases been as successful. It seems to be sufficient if the government confines its activity to giving encouragement and assistance to these local enterprises.

The organization of artificial fish-breeding associations involves expenses which, in smaller bodies of water, are not in due proportion to the extent of water, nor does every fishing water offer a suitable place. For this reason, many proprietors of small fisheries prefer to buy impregnated eggs from the larger establishments, and place them in suitable places in the waters, in shallow and quiet sand bottoms near to

reeds or bushes, or put them in wicker-baskets or boxes in streams, leaving the hatching to nature.

7.—PROGRESS OF FOREIGN FISHERIES.

Great Britain.—The most brilliant example of progress is in Scotland, whose rivers had for a long period been almost entirely depopulated by reckless fishing. The river Spey in Scotland scarcely contained any fish up to the year 1854; since then, and up to 1860, it has annually produced upward of \$10,000 worth of fish; this has even been increased of late years, so that a single fishing-station belonging to the Duke of Richmond yields an annual income of \$52,500 to \$60,000. The annual yield of the river Tay has, in a few years, risen from \$40,000 to \$90,000, net income, not counting the large number of fish given to the fishermen; and all this in consequence of feeding, watching, and protecting the fish, and of introducing artificial breeding. By the same means, and in consequence of excellent laws and strict protection of the fish during the spawning season, the yield of some of the Irish fisheries has in a few years increased fourfold. In 1858, the revenues from the salmon and trout fisheries in Scotland and Ireland amounted to \$3,500,000, while in 1863 they had increased to twice that sum.*

The constantly improved British fishery-laws, and many institutions called to life by the government, or at least encouraged by it, such as the appointing of inspectors of fisheries, are perseveringly following the object in view, to clear away all impediments to the progress of the fisheries, and to extend them by every possible means.

The report on the British salmon fisheries for the year 1870, by the inspectors Buckland and Walpole, shows a considerably increased harvest during the year 1869 in consequence of artificial breeding and proper protection of the fish; there are, however, still some complaints of hindrances and plundering the fisheries. In the seventeen salmon-rivers, the fish are still excluded from 7,990 square miles by weirs, and from 3,600 square miles by industrial poisoning of the water, so that there are only remaining 6,600 square miles for spawning and raising young fish. In order to do away with the weirs, water-mills are as far as possible to be changed to steam-mills, and those which are still in existence are to be made harmless by salmon-paths.

The poisoning of the rivers by factories is strongly condemned not only on account of the salmon but likewise on account of human beings, as it not only kills the fish, but has likewise been generally acknowledged to be a means of breeding fatal contagious diseases. Great efforts are therefore made in England to purify the rivers, whereby the industries are likewise brought to a higher degree of perfection, as the

* Die rationelle Zucht der Süßwasserfische und einiger in der Volkswirtschaft wichtigen Wasserthiere. R. Molin, Wien, 1864. p. 212.

Die Bewirthschaftung des Wassers und die Ernten daraus. H. Beta, Leipzig und Heidelberg, 1863. p. 67.

factories are obliged to put the refuse, which formerly was thrown into the river, to some use. Rivers which at an expense of many millions of dollars have been purified of the refuse of sewers and other poisonous matter, amply repay this outlay by the better health of the population and by the increase in fine fish. During the year 1869, 33,321 barrels of salmon each weighing 100 pounds, the whole valued at more than a million dollars, arrived at the wholesale market in Billingsgate; 2,405 of these barrels came from English rivers, which in 1864 had only supplied 752.*

France.—The French, in their establishment at Hünningen, have immediately carried out, on a large scale, the system of artificial impregnation, which was first discovered by a German, Jacobi, and much later by two Frenchmen, Gehin and Remy, and have thereby exercised a very beneficial influence on pisciculture throughout the whole country.

Even small bodies of water are cultivated, and the best possible use is made of the different character of the water: thus, in marshy places, eels are raised; in otherwise useless small streams, crawfish, imported from Germany, are increasing rapidly; and in the clear brooks numberless trout are found.

The cultivation of the oyster, which had been almost entirely destroyed by the former system of plundering, begins, though slowly, to revive on many parts of the coast.

Even the raising of turtles has been commenced; their eggs are gathered, and the young ones cared for and protected till they are old enough to take care of themselves.

In all parts of France, there are numerous private individuals who breed and raise all sorts of marine animals, partly as a pastime and partly for the sake of gain. The exaggerated expectations which in the beginning were connected with artificial fish-breeding in France have, however, not been fulfilled. Ignorance of the subject, which was very prevalent till better methods gradually gained ground by long experience and by many failures, demanded many sacrifices. It must, nevertheless, be acknowledged that, through the better cultivation of the water since the year 1849, when a beginning was made to extend the system of artificial breeding to the French rivers, and at first to those where there was the greatest amount of poverty, a new life has been developed along these rivers, so that many a poor fisher and farmer has become a man of means through his little fish-pond and his few pots for artificial impregnation.

One establishment belonging to the Marquis de Folleville at Imsleville in Normandy yields an annual income of \$750 to \$900 from one stream and pond which ten years ago did not produce a single dollar.

Before the war, France possessed about 4,600 (English) miles of navigable rivers; nearly as many miles of canals; 322 miles of mouths of rivers and bays; about 920 miles of private waters; more than 92,000

* *Beta, (H.) op. cit. p. 31.*

miles of not navigable rivers and streams; and more than 4,600 miles of lakes and ponds. The navigable rivers and canals belong to the government, and are leased to private individuals. In order to avoid all trouble, the sheets of water are carefully measured and accurately marked on special maps, so that every one knows the exact limits of his watery domain, within which he can fish with nets for an annual rent of \$4.50 to \$22.50. French statisticians compute the annual gain from the fresh-water fisheries at \$4,000,000, and the average annual rent of every hectare (1 hectare=2.47 acres) of water at \$15. The fisheries, however, are not yet able to supply the home demand.*

Germany.—Compared with the gratifying results in England, Scotland, and America, those obtained by the German fisheries can only be considered as small beginnings, and the complaints of the various hindrances to success are no less loud and numerous than in Austria, although it must be owned that of late years Germany has made considerable progress.

In Munich, the city-fisherman, Kuffer carries on fish-breeding, and has, according to a report published some years ago, during the last eight years impregnated about 300,000 eggs of the Bavarian salmon per annum, partly for the Bavarian waters, and partly for Switzerland, Austria, France, Italy, Russia, Denmark, and Prussia. During the last few years, he has shipped about half a million per annum. The establishment is well conducted, its location and the quality of the water are excellent. Kuffer has therefore often been commissioned to organize such enterprises in other countries, as for instance in Austria.

Württemberg only possesses some small breeding-establishments, which owe their existence and success chiefly to the efforts of the royal agricultural department, (*Königliche Centralstelle für Landwirthschaft.*) This department, since 1861, has endeavored to encourage pisciculture among small proprietors by offering prizes for hatching-houses in connection with ponds; to persons who stock open waters with fish; for a rational system of pond-fisheries; for the union of small fishing districts with a view to carrying on the fisheries in a more systematic manner. Information is freely given to all who desire it, as well as impregnated and hatched trout-eggs.

A report, made in the year 1871, shows that nearly all these organizations were in a flourishing condition.

In Baden, a joint-stock company was formed in 1865 with a capital of \$20,000. In the neighborhood of Freiburg, the seat of this company, a breeding-establishment has been founded, which annually produces about half a million young fish. All of their fish which were placed in open waters, were flourishing. The company possesses several trout-brooks, which they lease for an annual sum of \$600.

The joint-stock fishery-company at Wiesbaden, besides raising fish in closed waters to sell, has also set itself the praiseworthy task to re-

* Beta, *op. cit.* pp. 48, 50.

stock all the neighboring waters, which had been almost entirely depopulated. Besides the numerous bodies of water owned by the company, about forty lakes and rivers have been leased by them on the longest possible time; new trout-ponds have been made in shady forests; nor has the commercial portion of the enterprise been neglected, since in addition to the model and experimenting branches, a flourishing business has been started with a capital of \$62,500 in shares.

The fish-breeding establishment at Hameln, (Hanover,) originally founded by the Agricultural Society of Zelle, but which in later years has been taken and further enlarged by the city of Zelle, has, during the last twelve years, placed 316,000 artificially-raised young salmon into the river Weser, and its revenue has been constantly on the increase. Other Prussian organizations have, according to the report of the economical department (*Landes-Oekonomie-Collegium*) for 1868, done well, although, as the report says, the artificial breeding of fish is not appreciated as much as it deserves, and there is as yet a great want of larger piscicultural institutions.

The fish-breeding companies in the Prussian province of Silesia have for four years made efforts to introduce the cultivation of salmon into the Upper Oder and its tributaries, into which they placed no less than 307,000 young ones during the year 1872. The eggs were provided by the department of agriculture in Berlin, from the establishment at Hünningen, at the instigation of the *Deutsche Fischerei-verein*.

In accordance with an order of the Prussian commissioner of agriculture, dated January 23, 1871, the fish-breeding establishments in the Rhine province are to be subsidized in the following manner: A certain number of Rhine salmon, salmon-trout, and brook-trout, which must be at least five months old, shall be bought at a moderate price, which is to be settled every year, and placed directly into the water. A competent person shall be charged with buying the fish and placing them in the water. As the method of raising fish in the several establishments and the manner of feeding the young has the greatest influence on their ability to keep alive after they have been placed in the waters, the price of the fish bought will be regulated by the manner in which they have been raised.

The *Deutsche Fischerei-verein*, founded at Berlin in the year 1870, will doubtless prove a great benefit to the craft in that country. Its object is to further sea and inland fisheries throughout the whole of Germany, and to assist the several state governments in this direction. The society has resolved itself into five committees: for facilitating the transportation of stock; for the sea and inland fisheries; for the artificial breeding and raising of fish; for fishery legislation; and for the culture of the crawfish. It will also direct its attention to scientific investigations which will diffuse correct views regarding the true wants of the sea and inland fisheries.

The society intends to place itself in communication with piscicultur-

ists in all parts of the country, and to form a central agency for promoting the fisheries, and for facilitating the raising and shipping of fish so as to benefit the whole population.

Through the efforts of this society, Berlin and other inland cities receive an increased supply of fresh sea fish; it has also suggested the introduction of the sterlet and other finer species of fishes instead of the common food-fishes, which have hitherto been supplied to the markets from sadly neglected fish-ponds.

In May, 1871, the society addressed a petition to the chancellor of the German empire that, for a number of years, an annual sum of \$37,500 should be appropriated from the imperial German treasury to extend pecuniary aid to deserving pisciculturists and piscicultural societies, and to promote the interests of the sea-fisheries by procuring models of vessels and implements.

The circulars of the *Deutsche Fischerei-verein*, which are edited in a model way, give from time to time information both on the proceedings of the society and on all matters of interest to pisciculturists.

The society likewise directs its attention to the improvement of existing legislation. Thus, in its second session, it was urged to remedy the existing defects in the fishery-laws of North Germany, which at present contain no clauses enforcing the building of weirs in such a manner as to leave a free passage for migratory fish. The draught of a new fishery-law for Prussia, which has been published recently, owes its origin to a great degree in the exertions of this society.

8.—CONDITION OF PISCICULTURE IN AUSTRIA.

From the report of the ministry of agriculture for 1868, and from numerous special reports on piscicultural establishments, it will be seen that fish-rearing is gaining ground in Austria, and private enterprise has been successfully employed in this branch of industry. In nearly all the provinces of Austria there are piscicultural establishments, several of which have been very successful. Although there are no complete statistics, we shall, in the following pages, give all the information which can be gathered from the official reports and from articles in various journals. In comparison with the vast arrangements of other countries as described above, we can only chronicle small beginnings.

In Salzburg, a central establishment for fish-breeding was founded in 1864, by a joint-stock company, which has not, so far, been a pecuniary success, but which, nevertheless, has exercised a most beneficial influence on fish-culture throughout Austria. Since its foundation, it has sent a large number of eggs to nearly all the provinces of Austria and to foreign parts. During the season 1867-'68, it shipped 253,000 eggs of lake-trout, Rhine salmon, brook-trout, and pike. During the winter 1869-'70, orders for 815,000 eggs were received at the establishment, but only 572,000 could be shipped, partly because there was a lack of eggs on account of unfavorable weather and inundations

which had interfered with the spawning, and partly because some of these orders came too late. The arrangements for raising fish were unfortunately very poor; the ponds were badly located and soon became marshy; there were no shade-trees, and the supply of fresh running water was insufficient. Attempts had also been made in the beginning to breed a great variety of fish, while at present only salmon are raised, and the arrangements have been much improved. The rearing of fish in several lakes which the government has given to the institution has been much more successful.

In the Waller Lake, 19,000 young Rhine salmon were placed in 1869, and, so far as it is known, they are in a flourishing condition.

Last year, a new hatching-house for 300,000 eggs was built on the shore of the Hinter Lake.

On the headwaters of the Waller Lake, simple breeding-apparatus has been placed, so as to enable the stocking of all the streams with young fish from the lakes.

There is a constant improvement from year to year in the growth of the embryo business and in the stocking of the rented lakes.

During the season 1870-71, the total number of impregnated eggs was 1,157,000, of which 575,000 were sold, while the rest were either hatched in the establishment or placed in the lakes. For two years, a considerable number of fish have been sold as food from the establishment at Hellbrunn; during the last year, many defects of the original plan were remedied and many new improvements were introduced.

The central establishment has recently begun to obtain impregnated eggs of brook-trout from the fishers on the rivers Vökla and Ager; of the *Salmo hueho* from the river Salzach, as well as from the streams of Upper Austria: spawn of the lake-salmon, of the *Salmo salvelinus*, and of the *Coregonus Wartmanni* from the Matt, Mond, Fuschl, Wolfganger, and Atter Lakes; and to ship them at the proper time.

In Upper Austria, fish-culture has been carried on for some time by the convent-chapter of Kremsmünster, which annually places 20,000 to 40,000 young trout hatched in the establishment, into the Alm Lake, as soon as the umbilical bag has disappeared, (usually in February,) so that a considerable increase in the number of fish in this lake can already be noticed. *Salmo salvelinus* is raised in the lake itself. The fish-ponds belonging to the chapter have been famous from time immemorial for their great wealth of fine fish. Some of the small landed proprietors, such as Rettenbacher at Sulzbach near Ischl, Köttl at Neukirchen near zipf, Schedl in Fischelham, and the Ischl Piscicultural Society, have, with comparatively small means, founded establishments which to some extent have proved a pecuniary success, thus furnishing another proof that this branch of industry is suitable for private individuals of limited means. Special mention must be made of Franz Rettenbacher, a miner, who on his little piece of ground at Sulzbach near Ischl, has for some years, without any assistance whatever, but with great enthusiasm, car-

ried on, in a small way, pisciculture. Only by the strictest economy he was enabled to raise the required capital; with his own hand, in the spare time which the arduous life of a miner left him, he erected all the buildings, &c., so that the Upper Austria Agricultural Society, acknowledging his apparatus to be the most perfect in the whole province, gave him, in 1870, \$100, the first government prize for pisciculture. We give here the full report of the committee sent by the Agricultural Society, as it is in every respect very suggestive and instructive:

“The piscicultural establishment of Franz Rettenbacher consists of two hatching-houses, five ponds for the growing fish, (*Streckteiche*), and one floating hut with a boat. In the two larger connected ponds, which cover an area of about $1\frac{1}{2}$ acres, a very pretty watch-house, with many exceedingly practical contrivances, has been erected, from which all the ponds of the establishment can be seen and watched; all the buildings and apparatus, by their simplicity, cleanliness, and practical arrangement, show the enthusiastic, enterprising, and rational pisciculturist, whose fish, both in the houses and in the ponds, are all exceptionally fine and healthy specimens. Franz Rettenbacher commenced his enterprise in 1858, on a very small scale; up to 1864, his work consisted of nothing else than the impregnation of several hundred, occasionally, several thousand, trout-eggs, and the placing of young fish in the running water (his own property) near his house. After having labored six years, no increase in the number of fish was observable, which doubtless was caused by the fact that the fish, when they had grown larger, got into the government waters, into which his little stream flowed, and even, when there was a means of communication, into the Traun Lake.

“In 1864, Rettenbacher resolved to raise and feed the young fish which might be hatched during the following winter in a closed house; in this he was entirely successful, as the 800 young fish (*Salmo salvelinus*) when one year old weighed from two to seven ounces. Unfortunately, many of the fish died after they had reached the age of one and a half years, without exhibiting any outward sign of sickness, and in the course of half a year one-half of the whole number had perished; then this strange mortality ceased of itself. According to later experience, Rettenbacher believes that he fed the fish too much; for, since he possesses a larger number of fish, and therefore has not been able to feed them so much as formerly, this mortality has ceased.

“Since 1865, Rettenbacher annually has raised several thousand fish, *Salmo salvelinus*, trout, and cross-breeds. The cross-breeding, produced by impregnating the roe of the *Salmo salvelinus* with the milt of brook-trout, has been very successful, as also the raising of the *Salmo salvelinus* itself. Trout do not succeed so well, which seems to be caused by their being fed with meat. During their infancy, the fish get calves' liver and brains; later, lungs, entrails, and other cheap offal; also, horse-flesh. To every hundred-weight of live fish, Rettenbacher, on an average, allows five pounds of food per day.

“To feed such a large number of fish with insects is almost impossible, as insects, such as water-palmers, flies, their larvæ, &c., are very scarce in that neighborhood, and frog-spawn and cheap fish cannot be had. In Rettenbacher’s opinion, every pisciculturist who cannot obtain insects and whose space is limited, should only raise the *Salmo salvelinus*, since this fish alone can in a small space be fed on meat from its infancy till it is ripe for the market, and has the lowest percentage (7 per cent.) of mortality. It is a very gregarious and tame fish, which does not seem to be disturbed by being placed among fish of different species and size, while the trout is always shy and of an unfriendly disposition, especially toward small fish.

“Rettenbacher sells his fish at the age of two and one-half to three and one-half years, and only those whose growth has been retarded, at the age of four and one-half and five and one-half years. Recently, he has commenced to hatch a larger number of fish than he requires, and, after a year or more, he throws those whose growth has been retarded into the open water, leaving them to shift for themselves, because, according to his theory, the gain is much greater if the expensive food is given to such fish as promise a better growth. His spawn he gets from the Aussee Lakes in Styria, where, during the spawning season, he annually buys several hundred female fish, impregnating their eggs with milt from male fish of his own raising, as very few male specimens of the *Salmo salvelinus* are found in those lakes, and as those few are mostly worthless. The female fish he keeps till next summer, when he sells them. In 1870, Rettenbacher did not hatch any fish, since he had such a large number left over from the year before as to make it impossible for him to supply all the necessary food. The water used in his establishment consists of several hundred small and large springs flowing from the ground, with a temperature of $5\frac{1}{2}$ degrees Réaumur in winter, $6\frac{1}{2}$ in summer; near the Traun river 3 degrees in winter and 9 in summer. In this water, the young fish leave the eggs after fifty or sixty days.

“Up to 1864, Rettenbacher had only two small hatching-boxes. In 1864, he built a hatching-house with four boxes and two tanks for the young fish; in 1865, he built a covered tank with three divisions; in 1866, he dug the two ponds; in 1867, he built a new hatching-house; and in the same year, after having obtained the upper portion of the Altwasser stream from the imperial forest office, in exchange for a portion of forest belonging to him, he stopped the communication between his springs and the Traun River by a stationary wooden gate of lattice-work, and built his floating hut and boat, and, in 1868, the watch-house, resting on pales. The total capital invested was \$258.25. The location was extremely favorable for making the ponds, as but very little digging had to be done. According to the inventory taken, with a view to his obtaining the government prize, on the 29th and 30th of June, 1870, when all the fish were carefully counted and weighed, his establishment contained the following number of fish:

"Location.	Age.	Number.	Weight.
			<i>Pounds, avoirdupois.</i>
"In the building for young fish, No. 3	One and a half years	3, 700	54
"In the building for young fish, No. 4	do	2, 100	67½
"In the hatching-house, No. 2	do	3, 000	171½
"In the hatching-house, No. 1	Two and a half years	1, 010	96½
"In the small pond	do	1, 400	277½
"In the larger pond	Various	944	166½
"In the largest pond	Three and a half years	250	150
" Total		12, 454	982½

"Of this number, 262½ pounds of fish could be sold during 1870.

"The quality of the fish was very good, since, even at a high price, they found a ready market. The capital invested has therefore borne its full interest."

A further proof that it only requires some encouragement in order to have our smaller pisciculturists make practical inventions and improvements is furnished by Mr. Köttl, a miller of Neukirchen. Formerly, the better kind of food-fish were brought direct to Vienna from the lakes and streams of Upper Austria; the fishermen not taking the least care of the eggs contained in many of these fish. Köttl, at present, gets what he can of these eggs, and immediately impregnates them. The female lake and brook trout which are on the point of spawning when caught by the fishermen are brought to him, and their eggs are impregnated by the male brook-trout from his establishment. In this manner he has, in a short time, impregnated 200,000 eggs of brook and lake trout, which, without his intervention, would have been sold in Vienna with the fish.

In Upper Austria, a fishing-club has recently been formed, and its preparations for pisciculture are progressing favorably. The headwaters at St. Peter, near Linz, have been secured by a lease of ten years, a hatching-house has been built, a covered pond for young fish is almost finished, and the digging of an open pond has been commenced. (Report for 1871.)

Another hatching-house has recently been started by Werndl in Steyer.

In Lower Austria, there is a piscicultural establishment at Hollenburg. Mr. Fichtner, in Atzgersdorf, diffuses a knowledge of pisciculture by lectures and publications. No noteworthy results, however, have so far been obtained. That encouragement is wanting which this branch of industry seems to require in its beginning.

In Styria, Baron de Washington, at Pöls, has made the most praiseworthy efforts to further the cause of pisciculture by the exhibition of models, by lectures, and by giving general encouragement.

The farmers and the middle class begin to take an interest in pisciculture, and there are small establishments at Werndorf, Voitsberg, Köflach, Hirschegg, Altaussee, and other places.

Baron de Washington has succeeded in making the raising of gold-fish more common. These fish, which originally came from China, but

with us increase almost as fast as the herring, are now raised by many farmers, whose income is by this means considerably increased.

In Carinthia, the only fish-breeding institution is at present at Lölling, which, however, on account of the limited extent of water, confines its reproduction to the hatching and raising of young fish, (annually 12,000 to 18,000 *Salmo salvelinus*, lake and brook trout.)

In Tyrol, a fishing-club has been formed at Innsbruck, which, in December, 1870, received 20,000 impregnated salmon-eggs from Mr. Kuffer in Munich, from which, however, no more than 2,000 fish were raised. The club has not been discouraged by this failure, but believes if the hatching proves successful, if the eggs are carefully watched and treated, if the young fish are placed in favorable localities, and if some perseverance is shown, that it may do a great deal of good to Tyrol.

Mr. Glanzl, the city-fisher of Lienz, in Tyrol, has been more successful, as, according to his report, he was able, from 1865 to 1870, to transfer 260,000 young fish from his establishment at Moosbrunnen, near Lavant, to other waters. He raises principally trout and the *Thymallus*: and, as the spawning seasons of these two species of fish are far apart, the same establishment can be used for both. The finer the specimens which have been employed in artificial hatching the healthier and better will the young fish be. The catching of the adult fish previous to the spawning season, and their being kept in boxes till the spawn has matured, is considered useless by Glanzl, as they do not ripen properly, and as the female fish frequently does not let the eggs go.

According to the observations made by others, the catching of fish about to spawn is only considered hurtful if the eggs are not pressed out at once, while fish caught prior to the spawning-season mature their ova even in an inclosed space.

Glanzl made the observation that the hatching of the eggs in metal troughs, especially those made of zinc, succeeded much better when glass rods were laid in the vessels, which, as he thinks, neutralize the bad effects of oxidation.

He expresses his conviction that only by the artificial process, and by their more general industrial application, can an increase of fish be produced in the particularly suitable territory of the Drau and Isel, which is so rich in springs.

At the suggestion of the agricultural society, he accepted a subsidy of \$200 from the ministry of agriculture.

In Trins, a fisherman by the name of Schlierenzauer has stocked several brooks with trout; and in Thiersee, Mr. Lcrperger, a merchant, has devoted much time to this industry.

In Vorarlberg, the artificial hatching of fish has been introduced by Mr. Tiefenthaler, a landed proprietor of Meiningen, in the district of Feldkirch. As early as 1862, he endeavored to obtain fish-eggs for the purpose of hatching them, in which, however, he was unsuccessful for a long time on account of the prejudices of the fishermen in that neigh-

borhood, who were afraid that their trade might thereby be injured. It was not till 1864 that he was enabled to impregnate 1,500 eggs of the lake-trout, which flourishes in Lake Constance and its tributaries; he was so successful in this that scarcely 10 per cent. were lost. He has now on his property several large basins after the best foreign models; bought of the village of Rankweil the privilege to fish in the Ebe or Malanka stream, which flows near his property, for \$300; improved his establishment constantly on his own ideas; and, as early as 1867, he was able to raise 30,000 young fish. As there was a great want of water, the ministry of finance placed the remaining streams in that neighborhood which belonged to the government at his disposal; and the ministry of agriculture has repeatedly granted him subsidies for meeting the considerable expenses of his first establishment.

His example was imitated by other landed proprietors in Vorarlberg. With the subsidy granted in 1869, the agricultural society procured the model of a new hatching-box, and distributed six of them among the several pisciculturists of the province. We have reports of successful experiments made by some of these, which, on the one hand, have been favored by the excellent quality of the Vorarlberg water, but which, on the other hand, as the reporter of the agricultural society says, have been much impeded by the defective fishery-laws.

Bohemia in former times excelled all other provinces of Austria in her famous lake-culture; and, although a large number of lakes have been drained, this province has still maintained her old fame. Thus, 370,500 to 492,000 pounds of carp are every year sent to Vienna from the estate of Wittingau in the south of Bohemia. (*Die Teichwirthschaft mit besonderer Rücksicht auf das südliche Böhmen.* Wenzel Horák, 1869.) The great Rosenberg Lake in 1870 produced 192,660 pounds of different fish, which shows what large revenues can, with proper care, be derived from water.

The high prices have of late years made lake-culture more remunerative, and more attention is consequently given to it. This industry is particularly successful if there are separate lakes for spawning, for the raising of fish, and for those which are to be sold, and if they are several times transferred from one lake to the another. As in raising cattle and sheep, great care is likewise taken in fish-culture to select for breeding purposes the most perfect specimens; wherever artificial spawning cannot be applied, great care is taken to protect the young ones against all possible dangers; the different species are kept separate, and the lake-fish are well fed on various agricultural refuse, on refuse fish, and even frog-spawn, which is found in all marshes.

The occasional draining of the lakes, and the planting of their beds with corn or grass at the end of summer, usually every third or fourth year, has not only a very beneficial influence on pisciculture, but as also advantageous from an agricultural point of view by adding the rich harvest of one year.

In making estimates as to whether lake-culture will pay, the value of the soil, which thereby is abstracted from another culture, has to be taken into account; while the restocking of depopulated brooks, rivers, and lakes does not monopolize soil devoted to any other purposes.

In 1824, the artificial impregnation and raising of salmon was successfully carried out on the Horazdovic estate in Bohemia, but it was not developed any further at the time, and was soon given up.

Quite recently, fish-eggs have been artificially impregnated in the neighborhood of Braunau, on the estates of Mabec and Tachau, in Glashütten near Pribram, in Opceno, in Hammer near Beichor, in Krumau, in Nedosim near Leitomischl, and in Frauenberg. Further successful experiments in brooks and lakes were made with salmon-eggs, which mostly came from Salzburg. The most successful experiments were those made by Mr. Vacek, of Nedosim, whose brook, in consequence of culture and protection, produced a constant increase of fish, 62½ pounds of trout in 1865, and 250 pounds in 1870. The amount of trout in the lower portion of the brook, where there was no protection and culture, was likewise increased to about 500 pounds, the trout from the upper portion being carried down especially in consequence of high water in spring; while the fish-thieves of that neighborhood did a still more flourishing business. In consequence of the 37,000 trout-eggs placed there by Mr. Vacek, the number of fish has considerably increased in every portion of this brook. In 1871, the salmon-breeding establishment founded by Dr. Fric at Herrenskretschchen, near the Saxon boundary-line, commenced to place young fish in the Kamnitz, a small tributary of the Elbe. Preparations have been made to found another on a larger scale.

The fishing-waters of Moravia were formerly counted among the richest of the Austrian monarchy. Of late years, the fisheries have been almost totally destroyed, as in other places, by the want of any legal protection, and especially by the poisoning of the streams by the refuse from factories. The statistics which were published in the report of the Moravian and Silesian Agricultural Society for 1871 show, in spite of the deplorable condition of the fisheries, the beginnings of improvement. There are small piscicultural establishments in several places, as in Wisowitz, on the estates of Baron de Stillfried, whither, in 1868, 20,000 eggs of the trout, the *Salmo salvelinus*, the salmon-trout, and the salmon were brought from Salzburg. After the eggs had been successfully hatched, the young fish were placed in a mountain-stream, and in small lakes made specially for this purpose, where the trout are flourishing, while the salmon-trout and the salmon grow but slowly, most likely because the water is not sufficiently deep.

In Moravia, as in other countries, it is proposed to prohibit fishing, at least with nets, entirely, for at least three years.

In Silesia, Mr. Ernst Giebner, of Bielitz, has a very successful hatching-establishment.

In Galicia, there is one at Dublany, and another was founded in 1867

at Lubatowka, by Mr. Ludwig Lindes, of which he gives the following account in the Vienna Agricultural Journal, No. 51, 1869:

"From my own experience, I can testify to the fact that in a wild mountain-region, where, two years ago, the name salmon was entirely unknown, nobody having any idea how such a fish looked, at this day, every peasant is able to distinguish the trout from the *Salmo salvelinus*, and this from the lake-trout, &c.; that where formerly there were marshy openings, which, from times immemorial, had been entirely unproductive, there are now pleasant lakes, which are densely populated with all sorts of trout and salmon, which received the germ of life at the piscicultural establishment of Salzburg, and which, in an embryonic state, traveled a distance of 553 miles in order to reach their present dwelling-place. This became possible only through artificial hatching!"

According to later information, (*Der Wiener landwirthschaftlichen Zeitung*, November 5, 1870,) the establishment at present comprises thirty basins, or small lakes, covering a total area of 6 acres. From the year 1866 there were left over 4,000 fish, (*Salmo salvelinus*, salmon-trout, and lake-trout,) which in eighteen months had reached an average length of 11 inches, and a weight of 23 ounces, besides these there were 2,000 perch and 3,200 crawfish; of young fish, from 1869, 18,000, which, during the first six months of their life, reached an average length of 5 inches.

In Hungary, the government has recently appropriated \$10,000 for fish-culture, of which \$5,000 are to go toward the foundation of a piscicultural establishment, which will be supported by the government, and \$2,500 apiece to the assistance of two existing private enterprises.

A fisherman who was educated in Salzburg is at the head of the well-managed private piscicultural establishment at Szomolany, in the district of Pressburg.

In Transylvania, fish-culture, according to the Hermannstadt Gazette, is in a flourishing condition, and there are several piscicultural societies. The trout-raising establishment in Ireck, founded in 1869, got its spawn from Salzburg and Tartlau; the result was a very favorable one, and it has now on hand 1,200 trout, varying in length from 4 to 6 inches, which might have been sent to market in the autumn of 1870.

From this review, it will be seen that the results which fish-culture has so far obtained in Austria are very small, as far as the increase of fish in the open waters, viz, in the lakes, rivers, and brooks, is concerned. There are only a few exceptions, such as the Alm Lake, belonging to the chapter of Kremsmünster, a few lakes and brooks in Salzburg, &c.

It is only recently that the Salzburg company has made a beginning of placing impregnated spawn in the open waters which were placed at its disposal. Most of our organizations have limited their activity to the trade in fish-eggs, or to the raising of a few fish, for which the small enclosed waters belonging to them were sufficient.

Agents of foreign piscicultural establishments, especially Hünigen and Stormontfield, visit several of the provinces of Austria every year,

in order to buy trout and salmon spawn from the Austrian fishermen, as the irregular way in which our fisheries are managed does not, for the time being, offer any chances for an extensive use of this spawn at home. The smaller pisciculturists are not inclined to give it up to the larger waters, in which they have not the right to fish; while the proprietors of these larger waters do not feel encouraged to buy spawn, on account of the irregular manner in which fishing is carried on and the little protection it enjoys. Our smaller hatching-establishments are, nevertheless, of importance to fish-culture, because they have at least awakened an interest in this matter, and because they undoubtedly are the sources from which our domestic waters will be restocked.

9.—VALUE OF THE PRODUCTS OF THE FISHERIES.

Fish, crawfish, and many other marine products, form an easily digestible and pleasant food, which, if it is maintained, is also calculated to stimulate mental activity. Civilized nations cannot do without this important aliment without detriment to themselves. Fish, even without any elaborate dressing, form a good and easily-prepared meal for the laboring classes.

Their flesh contains as large a quantity of proteine as pork; 100 pounds (Austrian) of fish-flesh contain as much nourishing matter as 200 pounds of wheat-bread or 700 pounds of potatoes.

It is an essential advantage of the fisheries that their products supply delicacies for the table of the rich, and wholesome cheap food for the poorer classes.

It is a great defect in the Austrian fisheries that the extraordinary quantity of fish procured by occasional lucky hauls does not find a ready market. The great number of huso caught in the Danube, occasional rich hauls in the Alpine lakes, or even on the sea-shore, prove of no benefit to the fishermen, and the dead ones have frequently to be cast back into the water.

All this should be remedied by better arrangements for preserving and shipping, by a well organized fish-trade, by improvements in the manner of smoking fish on the English plan, and finally by making use of the refuse for various purposes, as for fish-oil, and even for manure.

In 1865, Dr. Lorenz, as also quite recently Professor Gohren, (*Land-wirtschaftlichen Wochenblatt des K. K. Ackerbauministeriums*, 1869, p. 114.) has directed attention to the importance of the fish-guano, which might, with great advantage to our Austrian agriculture, be made from the refuse of our fish, especially on the coast.

It must certainly be considered as in part the effect of a better system of fish-culture, of a well-organized fish-trade and stricter laws, that, according to calculations made some years ago, the daily consumption of fish per head amounts to $\frac{1}{7}$ pound (avoidupois) in London, $\frac{1}{10}$ pound in Paris, and $\frac{1}{10}$ pound in Berlin; while in Vienna, the capital of a country so rich in lakes and rivers, it is only $\frac{1}{10}$ pound. While in other cities

the best kind of fish are seen in the markets, only inferior fish, frequently nothing but carps from the Bohemian lakes, are brought to Vienna.

According to the report of the market-commissioner, the following quantities of fish were brought to the Vienna markets from October, 1867, till October, 1870 :

Place from which the fish were brought.	Kind.	Weight in pounds, avoirdupois.		
		1867-'68.	1868-'69.	1869-'70.
From the Lower Danube	Hausen, (<i>Acipenser huso</i>) ..	2, 346½	679½	1, 111½
	Dick, (<i>Acipenser schyppa</i>) ..		185½	
	Schindlen, (<i>Silurus glanis</i>) ..	18, 154½	17, 290	17, 413½
	Schill, (<i>Lucioperca sandra</i>) ..	45, 695	61, 997	67, 554½
Upper Danube, Traun	Hucho (<i>Salmo hucho</i>) ..		370½	
	Prute (?) ..			
Aussee ..	Forelle, (<i>Trutta fario</i>) ..		5, 557½	12, 226½
Gmund Lake and Atter Lake	Salbling, (<i>Salmo salvelinus</i>) ..			
	Laichforelle, (<i>Trutta lacustris</i>) ..		247	1, 720
Southern Bohemia	Carp ..	714, 925	897, 845	911, 800½
	Hoch, (<i>Esox lucius</i>) ..	29, 207½	26, 956½	28, 281½
Mayence ..	Lachs, (<i>Trutta salar</i>) ..	741	8, 367	12, 055½
	Sea-fishes ..	78, 669½	287, 284½	209, 703
Upper Austria	Crawfishes ..	39, 051, 300	30, 220, 450	123, 554, 950

To this must be added the sales made outside of the fish-market, which, however, are said not to amount to much.

Formerly, the Neusiedler Lake alone supplied Vienna with 864,500 pounds of fish ; it has, however, been nearly drained.

The price of fish has increased considerably during late years, a pound of huso (1 Austrian pound equal to about 1½ pounds avoirdupois) now costing from 40 cents to 90 cents, carp from 16 cents to 40 cents, white-fish 12½ cents to 15 cents. In spite of good railroad-communications, but very small quantities of salt-water fish are brought to Vienna, and no other cause can be assigned for this but the high price of fish. Although salt-water fish are very cheap in Trieste, and the freight is low, their price in Vienna is high, because there is no wholesale trade, the whole of this traffic being in the hands of a few fishermen, and because there is no suitable fish-market. When the market commissioners made an attempt to organize this trade, many fish were brought to Vienna, but they were—as is shown by a report on the subject—left lying too long outside the city custom-line, (a small duty has to be paid on all provisions entering Vienna,) or on the railroad, so that many were spoiled before they reached the market, and soon no more were sent. Poor people can only buy white-fish, (a small species of carp.)

It can safely be asserted that a well-organized system of fisheries, and suitable fish-markets, would, in Vienna, as in other large cities, increase the demand for salt and fresh-water fish, and all classes of society would be glad to buy them if, at all times good fish could be procured at reasonable prices.

The duty on provisions is, unfortunately, very high, not merely on rare

fish, but also on the inferior kinds, which alone are within the reach of the poorer classes.

If, with this deplorable condition of the Austrian fish-trade, one compares the vast proportions of the London wholesale fish-market in Billingsgate, as graphically described by Beta, the enormous difference between neglected fisheries and those which are protected by suitable laws, and carried on with a spirit of enterprise, is placed in bold relief. "A large fleet of fishing-vessels, carrying a greater supply of fish for one day than Germany draws from the inexhaustible harvest-field of the sea, the lakes, and rivers during a whole year, supplies every night the daily demand for fish of the three-million city. While half a century ago fifty fishermen supplied London with fish, a fleet of a thousand vessels scarcely suffices in our day. The daily supply of fish is bought by the wholesale dealers; and the finny inhabitants of the sea, as well as of lakes and rivers, are offered for sale in every imaginable shape, in heaps, and boxes, smoked, salted, and fresh, in barrels, baskets, bundles, and kegs, by the hundred-weight and by the million. A magnificent market-hall, with clean and airy apartments of every size, tempts even the finest gentlemen to buy and eat on the spot marine delicacies of every kind, while in other places the poorer classes buy their daily supply. The inferior kinds of fish, such as herring, eels, &c., are sold in 'fisher-hundreds,' at 140 fish, in quantities of 20 pounds, or by the bushel, to the retail dealers. The more aristocratic fish, such as salmon and salmon-trout, which in summer reach London by railroad, packed in ice in barrels and boxes, are sold by the pound."

According to a report by District-Judge Friedel, in Circular No., 1 of the *Deutsche Fisherei-verein* for 1872, on the English fisheries, the city of London consumed, in 1870, 400,000,000 pounds of meat and 450,000,000 pounds of fish and shell-fish.

As a proof of the great number of fish brought to the London fish-market and the strict regulations of the fish-trade, it may be mentioned here that during the month of April, 1870, the officers of the London Fishmongers' Society condemned 51,877 fish, 340 bushels of shell-fish, and 138 gallons of crabs, lobsters, and crawfish, weighing in all 56,439½ pounds avoirdupois. (Circular No. 4, 1870, of the *Deutsche Fisherei-verein*, p. 21.)

It must be acknowledged that the better organization of the hitherto much neglected fish-trade in our larger cities would be the best means of reviving our fisheries.

In some other respects our Austrian fish-markets deserve the sharp criticism which Beta passes on those of interior Germany. Everywhere fish are offered for sale either half-dead on account of bad water, or sick, of an insipid flavor, and expensive, while they might be had much healthier, fresher, and finer flavored if, immediately after having been caught, they were killed by an incision between the brain and the spine, and were packed in some moist substance, and during summer in ice.

Ice has repeatedly during winter been sent by railroad to Vienna from our Alpine lakes; and if people were acquainted with the well-known easy methods of preserving ice, fish could be sent fresh to Vienna even in the height of summer.

The construction of a proper fish-market in Vienna, which has been suggested by the committee appointed to inquire into the causes of the rise in the price of provisions, would be greeted with joy as a welcome beginning to improving the condition of the Austrian fisheries.

10.—FISHERY—STATISTICS.

In our Austrian *Cataster** the fishing-waters have been treated in a very superficial manner. The several lakes, rivers, streams, and brooks have, it is true, been surveyed, and their areas have been put down; but since water, as a general rule, is not subject to any land-tax, the lakes, rivers, streams, and brooks have been thrown together with the roads, marshes, rocks, rubbish, heaps of broken stones, sand-hills, and other waste places, and have been given under the head of "*unproductive lands.*"† The area of our fishing-waters can, therefore, not be given approximately, neither arranged according to their character, nor as a whole, important as such a statement would be for statistical and other purposes. The ministry of agriculture has taken steps to have a special survey taken and published.

There is, unfortunately, an almost entire want of accurate statistics of the products of our fisheries. Czörnig states that in 1861 the Austrian fisheries produced 145,000,000 pounds of fish, valued at \$10,500,000; but these figures are only the result of approximate estimates. They give, however, some idea of the still considerable value of this portion of our national wealth, which surely could, by good fishing-laws, be increased many millions.

There are no reliable statistical data as to the market-prices at the capitals of all the provinces, and all that can be found are scattered statistics from a few cities.

It is an exceedingly difficult matter to gather the statistics of fisheries, since persons who have leased them are very loth to state the exact truth with regard to the income derived therefrom, for fear that their rent might be raised. The importance of such statistics for legislation and other government measures is, however, daily becoming more evident; for which reason the sixth international statistical congress, which met at the Hague in September, 1869, placed fishing-statistics on its programme.

In accordance with suggestions made by the above mentioned congress, the Austrian central committee for statistics has resolved to

* The record-book of the titles, boundaries, and ownership of lands.

† The law of May 24, 1869, No. 88, regarding land-tax, declares as free from this tax, among other things, marshes, lakes, and ponds, in as far as they do not yield a revenue from their fisheries, &c., as also the beds of rivers and brooks.

collect the accounts of the Austrian fisheries, and has adopted the schedules which were recommended by a select committee.

With a view to this, the statistics of the several species of fish, fishing-implements, as well as the fishing-seasons given in Heckel and Kner's work, "*Die Susswasserfische der Österreichischen Monarchie*," are to be thoroughly examined and revised by the agricultural societies of the various provinces; and it is to be ascertained what is the average price of fishing-implements, how many persons are employed in the fisheries, how many of each kind are on an average caught per annum, what has been the influence of artificial hatching on the increase of fish in depopulated waters, at what seasons the different kinds of fish spawn, and, finally, what proportion the actual season of fishing in fresh-waters bears to the legally prescribed fishing season.

Exact or even approximately reliable data must not, however, be expected, as the agricultural societies have not the means of obtaining such. To obtain fishing-statistics, it is indispensable that a law should be passed requiring correct lists of all the fisheries, of the waters where they are carried on, and of the different fishing-privileges, in the same manner as a recent law ordered the registering of all the existing hydraulic constructions and water-privileges. On these official lists, the statistical reports of competent men should be based.

Mr. Hey, a forest-inspector of Lölling in Carinthia, has, from very incomplete material, which he had increased and corrected as much as possible from personal observations, made a report on the fisheries of his province, which has been published in the reports of the Carinthia Agricultural Society for 1872, Nos. 18 and 19. According to this report, the following is the area of the fishing waters in Carinthia:

	Acres.
Large lakes	12, 773
Small lakes and ponds	706
Rivers and brooks	8, 912
	<hr/>
Total	22, 401

The quantity of fish which might be caught if there were sufficient protection against thieving and the present reckless system of plunder, is, for running waters, estimated at 50 pounds avoirdupois per annum to 1½ acres, for lakes and ponds at 87½ pounds, making a total of 7,483,606, including 617,500 pounds of fine fish valued at \$35 for every hundred weight, (Austrian: equal to 123½ pounds avoirdupois,) and 6,866,106 pounds common fish at \$15 per Austrian hundred-weight. This gives a total annual revenue of \$258,394. The expenses for implements salaries, and taxes are estimated at \$55,280, making the net revenue \$203,114, or \$9 per acre. These estimates appear by no means too high if compared with the revenues of other countries where the fisheries are well protected.

The *Deutsche Fischeri-verein* has also given its full attention to fish-

ery-statistics. This society has, in its Circular No. 4 for 1872, published a form containing questions regarding the number, nature, and economical value of the useful fish and crawfish, thus paving the way for reliable information.

More reliable data regarding the numbers, the different species of fish, and their geographical location in the provinces of Austria have been collected by zealous naturalists. Fish-culture has, undoubtedly, of late years been studied very thoroughly on the before-mentioned basis of legislation.

11.—SCIENTIFIC INVESTIGATIONS.

Scientific researches, which have made us better acquainted with the mode of life of various animals, have encouraged numerous inventions, by which man has been enabled to derive the greatest possible benefit from the animal kingdom.

The excellent works of ichthyologists from those of Artedi and Linné down to Siebold's classic work, "*Die Süßwasserfische von Mitteleuropa*," as also very thorough works on fish-culture, such as Carl Vogt's "*Die künstliche Fischzucht*," Coste's "*Instructions pratiques sur la pisciculture*," and others, give the most important suggestions for fishing-legislation.

Brehm, in the last volume of his "*Illustriertes Thierleben*," gives a masterly description of the life of fishes; Beta, in his work "*Die Bewirtschaftung des Wassers und die Ernten daraus*," by describing the untold wealth which is still hidden therein, endeavors to give a new impetus to its cultivation.

We owe it to the high degree of perfection to which scientific observations in general have been carried, and especially to the intelligent, thorough, and careful investigations of two Austrian naturalists, Heckel and Kner, in numerous essays by the former, and in the work on the fresh-water fish of the Austrian monarchy, published by them in common, as well as to the before-mentioned work by Siebold, for a faithful and complete natural history of the Austrian fresh-water fish, including the distribution of their species in the different waters, an exact description of the manner in which they are caught, and the implements employed in fishing.

Recently, several governments have endeavored to further scientific investigations by special institutions and by granting subsidies from the public treasury.

In 1862, the Austrian government sent Professor Molin to France and Western Germany to gather full information, both practical and theoretical, on the progress of the artificial culture of useful aquatic animals. He has published his reports on this journey as well as his important suggestions for fishery-legislation in his work, "*Die rationelle Zucht der Süßwasserfische und einiger in der Volkswirtschaft wichtigen Wasserthiere*," R. Molin, Vienna: Braumüller, 1864.

In 1870 and 1871, the Bohemian ichthyologist Dr. Fric made a jour-

ney through Bohemia and other countries on the Elbe, with a view to studying the condition of the fisheries, especially the salmon fisheries and their international regulation, upon which journey he has likewise published a report.

In 1868, Professor Schmarida was sent to France by the Austrian ministry of agriculture, in order to report on the condition of fish-culture along the French coasts. Besides many excellent features, he observed many failures, and therefore recommends, above everything else, accurate scientific investigations as the only safe basis of future progress.

Schmarida remarks that economical progress can only be made by establishing experimental stations; these are just as important for a rational cultivation of the sea-coasts as for agriculture, and even more so, because the leading principles of water culture have yet to be learned. That something of the kind is necessary in order to put an end to the purely empirical system of exhausting and plundering will even now be clear to the unbiased observer of a large portion of the coasts of Europe. No half-measure, however, should be taken in founding such institutions, but they should be supplied with all the necessary scientific apparatus, and naturalists should be permanently stationed there. They will then flourish better than if some famous man whose time is necessarily occupied otherwise give his name to some expensive institution, but never visit it in person.

With the advancement of political economy, the advancement of fish-culture must go hand in hand.

In this respect, likewise, the great exertions of the Americans and English in investigating all the mysteries in the life of aquatic fauna, but more particularly the efforts made by France, deserve to be imitated. Everywhere, aquaria have been established for observing the mode of life of these animals. They have partly been founded by the governments, partly by scientific associations. One of the finest is the salt-water aquarium at Arcachon. A great deal has been done for fresh-water fish at Hübungen, and for other useful aquatic animals by the institution at Concarneau, which the French government has established under the supervision of Professor Coste, at an expense of \$20,000. (See Professor Schmarida's report on his visit to Concarneau, in the annual report of the ministry of agriculture for 1868, p. 349.) In Berlin, a magnificent aquarium for fresh and salt water fish and artificial fish-culture has been erected on plans made by Dr. Brehm. Large aquaria are at present being constructed in Trieste and Vienna, (in the Prater.)

The international maritime congress held at Naples in 1871 passed the following resolutions on the promotion of fish-culture, and more especially of the salt-water fisheries:

"This congress, acknowledging the importance of several inquiries made with the view of ascertaining the fruitfulness of the different species of fish, the number of those which reach the age of maturity, the laws of individual increase, and the places and seasons best suited for

fishing, and taking into consideration the fact that the necessary studies and observations may vary according to the location, circumstances, and personal views of the observer, expresses a desire that the investigations which have been suggested be left to the private enterprise of the several practical scientific institutions; that such researches should be encouraged by these institutions, and by the several governments by granting subsidies and by offering prizes; and that every possible means should be employed to support and further them.

Austria so far does not possess any means for making scientific investigations in the interest of fish-culture. The central establishment for pisciculture at Salzburg would be well qualified to prosecute such inquiries. From inaccurate observations, which have not been made in a truly reliable and scientific manner, incorrect information may be spread even by the institutions themselves, such as the report of the fruitfulness of a cross-breed between the *Salmo salvelinus* and the trout, which had been raised in the Salzburg establishment, a report which, after repeated and more careful experiments, has not been confirmed.

As late as 1871, the best modern works on lake-culture, fish-culture, and ichthyology could not be found in the library of this establishment.

It is an essential condition of the well-being of every economical institution, by which it also serves the cause of science, to supply the means of study to the officials employed.

Recently, exhibitions have become a popular means of promoting fish-culture and spreading a knowledge of ichthyology. Large exhibitions of fishery-products, fishing-implements, &c., were held at Amsterdam in 1861, at Bergen in 1865, at Havre in 1868. At the Paris exposition of 1867, there was a special department for fisheries; at the Gottenburg exposition of 1871, the fish-sections formed the chief attraction. Nearly every one of our agricultural exhibitions also displays some fishery-products, improved fishing implements, and especially improved apparatus for pisciculture to show the progress which has been made, and to awaken an interest in the matter. We may surely expect that the Vienna world's fair of 1873 will prove of great benefit to the fisheries.

C—THE IMPORTANT FRESH-WATER FISHES.

According to Heckel's and Kner's accurate observations, the chief mountain ranges exercise the greatest influence on the distribution of the different species of fish, so that those rivers and streams whose springs are on the same mountain slope have generally the same species of fish, even if finally they empty into far distant seas. Since all the great rivers of Central Europe, for longer or shorter distances, flow through Austrian territory, and empty from the various slopes into four different seas, we can easily explain Austria's wealth in fish of all kinds, which from here spreads into all the neighboring countries.

Nearly all species of Central European fish are, therefore, represented in the Austrian waters, but distributed among the several provinces in

accordance with the various slopes of the central mountain range, the Alps.

The following list of those fresh-water fish which are of most importance to our legislation has been compiled from the scientific works mentioned above, as well as from the reports of the several agricultural societies, and of many naturalists in the various provinces of Austria.*

12.—SALMON FAMILY, (SALMONOIDEI.)

The species of this family take the first place among fresh-water fish in regard to fishery legislation, both on account of their great value, and the exquisite flavor of their tender and boneless flesh, their rapid growth, their existence in nearly all the Austrian waters, and, finally, on account of their special adaptation to pisciculture, in which latter respect they excel most other species.

At the first glance, we can distinguish the individuals belonging to this kind by a double dorsal fin, consisting of a front one placed about the middle of the back, composed of soft rays of several joints, and a posterior one, being only a small piece of skin, a so-called fat-fin. They have mostly very small scales, thus differing entirely from the large-scaled fish of the carp kind.

Among the numerous genera of *Salmonoidei*, the following are the most important:

a. Trutta, comprising all salmon and trout, distinguished by a wide mouth with even teeth, and long vomer bone;

b. Salmo, with short vomer bone, the short front part of which alone has teeth;

c. Thymallus, with small mouth, fine teeth in the jaws, and powerful dorsal fin;

d. Coregonus, with a toothless mouth, fine bent teeth on the tongue, and a silvery-white body.

Carl Vogt divides the salmonoids of the genera *Salmo* and *Trutta*, according to their mode of life, a manner which is equally suitable for piscicultural and legislative purposes, into the sea salmon, the lake salmon or lake trout, and the brook trout. All the different varieties of this kind which are spread through Europe, Asia, and North America, as far as the northernmost limit of the circum-polar regions, are fish of prey, and have many characteristics in common.

Among the sea salmon we must count the common salmon, (Rhine salmon,) *Trutta salar*, the hook-salmon and silver-salmon, distinguished as different kinds by some naturalists, being only varieties of one and the same kind, and the sea-trout, *Trutta trutta*; these all spend a part of their life in the ocean.

The salmon are found in all northern seas, in the North Sea, and Bal-

* Along the coasts of Austria and Dalmatia the salt-water fisheries are of the greatest importance. These, however, require a separate treatise, and we therefore limit ourselves in this review to the fresh-water fish.

tic; in spring, they leave, and, favored by the sea-winds, come into the rivers flowing into these waters, and into their tributaries. In a short time, they reach a length of 3 and even 5 feet, leap over weirs and embankments if they are not too high, especially if contrivances, called salmon-paths or salmon-ladders, for making the leap easier have been placed there.

In order to find the best spawning and hatching places, they go very far up the rivers. They ascend the Elbe, and from thence into the Moldau, also, into the Oder and its headwaters in Moravia and Silesia; from the Vistula into the Dunajec, and into the Sau and its tributaries; the hook-salmon go into a small tributary of the Bug, and also into the Rhine as far as the falls at Schaffhausen.

Numerous experiments by marking fish have proved the fact that the salmon return to the same rivers and spawning places where they were born. In the establishment at Stormontfield, on the river Tay, more than 24,000 salmon were caught up to 1867, all of which had formerly been marked and placed in the sea as smolts.

In England, the young salmon born in the rivers, which as yet have no scales and cannot endure salt water, are called *parrs*; the older fish, which have scales and eagerly seek the sea, *smolts*; those which, for the first time, return from their voyage to the sea, *grilse*; and the fully-matured salmon, *salms*.

The spawning season usually commences in September, and lasts till the end of December; the smaller female fish frequently spawning from two weeks to a month sooner than the larger ones. During their stay in fresh water, and during the gradual development of the ova and milt, the salmon assume a darker color, and the male fish frequently show red spots on the sides and on the covering of the gills; old male fish show the most brilliant colors during the spawning-season, which disappear immediately when this season is over, and the salmon begin to return to the sea in a very emaciated condition. Like most of our food-fish, the salmon are fattest just previous to the spawning-season, but do not eat anything during this time, and are afterward scarcely fit for food. The old salmon are the first to go to the sea, while, of the young ones, only about one-half leave the rivers somewhat later the first year, (as smolts;) the other half remaining another year, (as parrs.) In the sea, they rapidly increase in weight and size.

The well-known ichthyologist Dr. Fric has recently made some very interesting observations on the life and habits of the Bohemian salmon. He says that there are in Bohemia three different ascents of the salmon during the year.

The first ascent frequently commences at the end of February under the ice, as a general rule in March, and lasts till May. These salmon are mostly large and stroug, weighing from 25 to 50 pounds avoirdupois, and are famous in Bohemia under the name of "violet-salmon."

The second ascent begins in the middle of June, and lasts till August,

if the rivers are not too low. These fish have a reddish flesh, and weigh from $12\frac{1}{2}$ to $22\frac{1}{2}$ pounds avoirdupois, and are known by the name of "rose-salmon."

These two classes of salmon are not ready to spawn when they arrive in Bohemia, and require a considerable stay in fresh water to develop their ova and milt.

The third ascent begins during the first half of September, and lasts till the end of November, in mild winters even till December. These fish are mostly weak, weighing from 3 to 10 and sometimes 15 pounds avoirdupois. Their flesh is of a pale color, and for this reason they are usually called "silver-salmon." They are fully prepared to spawn immediately on their arrival. The process commences in the mountain streams which flow into the Elbe, the Wild Adler, the Moldau, the Wotawa, and other small rivers.

Among the chief causes of the decrease of salmon in Bohemia, which formerly had large numbers of this fish, Dr. Fric places the high weirs built across the rivers which the salmon cannot leap over, especially at low-water; the stationary fishing apparatus, which frequently span the whole breadth of a river, especially near the weirs; the unprotected condition of the spawning places; the spearing of the fish with tridents during the spawning season, when they are half stupefied; and, finally, the want of well-protected hatching places, where the young fish can be safe from their numerous enemies on land and in the water.

No fisheries require proper legislation as much as those for salmon. On account of the large schools which ascend the rivers, the whole stream should be subjected to uniform laws and a uniform system of fishing, which only becomes possible by international treaties.

The sea-trout (*Trutta trutta*) does not reach the size of the common salmon, but is otherwise very much like it so far as its propagation and the localities which it seeks are concerned. Like the salmon, it ascends to the headwaters of the Oder and the Vistula, but does not go as far in the Elbe.

The lake-trout, lake-salmon, or salmon-trout, (*Trutta lacustris*), are found exclusively in the fresh-water lakes of the alpine regions of Central Europe, from which, during the spawning season, they go up or down the stream in the rivers or brooks connected with them. Only in lakes whose tributaries do not have much water, or mostly consist of rapids, they are obliged to seek flat gravelly places near the shores to spawn. Most of them spend the greater portion of their lives in inaccessible depths, and only ascend to the surface under peculiar conditions of temperature, in order to catch small fish and insects. During the spawning season, they come to the surface in larger numbers, their excursions in the brooks and rivers sometimes extend to a great distance, sometimes only to a few miles from their dwelling-place.

Those which ascend the brooks and rivers are caught with bow and stationary nets, which are placed near the mouth of the rivers or

at the spawning places; in the lakes, however, they are caught with hooks and flies, which have been introduced from England.

Ichthyologists and fishermen have frequently confounded the lake-trout belonging to the alpine lakes with the sea-trout (*Trutta trutta*) of the North Sea and the Baltic. Those of different age and sex have also been mistaken for separate species. The lake species, with completely developed sexual organs, which, in some lakes, as in the Chiem Lake, is called salmon-trout, and on the Lake of Constance ground-trout, is distinguished by a plumper shape, grows rapidly like the other kind of salmon, and reaches a weight of $31\frac{1}{2}$ to $62\frac{1}{2}$ pounds avoirdupois, and even more. Those which on the Lake of Constance, are called "floating-trout," (*Schwebforellen*,) and on the Austrian lakes May trout, remain barren and develop in a totally different manner from the fruitful lake-trout. They are less fleshy than the ground-trout.

The male of the lake trout changes considerably in color and quality of skin during the spawning season while he sojourns in running waters. According to whether they are caught in spring or autumn, in different localities, of different color or size, they are called by different names among the fishermen.

The brook trout to which, besides the common brook trout, (*Trutta fario*,) some Dalmatian species belong, such as the *Trotta* and *Pastrova*. The *Trutta fario* is of the utmost importance to protect, because it is found in nearly all clear waters, especially mountain and forest streams to a height of 5,000 feet; its flesh is universally esteemed, and its culture, both natural and artificial, is very productive, while it is easily kept and fed. It is therefore considered one of the most important fish to cultivate. The color, and partly also the size which it reaches, vary according to its location, the influence of light, the season, water, and food, and therefore several varieties are distinguished, such as the forest or stone trout, the alpine or mountain trout, the gold or pond trout, the lake-trout, and, according to the lighter or darker coloring the white trout, the black trout, &c. In this species, some are likewise found which are barren, and never spawn.

In the smaller and rapid mountain streams, which do not afford much food, the trout scarcely reach a length of 12 to 15 inches; while, in larger waters, such as lakes and ponds, with good and plentiful food, they occasionally reach a weight of $18\frac{3}{4}$ to 25 pounds. They can easily be fed with insects, small fish, &c. A beginning has even made on the sandy plains near Berlin, to dig artificial springs, in which trout are raised and fed. In our alpine regions, where nearly every village has a superabundance of fresh springs and brooks, much larger gains might be realized in a short time by imitating this example.

The brook-trout go up the stream for the purpose of spawning, but only for short distances, and make the most astonishing leaps over weirs and small water-falls; in winter, they go to the deeper waters, in order not to be overtaken by the ice in the small streams.

The female lays her eggs, which are of the size of a pea, from September to January, according to different climatic influences, in shallow pebbly places, between stones, logs of wood, and in little holes which they hollow out in the sand. The male, which follows the female with a sort of rage, squirts the milt over the eggs as they are laid. After the eggs have been impregnated, the fish do not care for them any more, but leave them to the stream. In comparison with other fish, the female of the brook-trout lays only a small number of eggs. By artificial culture, trout have been placed in many brooks where formerly they were not found. The spawning place is usually a small bay with a flat bottom, and with as much pure gravel as possible, so that the young fish may be protected against their numerous enemies. Such artificial spawning places should be guarded as much as possible by law.

As the trout do not make long migrations like the salmon, even the proprietor of small fisheries has them constantly within his reach, and can easily raise and feed them.

Beta, in his work so frequently referred to, on page 189, gives the following advice on trout-raising :

“Trout require very pure running spring-water, of the greatest possible evenness of temperature, which should be cool in summer and warm in winter, a gravelly bottom, and a shady forest or bushes on the banks.

“In order to hatch artificially impregnated trout-eggs, and to raise young fish, they have, in their brook or river, to go through a series of ponds. These consist of a succession of artificial ponds or widenings, which increase in size toward the mouth of the stream. In the first, which is the one occupying the highest ground, the young fish are kept for about a year, from the beginning of spring. Here care should be taken that they find natural food enough either on the gravelly bottom or between the aquatic plants near the banks, the water-cresses, &c., or artificial food has to be provided for them. Meat that has been chopped very fine and every kind of small worms are best suited for this. Pieces of spoiled meat can also be suspended over the water, from which, during summer, larvæ and maggots will soon fall down in sufficient quantity as a welcome food for the fish. They should be separated from the following division by a fine wire-work. In this division, the larger trout are kept till the end of the second year, and are during this time fed with snails, worms, young pike that have just been hatched, and bleak. In the third and fourth divisions, they commence to catch insects that fly over the water, but larger bleak should be thrown in to them or placed in the water for their food. In the third division, they are kept till the end of the third year; and in the fourth, the grown trout remain till the proprietor either sells them or uses them in his own household.

“The transfers from one division to another are generally made in the beginning of spring, when the weather gets warmer, say about March. The trout which are ready for the market weigh, on an average, $1\frac{1}{2}$ pounds each, and are so strong and active that they are no longer at-

tacked by their larger colleagues, and can undisturbedly chase the young fishes which have been placed in the water for them. No other fish should be kept in the ponds, and special care should be taken that young pike, which have been put in as food, do not escape the trout, and grow up to become merciless robbers."

The genus *Salmo* was formerly, by most ichthyologists, confounded with the *Trutta*, although there are very characteristic differences between the two. The chief representatives of the former are the *Salmo hucho* and the *Salmo salvelinus*.

The *hucho*, (*Salmo hucho*.) also called Danube salmon, is a fish belonging to the *Salmonoidei*, found in the territory of the Danube, in size and weight exceeding the salmon. The hucho reaches a weight of 50 to 75 and occasionally 125 pounds avoirdupois. Its sexual organs are not fully developed till it weighs about 5 pounds. It is not a migratory fish, like the salmon, returning to the ocean every year, but only leaves its dwelling-place during the spawning season to seek shallow and gravelly places. It is found in Austria, in the whole territory of the Danube, from Passau downward, but most frequently in the larger and smaller tributaries of the Danube flowing down from the Alps, especially in the Inn, the Salzach, Ager, Enns, Steyer, Traun, as far as the falls of the Traun, in the Traisen, Save, and Drau. It grows so rapidly that its weight annually increases about 2½ pounds. Its flesh is somewhat inferior to that of the salmon, but is nevertheless considered a great delicacy.

For the Austrian fisheries, the hucho is of the greatest importance on account of the large extent of country—the Danube and its tributaries—where it is found, and its rapid growth, produced through its great voracity. It is so fond of bleak that it can easily be caught with a hook baited with artificial fish of a whitish color.

The hucho does not spawn in winter, like all the other *Salmonoidei*, but usually in April and May. The eggs, sometimes 40,000 from one single female fish weighing about 50 pounds, mature much sooner than those of other salmon; the young fish weigh about 1¼ pounds after one year, while specimens weighing 5 pounds in the third year are quite frequent.

The chief causes of the decrease of the number of hucho are the weirs which recently have been built in the Upper Danube and its tributaries; no passage ways having as yet been left for them.

The *Salmo salvelinus*, also called red trout, is a lazy fish, but little inclined to prey upon other fish, and leaves the lakes during the spawning season. Its form is exceedingly variable, according to age, sex, and location, so that ichthyologists have frequently considered one or the other of the different forms in which it occurs as a separate species. It may be recognized by the color of its belly, which is orange, and even borders on vermilion, which colors are particularly bright in the male. It is found in the clear mountain lakes of the Alps of Upper Austria, Tyrol, Bavaria, Switzerland, as also in the Carpathian mountain lakes

at a height of 6,000 feet above the level of the sea. These fish increase very rapidly, but grow slower than the lake-salmon. Their flesh is, according to the season, the lake in which they live, and the water in which they have been kept either of a reddish or a whitish color, but has always been considered a great delicacy.

The *Salmo salvelinus* of the Fuschler Lake is distinguished by its rapid growth in size and weight. Here, as well as in the Hinter Lake near Berchtesgaden, rare specimens are sometimes caught, weighing 22½ to 25 pounds. This fish has likewise been transferred to lakes where formerly it was not found. In Upper Austria, they are caught with seines drawn by four men in two boats.

Artificial fish-culture has produced many cross-breeds, especially of the *Salmo salvelinus* and the trout, which excel the pure breed in many respects. In Upper Austria, the eggs of the *Salmo salvelinus* are mostly impregnated with the milt of brook-trout.

The third genus of the *Salmonoidei* includes the "Asch," called "Aesche," in North Germany, (*Thymallus vulgaris*.) It is found throughout the whole of Central Europe, in clear, shallow, running water, with a stony bottom, less frequently in lakes near the shore and the mouths of rivers. Its flesh comes nearest to that of the trout; and they are caught in a similar manner to the trout, but in a peculiar manner in the river Vöklä, in Upper Austria, by tying a female which is on the point of spawning to a pole rammed in the bottom of the stream, by means of a thread fastened to the dorsal fin; when the males approach the female, they are quickly raised out of the water by the net spread out below.

The *Thymallus vulgaris* is distinguished from all the other *Salmonoidei* by its remarkably large dorsal fin and by the great beauty of its varying colors.

In the ancient Austrian fishery-regulations, the *Thymallus vulgaris* is frequently mentioned, the young fish being valued very highly. At times it could only be caught for the imperial table, for sick persons, or pregnant women. In Upper Austria these fish are in the first year called "Sprenzling;" in the second, "Mailing;" in the third, "Aeschling;" and, finally, "Asch."

The fourth genus of the *Salmonoidei*, the *Coregonus*, especially the species *Coregonus Wartmanni* and *Coregonus fera*, live almost exclusively in lakes, and at the beginning of the spawning season gather in such large numbers that many are killed by the pressure of the crowd; at this time they may frequently be seen leaping out of the water. Closely pressed together, they drop roe and milt in the water. In large schools, they swim noisily at the surface, especially at night-time, and immense quantities are caught near the shore with floating drag-nets, and, where the water is deeper, with stationary nets. Their flesh is esteemed very highly; and, in some lakes where this industry is carried on a large scale, it is of as much importance as the herring-fishery. They cannot be easily caught with a hook and line. When taken out

of the water and exposed to the air, they die almost immediately. Like herrings, they are salted, smoked, and pickled, and form a considerable article of commerce. It is difficult to distinguish the several varieties, as they mostly live together in large numbers; the different species of the same age keeping together, changing their outward appearance according to the season, the weather, the method of propagation, location, and mode of life, and being called by different names by the fishermen. The more important varieties are the lavaret, (*Coregonus Wartmanni*,) called "Reinanken" in Upper Austria and "Renken" in Tyrol and Vorarlberg; it weighs $1\frac{1}{2}$ to 2 pounds, sometimes even $3\frac{3}{4}$ to 5 pounds; it is found in the Atter, Gmunden, and Fuschler Lakes, but in particularly large numbers in the Lake of Constance.

The *Coregonus fera*, called "Sandgangfish" in the Lake of Constance, "Knüpfing" in the Atter Lake, and "Rindling" in the Traun Lake, weighs little more than one-half pound.

The *Coregonus maræna* weighs as much as $12\frac{1}{2}$ pounds, is found in the lakes of Pomerania, and deserves to be acclimatized in the Austrian waters.

13.—THE PIKE FAMILY, (ESOCINI.)

These fishes are easily recognizable by their broad, flat mouth and their strong teeth. They are represented in the fresh waters of Europe by the common pike, (*Esox lucius*,) the shark of the fresh waters, which, unless purposely destroyed, is found in all large streams and their tributaries, in lakes, ponds, and marshes. It feeds on any live animals found in the water, and reaches a weight of more than 50 pounds; a female pike of medium size will contain 60,000 eggs. It loves to spawn on inundated meadows and peat-bogs, and in their ditches. Its flesh resembles that of the trout.

14.—THE CATFISH FAMILY, (SILUROIDEI.)

The fishes of this family have no scales, and a broad low head. Many species are found in North America. With us only one is found, the common "Wels," or "Schaide," (*Silurus glanis*,) a fish of prey, living in the Danube and its tributaries, also in Moravia, Galicia, and other countries. Next to the sturgeon and huso, it is the largest fresh-water fish, and in the Danube reaches a weight of 494 to $617\frac{1}{2}$ pounds; although its flesh is not universally esteemed, it is well suited for pond culture in peat-bog water.

15.—THE COD FAMILY, (GADOIDEI.)

The fresh-water representative is the *Lota vulgaris*, with a slender eel-like body. They spawn at different seasons, usually in December. During this season, they gather in schools of about 100. In the Danube, it weighs from $3\frac{3}{4}$ to 5 pounds; in the Fuschler and Atter Lake, 10 to 15 and even 20 pounds; and is found in the greater part of Europe.

16.—THE EELS, (MURÆNOIDEL.)

This group comprises long-bodied, snake-like fish of prey, without ventral fins. To this family belongs the river-eel, (*Anguilla vulgaris*), which lives both in fresh and salt water, and flourishes particularly in peat-bog marshes. The manner in which it propagates its species is not yet thoroughly known.

The young of those eels which spawn in the sea ascend the rivers in spring by millions, and frequently go to running and stagnant waters which are far distant from the sea.

The ascent of the young eels into fresh water, called *montata* in Italy and *montée* in France, lasts three or four months in the spring-season. Their return to the sea (*calata*) is made from October to December, usually not until they have lived for several years in fresh water. It invariably takes place during very stormy and dark nights. On the Austrian coasts and in Italy, many fishermen at the mouths of the rivers are employed in catching the migrating eels, which in some places are by means of special canals led into entirely closed caves. The river-eel spawns during summer on sandy and gravelly banks, where the eggs are hatched in October, and where the young remain till April or May.

The flesh of the eel is valued very highly, forms the exclusive flesh-food of large populations, and, salted, smoked, or pickled, is an important article of trade. The eel is found in the larger part of Europe, especially in all those rivers and standing waters which are connected with the Baltic, the North Sea, the Atlantic Ocean, the Mediterranean, and the Adriatic; but it is entirely wanting in those lakes and rivers which send their waters into the Black Sea.

As soon as that care which it deserves is given to the eel-fishery, and especially to its culture in our waters, this fish would with us, just as in England, become a cheap food for the whole people. Numerous little ponds, with marshy bottom, which at present are useless, and even injurious, might be populated with eels, and would, with some care, yield a rich harvest, if, during the first weeks of spring and in the latter part of autumn, they were properly fed.

17.—THE CARP FAMILY, (CYPRINOIDEL.)

The Cyprinoids are distinguished from all other fish by small toothless mouths, the well-known carp-mouth. The greater number of our fish belong to this family; among them the numerous varieties of the bleak, the carp, the loach, the barbel, the tench, &c., which chiefly inhabit the fresh waters of the temperate zone, and "which are valued in places where there are no better fish," (Vogt.)

By transferring the various kinds of carp into waters where they were not originally found, by different modes of life to which they have

been accustomed, by artificial culture, &c., numerous varieties of them have been produced.

The common carp, (*Cyprinus carpio*), for centuries the fish belonging to our civilization, loves sluggish water, with a marshy bottom. During the spawning season, May and June, it retires to warm, brackish waters, which are exposed to the sun. The females, while surrounded by the male, paste their eggs to water-plants. A medium-sized female carp is supposed to produce annually 200,000 to 250,000 eggs. In lakes, they reach a weight of 5 to 6½ pounds in three years. All vegetable and animal kitchen-refuse, agricultural and economical products of little value, the refuse of slaughter-houses, &c., supply a welcome food for them, if it is given to them in small soft pieces, so that they can easily grasp it with their toothless mouth and swallow it.

In some countries carps form an important article of trade, and are shipped to a great distance. In Austria, the "Danube carp" was once a favorite and cheap food of the common people; but, by the neglect of years, and by the reckless plunder of the tributaries of this noble river, once so rich in fish, their number has decreased very much.

The so-called mirror-carp, with disproportionately large scales; the leather-carp, which has no scales at all; and others, are only varieties of one and the same species. The barren carp, called "Laimar" in South Germany, and "Gelte carp" in North Germany, which is mentioned by Aristotle, and by him counted among the best fish, is also in our days highly esteemed on account of its tender flesh.

In Carniolia, the two varieties of the carp called "Alant" and "Jeses" are very much esteemed.

The crucian (*Carassius vulgaris*) usually weighs about 2 pounds, and is found all through Central Europe. Like the carp, it is cultivated, and its flesh is much esteemed.

The tench (*Tinca vulgaris*) has a yellowish-green color, and is a lazy fish, which is found in most parts of Europe in rivers, lakes, ponds, and clayey marshes. It can easily be shipped, and in clayey ponds which are too poor for other fish it can be cultivated with great profit.

The barbel (*Barbus fluviatilis*) grows rapidly, usually weighs 10 to 12 pounds, and is frequently caught with a so-called Pater-noster line. The roe of the barbel when eaten causes vomiting and diarrhœa.

The bream (*Abramis brama*) lives in lakes, gently-flowing rivers, ponds, and marshes. It is caught in large numbers with seines. In the spring of 1858, from 24,700 to 37,050 pounds of bream were in one day caught near Ermatingen on the Lake of Constance.

The bleak, (*Alburnus lucidus*), called "Uekelei" in North Germany, is found in all the running and standing waters of Central Europe with the exception of mountain lakes and streams. From their scales, the so-called *essence d'orient* is prepared, by which glass beads are made to sparkle almost like the genuine oriental pearls.

Numerous other fish, besides the above mentioned, mostly designated

as white fishes, belong to the carp family. The smaller of these are mostly used for feeding other fish. As they live on plants and refuse, their food is easily supplied, and during spring and summer numerous young fish are in a very short time developed from the eggs.

18.—THE PERCH FAMILY, (PERCOIDEI.)

The perch has a bright and beautiful color, and usually a wholesome finely flavored flesh. The front rays of their dorsal fin are actually like thorns, leaning backward like the bayonets of a column of marching soldiers.

To the perch proper (*Perca*) belongs the river-perch, (*Perca fluviatilis*), with light-red ventral and anal fins, found nearly everywhere in large and small rivers and lakes. It is very voracious, readily takes the hook, and spawns in March, April, and May in calm water on a reedy bottom. A medium-sized female perch lays on an average 80,000 eggs per annum, which, pasted together in the shape of ribbons or lumps, stick to stones and water-plants. Its weight seldom exceeds 1½ pounds; but in the Zeller Lake, (in the Pinzgau,) where it is found in very large numbers, it sometimes weighs from 4 to 5 pounds.

To the genus *Lucioperca* belongs the *Lucioperca sandra*, called "Zander" in North Germany, and in Hungary, when young, "Szüllö;" when old, "Fogas." It lives in lakes, larger streams and their tributaries, keeps at the bottom, in its voracity spares not even its own young, spawns from April till the beginning of June in shallow places near the shore where there are water-plants, thrives likewise in deep ponds, and grows as rapidly as the pike, to which also in other respects it bears a great similarity, and is, therefore, in Latin as well as in German, called pike-perch. If well fed, it weighs in a few years about 25 pounds. This fish was by an archbishop of Salzburg brought from the Neusiedler Lake and placed in the Waller Lake.

19.—THE STURGEON FAMILY, (ACIPENSERINI.)

The species of this family have no bones like the fish that have been spoken of, but instead, soft, flexible gristle. The sturgeon is for some countries as important as the salmon; it is mostly found in Eastern Europe, lives both in the sea and in large lakes, but at certain seasons of the year ascends the rivers in large schools, never going beyond a certain place. If supplied with good food, they reach a very large size; specimens weighing from 800 to 1,000 pounds having frequently been caught in the Danube in olden times.

There are few other fishes which are of greater use to man than the sturgeon. In Russia, a large portion of the population is supported by the sturgeon fisheries. Its flesh combines a certain firmness with excellent flavor, and is even preferred to veal by many persons. They are salted, dried in the sun, or smoked, and shipped to a great distance; the

roe, packed in kegs, comes into the trade as caviar, and the inner skin of the air-bladder is made into isinglass.

Most fish of the sturgeon family are found in the Black Sea, the Sea of Azov, and the rivers flowing into them; some of them are found in the Danube beyond Pressburg.

All attempts to hatch sturgeon-eggs and to raise the young artificially have so far been failures; and, only recently, Dr. Koch, in St. Petersburg, is said to have succeeded in solving this problem.

The common sturgeon (*Acipenser sturio*) is found in the Atlantic Ocean, the Mediterranean, the Adriatic Sea, the North Sea, and Baltic, and ascends very far up the rivers.

The *huso* (*Acipenser huso*) weighs as high as 2,500 pounds, and ascends the Danube and some of its tributaries. On account of the persecutions to which it has been exposed on the Lower Danube, it has at present become very rare in Austria.

The finest kind of sturgeon, whose flesh is almost as high-priced as that of the salmon, is the sterlet, (*Acipenser ruthenus*), which seldom measures more than two feet, and weighs from 8½ to about 9 pounds. It stays longer in the rivers than the other sturgeons, requires spawning places with gravelly bottoms and considerable fall, and is found in the Danube as far as Bavaria, in the Salzach, the Drau, and other tributaries, as well as in the Dniester, &c. Its air-bladder makes the finest isinglass.

The sterlet has recently been cultivated to a considerable extent in North Germany at the suggestion of the *Deutsche Fischerei-verein*. The Prussian ministry of agriculture, in 1872, accepted an offer of Dr. Koch, in St. Petersburg, to bring 100,000 young sterlets from the Volga to Germany, where they are to be distributed among the public rivers, private waters, and especially to piscicultural establishments.

20.—THE CRAWFISH, (*ASTACUS FLUVIATILIS*.)

The river crawfish (*Astacus fluviatilis*)* is considered to be very different from fish in the systems of naturalists; but, in the practical fisheries, it has to be treated in common with them, and the same legislation should apply to both. It is found in nearly all of our rivers, brooks, and even in ponds, though not always in such quantities as to supply cheap food for the masses of the people. With proper care, their numbers could easily be increased; all that has to be done is to give them cheap food, to observe the times when they should not be caught, and to plant alders and other bushes on the banks of those streams which, by too extensive fishing, have become drained of crawfish.

In France, the government has granted an appropriation by which more than 300 rivers and brooks can be stocked with German crawfish. Even these are not sufficient to supply the great demand, and large num-

*One species of *Astacus* is considered a great table delicacy in Europe and sells at high prices.—S. F. B.

bers are still imported from Germany. From Styria, fattened crawfish have been sent to Paris by Baron de Washington. Crawfish, likewise, increase very rapidly. Our present experience has shown that the eggs perish when torn off from the animals, so that it will not do to press them out and throw them into the water; all that can be done is to give ample protection to the female crawfish. In some places, young crawfish are kept and fed till they are able to take care of themselves. Considering the enormous demand for them, crawfish-culture in our numberless small brooks might soon become a remunerative occupation.

C.—PROTECTIVE LEGISLATION.

21.—THE FISHING-PRIVILEGES.

We possess a great deal of valuable information on all the legal questions pertaining to fisheries in the thorough and exhaustive researches made by eminent jurists upon the historical development of the fishing-privileges in Austria and in other countries possessing similar laws, and also in special investigations of the subject.

The historical development of the fishing-privileges was, especially in older times, very much the same in different countries.

Lette and Rönne, the well-known commentators on the "Agrarian Laws of Prussia," (vol. ii, p. 760,) briefly describe this development as follows:

"Originally, and far into the Middle Ages, every landed proprietor had the right to fish on his property; those who owned lands bordering on rivers could fish in these streams, and citizens of towns or villages had the right to fish in all the waters belonging to these communities. At a later period, the royal water and fishing privileges were established in connection with the hunting-privileges of kings and princes, and were in later times extended to nearly all the public rivers and streams, and either given or rented to private individuals. The right to fish in private waters, both standing and running, was, contrary to ancient usage, appropriated by the owners of estates and the local authorities to the entire exclusion of the vassals, (farmers.) These, as well as those inhabitants who did not possess any property, were frequently only allowed to fish with purse-nets and lines.

"Exclusive fishing-privileges are not acknowledged by the common law, and a person claiming such rights, as well as any others, must prove his lawful title to them. The right to fish in private waters is considered a natural consequence of owning property, and in running waters as belonging to persons holding landed property on the shores, all of which, however, varies according to the special laws and usages of different countries.

"Fishing privileges on foreign property must be considered as prerogatives of possession, (*Grundgerechtigkeiten*.)"

Most jurists express the same view, as in the text-books of German

private law by Runde, § 110; Eichhorn, §§ 268 and 269; Mittermaier, § 290; Gerber, p. 214, &c.

In the following, it will be shown by various instances that these views on the historical development of the fishing-privileges are confirmed by the old Austrian law-books.

22—FOREIGN FISHERY LAWS.

Most European states have of late years directed their special attention to the fishing-privileges and the fishery-laws, with the view to reforming the whole system of the industry in conformity with the demands of the natural sciences, of changed social conditions, and the requirements of political economy.

From the great mass of material at our disposal, we shall only select a few paragraphs of foreign laws which are of special importance to Austrian legislation.

Prussia.—Prussian legislators have given much attention both to the fishing-privileges and to the fishery-laws. Besides those provisions of the common code of the Prussian monarchy, treating of the privileges of private individuals, there are numerous provincial laws and local regulations dating from different centuries, so that at present twelve different laws may be distinguished in Prussia.

It is generally acknowledged, even there, that these laws and regulations do not afford sufficient protection to the fisheries; that they are defective in many points, and not sufficiently uniform; that, regarding the nature and life of fish, they have not kept pace with the advancement of natural sciences; and that, even including the recent laws of the provinces of Prussia, Pomerania, and Posen, which in most respects have proved satisfactory, they leave great room for improvement. The draught of a new fishery-law has, therefore, been prepared.

The present Prussian legislation, in its most essential features, does, nevertheless, deserve our full attention. The regulations concerning private fishing-privileges, the laws on the abolition of such privileges, numerous regulations regarding supervision, &c., are not touched at all by the new laws; other provisions are changed but very inconsiderably; and it is of great interest in every respect to become acquainted with the progressive steps of this important legislation.

According to the common law of Prussia, fishing in public running waters is a royal prerogative. Those persons who have been granted fishing-privileges by the state, without defining certain limits, can only avail themselves as far as their property on shore extends. No person possessing them can extend his fisheries beyond their lawfully restricted limits.

Fishing in closed waters which do not extend beyond the boundaries of the estate in which they are located is as a rule the privilege of the proprietor of such estate. As a general rule, fishing in streams, lakes, and other waters can only be carried on by such persons as have re-

ceived especial grants. In some fishing-regulations, as in the case of those relating to the gulfs of Dantzic and of Memel, those persons are allowed to fish who possess the privilege either by grants from the local authorities, by special arrangement with the treasury, or by prescription. The law of March 2, 1850, says that fishing-privileges in private waters, in as far as they are based on any relations of servitude, may be abolished by buying off, at the motion of either the landlord or of the one under obligations, in accordance with the principles of the agrarian law of June 7, 1821. The net annual revenue is to be estimated by competent persons, who have to take into account the average profit derived from the enterprise by those conducting it during the last ten years. The privilege can then be bought off either by payment of the annual interest or of the appraised value. In case the person under obligations has signified his willingness to buy off a privilege, the one holding it is entitled to have his fishing-implements likewise bought at their true value.

Some provincial laws contain still further fishing-regulations. According to those of the former Saxon provinces, fishing in the rivers Elbe, Mulde, Elster, Saale, and Unstrut is a royal prerogative. Fisheries belonging to towns or villages are to be rented out for the benefit of the community, or are to be carried on by two citizens successively, limited in this privilege to two days in the week.

In East and West Prussia, the right to fish in public waters can only be lost by its not having been exercised for forty years.

In the Prussian Rhine Province, especially in the district of Trèves, the government alone has the right to fish in navigable rivers, while in private streams the persons owning the shores have this right. (Article 538 of the civil law, law of the 17th day of Floreal, year X of the French Republic, royal cabinet order of June 23, 1838.) In navigable rivers, the governments rent out the fisheries.

The fishing-regulations, and the manner in which they are carried out differ in the several provinces.

The ordinance of 1669, Tit. 31, for the territory on the left bank of the Rhine, prohibits fishing during the spawning season, the employment of certain implements and methods of capture, and the taking of several species of fish below a certain size.

Special fishing-regulations were made in 1845, partly for different provinces, such as Posen and West Prussia, partly for certain waters, such as the gulfs of Dantzic and Memel, in 1859 for the province of Pomerania, others for the district of Cöslin, and in 1865 for the district of Stralsund.

Any closing of the fish-waters, hindering the migration of fish, especially salmon and sturgeon weirs and eel-traps, are prohibited, unless the government has granted special privileges for using such contrivances. New appliances disturbing the migration of fish cannot be permitted, unless they have been rendered harmless, or can be made so by certain conditions imposed on the owners. The police-authorities have to see to it that the conditions imposed, when privileges for such appli-

ances are granted, are strictly fulfilled. Should such appliances be of great benefit to navigation, agriculture, or industry, the authorities may permit their use, even if they should be injurious to the fisheries, provided that the persons owning the fishing-privileges are properly indemnified. In as far as no existing rights are infringed on, the police-authorities have to prohibit every pollution of the water which, in their opinion, is injurious to the fish or fisheries; to remove all industrial or other establishments whose refuse makes the water impure; and to permit new establishments, whose refuse is to flow into the water, only on condition that competent men shall decide that such refuse will not hurt the fisheries. The authorities may, however, permit such establishments, if they will prove a considerable advantage to agriculture or industry; it being, of course, understood that the persons holding the fishing-privileges are properly indemnified.

Towns, villages, or other corporations holding fishing-privileges, if they have not obtained a special grant to carry on the business, must transfer it, either as a whole or in suitable portions, to competent and reliable persons.

Fishing can only be carried on in such a manner and with such implements as are not injurious to the preservation and increase of the stock of fish. The local authorities are entitled, and in duty bound, to enact more detailed restrictions on this point, in conformity with the local wants. Methods of capture and fishing-implements, whose injurious character is universally acknowledged, are prohibited by the laws.

According to some fishery-laws, only such implements can be employed as are mentioned in the respective deeds, feudal documents, written agreements, &c., in so far as their use is not interdicted by the existing code.

The size of the meshes of nets is fixed by law. The authorities are, however, empowered to prescribe the use of those with wider meshes for certain species of fish in certain localities, and to permit the use of such nets exceptionally for a period not exceeding five years in places where those with narrower meshes have hitherto been employed. Some fishing-laws prescribe in detail the methods of capture and the implements allowed in certain waters, and make the use of new implements and methods entirely dependent on the special permission of the government.

The seasons when the different kinds of fish in certain waters must not be caught are specially defined by government ordinances, and fishing during such seasons is either totally prohibited or limited according to local circumstances. In later ordinances, the seasons when the different species of fish cannot be caught are defined by legal provisions, and the capture and sale of spawning-fish and young fish are prohibited. In fishing, the running waters must not be obstructed, and bags, stationary nets, as well as other implements, tools, and contrivances used, must never occupy more than one-half the breadth of a river or stream.

The spawning-places of the finer kinds of fish are to be made known to the fishermen in a manner to be defined by the government. Fishing-

apparatus which has not been removed from these hatching-grounds within twelve hours after notification, or which has been placed there after notice has been given, is to be confiscated, as well as all the fish which have been caught.

The fishery-laws of 1845 gave permission to persons holding fishing-privileges in one or more sheets of water, in case they unanimously agree to it, to abolish the confining regulations, either totally or in part, by a treaty which must be laid before the governing counselor (*Landrath*) of the district. The regulations of the district of Cöslin, passed in 1859, permit such deviations from certain specially mentioned rules, as have been agreed on by all the holders of fishing-privileges, inasmuch as a still greater protection of the industry is aimed at, and also the destruction of fish of prey, such as pike, or the stocking of the waters with fish, or the further increase of certain species of them, or the promotion of pisciculture. Such a contract must be approved by the governing counselor of the district, and the modified regulations must be clearly defined by the local police-authorities, and be properly promulgated throughout the whole district.

In some districts, special government officers are appointed to supervise the fisheries, such as higher fish-masters, fish-masters, fish-keepers, fishery-overseers, &c., all wearing a special uniform, and having their boats conspicuously marked, so as to be easily recognizable. Those private watchmen and other officers who are appointed by the proprietors of large fisheries are subordinate to the royal fish-master.

In other districts, the government has the right, in case the fishing-laws are violated by holders of privileges, and the fisheries are large and important, to appoint overseers at the expense of the proprietors. Fishing-permits have been allowed in some waters; they are to be issued on a mere request by the higher fish-master, but in case of litigation these permits cannot be used in giving judgment as to the rights of persons. The local police-authorities must every year make a list of all holders of fishing-privileges, and must exhibit them publicly for a certain period of time. Violations of the law are usually punished by a fine not to exceed the sum of \$37.50. In punishing transgressors, prohibited implements are as a rule to be confiscated.

These cases come into the police-courts, (law of April 14, 1856,) before which the district-attorney makes his charges. According to the circular of September 19, 1864, forest-officers can be appointed as attorneys for all violations of the fishing-law occurring within their jurisdiction, whenever they have no private interest in the fisheries, as lessees, &c., in which case the regular district-attorney prosecutes the case.

According to ¶ 370 of the imperial German penal code of May 15, 1871, persons catching fish or crawfish without having a privilege or a permit, are punishable by a fine not to exceed the sum of \$37.50, or by imprisonment.

According to ¶ 296 of the same code, persons who at night-time

catch fish or crawfish by torch-light, or, in fishing, use injurious or explosive matter; are to be punished with a fine not to exceed the sum of \$150, or by imprisonment for a period not to exceed six months.

In both cases of violation of the law, persons are prosecuted only if proper information has been given to the authorities.

Great as had been the care which the Prussian government had devoted to the framing of the several fishing-laws, many provisions had to be changed after a few years, showing how difficult it is to hit the right path at once in framing such a code. The published reasons for passing the law of April 22, 1869, changing the fishing-regulations of the law of August 30, 1865, in the district of Stralsund, contain the following:

“The law of August 30, 1865, is the result of thorough discussion during many years. The provincial authorities have gathered a vast mass of material for this purpose, which has been sifted and arranged by the ministry; and the provincial assemblies, as well as the Prussian parliament, have carefully considered all the propositions. If this law, nevertheless, after having been in force scarcely two years, is found to require a change, the cause of this is not a want of preliminary consideration, but the impossibility of making such consideration entirely exhaustive.”

The published reasons for passing the law point out the fact that the criticising of the many views of private individuals and fishermen, often differing in the most essential points, requires a fund of general, local, and technical knowledge not often found in one man, so that the defects of the first law can be remedied only by experience.

It is a peculiar phenomenon that in the Rhine province, the fisheries have been regulated by an order of Minister Stein, of August 18, 1814—to whom Prussia owes her best agrarian laws—on those principles which are even now recognized there, viz, the formation of fishing-associations by government order, in all cases where the persons holding fishing-privileges cannot agree. This very excellent order was rescinded by the law of July 23, 1833, and when, in consequence of this, the renting-out of the fisheries in private waters was entirely stopped, the fisheries were completely ruined. During the last thirty years, fishing in private streams in the Rhine province has decreased very much, because they were almost depopulated by the reckless conduct of privileged and non-privileged persons. As nothing was done either to protect the propagation of fish, or to prevent abuses, the business has become almost the exclusive property of fish-thieves.

From these and similar reasons, several agricultural societies, and especially the *Deutsche Fischerei-Verein*, have recently pointed out the necessity of regulating the fisheries in the larger waters by the formation of protective societies.

In the Rhine province, these protective associations begin to find favor, although they have no legal basis, as is shown by those at Polch and on the Nims, in the Bitburg district. The mayors, who usually start these

enterprises, are unfortunately obliged, through the lack of a law, to have recourse to ancient, almost fictitious laws, as for instance that those holders of fishing-privileges who were not present when a resolution was passed must be considered as having voted in the affirmative, that a resolution passed by the majority was binding on the minority, &c., all of which can only be enforced till one of the privilege-holders raises objections. (See Beck, *Beschreibung des Regierungsbezirkes Trier.*, vol. i, 549; iii, 305.)

In the autumn of 1872, the draught of a new fishing-law for the Prussian monarchy was published, and in December, 1872, brought, in a somewhat amended form, into the lower house of the Prussian parliament. This document is one of the most important in the history of fishing-legislation, and deserves our full attention also with a view to the adoption of a similar law in Austria.

In assigning reasons for passing such a law, the question is discussed whether it would be profitable to settle the whole matter as hitherto, by leaving it to the action of the local and provincial authorities, or whether a uniform fishing-law should be passed for the whole Prussian monarchy.

A careful consideration of this question showed that, although the fisheries differ very much in many respects, legislation for their benefit ought to be the same for all the provinces of the monarchy. In studying the different means of promoting the fisheries, no interests are found which are peculiar to any one province; they are, on the contrary, entirely independent of differences in the methods produced by local and climatic influences.

This being the case, an economical legislation demands general and uniform regulations. The means employed for promoting the fisheries will only then be successful if they are impartially applied to all portions of the country. It is true that, with regard to the inland waters, the body of every river flowing into the sea forms, so to speak, a separate and independent province; legislation, however, cannot follow the frequently not very clearly defined limits of these territories, whose tributaries often extend from one to the other, without getting confused and missing the object in view, viz: to establish firm and comprehensible rules for the fisheries, which gradually become indelibly impressed on the legal conscience of all parties concerned.

A fishing-law for the Prussian monarchy cannot entirely exhaust this matter, but must leave out some points which are to be settled according to local wants and by international treaties.

Rules which come under this head would mostly refer to the weight and measure below which certain fish could not be caught, sold, or shipped, as also to the limits of those seasons when fish are to be protected, and to the use and character of the fishing-apparatus.

These rules must be in conformity with the different methods in which the fisheries are carried on in the several provinces; but they must also have regard to the different species of fish found in the different waters

and to local and climatic circumstances. If such rules were embodied in the general law, this would become unnecessarily large, and would no doubt frequently require to be changed; and would doubtless, to the injury of the industry, of which science and experience are constantly developing new aspects, it would be prematurely settled.

The existing law of Prussia, like all the older fishing-laws, is, with few exceptions, confined to this field, and in most of the provinces there are rules regulating details.

The proposed law leaves these regulations unchanged for the present; but takes into consideration a uniform settlement of all these points in territories which belong together by a royal ordinance, which in many cases will have to be preceded by treaties with neighboring states.

The following are the more important provisions of this code, by which existing laws are to be amended or changed:

Fishing-privileges, which are not connected with some specified landed property, and which have hitherto been enjoyed by all the inhabitants of a village or city, shall, in future, to their present extent belong to the body politic. (§ 5.)

In those waters which form the boundary-line between two or more communities, without belonging to either, these communities shall enjoy equal privileges in that part of the water which is bordered by their territory. (§ 6.)

Existing privileges which refer to the use of certain specified apparatus for fishing, fixed contrivances, (weirs, fences, automatic traps for salmon, eels, &c.,) stationary nets, those that obstruct the greater part of the river, &c., can be limited or abolished by completely indemnifying the persons holding them.

Further limitation or abolition of such privileges can be claimed:

1. By the state for the public welfare;
2. By holders of fishing-privileges, or by fishing-associations, in the lower or upper portion of any water, if it can be proved that these operations are of lasting injury to the industry, impeding the introduction of a rational and economical system of conducting it.

The petitions of holders of privileges and of fishing-associations are decided on by the district government, after they have been thoroughly examined by competent men.

If the parties cannot agree upon the indemnity which is to be paid, the authorities will fix the amount, which must be settled by the person or persons petitioning for the abolition of privileges.

The existing ordinances regarding the abolition of servitude for the fisheries are not touched by any of the preceding regulations. (§ 4.)

It is said in the law that the abolition of fishing-privileges on foreign soil does not come within its jurisdiction; and reference is made to the above quoted abolition-law of March 2, 1850, which, as far as is required, is to be amended and completed. It is, however, considered as coming within the scope of this law to leave open a way for

abolishing such fishing-privileges as form a lasting opposition to a rational culture of the waters and the preservation and increase of the stock of fish.

Towns or villages can only make use of the inland waters belonging to them through specially appointed fishermen or by renting them. It is not permitted to make the fisheries free to all persons belonging to the community.

The period of lease must, as a rule, not be shorter than twelve years, and exceptions to this regulation can only be allowed by the local authorities in special cases.

If the fisheries belonging to one community are to be subdivided into several districts which are to be rented separately, such action must be approved by the local authorities, who have to see to it that they are not subdivided too much.

The local authorities are empowered to fix the number of fishing-apparatus in the several districts, which is not to be exceeded.

If two communities possess equal privileges in the waters bordering on their territory, they can only carry on the fisheries in common. If such communities cannot agree as to the manner in which this is to be done, the local authorities will decide the matter. (§§ 7.)

Persons holding fishing-privileges in a larger connected sheet of water way, with a view to better supervision and protection of the craft, form themselves into an association, with a statute, which must be approved by the government; such association must be represented by a board, to be elected by all the members according to the statute.

Before such statute can be approved, the privileged persons must be heard on the formation of the association and its statute, and, if one of these raises objections, the representative assemblies of the district in which the sheet of water in question is located are consulted. By the consent of all parties concerned, the object of the association may by the law be extended to the cultivation of the fish-waters in common. (§§ 8 and 9.)

The draught of the law discusses the question whether, after the example of several old provincial codes and after the model of some modern German fishing-laws, such as those of the Baden and Würtemberg, a rule should be made that every person who desires to fish should have a permit. This rule, says the draught, is taken from the game-laws.

Hunting and fishing are industries which in some respects are closely related to each other, and which, nevertheless, are totally different in the very points in question.

The economical value of fishing to the life of a nation very considerably exceeds that of hunting. Fishing is the chief industry and frequently the only means of earning a living in numerous families, in entire villages and districts, while hunting nearly everywhere is an occupation carried on outside of the various trades or industries.

If hunting privileges have unhesitatingly been granted on permits,

and a tax could be imposed on such favors, such taxation could scarcely be borne by the fishermen, who are as a general rule poor.

The most important reason for obliging all hunters to carry a permit is doubtless to insure public safety, and this reason entirely falls to the ground with the fishermen, not to mention other differences between the two occupations.

The introduction of such a measure to the above-mentioned extent is therefore not favored, as it would very much incommode the craft and the authorities charged with issuing or certifying the permits.

On the other hand, it is considered necessary, in order to prevent non-privileged persons from fishing, to demand some sort of identification of those persons who fish in the waters belonging to the holders of privileges, in the shape of some paper which such persons should carry with them when at work, and should exhibit, if requested to do so by an overseer. Those, however, who fish in their own waters would not require such a paper.

The right to issue permits to third persons should belong to the holder of a privilege within the limits of his jurisdiction; to the lessee of a fishing-district within the limits of his contract; and to the board of directors in waters belonging to an association.

Assistants employed in the presence of holders of privileges, or of persons having a permit, require no special permit.

The certifying of fishing permits by the local police-authorities must be done without any stamp or fee whatever. (§§ 10 to 15.)

The draught contains but very few regulations on the methods of fishing and the apparatus used. Apparatus, which is set for the purpose of fishing, in the absence of its owner must have a specified mark of recognition. (§ 16.) Fishing with poisonous bait, or by other means which stun or poison the fish, such as explosives, is prohibited, (§ 17.) as likewise the obstruction of more than one-half of any stream of water, (§ 18.)

All other regulations regarding methods of fishing, apparatus, the weight or measure below which fish are not to be caught, the days and seasons when fishing is prohibited, the rules to be observed by fishermen for avoiding mutual disturbances, and in the interest of public traffic and navigation, as well as for making supervision easier, are left to government ordinances, which, as far as required, are to be passed for connected territories. (§ 19.)

The code also contains prohibitions as to the sale of fish the catching of which is not permitted. (§§ 22 to 25.)

Great attention is given in this law to the establishment of places of safety, where the fish are to be absolutely protected; such places being considered as among the most important measures for protecting and preserving them.

The proposed law distinguishes two kinds of such places, viz:

a. Places of safety for spawning, *i. e.*, those localities which, in the

opinion of competent men, are specially suited to the spawning of fine fish and the development of the young ;

b. Places of safety for fish, *i. e.*, such portions of water in and before the mouths of rivers as command the entrance of fish from the sea into the inland waters.

Such localities (*a* and *b*) can be declared places of safety by the minister of agriculture, after having consulted with all the holders of privileges concerned ; in association-districts, with the board of directors.

The limits of such places of safety are to be made known to all persons concerned by public proclamation ; and they should be, as far as the locality permits, marked by special signs. In these spots, fishing of any kind is entirely prohibited.

In places of safety for spawning, all disturbances which tend to endanger the propagation of fish, such as their being cleaned out, the mowing of reeds and grass, the carrying away of sand, stones, mud, &c., should be avoided during the spawning season, as far as the tide and the claims of agriculture permit. More detailed regulations on these points as well as on the supervision of places of safety are, if necessary, to be made by the district authorities.

In selecting places of safety, preference should be given to those bodies of water in which the government has the exclusive fishing-privilege, or in which this has been transferred by law to political communities.

In these cases, no indemnity is paid for withdrawing the privilege of fishing in the places of safety.

If, however, the preservation or improvement of the fisheries demands the including of other waters as places of safety, the rights connected with such waters are withdrawn, and the holders of privileges must be fully indemnified from the public treasury ; the amount of such indemnity, if not mutually agreed on, to be settled by a court of law.

If it should no longer be desirable to keep up a place of safety, it can be abolished by an ordinance of the minister of agriculture. In this case, the former laws and privileges regarding fishing come again into force. If, however, an indemnity for the withdrawal of fishing-privileges has been paid from the public treasury, they shall then remain in the possession of the government. (§§ 27 to 31.)

Fish-passes (trout-paths, salmon-ladders, &c.) are considered essential conditions for the lasting preservation of remunerative fisheries.

The bill makes a distinction between new hydraulic constructions and existing ones which hinder the passage of migratory fish.

In constructing new hydraulic works, or extending them, the proprietor has, at his own expense, to make such arrangements as are necessary for letting the fish pass through.

If any such work is only constructed for a certain period of time, *e. g.*, while brooks and small rivers are temporarily dammed for the purpose of irrigating meadow-lands, or if the passage of migratory fish in the

respective waters is for the time being excluded by existing constructions or from other reasons, exceptions may be allowed under protest.

Proprietors of existing hydraulic works are obliged to permit the construction of fish-passes, if, *a*, the government demands such constructions in the public interest; or if, *b*, holders of fishing-privileges or fishing-associations intend to establish such passes in the upper or lower portions of the waters in question.

These rules only apply to natural waters, but not to artificial streams and to those hydraulic works which protect the lowlands against the flood from outside.

The proprietors of existing hydraulic works are to be fully indemnified for any injury done to such works. No indemnity is paid for any decrease in the value of the fisheries occasioned by the construction of a fish-pass.

The ground required for constructing a fish-pass must be given up by the proprietor; the full value thereof being paid to him.

In the fish-passes, any kind of fishing is prohibited. (§§ 33 to 39.)

The introduction into the waters of agricultural or industrial refuse of such quality and in such quantities as to injure the fish is prohibited.

In cases where the agricultural or industrial interests are of greater value than the fisheries, the introduction into the water of any of the above-mentioned refuse may be permitted by the authorities, provided that measures are taken to limit the possible injury of the fish to the smallest practicable amount.

If, through existing channels, agricultural or industrial refuse of an injurious character is introduced into the water to such an extent as to destroy or seriously endanger the fish, the proprietor of the establishments from which such refuse comes can, on the complaint of those persons whose fisheries are injured, be obliged by the authorities, after the case has been thoroughly examined, to make such arrangements as will remedy or at least diminish the damage that has been done, without, however, injuring his own establishment. The expenses of making such arrangements are to be refunded to the proprietor of the establishment by the complainants. (§ 40.)

The rotting of flax and hemp in running waters is prohibited. Exceptions from this rule can be made by the local authorities, always under protest, however, in such districts where the locality is not suited for making rotting-pits, and where the use of running water for preparing flax and hemp is absolutely necessary for the time being. (§ 41.)

The immediate supervision of the fisheries belongs to the government and local police-officers; in association-districts, besides these, to the board of directors; in all inland fisheries not belonging to associations, to each community within the limits of its own jurisdiction; in both cases under the superintendence of the local authorities. (§ 42.)

The first draught of the law contained the following regulation in § 43:

In superintending the operations, in carrying out the provisions of the

law, and in supervising all measures for furthering the industry, the district authorities shall, if necessary, be assisted by inspectors of fisheries. The relation of these inspectors to the superior and subordinate officers is regulated by ordinances of the government. (§ 43.)

Regarding the inspectors of fisheries, the preliminary report says:

“The appointment of inspectors of fisheries as competent counselors of the supervising officers has long since been recognized as an undisputed want, and becomes indispensable when all those measures are to be executed by which the sea and inland fisheries are to be promoted. It need scarcely be said that it is not intended to appoint at once an inspector of fisheries for every province; their number will, on the contrary, be at first a limited one, and will be increased as time and occasion demand.”

The second draught does not contain the above paragraph; but the preliminary report says expressly that the appointment of commissioners in chief as counselors to the principal supervising authorities, and as their referees in all matters pertaining to fisheries, will in all probability become necessary, but that their number will have to be as limited as possible. It seems, therefore, to be the intention to regulate this whole matter by some future ordinance.

Whenever the general German penal code does not provide for (§§ 296 and 370) violations of the fishing-law, the punishment inflicted will be by fines of \$7.50, \$22.50, and \$37.50, or with imprisonment.

Any person who violates the law through his servants, apprentices, or day-laborers is, besides being punished himself, made responsible for the payment of fines imposed on these assistants in case they are not able to pay them. (§ 47.)

Bavaria.—In Bavaria, the government, in 1854, recommended that artificial fish-culture should, with the assistance of the agricultural society, be introduced as far as possible, and that, through it, natural propagation should be carried out by placing spawn of the finer species in the rivers.

By giving information and encouragement, the authorities should aim at having smaller fisheries combined, and see to it that they are leased as a whole for a longer period to enterprising fishermen, on condition of their being carried on in a rational manner. The several villages and towns should be urged to do the same with those under their control.

The police-authorities were ordered to afford the greatest possible protection to fish-culture; to remedy existing evils as soon as possible; and, wherever practicable, to fix the amount of the fines.

In 1855, the fishing and fish-market regulations, which were partly revised and partly new, were promulgated throughout the kingdom.

Violations of the fishing-law were spoken of in article 231 of the penal code.

The example of the neighboring states will soon prompt Bavaria to reform her antiquated regulations, which will also exercise a beneficial

influence on the Austrian fisheries, since many of the Austrian and Bavarian waters are closely connected.

Württemberg.—The *Württemberg fishing-law* of November 27, 1865, is the result of discussions which were carried on for several years in the parliament. It contains regulations regarding permits, the leasing of the waters for several years by the communities, and prohibitions of entirely free fisheries; also full regulations on the rights of land-holders on the shores of the waters. In case of inundations, privileged persons can fish even beyond their shores, but are obliged to pay for any damage done to the land; after the waters have receded, every proprietor can catch the fish and crawfish left on his property, but must not place any contrivances which might hinder them from returning to the waters. During the spawning season of the finer species of fish, the cutting of wood near the shore, the mowing of reeds, &c., are prohibited.

Authorities and associations are urged to see to it that holders of fishing-privileges either carry on the enterprises in common, or lease them as a whole; the too great subdivisions of fisheries being in all cases considered as injurious.

Baden.—In *Baden*, the laws of March 29, 1852, and of March 26, 1853, provided that fishing-privileges on foreign soil could be bought off by paying a sum equal to twelve times the average annual revenue, to be paid in ten yearly installments, at 5 per cent. interest.

The law of March 3, 1870, provides that smaller waters may be united into a whole by the privilege-holders, with the consent of the district authorities, if the interests of the fisheries require it.

The privilege-holders of such a united fishing-district form an association; resolutions passed by the majority, and approved by the authorities, decide where the permanent seat of the association is to be, and on its constitution, duties and rights, its members, organs, and the manner in which business is to be transacted. Before the law, those privilege-holders who combined own the largest extent of water, form a majority, even though, in point of numbers, they should be in the minority.

The associations mentioned here, as well as communities and corporations, can only carry on their operations through specially appointed fishermen, or by renting them; the term of the lease not to be less than twelve years.

The draught of the law contains detailed regulations forbidding injurious fishing-apparatus, mischievous transgression of the law, &c. Special ordinances are to regulate the weight below which fish must not be caught, days and seasons when fishing is prohibited, and to mention those implements which are forbidden. All engaged must have permits, and, during the seasons of protection, fish are not to be caught, or sold, or offered as food in restaurants.

Fines for violating the fishing-laws, to which also assistants are liable, as well as confiscated nets and apparatus, shall go to the holders of

fishing-privileges. No one is to be prosecuted unless on the complaint of privilege-holders, their representatives, or one of the lawful overseers.

An ordinance of January 11, 1871, contains more detailed regulations on the formation of fishing-associations and on the establishment of spawning places and of places of safety. A minimum length has only been prescribed for *Trutta lacustris* Agass., *Trutta trutta* Lin., ($7\frac{4}{5}$ inches,) and for *Trutta fario* and *Thymallus vulgaris* Nilss., ($5\frac{3}{4}$ inches.) These fish, with the exception of the last mentioned, must not be caught from October 20 to January 20; all others may be taken, as well as the crawfish, from April 15 till the end of May.

The salmon-fisheries are to be regulated by future laws.

Fishing at night-time is prohibited, but exceptions may occasionally be made; the number of fish-weirs in public waters is to be limited as much as possible; the regular width of meshes and openings is fixed at 0.78 inch; spears and guns can only be employed in exceptional cases; automatic fish-traps connected with mills or other water-works are prohibited.

The public treasury may offer prizes for the best piscicultural establishments and for artificially hatched fish.

Saxony.—In Saxony, a new fishing-law was promulgated on the 15th October, 1868. By this law, the right to fish in running waters and their tributaries—if not otherwise settled by government grant or private title—belongs, *a*, in the original portions of the kingdom, to the proprietors of the shore as far as this extends, and, if both shores do not belong to the same person, as far as the middle of the stream; *b*, in Upper Lusatia, to the landed proprietors; *c*, in the rivers Elbe, Mulde, Elster, and in the Grödler and Elster Canals, to the state. If the fishing-privilege belongs to a community, or to the members of the community at large, or to a privileged class of citizens, or to a corporation, it can only be exercised through reuting it or by appointing a special fisherman. Fisheries can only be leased to a corporation of professional fishermen or to *one* individual. Fishing-permits are issued, but only to such persons as are not privilege-holders, lessees, or professional fishermen. All persons, including holders of privileges and manufacturers, are prohibited from hindering the migration of fish by permanent arrangements, and manufacturers must, as far as practicable, make passages in their weirs. Also, in other ways, the law endeavors to harmonize the water-privileges with the interests of fishing and pisciculture. Various ordinances regulate the employment of injurious apparatus, the time when fishing is prohibited, the minimum weight of fish that can be caught, &c. So far, only one ordinance has been passed in regard to these matters, that of October 16, 1868.

Dr. Fric, in his report, says that the carrying-out of the law leaves much to be desired. Many fishermen seem scarcely to be aware of the existence of a law at all, and are still waiting for one. The fixing of the time when salmon are to be protected has been deferred till treaties

can be concluded with all the other states bordering on the Elbe. The authorities seem to delay the carrying-out of the law, because they wait for a general fishing-code for the whole of the German empire.

Dr. Fric remarks that the fact of most of the shores and streams being under one and the same authority greatly favors the execution of the laws in Germany.

Lübeck.—In Lübeck, the piscicultural society has drawn up rules for the protection of fish during the spawning season, the size of meshes, the minimum size of fish that may be offered for sale, &c.; all of which rules have been adopted by the senate in its fishing-law of December 16, 1868. It is a matter of regret that the senate has been induced by the representations of selfish men, who were afraid to see their income diminished for a short time, to change some of the most important regulations by an amendment of February 15, 1869. Complaints are also made that the supervision of the fisheries is very defective; the market-police do not exercise the necessary control, from ignorance and want of interest; the directors of the fishermen's guild, whose duty it is to superintend the fisheries, are themselves fishermen, and therefore but rarely inclined to use the proper severity in proceeding against members of their guild. It is therefore the aim of the piscicultural society to have a fish-master appointed, who is to possess special powers, and whose duty it shall be to superintend the fisheries. This aim has not yet been attained, from purely financial reasons.

Switzerland.—In Switzerland, there are different fishing-laws in the different cantons. The most recent law is the one passed by the great council of the canton of St. Gall, December 25, 1870.

According to this law, the right to fish in the waters of the canton, whenever there are no special privileges of communities, corporations, or private individuals, belongs to the government.

The right to fish in government waters may be obtained by a lease or by buying a permit, ("patent.") The lease may be for a term of ten years and shall be sold at public auction.

A fishing-permit must be renewed every year. Certain specified persons are excluded from taking out permits. A permit to fish with nets and other implements costs \$4, and \$2 for every assistant; and a permit to fish with hook and line, \$1.20; which sums go to the treasury of the canton.

The law contains the usual regulations as to prohibited fishing-implements, the seasons when there is to be no fishing, and the buying and selling of fish.

In some waters, such as the rivers Thur and Rhine, and in the streams flowing into the Lake of Constance, the Wallen Lake, and the Lake of Zürich, fishing with hook and line is alone permitted; all other implements being entirely prohibited. The great council is, however, empowered to permit the use of nets, if in future times the increased number of fish in one or all these waters should justify such use.

The council is likewise empowered to extend the time when the fishing of salmon, salmon-trout, and trout is prohibited, in any water or in portions of it, to a whole year or several years, if their preservation demands such a measure.

The council can only make exceptions in the case of piscicultural establishments, allowing fish to be caught during the season of protection, or spawn to be taken for the purpose of hatching, if the establishment in question contributes its share toward restocking the waters of the canton. Such establishments are, if necessary, to be placed under special police protection.

It is forbidden to throw or otherwise introduce into fishing-waters refuse from factories or other injurious substances. Such refuse must be buried in pits. If the agricultural or industrial interests are of more importance than the fisheries, the council may permit exceptions to this rule.

The owners of water-privileges are obliged to build their weirs and dams in such a manner as to allow the fish to swim up the stream. Proper arrangements shall also be provided to prevent fish from getting entangled in mill-wheels, &c.

Violations of this law are punished—

- a. By fines, varying from \$1 to \$20, or by imprisonment;
- b. Withdrawal of the lease, or of the fishing-permit, for a certain period, or forever;
- c. By confiscation of prohibited implements, or of fish bought or sold contrary to the regulations as to size and fishing-season.

The council is empowered to conclude treaties with the neighboring cantons or states, regarding the fisheries in waters which form boundary-lines, and, if circumstances require, to suspend some of the regulations of this law as far as boundary-waters are concerned, and to make special rules for such waters. It is also charged with carrying the law into effect by special ordinances.

Such an ordinance was promulgated by the council May 17, 1871.

This statute gives the division of the canton into districts which are rented, and districts where fishing can be carried on by permit; likewise regulations as to renting and issuing fishing-permits.

If no bid should be made on any district, permits may be issued for such a district; and, *vice versa*, if no permits are taken out, it may be rented.

An exception from the regulations contained in this law is made with regard to the fisheries in the Rhine, both as to the implements and the seasons of protection, as long as these fisheries are not regulated by treaties, or whenever the fishermen on the opposite shore do not of their own accord submit to these regulations. The obstruction of the Rhine by nets or other apparatus for more than half its breadth is even now strictly prohibited on both banks.

Lessees of fisheries who carry on artificial breeding, and can prove

that they do this in a productive manner, not only can claim all those favors which the law accords during the season of protection, &c., but their rent may also be lowered in proportion as they give young fish to other waters of the canton.

The district-offices keep lists of all waters, leases, and fishing-permits. The local, district, and cantonal police-officers are to see that all the provisions of this law are fulfilled. If necessary, special overseers over the fisheries in one or more waters may be appointed.

France.—In France, exclusive fishing-privileges were abolished by the laws of July 6, July 30, and September 26 1793, as being a remnant of the age of feudalism. Navigable rivers and streams belong to the state, and are usually rented.

The fisheries have since been regulated by the law of April 15, 1829, which gives full details of the rights of the fishing-guards to examine implements, vessels, huts, tanks, &c. A few changes have been made by the law of May 31, 1865, and by an imperial decree of November 28, 1868.

The instructions given to the authorities to protect the fisheries in every way, to use all means for improving them, to stock rivers and streams with fish and crawfish, to establish places of safety, to plant the banks with trees and shrubs, &c., deserve great praise.

Italy.—In Italy, a special committee was appointed as early as 1861 to prepare the draught of a fishing-law; and a new committee for the same purpose was appointed in 1870.

The government, in 1870, had reports drawn up by the prefects of all the provinces relating to the several species of fish found in each province, the implements used in fishing, the spawning seasons of fish, &c., the number of piscicultural establishments, the number of fishermen, their relation to each other, the total area of water, and the existing rules and regulations; inquiries were also made regarding foreign fisheries and laws.

On the basis of these reports, the ministry of agriculture, industry and commerce, in the session of the chamber of deputies of January 24, 1871, laid before the chambers the draught of a fishing-law, together with a lengthy report containing the results of all the inquiries.

The annual value of the salt-water fisheries is estimated at \$8,000,000, and that of the fresh-water fisheries at from \$600,000 to \$800,000.

As interesting to Austrian fishermen, it may be mentioned that on the Italian portion of Lake Garda 500 fishing-vessels, manned by 1,400 fishermen, are employed. The fisheries on this water, belonging partly to Austria and partly to Italy, must be regulated by an international arrangement, to arrive at which the first steps have been taken by the Austrian ministry of agriculture.

The draught of the new Italian fishing-law contains 54 paragraphs. The separate laws of the provinces are abolished, and a uniform code

for the whole kingdom of Italy is to be introduced, extending also to the salt water fisheries.

The details of the code are modeled after the best modern fishing laws, especially those of Germany, and contain not only provisions for the proper protection of the fisheries against reckless plundering by privilege-holders, but likewise such as are intended to regulate the legal relation to third persons. Many points are left to be settled by special ordinances.

These ordinances are to fix the boundaries between salt-water and fresh-water fisheries; to make rules and regulations regarding the time, place, methods, and implements of fishing; regarding the transportation of implements and fish and the sale of the latter; and, finally, regarding the supervision of the fisheries, which the proper protection and care of them requires. The nets and apparatus by which spawn and young fish might be injured are to be prohibited.

The ordinances have also to fix the limits of time and space of such prohibitory measures, and also the extent to which contrivances can be permitted which would hinder or disturb the free passage of fish. Special regulations are to be made for cases in which spawn and young fish may be used for scientific purposes, for piscicultural establishments, or as bait. Rules will be adopted as to the extent of regulations for the transportation and sale of water-products according as these come from private waters, from the open sea, or from foreign countries. Other regulations will decide how far weirs, sluices, and other hydraulic constructions which hinder the free passage of fish can be permitted in the interest of industry or agriculture, providing in all cases for the construction of passage-ways. Special decrees will decide how far refuse which is injurious to the growth and development of fish can be introduced into the water in the interest of industry or agriculture, or how far industrial or agricultural pursuits, which have the same effect, may be carried on near fishing-waters.

Without special permit, no water-plants, sand, stones, or mud can be removed from inland waters.

The ordinances will point out those private waters to which the foregoing provisions are to apply. The proper police-regulations for supervising the fisheries are also to be made.

By royal decree, a central commission of fisheries is to be appointed, besides the ministry of agriculture. It belongs to this commission to pass an opinion on the regulations of the above-mentioned ordinances, and to propose all those measures which they consider to be of benefit to the fisheries. Within one year, the provincial assemblies—and, in behalf of the salt-water fisheries, special committees from each district—have to hand in their draughts of these ordinances; the ministry promulgating them without delay in case of non-compliance with this decree. The ordinances may refer to several provinces and several districts or only to certain waters.

The ministry of finance will make proper regulations for the assistance which coast-guards and officers of the customs are to give in superintending the fisheries and in hunting up persons who have violated the laws. The ordinances will also decide how far the various communities have to assist in supervising the transportation and sale of fish and other water-products. Violations of the law are to be punished by fines not to exceed \$60, and \$200 in case of the tunny-fisheries.

The ordinances will also decide in what cases the implements of violators of the law shall be confiscated.

Two-thirds of the money coming from fines and the sale of confiscated articles is to go to the officers or agents who have discovered the violations, and one-third is to go to the public treasury or to special benevolent funds. The harbor-officers, as well as the prefects, may be present in court, in person or by proxy, when cases of violation of the fishery-law are brought up, in order to express their views on the case and to decide legal questions.

Professional fishermen may form themselves into associations, and elect from their number a board of directors, called "The trusty men of the fisheries," (*probi viri della pesca.*) These men shall pass decisions in private quarrels, shall assist in the superintendence of the fisheries, and they are entitled to propose changes in the ordinances to the ministry, and to suggest new measures which, in their opinion, will be beneficial to the industry. Special ordinances will prescribe the manner in which associations are to be formed, what persons may be active and honorary members, as well as rules for the guidance of the board of directors, in cases laid before them.

Denmark, Sweden, and Norway.—The Scandinavian countries, Denmark, Sweden, and Norway, have also regulated their fisheries, both salt-water and fresh-water, during the last twenty years, by new laws; Denmark, 1857-'60, 1861, and 1867; Sweden, 1852 and 1869; and Norway, 1854, 1863, and 1869.

The many changes in the fishing-laws which have been made in these countries during so short a period afford another proof of the difficulty of passing such definite laws as will answer all practical purposes.

Russia.—Of the Russian fisheries in the Dniester, Dnieper, the Volga, and the Black Sea, it is said "that laws, discipline, and work are so strictly and suitably regulated that other nations which consider themselves far more civilized might learn a great deal from them."

United States.—Even in the United States of North America, where hitherto the large lakes, streams, and seas have been plundered shamefully, and with most ingeniously-contrived nets, the people have now become afraid of exhausting their wealth of fish, and are endeavoring to bring about order and a system of protection by laws, treaties, and other measures. The last reports of the commissioners of the different States, whose duty it is to see to the proper execution of the laws, to

propose new ones, and to promote the fisheries in every possible way, have been spoken of above.

Great Britain.—The British fishing-laws deserve our fullest attention. Since, about eighty years ago, the discovery was made that salmon packed in ice could be brought to London in a fresh condition, the demand for it, and the price paid, have been increasing so rapidly that there was imminent danger of seeing the British seas and streams entirely depopulated, and of having the traffic in salmon, the pride of the English fisheries, entirely destroyed.

Dire necessity has compelled Great Britain to protect and improve its fisheries in every possible manner. All technical inventions and improvements, artificial fish-culture, passage-ways for fish, &c., are put to the best practical use. Immense capital is invested in the fisheries by private individuals or by joint-stock companies. The laws afford the fullest protection to these enterprises. Holders of fishing-privileges have formed themselves into well-managed organizations, so that the majority is enabled to pass resolutions which will prove beneficial. The British fishing-laws afford protection against the factories, the poisoning of the waters, and their being obstructed by weirs; they protect the spawning places; see to it that the spawning seasons are properly observed; do away with injurious stationary nets; prevent the capture and sale of young fish, &c. Inspectors of fisheries possess full powers to control the privileges of angling in salmon rivers and of using a specified kind of nets; to have a strict eye to stationary nets and other apparatus; and to punish all violation of the law severely.

Although occasional complaints are raised that the acts of parliament are getting more and more confused, their complication is not so great as to injure the fisheries, and, with sensible firmness, injurious influences are constantly overcome, and improvements are made.

Many antiquated and impracticable laws have been replaced by new and better ones, especially since the beginning of Queen Victoria's reign. Still more important are the acts of parliament of 1828, 1842, 1850, 1857, and 1861. They refer either to special branches of the trade such as salt-water fishing, shell-fish and oyster dredging, and salmon catching, or to the fisheries in the several different countries composing the British monarchy, England, Scotland, Ireland, or to certain lakes or streams, as for instance the act of 1857, concerning the Tweed fisheries, which was amended in 1859.

In discussing the act of 1861, relating to salmon-fisheries, many were of the opinion that this entirely neglected British industry, the profits of which amounted to almost nothing, could never again be brought to a flourishing condition.

These opinions have proved to be erroneous, since that law has produced such favorable results; and it is expected that these results will be still more brilliant in the future. A commission was appointed in 1870, charged with considering the question in what respects the salmon-

fishery laws could be still further amended. Improvements had been introduced into Scotland some time before this.

From the law of July 31, 1868, concerning the salmon-fisheries in Scotland, and from some older laws, which have been incorporated with it, we quote the following as of special interest for Austria:

“All the waters, streams, and rivers in Scotland which are of importance to the fisheries have been accurately described by special commissioners, and their limits toward the sea have been defined; as a general rule, they have been divided into an upper and a lower portion by a boundary-line. These commissioners have fixed the annual as well as the weekly-period of protection for each sheet of water or stream, when salmon-fishing is either entirely prohibited or only permitted with hook-and-line, and their decisions have been published in an appendix to the law. The different contrivances to be used in nets, salmon-traps, &c., in order to keep the seasons of protection, the size of the meshes, and certain precautions in using the nets, are separately prescribed for each body of water.

“If two owners of salmon-fisheries in a continuous district—no matter whether the waters at the time contain salmon or not—apply to the county sheriff to have a district-board appointed, such application must be granted. The clerk of the sheriff has to draw up a list of the upper and lower fishery owners, and call separate meetings of both, for electing a district-board. The district-board appoints an officer, whose duty it is to keep the list of owners constantly revised. If names have been left out of this list, or have been entered in a faulty manner, a complaint may be made to the district-board; and if its decision is unfavorable, the matter can be referred to the sheriff, whose decision is final, except in cases of hereditary rights.

“The district-board, at its meetings, decides all questions pertaining to fisheries by an absolute majority. The minutes of the meetings of the board, signed by the chairman, are considered evidence in a court of law.

“The district-board may, by a resolution to that effect, petition the ministry to make the following regulations:

“1. Change of the annual season of protection in the district, fixed by the commissioners; which season, however, is never to be less than one hundred and sixty-eight days. (It generally embraces the period from the 27th August till the 10th February, and for line-fishing from November 1 till February 10.)

“2. Change of the weekly season of protection in the district or in portions of it; such season to be no less than thirty-six hours per week. (From 6 p. m. on Saturday till 6 a. m. on Monday.)

“3. Change of the rules applying to the yearly or weekly season of protection.

“4. Change of the rules concerning ‘cruives,’* and the dams and weirs belonging thereto, within the district limits.

“5. Changes regarding the establishment of mill-dams, aqueducts, and water-wheels, the placing of heks or gratings, the closing of sluices wherever they open into or from aqueducts within the limits of the district; provided that by such changes the supply of water to which persons are entitled who have the right to use an existing salmon-dam as a weir is not diminished.

“The votes of the district-board deciding such changes must be published in some paper of the district before they can be officially presented to the minister. The minister may collect information on the subject; and if the proposed change is not in opposition to any rights belonging to persons by royal grant, privileges, or immemorial possession, the minister shall consent to the change and publish it in the Edinburgh Gazette.

“Until some change shall have been made, the regulations settled for each district by the act of 1868 remain in force.

“The district-board is empowered to buy, from the proprietors, dams, weirs, cruives, and other stationary contrivances, whose removal they consider necessary for the welfare of the fisheries; heirs of entailed estates are likewise entitled to conclude such transactions with the district-board, even without the consent of their guardians.

“The district-board is also empowered to remove every natural hinderance in the bed of a river which might impede the passage of fish; to make fish-passes near the water-falls; to take all the measures and meet all the expenses which in their opinion appear necessary for the protection or improvement of the fisheries in the district, as well as for stocking the waters with fish.

“The above-mentioned right of buying weirs, &c., can only be applied if the resolution of the district-board relating thereto has the sanction of the owners of four-fifths of the total value of the district fisheries.

“The members of the district-board shall not receive any salary or fee.

“The board is empowered, with the consent of the minister, to contract loans for carrying into effect the above regulations; such loans not to be made for any period exceeding two years.

“A fine, not to exceed \$25, is to be imposed on any person who fishes during the yearly or weekly season of protection, or assists in fishing, or violates a law relating to the season of protection, or uses nets with too narrow meshes, or catches salmon as they leap over a water-fall or some other impediment, or keeps them back after the leap, or prevents salmon from going through fish-passes, or catches them in such passes, or throws sawdust, chaff, or corn husks into fishing waters, or causes it to be thrown into it. For every salmon caught or killed contrary to

* A cruive is an inclosed space in a dam-wall, so contrived that when the fish enter it in their passage up stream they cannot escape.—S. F. B.

law, a further fine, not to exceed \$10, is to be imposed; and the fish are to be confiscated.

“A fine of \$25 is to be imposed on any person who fishes with a light or fire, a spear, lance, harpoon, or similar implement, with a cross-line or a drag-net, or who is found in possession of any of the above-mentioned implements under circumstances which convince the court before which he has been brought that he intended to catch salmon; his implements and the fish found in his possession are to be confiscated.

“A fine, not to exceed \$10, is imposed on any person who uses fish-spawn for fishing, who buys, sells, exhibits for sale, or has in his possession, with a view to selling it, any salmon-spawn. This does not apply to spawn used in artificial fish-culture or for scientific purposes.

“A fine, not to exceed \$25, is imposed on any person who catches, has in his possession, or sells a smolt, (young salmon;) who places contrivances in the water which delay the salmon on their journey; who intentionally damages salmon; who disturbs fish-spawn, spawning places, or shallow places where there might be salmon-spawn; or who prevents salmon from going to the spawning places.

“The district-board is empowered to use all suitable means for preventing the entrance of salmon into narrow streams or into spawning places where the eggs might be exposed to destruction; provided that industrial or agricultural establishments, and especially drainage, or any water-rights, shall not be injured thereby.

“A fine, not to exceed \$25 for every fish, is imposed on any person who catches spawning salmon, or who buys, sells, or has such in his possession.

“Salmon which are intended for exportation must be registered by special officers of customs, in order that the law providing seasons of protection may not be violated. Persons who violate this rule, including those who ship the fish, are punished with a fine, not to exceed \$10, for every salmon. Custom-house officers have the unlimited right of searching after salmon.

“The owner or lessee of a fishery must remove all fishing-vessels, oars, nets, and other apparatus used in salmon-fishing from the waters, from the landing-places and the portions of ground near to them within thirty-six hours after the commencement of the annual season of protection, and secure them in such a manner as to prevent their use during this season. Exceptions are made only for boats and oars used in line-fishing. At the same time, all *heks* of the *cruives* must be removed, as well as all planks and contrivances which might hinder the free passage of the fish through the *cruives*. Persons who violate these rules have their boats, nets, &c., confiscated, and are punished with a fine, not to exceed \$50, for every day after the time mentioned.

“Ferry-boats must be marked with the name of the owner, and must, when not used, be kept under lock and key.

“The by-laws for the separate waters contain suitable regulations for

observing the weekly season of protection, for using poles, weirs, pole-nets, fly-nets, and sack-nets. Persons violating any of these regulations are punished with a general fine, not to exceed \$50 for every net used, and a special fine, not to exceed \$10 for every salmon caught, during the weekly season of protection.

“Every constable, overseer, or officer of the district-board, as well as every police-officer, has the right to examine every boat, net, and other fishing-apparatus in the water, or to have them brought on shore, and to confiscate any salmon which have been caught contrary to law or which are found in the possession of non-privileged persons. For the right to fish in waters beyond the district, a written order from the sheriff or justice of the peace is required, which must be issued on the oath of some police-officer of the district that the person desiring such order is not in any way a suspicious person.

“Any person can, even without a special order, take up any violator of the above regulations, and take him before a sheriff or justice of the peace or any other magistrate, or have him taken there by a constable. He is then to be heard immediately, and according to the circumstances of the case, or, in default of bail, be kept in confinement till the next meeting of the court.

“All violators of the ordinance can be prosecuted before any sheriff, or before two or more judges who have the jurisdiction in the place where the law was violated, even if the clerk of the district court or any other person possessing the right should interfere; and the fines mentioned in the act can be imposed by such courts. The act prescribes a special summary procedure for such cases.

“Conviction in any case of violating the aforesaid act also involves the loss of all boats, nets, lines, hooks, spears, lances, or other implements used, as well as of all the salmon found in the possession of the transgressor. The objects which have been confiscated are either to be destroyed or handed to the district-board or to any person who acts as plaintiff in the case.

“If a person is convicted of two violations of the law at one and the same time, the fine must not be less than one-half of the highest amount for each violation; and, if convicted a third time, not below the highest amount fixed by law.

“No justice of the peace should be considered incompetent because he is a member of a district-board. No judge, however, shall preside in a case of violation of law committed in his own waters.

“If a law has been violated on some water forming the boundary-line between two counties, the case may be prosecuted in either county. If the law has been violated on the sea-coast or on the sea beyond the jurisdiction of a sheriff or justice of the peace, it is to be considered as if committed within the limits of some county bordering on the coast.

“All fines imposed by this act, and costs, can be assessed on a common complaint, or before the debtors' court. The clerk of the district-

board is entitled to receive all such moneys. The district-board may use all money coming from such sources in meeting the expenses of carrying out the regulations of this act."

23.—FISHING-PRIVILEGES AND FISHING-LAWS IN AUSTRIA.

A review of the fishing-privileges granted in olden times in the several provinces of Austria, and of the old fishing-laws, possesses not merely a great historic interest, but is likewise useful, because a portion of these, even some very old ones, have not been changed in the course of time, and because all of them frequently throw much light on the various demands which even a modern law must take into account. Many of the older laws, though their form be antiquated, therefore in many respects form the best guides for the framers of new ones.

The question which of the older laws are still in force is a very difficult one, and the following review, which divides them into old and still existing fishing-laws does not claim to be complete nor to be entirely free from errors.

Old fishing-laws.—A large portion of legislation, especially with regard to economical matters, and therefore also to the fisheries, was formerly in the hands of lower autonomous bodies, such as villages, towns, and corporations, and of smaller landed proprietors.

We therefore find numerous fishing-regulations from the oldest times in the legal documents containing the privileges of villages and landed proprietors. These ordinances partly define the limits of the fisheries, and partly prescribe the manner in which they are to be carried on.

The older documents frequently consider the catching of fish as a privilege belonging to the community or to the landed proprietors; but from the fifteenth century the right had fallen almost entirely into the hands of the government.

To mention a few examples: the Lower Austrian Law-Book of Möllersdorf, in the archbishopric of Vienna, gives the right to fish in the water called the Müll to the community of Möllersdorf. The king's bailiff and the bailiff of the convent-chapter are allowed to go to the water on Fridays and catch a "dish of fish." Strangers are not allowed to catch fish or crawfish, either with "tools" or with their hands. (*Kaltenbäck, Österreichische Rechtsbücher*, I, 482.) In Oberwaltersdorf, the community likewise possess a fishing grounds; the fisherman is appointed by the community, but is not allowed to sell fish to any one, unless he has called them three times on the bridge. Every person who sits "at his own fire-place" may fish in the stream with hook and line, (I, 35.) Similar regulations are given in the Lebern Law-Book, (II, 114.)

According to the old Law-Book of Neunkirchen, the citizens of the town have the right to fish; servants who fish when not in the company of their master are punished. A later appendix to this law-book likewise indicates the transfer of the fishing-privileges in the following words: "When the market was changed, the fisheries were likewise

changed, so that henceforth neither citizen nor servant is allowed to fish." (I, 488.)

In Minkendorf, every miller is allowed to fish as far as he can throw his "*billc*" (instrument used for sharpening the millstones) from his mill-wheel, either up or down the stream, (I, 541.)

In Moravia, the neighbors of millers' wives are allowed to fish every Thursday in the afternoon, and every Friday in the forenoon, and during the season when the ice and water flow from the mountains for three days in succession. (Chlumecky, *Mürische Dorfwirtschaftlümer, Archiv für Kunde österreichischer Geschichtsquellen*, XVII, 70.)

In villages or towns where all the ground belongs to a landed proprietor, the fisheries likewise belong to him. The old law-books say, in such cases, that to him belong "the fish in the water," "the fish in the stream," "the fish in the pond," "the fish on the sand," &c. In all such domains, there were, however, free waters in which every one was allowed to fish.

On lakes and rivers where fishing is carried on as a trade, the privilege holders form an association, and have as such their own law-books, their autonomous and judicial power. They make their own regulations, and in their own court of justice decide all disputes between members of the association, and punish violations of the law. The lord of the manor, or his representative, presides at these courts of fishing-associations, as well as in village-courts. This applies as well to those free communities which elect their own presiding officers as in domains in which the fishing grounds belongs to the lord of the manor, while the villagers have only certain rights, either hereditary or temporary, which must be paid for in a certain annual number of fish or by some work.

On the Gmunden Lake, the fishery court was held every year on the days of the fishing apostles Philip and James, and, later, on St. Peter's day, and the mayor of the village of Ort presided, under the title, "Lake-judge." In special cases, the lord of the manor may call the court together on other days.

The prelate of Klosterneuburg holds an annual fish-court at that place, with the master-fishers of the Danube and their servants. Similar courts are held at St. Georgen on the Traisen. (Kaltenbäck, I, 600; II, 107 and 108.)

The law-book of Ort, on the fisheries of the Traun and Gmunden Lakes, gives very exact rules regarding nets and other fishing-implements; on the seasons when the various kinds of fish in these lakes may be caught; on the minimum length below which they must not be caught; of the rights of the individual fishermen; the fish-trade; punishments; the duties which fishermen owe to the lord of the manor, and especially the right of the latter to be the first bidder on all fish caught, &c.

This law-book is, like many old documents of the kind, arranged in the form of questions and answers. The questions are, as in our modern courts of law, addressed by the presiding judge to the jurors, or, as they

are here called, "Schranne," (Old-German;) and the foreman of the jury, appointed by the community, gives the answers in the name of the jurors, and all the assembled citizens of the community or members of the association. If these answers meet with no objections from the assembly, they are considered as "judgments." The fish-court is opened by the judge with the well-known introductory questions, "Is this the right hour, day, and time that I should open the fish-court on the Traun Lake, as has been done from times of old?" The foreman answers, "Your honor, the judge of the fish-court, since you ask me whether this be the right time that you should hold a fish-court in the county of Ort, I solemnly affirm that this is the day, hour, and time that such fish-court should be held, seeing that this is St. James's Day." In this manner, the fishing-laws, as they have been in force on this lake from time immemorial, are given, with occasional later additions or changes, by "question and judgment," on every article of the law, on each commandment or prohibition.

From all these old documents we see that the fishermen's trade in its connection with agriculture was organized in a practical and liberal manner, with much of that spirit of self-government which does not shrink from energetic measures whenever these are considered necessary and practical.

The oftener attempts are made, on the one hand, especially in the larger waters, streams, and lakes, to enforce the royal prerogatives in the matter of fishing-privileges, and the more, on the other hand, the ownership of the fisheries by the monarch incites his disposition to control them, the more does this autonomous legislation of the lower classes disappear. From the sixteenth century, we find the fisheries more and more regulated by state legislation, by rules and regulations for certain provinces or for certain waters, and from time to time measures taken to make them more productive, and to prevent the reckless plundering of the waters by the lower classes.

Some of these government fishing-regulations date very far back. Instead of merely enumerating a great many of these provisions with their date, we shall attempt to give a fuller review of some of the laws enacted by the Upper Austrian government.

But few traces are found in these regulations of the fishing-privileges of olden times, when they formed an integral part of the common rights of each community to field and forest, because these societies, or, as they are usually called in Austria, these "neighborhoods," which had fields and meadows in common, still retained the right of fishing in those waters which were the property of the people at large. In the larger waters, especially in the lakes, the right to fish was in most cases a special privilege, some of these dating back as far as the time of Charlemagne. In granting such favors, a distinction is made between "large" and "small" privileges, differing according to the fishing-inplements used. Thus, we read, in a document dated 813,

"*Segena una ad piscandum.*" (*Mon. Boic*, 85.) By the term "*segena*" is meant a large drag-net, with all the fishing-apparatus belonging to it, large and small boats, and implements of every kind; sometimes this word also implies the fishing-privilege, and occasionally the district where such privilege may be exercised.

Besides the *segena*, or great fishers, there were small "carriers," or small fishers, who again were subdivided into "*Gärnlers*," (literally "netters,") who were allowed to use bow-nets, and "*Schnürer*," (literally "liners,") who were only allowed to use hooks and lines.

The oldest fishing-law of Upper Austria is that established by the Emperor Maximilian I, March 7, 1499, which is preserved in the archives at Linz. In this law, the emperor charges his vice-regent in the country above the Enns, George von Loserstein, to regulate the fisheries in the river Traun from the Falls to the Danube.

This law contains a paragraph ordering the fishermen only to use *segena*, or bow-nets, with meshes of a certain size, and to throw out all all fish which have not the prescribed length.

The government prescribed the size of the meshes on certain small stamped pieces of board, which were to serve as models for those blocks on which the fishermen knit their nets. Illustrations of such model blocks are frequently met with in old fishing-laws, and also pictures of fish of the exact size below which they must not be caught. Such pictures were frequently hung up in town and city halls, and may yet be seen there, as in the city-hall of Zürich.

A very similar fishing-law was proclaimed February 1, 1537, by the Emperor Ferdinand I. This law enumerates those fishing-implements which are entirely prohibited, such as double drag-nets, the outer one having smaller meshes than the inner one. It also prohibits the catching of fish during the spawning season. Specially appointed fish-masters are to examine the fish-tanks frequently.

A third fishing-law for Upper Austria was enacted by the Emperor Maximilian II, December 31, 1573, which is kept in the register's office for Upper Austria. This law for the greater part is a repetition of former laws, and contains certain limitations for protecting navigation on the river Traun.

Complaints having been raised by the provincial assembly against the former fishing-laws, a new one was proclaimed by the Emperor Rudolf II, June 3, 1583, which has not been displaced by any later code, but which has practically everywhere fallen into disuse. It is contained in the *Codex Austriacus*, I, p. 354, and relates chiefly "to the waters, rivers, and streams containing the greatest wealth of fish, viz, the Danube, Traun, Vöklä, Ager, Alm, Krems, Enns, and Heier."

For the lakes, especially for the Mond, Atter, Wolfgang, Hallstädter, and Gmunder Lakes, there were special laws, which the emperor in former times had, to a great extent, examined and amended through his commissioners.

In the general fishing-law, the size of the meshes in all nets is exactly prescribed by a model block, of which an illustration is given in the text. Such a block is to be kept in every town and in every market. The exact size of the openings in box-nets is likewise given. They must not be placed in such a manner as to disturb navigation in the rivers.

No fisherman is allowed to interfere with the fisheries of another. Fishing in the Traun at night-time is entirely prohibited. The drag-nets forbidden by former fishing-laws are now permitted, but only for smaller fish, and during the period from St. Martin's Day (November 11) till Shrove Tuesday.

The owners or lessees of hereditary fisheries must observe the same rules.

Millers, owners of founderies, and other manufacturers shall abstain from all fishing in the waters flowing past their establishments, because thereby the finer kinds of fish might be exterminated, even if some of them should possess the privilege to fish as far as they can throw a hammer or pick. They are forbidden to fish with bow-nets, and even with hook and line, unless they have received a special permit. When, in cases of necessity, they wish to turn off the mill-streams, they must announce their intention to the privilege-holder three days beforehand, in order that the stock of fish be not destroyed. The privilege-holders are obliged to permit this four times a year. In the common or free fishing-waters, no person is allowed to fish, unless he possesses fields and meadows in common with his neighbors.

The neighbors are only allowed to fish two days in every week, viz, Thursdays and Fridays, with small nets with the meshes made of the size of the model block. Fishing at night and the taking of crawfish in the free streams are entirely prohibited. Those living near the waters who find any one violating this rule are empowered to take all his fishing-tackle and fish, and it is provided that the government shall punish the transgressor.

Any person who stuns the fish with prepared pellets so as to enable him to catch them with his hand shall undergo a severe corporal punishment.

No one is allowed to dig pits or to make marshes alongside of a fishing-water, for the purpose of fishing. Wherever there are such pits or marshes, they shall not be shut up when the water rises and fills them, so as to prevent fish which a higher water has brought into them from returning.

Fish remaining in uninclosed pits or marshes may be caught by the proprietor thereof, who is, however, obliged to throw all the young ones into the water. The rotting of hemp and flax in ponds, streams, and fishing-waters is strictly prohibited, and the government shall see to it that special pits and pools for rotting flax and hemp are prepared at a suitable distance from these waters. As the fish at times go from the Traun, the Enns, and other waters, into the Danube, and back again

to those rivers, and are frequently prevented from leaving and entering, by the fishermen of the Danube, it is decreed that henceforth neither the Danube fishers nor any other fishermen shall close the streams flowing into that river with stationary nets or any other contrivances.

Fishermen shall be allowed to catch injurious birds in traps all the year round, but shall not injure swans and herons. Royal and other fishermen shall not catch, confine, or sell any fish of the genus *Thymallus*, any pike, carp, or *Salmo hucho*, in private, free, and other waters, unless their length from head to tail is exactly the same as that given on the model board as represented at the end of the fishing-law. If smaller fish get into the nets, which cannot always be prevented, they are immediately to be thrown back into the water. In order to carry out this provision of the law, the authorities, the fish-masters, the market-overseers, shall examine the fish as well in the open markets as in the fishing-huts, fish-tanks, and fish-boxes, and shall punish any persons violating this law.

During one month after St. Simon's Day, (18th February,) no fish except salmon shall be confined, caught, or sold, and no fish of the genus *Thymallus* for two weeks before and two weeks after St. George's Day, (13th April.) The seasons of protection for other fish, as given in older laws, shall be abolished, because there are a number of objections to such an arrangement, and because it can never do full justice to all the different kinds of fish.

The reckless fishing for the *Thymallus vulgaris*, by which the Traun, one of our finest waters, has almost been depopulated, is for the time being entirely forbidden, till the number of this fish has again increased in that river. An exception is made for the imperial table only, which may be provided with young fish caught before St. Catharine's Day, (30th April.)

During the seasons when fishing is prohibited, the authorities, lords of the manor, &c., cannot demand the professional services of the fishermen.

In the other forest streams not mentioned in the law, the lords of the manor, and those of their subjects who own fisheries or fishing-privileges, shall see that the laws are observed; and wherever several persons own a fishing ground in common, they may make an agreement among themselves not to catch fish out of season, nor to catch any which have not the prescribed length, nor to sell or send to market any such fish.

The fishing-law was considerably modified to suit the prejudices of the times, which is shown by the introduction of certificates of sale, and by the close supervision exercised over the sellers of fish, "in order that fish may be sold cheap." From this reason, the arbitrary market-laws of the period regulated the sale of fish. Salmon shall, at the market in Linz, be sold at 14 pfennige (value at the time a little more than 4 cents) apiece, and at 12 kreuzer (somewhat more than 14 cents) the

pound, and a young fish of the genus *Thymallus* at 1 kreuzer 2 pfennige, (nearly 2 cents,) &c.

With fish imported from Bohemia or Bavaria, the regulations regarding size have nothing to do. The ordinances regarding the proper carrying-out of all the provisions of the fishing-law by specially appointed fish-masters are very strict.

For the lakes, there were special fish-laws. Such a law was passed in 1544 for the Mond Lake in Upper Austria.

When, in 1858, the district-officers of Upper Austria were asked to report on the fishing-privileges in their respective sections, the officer in whose district the Mond Lake is located reported that the law of 1544 was still in force on this lake so far as police-regulations were concerned; that, as a general rule, these ordinances were well observed, and were in many respects more practical than the draught of the new law which had been sent to him.

The jurisdiction over the Mond Lake belongs partly to the archbishop of Salzburg and partly to the abbot of the Mond Lake convent. Of the fines, one-third belongs to the archbishop and two-thirds to the abbot, exactly in the same manner as the division of fines prescribed in the law-books of Charlemagne, is made between the country law-courts and the lords of the manor. In the country-sessions, the fishery-courts are held every year, and the mutual rights and duties of the lords and other proprietors are defined.

Quarrels and abuses were the causes which, in 1544, led to the fisheries being regulated anew by a treaty between Archbishop Ernst of Salzburg and Sigmund, abbot of the Mond Lake convent.

The owners of the buildings called *segena* houses, do not possess the right to fish in the lake as a free property, nor after the manner of a lease, but as a hereditary privilege, and have in exchange to render service to the lords of the manor.

To the archbishop, and to his hereditary lessees, there belong $5\frac{1}{2}$ fisheries; to the abbot of the Mond Lake convent, 10 fisheries; and to the Lord of Thury, 1. The abbot possesses, besides the 10 fisheries mentioned, which it seems were all rented on hereditary leases, two large fisheries, which supply the convent with fish, called the *dipper* and the *long segena*.

The length of each of these *segene* (seines) is accurately described. The *dipper* may be 360 feet long, and the "*long segena*" 276 feet. With the *dipper*, fishing was permitted during Lent, from the fourth Sunday thereof till Easter; at other times, only when the reigning prince comes to the Mond Lake. Fishing with the *long segena* was permitted twice a week, from Saint George's till Saint Michael's Day, (29th September.)

Every hereditary lessee has one broad *segena* 168 to 180 feet long, and a narrow *segena* 120 to 138 feet long. The size of the meshes in each *segena* is fixed very accurately according to the measure given in the fishery-law. Besides drag-nets and bow-nets, stationary nets are per-

mitted for catching *Abramis brama*, *Coregonus Wartmanni*, *Salmo salvelinus*, and pike; their number and size is accurately given; angles are prohibited as well as several other fishing-implements, because the lake had thereby been almost depopulated; the places where each fisherman may operate, and the fishing seasons are very accurately defined.

By a special regulation, the peasants near the Mond Lake are forbidden to dig ponds and stock them with fish, because they are in the habit of taking the food-fish which they require for their ponds from the lake. The peasants had at that time dug a great number of such ponds. The hereditary lessees of fisheries, however, were permitted to have ponds for finer fish, especially for pike.

The length below which pike, *Abramis brama*, *Coregonus Wartmanni*, and *Salmo salvelinus*, must not be caught, is exactly prescribed; the law contains drawings of these fish in their natural size and of the meshes of nets. If smaller fish get into the nets, they shall, without injuring them, be put back into the lake.

The number of fishing-boats, the manner in which they are to be used, and the rules regarding the sale of fish are exactly prescribed. The government has the first bid, as merchants must first offer their fish for sale to the lords of the manor. Even those sent to the court of the archbishop of Salzburg are to be supplied by the fish-merchants in accordance with rules set down by the archi-episcopal fish-master.

The archbishop and the abbot each appoints an overseer of fisheries from the number of his officers. These overseers are to punish all violations of the law, and shall, once or twice a year, examine all fishing-implements and remedy all defects. The fishing-law, like all similar laws, is to be read and revised at the annual fishery-courts.

A law on the catching of fish and crawfish, made for the fishermen and fish-merchants of the city of Vienna in 1557 by the Emperor Ferdinand, regulates the trade in Vienna and shows the great wealth of the industry at the time; numerous places in the city being assigned to the fishermen for selling their stock.

The present fishing-law.—In 1864, reports on the fishing-privileges and fishing-laws of the several provinces of Austria were prepared by the minister of the interior. These reports and other more recent investigations have shown that there is the greatest variety of privileges and laws in the different provinces. The right to fish, especially in public waters and lakes, sometimes is claimed by the state as a royal prerogative, sometimes by communities, convents, former lords of the manor or other private individuals, in the shape of a privilege or a free possession, either for or without payment, or is exercised without any privilege or title whatever. Fishing in private waters is sometimes carried on by the owners of the waters or of the shores, sometimes by third persons as an independent right on soil not their own, mostly by former lords of the manor and other private individuals, by convents and communities; all of these basing their rights on widely different titles.

As the middle of running waters is usually considered the boundary-line between villages and townships, judicial and manorial districts, as well as between private properties, and as fishing-privileges usually belong to one of the above mentioned divisions, it is easily explained why numerous grants of this kind in all provinces only extend to the middle of a stream, while other parties have the right to fish in the other half.

In some provinces there are so-called alternate fisheries, in which the right to fish successively passes from one person to another at certain stated periods, usually one year.

Many fishing-privileges of different kinds are connected with mills and other water-works; such grants being mostly limited to mill-dams or to running water as far as a hammer can be thrown both up and down the stream, a custom evidently a remnant of the Middle Ages.

Fishing is sometimes an independent right, recorded in the law-books as a special grant; sometimes a right connected with some other privileges, or a right which may be sold, and as such entered on the public records. In some parts of the country, the fishing-waters are entirely free as they were in the Middle Ages; in others, they are the common property of communities; in the former, any one may fish, and in the latter, all citizens of the community. As the old limitations for such waters, such as that of fishing on certain days of the week and the use of prescribed fishing-implements, have been abolished, such waters have been recklessly plundered, and have consequently been almost depopulated.

In many lakes of Upper Austria, the fishing-privileges are very ancient, and entered on the oldest documents, which prove how carefully such rights were maintained in the older times. In later times, however, we hear of complaints that these rights were no longer properly respected; that irregularities began to occur; and that at present the actual possession no longer tallies with the long neglected books; and that there is a universal desire to have order restored.

The question whether courts of law or the executive officers have to decide on fishing-privileges has, for a long time, been in practice answered in different ways. The ministry of the interior and the ministry of agriculture, to which all matters pertaining to the fisheries have been referred, have repeatedly decided that, in accordance with existing laws, the ultimate decision regarding the title to, and the possession of, waters, and the legal and actual possession of rights to fish in waters not one's own, wherever such matters do not come within the jurisdiction of the authorities appointed for regulating the buying-off of privileges, should rest with the courts.

The regulations regarding fishing are, in the older laws, usually combined with those regarding fishing-privileges. Most of these laws only relate to one province, and frequently only to one lake or stream.

Several river police-regulations also contain paragraphs on fishing;

thus, in Lower Austria, those for the lower part of the river March, dated May 7, 1825, Z.* 2739; those for the Danube of March 30, 1828, Z. 10198, § 23, (both in the Lower Austrian collection of laws No. 29 and No. 62.) The Styrian river police-regulations of October 9, 1826, section IV, contain such paragraphs for the rivers Mur, Drau, Save, and Sann, as well as special paragraphs regarding the other rivers and streams. (*Provinciale Gesetz-sammlung* 1826, vol. 8, page 228.)

Among the special laws which relate to the fishing-privileges, and to some extent also to the fisheries, the following deserve especial mention. The ordinance of the Empress Maria Theresa of March 21, 1771, is almost universally recognized as a binding law, though rarely carried out in practice, (*Gesetz-sammlung Kaiser Josef II.*, vol. 8, page 506.) Referring to the ordinances of June 3, 1583, June 25, 1720, and June 12, 1728, this ordinance decides that no person is allowed to fish except owners of the waters, and those who, having learned the fishing-trade, have rented a privilege; fish of all those kinds which reach a heavier weight than one pound, such as pike, carp, &c., must not be caught if they weigh less; and those which do not reach a heavier weight, such as the perch, tench, &c., if they weigh less than one-fourth of a pound. The catching of young fish with narrow meshed nets of any kind is considered injurious to the fisheries; very narrow meshes are forbidden; their width shall not be less than one square inch; only exceptionally are smaller meshes allowed for catching very small fry to be used as fish-food. The use of hook and line is only prohibited in shallow water.

For fishing under the ice, a special permit is required. Forbidden fishing-tackle will be confiscated, and all persons violating these regulations will be punished in such a manner as the judge considers proper.

The royal ordinances of July 18, 1819, Z. 21529, (*Folitische Gesetz-sammlung*, 1819, vol. 47,) and of July 23, 1829, Z. 9827, prohibit the use of *cocculus indicus* and of *nux vomica* in fishing, and are in force in all the provinces of Austria.

For Lower Austria, a *tractatus de juribus incorporalibus* was promulgated in 1679. It is contained in the *Codex Austriacus*, I, p. 599, and partly also applies to other provinces, especially to Upper Austria. In its tenth section it treats of the fisheries. Unlawful fishing is prohibited by several ordinances, such as those of May 9, 1799, and May 30, 1823.

The inquiries with regard to the statistics of Lower Austria, made by the agricultural district societies, have shown that in most parts of this province the present arrangement of the fishing-privileges throws the greatest impediment in the way of all progress.

In some parts of the province, the domains rent their fishing-privileges in several small portions, in order to keep themselves in possession for the time being; for the division of privileges and disputes with the

* Z., abbreviation for "Ziffer," meaning figure, usually referring to the page of the law-book.—*Translator*.

lessees do not allow regular fisheries to be carried on. As an example, we mention those in the river Ybbs.

In this river, which once possessed a great wealth of fish, the right to catch on one bank belongs to the domain of Waidhofen, which rents it to numerous small lessees, while on the other bank it belongs to several peasants. All this does more harm to the fisheries than the floating of lumber in long rafts, recently introduced in the Ybbs, which, in some places, turn up the ground, and which, in the upper portions of the river, are moved by a rapid stream of water, which has been dammed up and suddenly let loose.

On account of the greater economical value of the lumber-trade, these evils have to be borne; if the fishing-privileges, however, were better regulated, the protected portions of the Ybbs and its tributaries might still contain a reasonable number of fish.

Salzburg is an example of a most fully-developed royal fishing-privilege. Even here the privileges were in olden times considered as being an essential portion of landed possessions, and were in the oldest deeds of transfer of real estate given over to the new proprietor, with all other water-rights as part and parcel of the property, as is shown by the usual form of such documents: "*una cum campis, silvis, aquis aquarumque decursibus.*" In the lakes, however, there existed, even in the oldest times, special fishing-privileges, so-called *segene*, as in other provinces.

As in Salzburg the game and forest prerogatives of the archbishops have been established since the fifteenth and sixteenth centuries, the fisheries were in nearly all places included in these prerogatives and declared as such in the law-books, particularly in the archiepiscopal fishing-law.

The Salzburg fisheries were therefore organized in the following manner. There were:

1. Archiepiscopal lakes, or kitchen-lakes, in which no one was allowed to fish except the specially appointed court-fishers, who had to sell their stock, for a certain stipulated price, to the archiepiscopal kitchen. These were the Fuschel, Hinter, Tappenkar, and the Little Ael Lakes, likewise the Abbot Lake in Bavaria.

2. Lakes with hereditary leases, the Zeller, Matt, Waller, and Aber Lakes, and the Waginger Lake in Bavaria. In some of these the leases were given by the archbishop, some by the cathedral chapter, by other chapters, domains, &c.

On the Atter, Mond, Irr, and Zeller Lakes, in the neighboring province of Upper Austria, the archbishop likewise possessed some fishing-privileges.

3. The fisheries in the streams and rivers of Salzach were either under the protection of the archbishop, and given to specially appointed fishermen in exchange for a certain amount of fish and money, which helped to supply the court kitchen, or they were rented out annually for a cer-

tain amount of fish and money. The officers of the government and clergymen received a stipulated supply of fish yearly.

The following list shows the number caught, of which an account was taken in 1804, at the Salzburg fishery-office; these being partly used in the court-kitchen and partly sold or given away.

	Pounds avoirdupois.
Saibling, (<i>Salmo salvelinus</i>)	5, 166 $\frac{1}{4}$
Rutte, (<i>Lota vulgaris</i>)	240 $\frac{3}{8}$
Forelle, (<i>Trutta fario</i>)	3, 909 $\frac{3}{8}$
Asch, (<i>Thymallus vulgaris</i>)	125 $\frac{1}{2}$
Lake-trout, (<i>Trutta lacustris</i>)	486 $\frac{5}{8}$
Hucho, (<i>Salmo hucho</i>)	310
Perch, (<i>Perca fluviatilis</i>)	89 $\frac{1}{16}$
Waller, (<i>Silurus glanis</i>)	197 $\frac{1}{2}$
Hecht, (<i>Esox lucius</i>)	4, 885
Carp, (<i>Cyprinus carpio</i> and var)	2, 038 $\frac{3}{4}$
Renke, (<i>Coregonus Wartmanni</i> ,) (fresh)	5, 850
Renke, (<i>Coregonus Wartmanni</i> ,) (salted)	2, 465
Schleie, (<i>Tinca vulgaris</i>)	431 $\frac{9}{16}$
Weissfisch, (<i>Alburnus lucidus</i>)	40
Schrätzer, (<i>Acerina Schraitzer</i>)	70 $\frac{5}{8}$
Brachsen, (<i>Abramis brama</i>)	
Alte, (<i>Squalius cephalus</i>)	198 $\frac{1}{8}$
Grundel, (<i>Gobio fluviatilis</i>)	
Koppèn, (<i>Cottus Gobio</i>)	218 $\frac{3}{4}$
Pfrille, (<i>Phoxinus laevis</i>)	62 $\frac{1}{2}$
Table crawfish	16, 452 $\frac{1}{2}$
Soup-crawfish	65 $\frac{5}{8}$

From the archbishops, the fishing-privileges were transferred to the crown; and of late years they have been leased to some extent to private individuals.

Exceptions are only made with regard to a few small bodies of water, which convents or chapters have possessed as special grants from time immemorial, or which fishermen have held on hereditary leases, and which now, in consequence of the buying-up of all old privileges or servitude-rights resting upon the lands, are held by the fisherman in free possession.

The archbishops had preserved the fisheries as their property through numerous fishing-laws, as in the case of that of 1507, made by Archbishop Leonhard Kreutschach; of 1590, by Wolf Dietrich; of 1767, by Sigismund von Schrattenbach. For the lakes, there were special laws, which have never been officially rescinded, but which have gradually fallen into disuse. The Salzburg Historical Society has published some of them in its reports, vols. V and VI, among others the law relating to the Waller Lake, made by the Archbishop Cardinal Matthäus Lang, (1519-'40); another one of 1567; the revised fishing-code relating to the

Matt Lake, made by the Archbishop Marcus Sitticus, in 1617; one relating to the Aber Lake, of 1692; and one for the Zeller Lake, of 1641.

Some provisions of these laws are also entered on the old statute-books. The common law of Altheim, a district of Salzburg, dated 1625, prohibits the building of weirs in waters without special permission, "since the streams belong to the authorities, and because the fish would be much disturbed thereby." (*Salzburgische Taidinge, herausgegeben von der Akademie der Wissenschaften*, p. 24.)

A more recent law is the one passed by the Salzburg provincial government February 13, 1856, Z. 13666, which forbids fishing in the so-called "beaver-dams," marshy ponds much frequented by the beavers on account of the many willows. The same law allows fishing at night only after previous announcement to the forest-officers, and obliges fishermen to submit to the examination of their fish, baskets, boxes, or tanks by the officers, whenever these think it necessary.

The injudicious manner in which the Salzburg government till quite recently cut up its fishing-waters by either selling or renting them on short time in very small divisions—the lakes in very insignificant little patches, and the running waters frequently by shores—caused a petition to be addressed to the Salzburg assembly, asking that these small subdivisions be discontinued.

In *Styria*, great attention was in olden times given to the fisheries and the fishing-laws. A court fish-master was appointed, having his residence at Graz, and an inspector for Upper Styria to watch over the several privileges, especially the royal prerogatives, both possessing the most unlimited judicial and police powers. Since 1790, when a regular police was introduced, "the authority of these two mentioned officers began to be ignored," as we learn from a report. The court fish-master gradually became a privileged fish-merchant; the office of inspector disappeared entirely; and the numerous fishing-laws, such as those of March 24, 1641, March 9, 1673, February 27, 1676, May 30, 1699, May 24, 1747, March 21, 1771, fell into disuse, were lost from the archives, and forgotten by the people. In place of a regular system of fisheries, we find plundering expeditions by foreigners, and the most reckless capture of fish by privilege-holders and lessees.

A circular of the imperial government for the central provinces of Austria, dated February 24, 1790, had to be published to counteract the wide-spread "erroneous idea of the general freedom of fishing and hunting," and urged the holders of privileges to maintain themselves in their undisturbed possession, for the reason that they had obtained them "*titulo oneroso*."

At present, we see nothing else in Styria but constant quarrels between privilege-holders and communities, over small domain fishing-privileges, which partly had their root in the feudal system, and which form a serious obstacle in the way of progress, as such small waters are

not infrequently leased in smaller subdivisions, and are thoroughly exhausted by the lessees.

Owners of land even now consider themselves in most places as privileged to fish, and do not allow any fisherman or lessee to come on their property, even if no damage is done, threatening them and driving them away. Everybody fishes, and there is no supervision attempted, as it could scarcely be carried through. No more complaints are therefore made as to unlawful fishing; many of the privilege-holders consider their rights as almost lost, and wish to sell them out.

This, of course, strengthens the erroneous views which the larger portion of the population entertain.

Even in those parts where fishing-privileges are still somewhat respected, the organization of the industry is not much better. The privilege-holders rent their grounds in small portions and on short time, and the lessees catch everything that swims in the water.

Here and there we find fishing-privileges belonging to a number of persons in common; also so-called alternate fishing-privileges, (see above.) A reporter calls all these, "privileges for plundering and destroying."

In *Carinthia*, provisions are made for the fisheries in the law made by Charles VI, 1577, § 29, and also by a special resolution of the Carinthian assembly, passed June 17, 1715, and the privileges of lords and landed proprietors have been protected. Towns and market-places which have their own independent law-courts likewise possess the fishing-privilege.

The last reports complain very much of the senseless system of plundering, thieving, insufficient protection, and of the antiquated forms which are in the way of a healthy development of the fisheries. By these evils, it is said, the finest fish-waters are depopulated, and this, as well as the low price paid for the products, sufficiently explains the decline of the Carinthian fisheries.

At the general meeting of the Carinthian Agricultural Society, held January 25, 1872, a strong and almost universal desire was expressed to have the fishing-privileges bought off. Although the necessity for such a measure was fully recognized, no resolution was passed.

In *Carniola*, the state of affairs is very similar. Here also there are in some parts of the country alternate fishing-privileges, the fisheries changing owners every year or at longer intervals. No one doubts that such privileges are injurious to the fisheries, and both the Carniola assembly and the agricultural society have strongly urged their abolition.

By government ordinances of June 27, 1852, Z. 4881, (*Landesgesetzblatt*, XXV, p. 510,) and of September 18, 1852, Z. 8045, fishing-permits have been introduced in Carniola.

Istria does not possess any fresh-water fisheries of importance. The forest-streams mostly dry up during the summer; the Arsa Canal,

which is fed from the Lake of Ceppich, the lake itself, and the small rivers Quieto and Risano, are but little suited for fisheries.

Görz and *Gradisca* possess fresh-water fisheries in the Isonzo and its tributaries, and in Wippach. The other streams have a full supply of water only during continued heavy rains, and the coast streams and canals are of no importance.

During the sessions of the Ecumenical Council of 1870, trout were for the first time sent regularly from *Görz* to Rome. It is thought that artificial fish-culture could be successfully introduced through associations. At present, there are no fishing-laws whatever.

Dalmatia is, according to Heckel and Kner, a very interesting country for ichthyologists, not on account of its wealth of fish, but on account of its great number of fresh-water species. In this respect, it is the most interesting portion of Austria; for, in its, for the greater part, insignificant streams, it has not only many species of fish similar to those of Lombardy and Southern Italy, but likewise a great many which are peculiar to this province, and which, continuing through Bosnia toward the East, are related to Syrian fish, and through these again to those of India.

It must, therefore, be regretted, from a purely scientific point of view, that pisciculture, like nearly all other branches of culture, is entirely neglected in this province.

Besides numerous smaller streams, which are entirely dry during summer, *Dalmatia* has several coast rivers and lakes. The former are particularly rich in fish near their mouths, which actually form arms or bays of the sea. Especially is this the case with the river *Narenta*, which is rich in eels, pike, and other fish. The total absence of any fishing-laws and regulations has prevented fishing in the rivers and lakes from becoming a source of income to the population.

Fishing in the rivers is generally free; only in some portions thereof the privilege to catch trout and eels has been reserved to private individuals, communities, or corporations, such as convents, through so-called "investitures;" legal documents dating from the times of the Venetian Republic: thus, the Franciscan convent of *Vissovaz* has the exclusive right to fish in the river *Kerka*, from the *Slap Falls* to the *Scardona Falls*; and the village of *Almissa* has the same exclusive right at the mouth of the river *Cettina*. In many waters, the fisheries were rented by the government, which is still the case at the mouth of the *Narenta*. Fresh-water fish are never offered for sale, and there is no market for them.

In the marshes and waters of the *Narenta Valley*, there were, in former times, extensive eel-fisheries; but these have likewise decreased very much in value through the unpardonable neglect of the last few years.

The government has the right to fish at the mouths of the *Norino* and *Pranjak*, in the *Jesero-Malo* and the *Cernarizza*, in the valley of *Cutti*, likewise at the mouth of the *Pulinica*, in the district of *Logorie*, which right is mostly rented. The total annual revenue was, however, only

about \$56. The village of Fort Opus has, through a grant from the former republic of Venice, the right to catch eels in the lake of Dragace, and in the river Jassenica-Struga. The income from these fisheries scarcely amounts to \$100 per annum.

In *Tyrol*, there were fishing-laws enacted in 1575, 1753, and 1768; sections XVI to XXI of the 4th book of the common law of Tyrol, of 1573, also treat of the fisheries. In many parts of Tyrol, fishing is free; and in the remaining rivers, streams, and lakes, the fisheries belong to private individuals, village-communities, and landed proprietors, but especially to the state. The right to fish has frequently been acquired by purchase-deeds and other documents, and is in some cases subjected to taxation.

In the district of Bozen, there are several important fishing-grounds, which are considered as belonging to no one in particular, and where, consequently, anybody may fish.

Tyrol has several lakes, rivers, and numerous clear, mountain streams, which formerly were full of fish, and which in every respect are well suited for spawning places, places of safety, and waters where the finer kinds might be successfully raised.

According to a report of the fish-master, Wolfgang Hochleitner, of the year 1504, whole wagon-loads of fish came annually to Innsbruck from the Achen Lake alone.

Even to this day, the finer kind of fish are represented, some of them in Northern Tyrol, in the territory of the Danube, some of them in Southern Tyrol, in the territory of the Etsch, some again in the lakes, and some throughout the whole province; but their number has decreased very much, through reckless plundering, carelessness, and complete want of protection, so that in the markets, especially those of Southern Tyrol, only foreign fish are offered for sale.

In *Vorarlberg*, a full report on fishing-privileges has been made at the suggestion of Mr. Joseph Tiefenthaler.

Small as is this province, it, nevertheless, possesses the greatest variety of fishing-privileges. There are waters in which the state possesses the royal prerogative, and which are rented to private individuals, waters belonging to domains, waters which belong to the villages on whose territory they are found, and waters in which only those living near the shore have the right to fish. Some waters are partly in the possession of private persons, possessing their rights to fish through deeds of purchase; while other portions of the same waters are entirely free, fishing in them being carried on only by peasant boys; and of some waters it could not, even after the most thorough investigation, be ascertained to whom they belong.

Of the state fishing-privilege in the Rhine, small portions were sold to private individuals in 1858, so that only the following sections are left to it: from the mouth of the river Ill to the Lichtenstein boundary, about 6,000 feet on the Austrian side of the river; the Ill from Feldkirch

upward to its source in the Moutafone Valley ; and the Dornbirner-Ach to its mouth.

The Vorarlberg Agricultural Society justly regrets that the senseless subdivision of the fishing-waters into insignificant patches throws almost insurmountable obstacles in the way of successful fish-culture ; and these small patches of water have recently been still further subdivided, thus lowering the value of the fisheries still more.

In *Galicia*, several reports have during the last years been made regarding the fishing-privileges. These, on the strength of some old Polish and other laws, in some cases have been defined as rights pertaining to domains ; in others, as royal prerogatives, or as rights belonging to the inhabitants of the shores or banks.

By a statute of Casimir the Great, dated 1346, fishing in rivers and streams in the former kingdom of Poland was declared to be the exclusive right of the inhabitants of towns or villages located on their banks ; such right to belong to them as long as these rivers and streams remain in their original beds.

From this, as well as from a second statute of Casimir, dated 1457, and from another published by King Sigismund II, dated 1507, we see that even the common laboring people were permitted to fish.

By the statutes of Casimir Jagello, 1447, and Johann Albert, 1496, the rivers were distinguished as royal and free, in order to diminish abuses ; and it was ordered that no weirs or poles should be allowed, but only nets.

It was claimed in the reports, in favor of the domains, that, in the kingdom of Poland, by its old constitution, all land lying within the jurisdiction of a landed proprietor was his absolute property ; and that the lands given to the serfs, who themselves were property, only belonged to them as long as their master thought proper ; and that consequently the fisheries on his land were likewise his absolute property. It was maintained that, by the charter which King Stephen Bathory signed at his election in 1576, the entire usufruct from lands had been made over to the owners ; neither the king nor his successors having any right to deprive them of it. When *Galicia* became an Austrian province, the privileges of the landed proprietors were not interfered with. The government ordinance of May 6, 1808, was also thought to be in favor of the landed proprietors, as it says that the *Soltyszen* (free peasants) did not possess the right to grind corn, to cut wood, to sell beer, wine, and liquor, and to fish, even if these pursuits should be mentioned in the privileges of the *Soltyszen*, and they should actually be in the enjoyment of such rights. It was finally claimed that the imperial decree of January 31, 1823, had declared fishing to be among the prerogatives of landed proprietors.

To all these claims it was objected that the statute of Casimir, given in 1346, did not speak of landed proprietors, but of the inhabitants of villages on the banks of rivers and streams ; that later statutes declared

the rivers to be royal and free; that Stephen Bathory's charter only guaranteed to the nobility the usufruct of lands belonging to them, and not of the royal rivers; that the government ordinance of 1808 had been expressly annulled by the ordinance of March 26, 1826. It was said that the royal decree of January 31, 1823, had only exempted the fisheries from the tax on landed property, and had placed them under the category of trade-taxes; §§ 3 to 6 and 9 of part II, as well as §§ 108, 110, 111, and 113 of the old Galician law of 1797, proved that fishing in the public waters was not an exclusive right of the landed proprietors, but a prerogative of the state or of those persons to whom the state had granted it.

When these different views of the Galician authorities were laid before the imperial ministries in 1864, they resolved that in Galicia also the fishing-privilege should be considered a private right, because the general law in its § 414 had enumerated it among the other private privileges, and that no other explanation was possible; that, therefore, in Galicia, in public as well as in private waters, the actual possession, based on many different titles, should be recognized before the law as the only valid one. In this sense, the ministry of finance, in its decree of June 19, 1865, Z. 2711, directed the provincial finance-office at Lemberg not to enforce an exclusive fishing-privilege of the state in the rivers of Galicia, and that matters in this respect should remain *in statu quo* till otherwise regulated by some new law.

The reports of former Galician officials and of the Galician agricultural societies faithfully depict the chaotic state of the fishing-laws, which, in many parts of the province, had almost entirely exhausted this source of national wealth, and had seriously injured the salmon and sturgeon fisheries in the Galician rivers, which had formerly been very extensive. In some districts, the fisheries are carried on by the land-owners; in others, they are managed by the village-communities as the common property thereof, and the revenues derived from them are used for meeting the common expenditure; while, in other parts, they are the independent property of private individuals.

One of the reporters writes: "The lower classes consider fishing in rivers and streams as belonging to nobody; at every season of the year, people practice it in the most reckless manner, and the privileges of other persons are entirely disregarded, since they are in no wise protected. The disorder exceeds all bounds; the most injurious methods of fishing are freely employed; and, contrary to common sense and law, the fishing in the rivers is carried on in such a manner as to hasten its entire destruction."

In *Bukowina*, which, since its incorporation into the Austrian monarchy, has been treated like Galicia, even in matters concerning which formerly a difference had existed, the condition of affairs has been very much the same.

Bukowina has, in proportion to its area, the largest number of rivers

and streams of any Austrian province, and, in former times, had, besides these streams, more than 15,000 acres of ponds. These latter have gradually been decreased to 600 acres; most of the ground gained by draining the ponds being planted with corn, which, so far, has not proved a very profitable speculation.

The majority of the population, especially in the rural districts, belong to the Greek Church, and have to observe one hundred and ninety-four strict fast-days during the year, so that the demand for fish is consequently very large. It has been estimated that \$56,000 worth of fish is annually imported into Bukowina from Moldavia and the cities on the North Sea. On account of their high price, these fish are mostly eaten only by the wealthier classes.

The agricultural society at Czernowitz deserves great praise for having recently given its full attention to the fisheries hitherto neglected.

With the exception of the ponds and a few mountain streams, nearly all waters in Bukowina are almost entirely deprived of their former wealth of fish by reason of the utter want of system in all matters pertaining to the fisheries; and it will take a long time for a fishing-law to gain ground.

In *Bohemia*, the revised law of Ferdinand II, dated May 19, 1627, was, till the year 1848, considered the constitution of the country. In consequence of the events which took place then, the political rights of the assembly were limited, but the rights of private persons (*jura privatorum*) were not touched, as will be seen from the preface of the law and from a comparison of its provisions with those of Maximilian's ordinance of 1564, and King Vladislav's ordinance of 1500, which served as bases for the former, as well as from the charters of the Bohemian cities. In all these laws, the fisheries are protected against "arrogance and violence."

This protection, however, was only afforded to members of the assembly in their relations toward each other, and, according to Maximilian's ordinance, especially against their vassals and their servants; the vassals themselves had at that time no property of their own, and could only exceptionally enjoy the usufruct of property given to them by their masters for a short period, but could never be the actual possessors of any lands.

The laws of Maria Theresa and Joseph II were the first to afford thorough protection to subjects and their property; the ordinance of November 1, 1781, abolishing serfdom, gave a firmer basis to the security of subjects; and the common law declared that they might also hold property.

Thus it came that the fishing-privileges were transferred from their originally exclusive owners, the landed proprietors and the cities, to private individuals, by gift, sale, or exchange; and that they were exercised *de facto* on the ground of these various titles.*

* See Bericht der zur Revision der Fischereigesetze für Böhmen gewählten Landtags-commission of February 14, 1866.

Even in former times, numerous great and small fishing-privileges in rivers and brooks had been hereditary in certain Bohemian families; and the salmon and eel fisheries in the Elbe are carried on by nearly all millers on a large scale at their weirs with an apparatus called *Slup*.

The small fishing-privileges connected with mills and other water-works, especially the right to set so-called automatic traps, are in all countries considered as hostile to our modern civilization and as great obstacles in the way of rational fish-culture. A Bohemian inspector, Director Horak, of Wittingau, calls the salmon and eel traps of the millers on the Elbe and Moldau infernal machines, and remarks that, like the shark, they devour all fish, both young and old. In international treaties, the contracting parties usually agree to abolish such privileges as far as possible.

Among the Bohemian fishing-laws, we mention as important an article from the Bohemian river-police-regulations of February 10, 1854, which says that a permit from the authorities is required for setting salmon-traps in navigable rivers, and likewise decrees that the placing of bow-nets, catch-poles, &c., must not in any way interfere with navigation.

In Moravia, the state of affairs up to 1849 was very similar to that of Bohemia. According to the report, there were many waters in which fishing with hook and line had never been prohibited; and the free catching of crawfish in many running waters has been practiced for centuries.

The practices allowed by the law of 1859, which we shall give more in detail, have, with regard to those fishing-privileges which hitherto belonged to the landed proprietors, produced a state of disorder and uncertainty, which has contributed not a little to the neglect of the fisheries, so that reforms are urgently demanded.

In *Silesia*, the government, at the request of the assembly in 1866, had reports made on the fishing-privileges by the district officers, to be made use of in the preparation of a new law, by which they should be regulated.

Here, likewise, the titles to possession vary very much, and their validity has frequently been questioned. The bishop of Breslau had, from times immemorial, the fishing-privilege of numerous waters, but had likewise many obligations toward the communities, especially with regard to keeping the beds of rivers in order, protecting the banks, furnishing the wood for bridges, &c. Since these obligations have ceased, the fishing-privilege of the bishop is, as the agricultural society complains, found to be a heavy burden.

On the actual state of affairs in *Silesia*, the report of 1869 says:

"In many waters, everybody is allowed to fish; in some, the community is considered to possess this right, without its being clear whether it possesses it as a corporation, or whether it merely means

that any person belonging to such community has the right to fish; sometimes the mayor of a village is mentioned as the privilege-holder, or the clergyman, or some landed proprietor; the fisheries are mostly considered as belonging to the former proprietors of the lauds, among them the cities; and, in other cases, the privilege is said to belong to the inhabitants of the banks, and occasionally to these and to everybody."

In Bohemia, Moravia, and Silesia, these privileges are placed in a peculiar position by the regulations for buying them off.

In *Bohemia* and *Moravia*, fishing-privileges on the land of others have been abolished by the ordinances relating to the buying-off of privileges of June 27, 1849, § 4, Z. 3; and in *Silesia*, by the ordinances of July 11, 1849; and an indemnity has only been conceded to the former holders in cases where it could be proved that the privilege was based on a special contract with the owner of the soil.

The regulations for buying off privileges in the other provinces do not contain any paragraphs relating to the fisheries.

When, somewhat later, doubts were raised as to the proper meaning of different regulations, the ministries to whom this matter was referred consulted on them in common. The ministry of justice, in its note of December 30, 1851, Z. 13740, said that the fishing-privileges based on different titles had not been changed in the other provinces; but that in Bohemia, Moravia, and Silesia, this whole question had a different aspect. In these provinces, a change had already been made by the ordinances, (§ 4,) and, based on the abolition of all fishing-privileges on the soil of others, many new property-rights had been established, with, to some extent, respect for legal forms. If the state of affairs existing prior to the year 1848 was to be continued, or, properly speaking, created anew, any measure tending to this end must be preceded by a special law sanctioned by the emperor, declaring the above-mentioned § 4 null and void.

The ministry of the interior thereupon, by its ordinance of January 31, 1852, Z. 460, informed the commissions for regulating the buying-off of privileges, as well as the assemblies of Bohemia, Moravia, and Silesia, that, conditionally on some future possible regulation of these matters, every fishing-privilege which is not exercised in waters belonging to others shall be maintained; and that any one who desires to have his property freed from the burdensome, fishing-privileges, in accordance with the above-mentioned § 4, must bring absolute proof that he is the exclusive owner of the property in question, viz, the water, it being understood that all doubts as to the ownership will have to be decided only before the proper court. Wherever the mutual relations of the owner of the property and the holder of the fishing-privilege come under the law of September 7, 1848, the commissions named above have, conditionally on some future regulation of the fishing-privileges, to act in accordance with existing rules.

The other commissions for buying off privileges, and the assemblies, were at the same time informed by the ordinance of January 31, 1852, Z. 460, that by the laws regarding the purchasing of these rights, the fishing-privileges had not been abolished, and should therefore remain as they were in 1847, and that no buying-off should be allowed.

These ordinances have also been published in the official journals of several provinces.

The government of Silesia has at its request been informed by an ordinance of the ministry of the interior, of April 9, 1852, Z. 7997, that protection was not to be afforded to the arbitrary practices introduced in 1848, but to the laws as existing in 1847.

The ministry of justice, in its note of December 30, 1851, Z. 13740, declared that it did not consider it proper to construe the regulations for buying off privileges in such a manner as to make the proof of ownership of ground bordering on the water sufficient evidence as to the ownership of the water, because such an explanation would exceed the legally prescribed functions of the ministry, and would scarcely be noticed by the civil courts. It would then also be necessary, if any one, in accordance with § 4, had put himself in possession of some fishing-privilege, and a dispute should arise on this point with the former holder, that the decision, and therefore also the explanation of the law, should belong to the judge, inasmuch as the commissions themselves are not competent judges in disputes relating to titles of possession.

In reviewing the different notes and proclamations of the ministries in their connection, we are assured, beyond a doubt, that, in 1851 and 1852, they did not consider themselves justified in annulling, by a ministerial ordinance, the Bohemian and Moravian statutes of June 27, 1849, and the Silesian statute of July 11, 1849; and that such action was by no means intended by the ministerial ordinance of January 31, 1852, Z. 460, even if a faulty practice occasionally led to such erroneous views.

That the practice was not the same everywhere is stated expressly in a report on fishing-privileges of the Silesian assembly, (*Stenographische Sitzungsberichte*, 1869, p. 310,) in which it is said that in that province the landed proprietors did not always succeed, and that in fact they made no great exertions to restore the state of affairs that had existed before 1848.

In Bohemia and Moravia, fishing is likewise carried on in some waters by communities, or owners of the shore, without any dispute arising from this. It is an undoubted fact that the fisheries in these provinces have been declining rapidly since the year 1849, since the innumerable small subdivisions of the fishing-waters, where frequently the left bank of a stream has another owner than the right, do not admit of a rational and profitable culture, and since, so far, all attempts at reform have proved failures.

24.—THE BUYING-OFF OF FISHING-PRIVILEGES.

From the foregoing it will be seen what confusion was occasioned among the fishing-privileges in Bohemia, Moravia, and Silesia by carrying out the buying-off measures only to a limited extent. There has been no lack of attempts to solve the many difficult problems which in this respect present themselves in all the provinces of Austria.

The Silesian assembly, in order to put an end to this confusion, by enforcing the ordinance of July 11, 1849, and to give an ear to complaints which were coming in thick and fast, proposed to make a new law declaring fishing in the waters of others, in brooks, and non-navigable rivers, to be abolished, and to give the right to the owner of the river or brook, and, wherever the ownership cannot be properly proved, to the inhabitants on the banks, in proportion to the amount of property they possess. If the fisheries are to be developed, and there is no reason why they should not, there is no other way but to gain over to this cause the owner of the river-bed and the owner of the bank.

The assembly also recommended the method of ascertaining the amount of indemnity mentioned in the ministerial ordinance of July 11, 1849, in those cases where it could be proved that the fishing-privilege was based on a contract made with the owner of the ground.

At the same time, it was proposed to establish, as far as possible, large fishing-districts, where the business could be carried on in a rational manner, and to lease them on long time. The net profits from these leases should be distributed among the inhabitants on the shores in due proportion to the extent of their property along the water's edge.

The above recommendations were referred to the committee on agriculture, but no discussion was reached in the assembly.

In the other provinces, the very important question was also frequently discussed, whether there should be any legal provisions prescribing the buying-off of those fishing-privileges which were exercised in the waters of others, or in those between banks owned by others in accordance with the older laws.

The imperial law of May 30, 1869, on those regulations regarding water-rights which are left to the decision of the imperial parliament, in §§ 2 to 7, establishes principles on the juridical character of waters which have been of great importance to the fisheries, and, in its § 2, says expressly that rivers and streams and their tributaries shall be public property from the place where they become navigable for ships or rafts; in § 3, the same is said with certain limitations of other waters; and in § 5, private brooks and other running waters shall, unless otherwise decreed, belong to those tracts of ground over which or between which they flow, in proportion to the length of bank occupied by each piece of ground.

It has been repeatedly proposed to turn over to the state or province all the fisheries, or at least those in the so-called public waters in

streams, rivers, lakes, and large brooks ; a proper indemnity being, of course, paid to the former privilege-holders. In making such a change, three methods or systems of developing the fisheries may be distinguished.

The first method would be for the state to lease the fisheries in large portions, and by the terms of the lease oblige the lessee to protect and increase the stock of fish. This system is at present in vogue in France and Belgium.

The second method would be for the state to sell the different water-courses and sheets of water in large and properly connected portions, as is done at the present time in England.

According to the third method, the state makes the fisheries free by issuing a certain limited number of fishing-permits, as is done in several cantons of Switzerland.

The two first mentioned methods presuppose that there is a sufficient number of capitalists who are willing to rent or buy the fisheries in large portions, and to carry them on in a rational manner ; and all three methods presuppose that the state has become the exclusive proprietor of all the fishing-privileges, either by free agreement, or, as this can be hoped for only in a few exceptional cases, by an intricate and uncertain buying-off system, so that, at any rate, all those persons who earned their living from the fisheries should have no cause to complain.

All these different suppositions and conditions on which a radical change of the fishing-privileges would be beneficial to the fisheries do not exist with us, and the obstacles in the way of reform would be almost insurmountable.

Similar propositions have recently also been made in other countries, as in Italy. But even there, where there is no opposition from principle to such propositions, it is considered necessary, first of all, to make a good fishing-law. The Italian report says, "As soon as such a law shall have shown its beneficial effect, capitalists will be easily found willing to buy or rent our lake-fisheries, and then the time will have arrived to carry out the bold reform which has been proposed."

There is another proposition, to turn over the fisheries in large waters to the town or village communities owning the rights of the shore ; and in other waters, ponds excepted, to the owners of the ground along the shore ; to facilitate the buying-off in both cases by a law, which law should also, by forming suitable fishing-districts, regulate operations still further, such districts either to be leased or worked in the interest of the inhabitants of the shores.

The fisheries, or the usufruct thereof, were in future to be under control of districts, communities, or private individuals, or of whichever of these had paid the indemnity. The transfer should either be made on a certain day by law, and the indemnity paid later, just as in buying off privileges resting on landed property, and in accordance with the ordinance of September 7, 1848, or, only after the indemnity had been

paid, in accordance with the ordinance of July 5, 1853. It should be made either by the authorities or by mutual agreement between the contracting parties.

Some think the provinces ought to issue bonds covering the amount of the exemption, while others would have the communities or private individuals owning the shores furnish the money required to pay the former privilege-holders.

Leaving out of view certain minor details, which could be arranged without much difficulty, the solution of the chief question should have proper regard to the fisheries as well as to social and other relations.

In order to make the owners of the river-beds, or, more properly speaking, of the shores, interested in the development of this industry, it should be considered an important point, when buying off the privileges, to remove out of the way the many causes of disputes between privilege-holders and owners of the shore; and to produce a well-established state of affairs on a secure legal basis. This has been done in Silesia, where the assembly, guided by the above-mentioned considerations, has taken measures to continue the buying-off of fishing-privileges, which had been commenced in accordance with the general regulations for buying off liens resting on landed property, but which so far had not yet been fully carried out.

In several reports, we find the remark that serious complications had arisen since 1848 where former rulers exercise the right of fishing between lands belonging to their former subjects; and that the abolition of fishing-privileges on the waters of others in the three provinces of Bohemia, Moravia, and Silesia had produced a desire in many other provinces to see the same thing accomplished with them. Fishing-privileges have frequently remained objects of dispute in the three above-mentioned provinces, because the regulations regarding them had not yet been fully carried out, and in other provinces, because the titles to property were in many cases not perfectly clear. This applies particularly to the fisheries in mill-streams, or in small tributary rivers, in small brooks, where fishing was rarely carried on, and where the area of the brook was frequently entered in the *Kataster** as belonging to village-communities, or to the persons owning the lauds bordering on such brooks; they, at any rate, paying the taxes on such property. It is a natural consequence of such doubts and disputes that the owners of the shore endeavor to keep privilege-holders and superintending officers away from it, and seek to hinder all measures tending to the development of the fisheries.

Wherever such circumstances prevail, we cannot hope to see the fishing-laws carried out vigorously, or to see piscicultural establishments founded; and since the voluntary abolition of the fishing-privileges presents too many difficulties, most holders of them, communities, and

* A book containing the surveys, titles, and ownership of the lands.

owners of shore-lands would consider a law regulating the buying-off of privileges a great benefit.

Leases calculated to improve the condition of the fisheries would take the place of worthless fishing-privileges, from which the owners derive no real benefit; former privilege-holders, especially where they own part of the shore, would be afforded a chance to lease, and smaller owners of shore lands would see their income increasing by the rising rent.

It is hoped that, just as landed proprietors have quietly permitted their farmers to hunt on their property ever since the right has been recognized by the law as forming an integral part of such property, and since the rent forms part of their revenue, so also they will permit the lessees of fisheries, not only to catch, but also to protect fish, and to introduce all those measures, such as fish-passes, places of protection, planting of banks with trees, &c., which are essential to successful fish-culture, but which at present are almost unknown in Austria. Such a hope is also encouraged by the fact that even an extraordinarily large number of fish would do no injury to agriculture, which can certainly not be said of game.

It must not, on the other hand, be overlooked that, by abolishing the old fishing-privileges, and simply turning the fisheries over to the proprietors of the banks, a condition of affairs may be produced which is calculated to decrease rather than to increase the number of fish. This applies particularly to countries where it is difficult to execute the fishing-laws in an efficient manner.

The conditions on which privileges can be bought off should form the subject of another law. In this matter, regard should be had to the different wants of the several provinces regarding the fisheries, as also to all other circumstances which may be of influence, so that the question whether the time has arrived when such a law can be really beneficial should be answered separately for every province.

Whether the question of abolishing the privileges in any of our provinces is being discussed at the present time, or whether it is referred to some future period, it will, under all circumstances, be desirable that such abolition should not take place before a good fishing-law has definitely settled all questions relating to the protection and practice of the fisheries, especially those belonging to communities and owners of shore lands, fishing-associations, &c. If this is not done, the abolition of privileges and the transfer of the fisheries to communities and owners of shore lands will do more harm than good to the industry. It would also be an inestimable benefit if the new owners could enter on their possessions with that feeling of security which only a practical and well-executed law produces, and if the great landed proprietors, who at present own fisheries, could have the chance of improving them further and of making them more valuable.

The question of abolishing the fishing-privileges has not yet been fully discussed in all the provinces, nor has an accurate list of all such

privileges been made out. The above remarks on this subject, suggested by the material at my command, will suffice for the present; any further discussion being at this time neither desirable nor possible.

25.—INTERNATIONAL FISHERY-TREATIES.

Many of the finer kinds of Austrian fish are migratory species, some of which live part of the time in the sea. The salmon come from the sea into the Bohemian, Moravian, Silesian, and Galician rivers and their tributaries, spawn there, and then return. In the Rhine, the salmon only go as far as the falls near Schaffhausen. The eels, on the other hand, usually spawn in the sea; the young ones ascend into the fresh water, and live there till they are able to propagate their species, when they return to the sea.

Other fish remain in fresh water, lakes, rivers, and brooks, but change their location according to their size, the character and depth of the water, temperature, the quantity and quality of food found, and the more or less favorable location of the spawning places. What has been said of salt-water fish applies likewise to several lake species, and to some living in large rivers, which, during the spawning season, ascend the tributaries and brooks.

These migrations cause a community of interests in all the countries of one connected water-system, chiefly with regard to the cultivation of the fish and the protection of the fisheries.

If, for example, the free passage of the salmon and eel from the Lower Elbe is prevented by the fishermen of that region, if they are there caught at the wrong season, or in too great numbers, all the fisheries on the Upper Elbe will suffer from this, and all the efforts to improve those of Bohemia will prove futile.

In the Netherlands, especially in the mouths of the Rhine, the salmon-fisheries are at present carried on in such a destructive manner, with immense seines, that only in very exceptional cases, high water, &c., the fish escape and ascend to the spawning places; for during the season when the salmon ascend the rivers, these seines are hauled uninterruptedly, even on Sundays; they take up the whole stream, and a few of them, worked at short distances from each other, are sufficient to catch every salmon entering the river.

The lower fishers, however, are likewise entirely dependent on those higher up; for, if the latter disturb the salmon while they are spawning, and catch and destroy the young fish, none go to the sea, and consequently none return from there.

In large connected fishing territories, divided between several countries, each one is dependent on the others for its fisheries. Every country by itself can do much to destroy the fisheries of the whole territory; but, without the co-operation of the other countries, it is not able to keep them up, even with the best and strictest fishing-laws.

The community of interests is still more striking in rivers which form the boundary-line between different countries. Of what use would it be to prescribe times of protection when the fishermen on the right bank were not allowed to fish, if those on the left bank were allowed to catch all through the spawning season ?

In such a manner are the Austrian fisheries, especially the more valuable ones, such as those for salmon in Bohemia, Moravia, Silesia, and Galicia, dependent on those of the neighboring countries. The absence of a good fishing-law in North Germany, more especially respecting lawful seasons of protection ; the lack of any law regarding places of protection ; the utterly destructive way in which here and there salmon are caught with seines ; the many weirs and other hydraulic constructions in most North German rivers, which hitherto have not been made harmless by fish-passes ; the poisoning of the waters by the introduction of noxious substances ; the numerous automatic salmon and eel traps near the mills in those rivers and streams which from our country flow into North Germany ; all these causes combined have injured our salmon-fisheries to such a degree that at present but few salmon ascend to our waters from the sea.

The Austrian government, for these reasons, endeavored to conclude treaties with all the states bordering on the Elbe, as early as 1857, so as to secure the free passage of salmon and eels from the sea to the Bohemian waters and *vice versa*. These negotiations have been interrupted, but will be taken up again.

It has been proposed to conclude treaties establishing uniform regulations between Baden, Bavaria, Lichtenstein, Austria, Würtemberg, and several cantons of Switzerland for the benefit of the fisheries in the Lake of Constance and its tributaries. Such a treaty was, on December 9, 1869, concluded between the Baden government and the Swiss federal council.

A similar treaty was concluded November 27, 1869, by the delegates of all the states on the Lower Rhine, from Basle downward, but failed to be ratified by the Dutch government, as the lower house of the parliament, by a majority of four, voted against the treaty ; and it is sought to reach a uniform legislation by other means.

In the Netherlands, there is at present a new law in preparation, which is to regulate the salmon-fisheries in the Rhine ; and the *Deutsche Fisherei-Verein* hopes, by laying its suggestions before the most famous ichthyologists, both at home and abroad, to induce the Dutch government, in its own interest, to pass not only such laws as will include the Mannheim propositions, but will even be an improvement on them by prohibiting the catching of salmon in the Rhine for at least thirty-six hours every week.

A fishing-treaty between all the states bordering on the Danube has been proposed, as likewise one relating to the fisheries in Lake Garda between the Austrian and Italian governments.

Such treaties make it necessary that the fishing-laws of the several countries should accord with all the points touched in the treaties.

We give below the full text of the treaty between Baden and Switzerland, relating to the fisheries in the Rhine, including the Unter Lake, (a portion of the Lake of Constance.) This treaty is based on scientific principles, and on the experience of countries where strict fishing-laws have been successfully in force for some time.

“For the protection and increase of the valuable kinds of fish in the Rhine, including the Unter Lake and its tributaries, between Constance and Basle, the government of Baden and the federal council of Switzerland have resolved to draw up uniform rules for the fisheries in these waters, and have, for this purpose, appointed the following delegates: His Royal Highness the Grand Duke of Baden, his Privy-Counselor in the Ministry of Commerce, Dr. Rudolph Dietz; the Federal Council of the Swiss Confederation, the Federal Counselor, Dr. Karl Schenk: between whom, after their credentials had been found to be correct, the following treaty, waiting a future ratification, was drawn up:

“ARTICLE 1. In the Rhine fisheries, including those of the Unter Lake and its tributaries, between Constance and Basle all stationary apparatus (fish-weirs) and the use of stationary nets, which at the common low-water mark on a line drawn at right angles from the bank obstructs more than one-half of the breadth of the river, thus hindering the migration of fish, are prohibited. This prohibition only applies to those waters which contain salmon. The distance between the several poles forming the fish-weir intended to catch salmon, as well as the distance between the connecting cross-poles, must be at least 10 centimeters, (1 centimeter=0.39 inch.) If several such stationary apparatus, or several stationary nets, are set at the same time, near one and the same bank, or on the opposite bank, they must be placed at a distance from each other amounting to at least twice that of the largest apparatus.

“ARTICLE 2. No fishing-implements of any kind or name must be used, if, when moist, their openings do not have the following dimensions: *a*, for salmon-fishing,—bow-nets, 6 centimeters, inside 4 centimeters; *b*, for catching other large fish,—3 centimeters; *c*, for catching small fish,—1½ centimeters. Implements used in taking fish for bait are not subject to these regulations.

“In the Rhine between Schaffhausen and Basle no nets are to be used whose openings are larger than 3 centimeters.

“In regulating nets and other implements, the difference of one-tenth centimeter shall not be counted.

“ARTICLE 3. Floating nets must not be placed in such a manner as to stick to the bottom or remain attached to anything.

“ARTICLE 4. All means employed to stun fish, as well as the use of traps with springs, spears, guns, or pistols, explosive cartridges, poles, and other contrivances tending to wound the fish, are forbidden.

“The authorities in the different parts of the country may permit exceptions as to the use of spears and guns or pistols.

“Fishing with hooks and lines is allowed.

“It is forbidden to drain any water-courses dry for the purpose of fishing.

“The governments which adopt this treaty will see to it that the so-called automatic traps connected with mills and other water-works are as much as possible removed.

“The placing of new traps of this kind is forbidden.

“ARTICLE 5. The following kinds of fish must neither be offered for sale nor sold, if, from the eye to the commencement of the anal fin, they have not at least the following length: Salmon, (*Trutta salar* Lin.), 35 centimeters; lake-trout, (*Trutta lacustris* Agass.) 20 centimeters; brook-trout, (*Trutta fario* Lin.), grayling (*Thymallus vulgaris* Nilss.) Rötheli, (*Salmo salvelinus*), 15 centimeters. The authorities of the two countries may, for these measures, substitute the corresponding weights.

“If fish are caught which have not this weight or measure, they must immediately be thrown back into the water.

“ARTICLE 6. In order to increase the number of salmon, fishing is every year entirely suspended in the Rhine and its tributaries, from Basle upward, from the 15th October till the 1st January.

“In the time from the 1st September till the 1st January, it is forbidden to offer for sale, to sell, or to transport Rhine salmon which are capable of spawning.

“During the seasons of protection, the respective authorities may allow the taking of salmon to be used in piscicultural establishments for impregnating eggs. These fish, after they have been used for this purpose, may, under the proper supervision of the authorities, be offered for sale, sold, or transported.

“ARTICLE 7. From the 20th October till the 20th January, it is forbidden to fish, offer for sale, or to sell lake-trout, salmon-trout, and brook-trout. If, during this period fish of these kinds are caught accidentally, they are to be thrown back into the water immediately.

“The respective authorities may permit the taking of these kinds of fish, during the seasons of protection, for piscicultural purposes, and also the offering for sale and the sale of lake-trout after these have been used for impregnation, under proper supervision.

“ARTICLE 8. From the 15th April till the end of May, the catching of any kind of fish—except salmon and lake-trout—with nets and bow-nets of any kind, is prohibited.

“ARTICLE 9. The taking of fish for artificial culture, and the catching of small fry to serve as food for the fish in the piscicultural establishments, may, by the respective authorities, be permitted even during the season of protection mentioned in article 8.

“ARTICLE 10. It is prohibited to throw refuse from factories or other

substances of a like character into the waters in such quantities as to injure the fish thereby.

“If, in some places, the agricultural or industrial interests are of greater value than the fisheries, the respective authorities may permit such substances to be thrown into the water, taking measures, however, to limit the injury as much as possible.

“The respective authorities will likewise decide whether and how far the above regulations shall apply to existing conduits for leading agricultural or industrial refuse into the water.

“ARTICLE 11. Both contracting states will see to it that the number of salmon in the Rhine and its tributaries is increased by hatching a number of eggs every year, and by placing the young in suitable portions of the above-mentioned waters. They will likewise see to it that so-called salmon-ladders are put in suitable places, to assist the salmon and trout in ascending the river.

“ARTICLE 12. Each of the contracting states engages to make the necessary regulations for carrying out the articles of this treaty, to repay violations by suitable punishments, and to appoint the necessary officers for this purpose.

“The present treaty shall not prevent either of the contracting states from making still stricter regulations for the protection of fish on their territory.

“ARTICLE 13. Each of the contracting states shall appoint a commissioner of fisheries for its territory.

“These commissioners are to inform each other of all new measures regarding the fisheries which their governments have adopted; communicate to each other the annual reports on the results of the salmon-fisheries, as well as on the young salmon which have been artificially hatched, and placed in the water; and shall, by correspondence and occasional meetings, further the mutual interests of the fisheries in the Rhine and its tributaries.

“ARTICLE 14. The contracting governments will, according to some plan to be agreed on at some future time, make investigations as to the nature and life of fish, especially of the *Salmonoidei*, and communicate to each other the results of these investigations.

“ARTICLE 15. This treaty will take effect on the 1st of July, 1870, and remain in force for ten years counting from that day; and if no warning shall have been given by either of the contracting parties twelve months before the end of the period mentioned, it shall continue from year to year till the end of a year after the day on which either of the contracting parties will have given warning.

“ARTICLE 16. If the treaty concluded November 27, 1869, between all the states bordering on the Rhine should from some cause not take effect on the 1st July, 1870, but at a later date, the present treaty will likewise not take effect till this later date.

“ARTICLE 17. Those governments on whose territory there are portions

of the Lake of Constance and its tributaries may become parties to this treaty.

“Those portions of the Lake of Constance and its tributaries which are either on Swiss or Baden territory are subject to the articles of this treaty as soon as all the other governments holding portions of the Lake of Constance and its tributaries will have become parties to this treaty.

“ARTICLE 18. This treaty shall be ratified, and the customary documents exchanged, on the 1st March, 1870, or, if possible, at an earlier date, in the city of Berne.

“In witness whereof we have signed this treaty and affixed our seals.

“Done in the city of Berne, December 9, 1869.”

26.—SALT-WATER FISHERIES, AND THE LAWS RELATING TO THEM.

There are very important salt-water fisheries on the Austrian coasts, viz, in the districts of Triest, Görz, Gradisca, and Istria, and in the kingdom of Dalmatia.

These may be considered under the divisions of high-sea fisheries and coast-fisheries. The former are carried on in the open sea, and the latter in gulfs and inlets and all along the coast as far as a gun-shot will reach.

From many sources we glean the fact that the salt-water fisheries in olden times contributed more to the thrift and wealth of the towns on the coast than nowadays. Of the high prices which the products of the sea bring in far distant markets, the poor fishermen reap but little benefit. It often happens that they sell the results of their laborious and dangerous trade on board their vessels to speculators for a trifling sum, and these latter reap the profit of the valuable products which the fishermen have brought up from the store-houses of the sea. There is no doubt that a suitable organization of the salt-water fisheries on a legal basis, the encouragement of such institutions as the *valli di pesca*, (see below,) and of the trade in salt-water fish with Vienna and other large cities, would increase the profits of the fishermen considerably.

As being of special importance, we mention the so-called *valli di pesca*, which includes inlets, canals, or brackish ponds near the coast, that have been artificially closed, and are used for raising salt-water fish and shell-fish. As is done by the French ministry of marine, we likewise grant small strips of land near the coast to private individuals for establishing such artificial waters, so that every inhabitant of the coast is enabled to have his own little fish-pond or oyster-bed.

Mr. Smarda says that the arrangements of these brackish ponds on the Austrian coast far excel anything of the kind in France.

The taking of some kinds of salt-water fish, such as sardines, mackerel, and tunnies, is most profitable if carried on in common by a number of fishermen, and should therefore be regulated with a view to founding properly organized associations.

The attention of legislators has most frequently been given to the

methods of fishing termed a *cocchia* or *al fondo*, and those termed a *bragozzo* or a *tartana*.

Fishing a *cocchia* is carried on with a deep, narrow-meshed net, tapering off into a long bag, which by leaden weights is lowered to a great depth, even to the bottom of the sea, where it is dragged along by two boats sailing parallel with each other at a small distance apart. Fishing a *bragozzo* or a *tartana* is carried on with a similar net, which, however, is only fastened to one boat by means of poles. As these nets, which are frequently many hundred feet long, are for hours dragged along the bottom of the sea, before the fishermen haul them in at some point which long experience has indicated to them as particularly favorable, they catch not merely all the fish in those portions of the sea, but likewise destroy the algæ and sea-weeds growing on the bottom.

Fishing a *tartana* has been carried on from time immemorial, while fishing a *cocchia* came into use on our coasts only during the last century.

The greatest masters of fishing a *cocchia* are the inhabitants of the island of Chioggia near Venice, who visit all the Austrian coasts, especially those of Dalmatia.

Since the middle of the last century, there has been no lack of prohibitions against both these methods of fishing, which, however, have invariably soon been revoked or permitted to fall into disuse.

There have been different causes for such contradictory measures. It could not, on the one hand, be proved that these methods of fishing had diminished the number of fish very materially. Just as the harvests of fields vary in different years, so was the decrease in the quantity of marine products only a temporary one; in a few years, the fish came again in large numbers, and certain species which had disappeared entirely, returned after some time.

It must be granted, on the other hand, that fishing a *cocchia* is undoubtedly the most ingenious and efficient method employed on our coasts, which has been settled on by the fishermen after long thought, and the experience of many years, and that it would be exceedingly difficult to substitute any other method. It was not only a feeling of pity for the families of poor fishermen which prompted the authorities to relax their severe measures, which generally were caused by the loud complaints of some community on the coast, desirous of obtaining a secure monopoly by excluding all strangers; but as long as no sufficient proof has been adduced of the injurious character of these methods of fishing, such prohibitory measures would only tend to raise the price of fish, and, in this manner, they would be anything but beneficial to the poor fishermen and the general public.

Fishing a *cocchia* is, at any rate, almost impossible on most coasts on account of the uneven, and especially the rising bottom, and the dense growth of sea-weeds on which fish deposit their spawn; if, therefore, a few

spawning places should be destroyed by the large nets, the number remaining would still be very large.

Although, as we have seen, the entire prohibition of this and of similar methods of fishing is scarcely justified, it is necessary that there should be certain legally prescribed limitations; economical and, still more, administrative reasons demand the proper regulation of the coast-fisheries, and certain rules as to the formation, rights, and duties of associations.

In this respect, the coast-fisheries, especially those carried on in bays and inlets, do not differ much from the inland. In such places, the exclusive rights of communities and landed proprietors have been respected; while, outside of such narrow limits, salt-water fishing has been free.

Legislation has, therefore, directed its attention to the above-mentioned limited portions of the sea, although not to the same extent as to the inland fisheries. As an example, we mention that, till the definite regulation of the coast-fisheries, the use of torpedoes and other explosives has been prohibited.

With regard to the high-sea or open sea fisheries, other considerations prevail.

The productive power of the ocean, in its unlimited extent and its unfathomable depths, is, with regard to its various processes and their causes, far less known and far less accessible to human observation than that of the inland waters.

It is true that there have been complaints of the decrease in the wealth of fish in the ocean; and the injurious methods of fishing are partly assigned as the cause.

It is maintained that some species of the most valuable and numerous salt-water fish, from which millions of money were formerly gained, have been almost totally destroyed. This is certainly true of the gigantic whales, which, even twenty or thirty years ago, were so numerous on the coasts of the islands in the north of Scotland. It is likewise said that a decrease in the number of sardines, cod-fish, &c., has been observed; while others deny this, especially as far as the sardines are concerned.

We consequently find two opposing views on the high-sea fisheries: the one demanding complete freedom from all those limitations which only quench the spirit of enterprise, and do not benefit the fisheries; the other fearing that the erroneous idea of an unlimited and indestructible supply of fish, the disregard of all protective measures, and of all regulations limiting the methods of fishing, will, in the end, prove disastrous to the salt-water fisheries, in the same way as with our river and lake fisheries, and with the oyster-beds, which have been almost totally destroyed in some parts.

Of late years, there have been many attempts to obtain a legal and economical basis for the high-sea fisheries; and seasons of protection, artificial impregnation, and hatching, &c., have been spoken of. The

difficulties in the way of legislation are much greater, however, than with the fresh-water fisheries.

The open sea, beyond the reach of a gun on shore, is the common property of all nations, and individual states have no right to legislate concerning it.

From the oldest times, fishing in the open sea has been a free trade, bound by no guilds or other limitations. As an old document says, "The fishermen are here allowed to fish as far as they want to risk their necks."

No individual state would desire to limit the enterprise of its subjects on the open sea, thus offering a chance for foreign fishermen; and, as to international legislation, there has been too little material collected on which to build up such a code in spite of the numerous reports on the subject made by individual states, and the trustworthy investigations of the influence of certain methods of capture on the fisheries.

E.—CONCLUSION.

In reviewing the whole subject under consideration, we can briefly give the following more important points, which should be kept in view for any future regulation of the Austrian fresh-water fisheries.

The reports from all provinces of Austria agree that the fisheries which formerly were in a very flourishing condition have declined. The causes of this decline are nearly the same in all provinces. Not to mention those unavoidable injuries which they have suffered from the progress of civilization in other directions, we must assign, as prominent causes, the entire want of protection; numerous rights and privileges which absolutely hinder or even destroy them; the reckless plundering of the large connected waters by privilege-holders, each one being at war with the other; and the total neglect of all measures which tend to do justice to the fisheries in the exercise of water-rights, even in cases where conflicting interests might easily have been harmonized. All reports agree as to the necessity of passing laws for protecting and promoting them.

In some provinces of Austria, there are at present, if we except laws applying to the whole monarchy and a few regulations in general ordinances, no laws whatever relating to the fisheries. Other provinces possess old fishing-laws; but although we see in them the proof that our ancestors desired to protect this important branch of economy, although they might in many respects—with regard to the formation of associations and the establishment of proper protective regulations—serve as models, it is doubtful whether these laws, which in many points are utterly at variance with modern ideas and statutes, could at this day be enforced, either as a whole or in part. Many of the provisions of these old laws no longer agree with the present advanced state of natural sciences and technology. The most important relations which a statute is intended to regulate, especially with regard to other

trades or industries, are not touched in the fishing-laws of the several provinces. The regulations regarding punishments are entirely antiquated, and there were no measures for making the law more effective, even in the olden times. Most of these statutes have fallen into oblivion, so that it may justly be said that in none of the provinces of Austria do the fisheries enjoy that protection by laws which is an essential condition of their success.

The decline of the fisheries must, therefore, be mostly ascribed to defective legislation, or, more correctly expressed, to the utter want of legislation regarding the protection and practice thereof. Most civilized nations are either ahead of us in making new fishing-laws suited to the demands of modern science, or are on the point of re-organizing their old ones.

The beneficial influence of such practical laws, and of the institutions called to life by them, is universally recognized among these nations, and has in many cases been proved by figures.

There is not the slightest doubt that the natural conditions in Austria are extremely favorable to the improvement of the fisheries. Few other countries possess such a wealth of inland waters, streams, rivers, brooks, lakes, and ponds; most of these have, even at the present day, an ample supply of fish, somewhat diminished as to numbers, but still excelling through its great variety of fine and valuable sorts. Science and experience have in our time produced such a number of improvements in the fishing-trade—such as the different ways of preserving fish, and the different uses to which the products of the water are put—that by their aid it becomes possible to revive our fisheries, in spite of unfavorable influences to which they are exposed, and without in the least injuring the more important interests of navigation, industry, and agriculture.

The spirit of enterprise has also in Austria again turned toward this branch of productive industry; and it is a matter of great satisfaction that not only many great landed proprietors, but also many small landowners, peasants, mechanics, and workmen have founded establishments for artificial fish-culture, and derive considerable profit from small sheets of water either owned or rented by them.

In some provinces, associations have been formed, having for their object a system of rational fishing and fish-culture; and there is no doubt that such associations, adapted to the peculiar wants of the fisheries, will, if supported by legislative measures, gain ground constantly.

The above mentioned manifold evils, which have hastened the decline of the fisheries, have also prevented any practical benefit being derived from the numerous modern improvements in fishing and the fish-trade.

If one considers the enormous profit which other countries derive from their lawfully protected fisheries, and then applies this standard to our extensive waters, it becomes absolutely certain that as soon as a proper legislation has paved the way for the introduction of all the

modern improvements and institutions, the results of the fisheries in Austria will be no less brilliant; our national income will then likewise increase, and these advantages must be rated all the higher, because the point in question is to provide a cheap and wholesome article of food, accessible to all classes of our population, for which no substitute of equal value can be found.

Our government is earnestly endeavoring to extend such favors to the fisheries, at first in the inland waters, as are commensurate with their importance to the welfare of the nation, and is at present discussing the draught of a new fishing-law, based on the most careful consideration of all the reports sent to the ministries. Our review may serve as a forerunner of this law, and in some portions as a fuller commentary on the subject, than the necessarily limited report preceding the law is able to give.

