

XXXV.—OYSTER CULTIVATION IN THE NETHERLANDS.

By Dr. P. P. C. HOEK.*

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In his interesting work, *Die Austern und die Austernwirthschaft*, Berlin, 1877 (Oysters and Oyster Cultivation), Professor Möbius returns a negative answer to the question, whether the artificial cultivation of the oyster, according to the French system, can be carried on in German coast-waters; and assigns as the principal reasons for his conclusions the unfavorable conditions of tide and temperature.

Many a German reader will, therefore, be astonished to learn that oyster cultivation is very successfully carried on on the coast of the Netherlands. I have recently published a treatise, in the Dutch language on oyster cultivation in the Netherlands, as compared with such cultivation in France, and the unsuccessful attempts in that direction made in England and on the German coasts, and at the request of Professor Möbius, I shall here reproduce, in German translation, that portion of my treatise which relates to oyster cultivation in the Netherlands.

The rise in the price of oysters had produced on the coast of the Netherlands, as in other countries, a system of fishing, which might well be termed plundering or robbing, and the number of oysters decreased very perceptibly in consequence. The *Texel* oyster-beds have been almost exhausted, although a few years ago they enjoyed the reputation of possessing a great wealth of oysters. Thus a whole ship-load of young *Texel* oysters was sold in 1835 at mark 3.25 to mark 4 (77–95 cents). In 1836, *Texel* fishermen brought large oysters to Hamburg and Bremen and sold them at mark 1.90 to mark 2.60 (45 to 60 cents); besides these they sold 2,000,000 oysters to Amsterdam merchants at about 80 pfennig (20 cents) a hundred. These oysters were sold in the Amsterdam oyster-saloons at 2 mark (47 cents) a hundred. For a hundred oysters of the same kind 7 mark (\$1.66) were paid in 1870, and ten mark (\$2.38) in 1875.

When the Dutch Government, in 1870, began to give attention to the subject, the number of oysters had greatly decreased, not only on the *Texel* oyster-beds, but also on those of the coast of Groningen, Friesland,

*Dr. P. P. C. Hoek, in *Leiden: Ueber Austernzucht in den Niederlanden.*—Translated by HERMAN JACOBSON.

and Zeeland. After some hesitation the government resolved in the year 1870 to prohibit general fishing on the large Yerseke oyster-bed in Zeeland and on the large oyster-beds in the Lauwer Sea, and to rent out these beds in small portions. This measure was both warmly defended and bitterly assailed. It is natural that a person owning oyster-beds—even if it should only be temporarily—will take much greater care to keep up the value of his oyster-beds, and if possible to increase their value, than fishermen who take oysters wherever they please. These latter will of course endeavor to obtain in the shortest possible time the greatest possible number of oysters, because they feel convinced that every oyster which they leave on the beds will increase the wealth, not of the oyster-bed, but that of the fisherman who comes after them. Many persons, however, viewed the subject from a philanthropic point of view, and maintained that it would be very hard for the “poor” fishermen, who live on the daily result of their fisheries, if general fishing on the oyster-beds were prohibited, because it would require some capital, if ever so small, to rent a portion of an oyster-bed. But regard to the interests of the *entire* population gained the victory, and at the present time, when hardly ten years have elapsed since the introduction of that measure, every one feels thankful for it. In the beginning the rents were not too high even for fishermen of moderate means, especially if they went shares with some neighbors or friends. Thus as early as 1870 some fishermen of Tholen rented portions of an oyster-bed, and did a good business.

But only the Zeeland oyster-beds have recovered from their condition of decadence, and have attained to a formerly unknown degree of prosperity. Oysters are occasionally fished on the *Texel* oyster-beds, but they are so few in number that it is hardly worth the trouble. The Groningen and Friesland beds in the Lauwer Sea have of late years been entirely abandoned, although they afforded good fishing in former times; principally because by the closing of the Reit Diep, a canal which communicated with the Lauwer sea, the Zoutkamp beds in the neighborhood of *Vostmahan* and in the *Dokkwerdiep* have become entirely worthless.

Besides the oyster-beds which are rented out, there are still in Zeeland some public oyster-beds which do not seem to have undergone any material change during the last few years. The yield of these beds is not the same every year, but in 1875 it was very good.

During the summer months access to the oyster-beds is, at least officially, prohibited. But the police supervision leaves much to be desired, and in 1875 large numbers of young oysters were taken from these beds during the period of prohibition, and were sold to the lessees of portions of oyster-beds for the purpose of restocking their beds.

The rented oyster-beds, however, are the ones which deserve our special attention. This combination of oyster-beds forms the so-called *Yerseke Bank* in the eastern Schelde, between the coasts of South Beve-

land and Tholen, and has a surface area of 2,000 hectares (4,942 acres), but only a portion of this area is well adapted to the cultivation of oysters; the remaining portion, the so-called "flat bank" (*platte bank*) has *natural* oyster-beds, and fishing is there carried on with drag-nets. On this bank experiments in oyster cultivation were made as early as 1870. On the whole, the method introduced into France by *Coste* is followed; and consequently there is no exclusively artificial oyster cultivation.

The method referred to consists, as is well known, in catching young oysters and placing them in other portions of the bank where they are not exposed to so many dangers, and where consequently they have a better chance of growing and developing. Only in rare cases do these oysters reach the age of sexual maturity; for the following years recourse must therefore be had to the original oyster-beds. I will, in this connection, briefly describe how young oysters are taken and to what further treatment they are subjected.

In places where oysters are found and which are not too deep, different objects are thrown here and there into the water in the beginning of summer, with the view of offering to the young oysters a suitable surface to which they may cling. The places most favorable to this purpose are those in which, when the tide is out, enough water remains to allow the objects to which the oysters adhere to remain under water at all times. In the beginning a great variety of articles was used for this purpose: dishes covered with cement, milk-pans, sugar-bowls, and during the very first year 20,000 tiles covered with cement. It soon appeared that these tiles were best adapted to the purpose in view, but in the beginning the attempts to loosen the oysters proved unsuccessful in many cases, as many of the tender shells broke during the process. With the view of remedying this evil the tiles are at present covered with a crust of cement several millimeters in thickness, which can easily be removed, leaving a small piece of cement adhering to every oyster when loosened from the tile. As soon as the winter is past the collectors are removed from the bank and the young oysters are taken off.

The number of young oysters adhering to one collector (*e. g.*, a tile) differs of course very much. In 1875 the average number per tile was 25; this, however, was an exceptionally large number, for on an average there are not more than ten oysters to a tile. After the young oysters have been loosened from the tiles, they must be scattered in suitable places so that later they may easily be found again. In this way a portion at least of the young oysters are treated, *viz.*, those which have attained a certain degree of hardness; the remainder are placed in specially prepared boxes, some of which are placed on the banks, and others in the parks. These boxes rest on piles, and their top and bottom are covered with a wire grating; inside there is a partition likewise formed by wire grating. In these boxes the young

oysters are protected from crabs and other enemies, whilst the water has free access and supplies all the food required.

The oyster parks or ponds are specially intended to protect the young oysters from the cold of winter, which is very hurtful to young oysters, especially when they are in shallow water. In his work (referred to above) Professor Möbius enters very fully into this question, and it is therefore not necessary for me to dwell on it any more.

Oysters which have been treated in the manner above described are ready for the market in the second year. It is but natural that only a portion of the young oysters which have been scattered should grow up and become fit for the market. The firm of Meulemuster & Co., in Bergen op Zoom, which owns one of the largest establishments for oyster cultivation on the Yerzeke Bank, forwarded between 2 to 3 millions of oysters to the market in 1875. This number was the result of 12½ millions young oysters placed on the bank during the season 1873-'74. About 70 per cent., therefore, had perished,* partly through the low temperature, but partly also by the numerous enemies of the oyster, prominent among which is the star-fish. In 1876 the same firm sold 2 millions oysters, which in the beginning of the season brought 80 marks (\$19.04) a thousand, and somewhat later 100 marks (\$23.80). These figures will convey an idea of the extent of the oyster business done by this firm. The total number of oysters which came into the market from these rented oyster-beds in 1875 was about 30 millions. From the official reports of the Netherlands Commission of Sea-fisheries (from which the above figures are taken), we are enabled to get the exact number of oysters which, in 1876, were furnished by the *natural* and *artificial* oyster-beds in the Zeeland waters (viz, 36 millions), but it is impossible to ascertain how many were furnished alone by the artificial beds. In 1877 the yield was not quite 10 millions, whilst in 1878 it was much larger. The market price in 1877 was, in the beginning of the season, 135 marks (\$32.13), and somewhat later 160 marks (\$38.08) a thousand. Good and bad years alternate, as in most other branches of industry. The peculiar feature of the oyster cultivation, as carried on in the Netherlands, is this, that two years ahead it can be ascertained with a tolerable degree of probability whether the oyster harvest will be a success or a failure. In 1877 a large number of young oysters were placed on the banks, and the winter 1877-'78 was a mild one, so that in all probability 1879 will be a good oyster year. The demand for Dutch oysters,

* It is said that in France about 80 per cent of the young oysters become fit for market. This seems to be owing to the circumstance that in the French oyster establishments the oysters, which have adhered to different objects in autumn, are not taken off in spring, but are allowed to cling to the collectors for a whole year. In employing this method twice the number of tiles is required, therefore a larger working capital. Last year (1878) attempts were made in the Zeeland oyster establishments to introduce the French method in the eastern *Scheldt*, and, as it seems, with good results.

especially in Germany and England, is so unlimited, that even in the most favorable years a good price can be obtained.

The above will, at any rate, furnish sufficient proof that oyster cultivation, according to the methods described, can be carried on very successfully in the Zeeland waters. It is very difficult, however, to answer satisfactorily the question, Why the same methods which, on the Dutch coast have been productive of such good results have proved entire failures on the German and English coasts? As far as I can see, there are three causes which contribute to this result: (1) the happy idea of our government to rent out the Zeeland oyster-beds in small portions; (2) the fine business qualities of the men who engaged in this enterprise with genuine Dutch perseverance, simplicity, and zeal; and (3) the quality of the bottom, and the exceedingly favorable conditions of temperature and tide. The three last-mentioned causes are the ones to which these favorable results are mainly owing, and I therefore regret it all the more that I am not able to give further information on this subject.

In this short article it was only my purpose to direct the attention of other nations to oyster cultivation as carried on in the Netherlands. As regards statistical data and exhaustive descriptions of the methods employed, I refer the reader to the respective reports.

CIRCULAR OF THE NETHERLANDS ZOOLOGICAL ASSOCIATION.

HONORED SIR: The Commission of the Zoological Station intends during the coming summer months to inaugurate a series of investigations, on as extensive a scale as possible, relative to the anatomy, propagation, development, mode of life, &c., of the oyster. From the second half of April opportunity will be offered both at the principal station at Bergen op Zoom and at the branch station at *Wemeldinge* in South Beveland, to make such investigation.

A number of persons having already declared themselves willing to take part in these investigations, the commission is of opinion that a division of labor would greatly increase the chances of a favorable result, and I have therefore been directed to request that you will take an active part in these investigations. The commission will supply you with all the aids necessary for such an investigation, excepting optical instruments; and I would ask you, in case you should be inclined to comply with this request, to inform me as soon as possible.

The only condition imposed upon you by the commission in asking you to share in this undertaking is that you will consent to furnish us, after the investigations have been brought to a close, with as full a report as possible, accompanied by the necessary illustrations, &c., and in shape for publication. It is impossible for the commission to state at the present time in what shape the results of your investigation will

be published. The commission, nevertheless, does not hesitate to make itself responsible (1) that the results of your investigations, if suitable, shall really be published, and (2) that whatever you furnish us shall be published under your name.

In order to give you an idea of the extent of the investigations which the commission have in view, I give below an outline of our programme, and at the same time inform you for what portions of it we have already received offers.

(1.) To prepare as complete a list as possible of all the works relating to the oyster, accompanied by short references, and to publish this list at an early date. The commission will take charge of this matter, and hopes to have the work ready in time so that it can be used during the coming summer.

(2.) To subject to an exhaustive investigation the anatomy of the oyster, and more especially that of its generative organs. Dr. Hoek and Dr. Vosmaer have this subject in charge.

(3.) To examine the contents of the stomach of the oyster, with the view of attaining absolute certainty as to its food.

(4.) To trace the development of the oyster :

(a.) The egg, from the time it has become impregnated till the young oyster leaves it. Dr. Horst and ———

(b.) The young oyster at the surface of the water until it goes toward the bottom, Prof. Hoffmann and ———

(c.) The young oyster after it has adhered to an object, Dr. Hubrecht and ———

(d.) To determine the limits of the migration of the young oyster, Dr. Van Rees and ———

(5.) To find the physical and meteorological conditions under which the young oyster leaves the egg and adheres to various objects, and to trace the normal course of life of an oyster, Dr. *Hubrecht* and ———

(6.) To study the life and habits of those animals which share the bank with the oysters, either as enemies, parasites, friends, or companions.

Protozoans Dr. Van Rees.

Sponges, echinoderms, &c. Dr. Vosmaer.

Worms Dr. Horst.

Articulates Dr. Hoek.

Mollusks ———.

Fish Dr. Hubrecht.

(7.) To answer practical questions relative to the industry of oyster cultivation not given under any of the six preceding heads.

The commission hopes that sooner or later at least two persons will be engaged in the investigation of each of the above subjects, and would state here that even as regards those subjects for which one or two persons have been mentioned, nothing definite has been settled, so

that, if any of these subjects should offer special attractions to you, you will very probably be assigned to it.

As soon as all answers have been received, I shall address a more definite letter to you, so that we may arrive at some positive understanding with you.

Very respectfully, yours,

Dr. P. P. C. HOEK,

Secretary of the Commission of the Zoological Station.

LEIDEN, *March* 16, 1881.