

## Notes on Oyster Culture.

By

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With Plate XXI.

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### I. OYSTER FARMING IN HOLLAND.

WHILE on a visit to Holland last December, I took advantage of the opportunity to learn something of the extent and methods of oyster culture there practised. To Mr. C. J. Bottemanne, of Bergenop-Zoom, the Inspector of Fisheries, and to Prof. A. A. W. Hubrecht, of Utrecht and his published papers, I desire to acknowledge my indebtedness.

Though the invention of the modern system of culture is to be credited to France, it is at present carried to its highest perfection on the Eastern Schelde, in the Dutch province of Zeeland. This, no doubt, is partly attributable to the fact that the geographical conditions are here almost ideally perfect for the purpose. Originally continuous with the Western Schelde, but now for many years cut off from it by the railway embankment (see map on Pl. XXI), the Eastern Schelde forms a quiet, almost land-locked, shallow bay, about twenty miles in length, which at low tide leaves acres of good hard ground exposed on both sides of its bed. There are two other exceptional advantages in this position: the one, that on the ebb tide the main bulk of the water lying in the extremity of the bay is never lost in the sea, so that the floating spat of the oyster, though carried down by the tide, is swept up again into the bay and over the collectors placed to catch it, without ever reaching open water; the other, that on the stone bases of the dykes, within 546 yards (500 metres) of which no one is allowed to dredge for fear that their foundations should be injured and the country be flooded, are at certain points enormous natural colonies of oysters, which provide every year a plentiful supply of spat for the artificial cultivation. The fact, also, that much of the land lies below high-water mark and is surrounded by dykes, makes it easy and cheap to construct store-ponds, &c., on shore, and to admit salt water through sluices. Beside, however, these natural advantages, there are further reasons for the success of the Dutch oyster culture: the patient

and careful industry of the people, the public spirit of the Government, and the fact that throughout the enterprise several members of a body of naturalists, the *Nederlandsche Dierkundige Vereeniging*, have constantly inaugurated fresh experiments and investigated causes of failure.

With all these advantages, it is hardly surprising that the industry has attained enormous proportions in a few years. In 1870, at the commencement of the enterprise, the rental of the (hitherto valueless) low-water flats, 7720 acres in area, leased by the Government to oyster farmers, was £1720; in 1885, when the leases were renewed, the rental amounted to £28,765. In 1888 (a bad year) there were despatched from five stations on the Flushing line *more than 2580 tons* of oysters, besides what was conveyed by water; 954 tons being destined for England by the Flushing route, and many more by way of Rotterdam. As to the amount of hands employed in the industry, it is not easy to give exact figures, since at some times of the year the whole population of the district, men women, and children alike, take a part; but about 480 boats, averaging three hands each, are regularly licensed for the oyster fisheries. A small fact, but one which indicates the importance of the interests concerned, is that it is intended in the course of this year to supply the police-boats, entrusted with the duty of watching the ground and preventing depredations, with electric search-lights for night service.

The statistics given above refer, be it noted, only to the artificial oyster culture; the natural beds (public beds) have, as in England, practically ceased to exist, owing to the rapacity of the dredgers. Nominally dredging on these beds is permitted by the Dutch Government from March to September inclusive; but they are nearly valueless. It is only by sowing annually large numbers of clean oyster shells for cultch, and by absolutely prohibiting the free taking of oysters for years, that an overdredged bed can be restored to an effective condition. As during these years the bed would have to be policed, and occasionally dredged to clean away weeds and mud, it is probably only by action on the part of the Government that dredged-out banks in England could be again made valuable; action which, in despite of the bulky Reports of Commissioners, England has shown no inclination to take. In Holland, on the other hand, the Government, with a view to restoring the once celebrated but almost ruined Texel beds, some few years ago prohibited free dredging on a part of the beds and leased it out in parcels. A considerable amount is already paid for the lots, oysters have been imported from France and Zeeland, and the beds are already flourishing without any further interference from Government than the supply of police. To achieve

this in England by private enterprise, an order of the Board of Trade under Part iii of the Sea Fisheries Act would be necessary, and it is more than doubtful whether it could in such a case be obtained.

It is therefore from the artificial cultivation only, from the oyster farms, that these tons of oysters are produced. The farms vary naturally in size and complexity according to the amount of capital invested in the undertaking, and in the details of management, but they conform to a general type of the following character. Each consists of two sections; the one, an area of ground from 12 to 150 acres in extent in the bed of the Schelde, rented from the Government, covered at half tide and marked off by stakes from other similar properties; the other on dry land comprising the necessary buildings and the ponds (Fr. *claires*, *parcs*; Dutch, *putten*). The river section of the farm is generally divided into one area on which are set the collectors for the spat, and another (often some distance off and in deeper water), where the "half-ware" or young oysters are placed to grow to a marketable size. The plan of the land-section of a typical farm is drawn in Pl. XXI (slightly altered from one at Bergen-op-Zoom); through the dyke communication is made by a sluice between the Schelde and a canal; from the latter the water passes by smaller sluices into the ponds I—III, which can also be put into direct communication with each other by other sluices. The natural rise and fall of the tide effect the changing of the water. A few buildings for packing and sorting houses, watch-house, carpenter's shop, &c., and a clear space of ground for stacking the tiles and "hospitals" during the winter are the chief other requirements. The method of procedure is thus arranged: the collectors, common roof tiles, coated first with hard, afterwards with soft lime, and thoroughly dried, are set about June in the bed of the Schelde at low water at right angles to the current, and sloped so as to make little eddies into which the swimming spat may be swept; they lie here, except for being occasionally swirled in water to wash off the mud, till September or October, by which time, if the season be good,\* numbers of tiny oysters will be found to have adhered to them. The tiles are carefully brought on shore and arranged in the pond marked II (Pl. XXI); they are generally set like the Greek capital  $\Pi$ , two vertical covered by one horizontal, and stand in about three to four

\* A good season is conditioned chiefly by wind, state of the water, and most of all by temperature. With rough weather, foul water, and a cold summer, there will be no young oysters; but the statement so often to be met with in the evidence before committees that "there has been no spat here for many years" means, not that the oysters have failed to spat, but that the spat has been killed by unpropitious physical conditions, or has failed to find a suitable foothold. Plenty of spat is thrown off every year.

feet of water. Clean salt water is of course admitted constantly. Here they remain till about February; they are then taken up and the young oysters detached. This is not difficult owing to the layer of soft lime with which the tiles are coated. When detached they are placed in the "hospitals;" these are generally made of tarred wood (fig. 1, Pl. XXI), and are shallow trays about six inches deep standing on legs about six inches off the ground; they rest on the bottom of ponds II and III, singly or in two tiers, according to the depth of water (three to five feet) in the pond; in some cases they are allowed to float. Here the young oysters remain for about two months, increasing in bulk and strength, and recovering from any damage which they may have incurred in detachment from the tiles; at the end of this time they are sowed out on the private banks in the Schelde as "zaai-goed," it being found that, though the percentage of loss is here greater, growth is much more rapid and quality better than if they are kept in enclosed ponds. The grounds on which they are placed are occasionally cleaned by dredging without a net. The oysters are considered marketable in the third and fourth year; they are dredged up\* and brought to the sorting houses, and, according to size, are either replaced on the beds to grow larger, or are laid down in the store pond marked I. This latter is generally floored with tarred planks, an expensive material, but found to be better than either the natural ground, which becomes foul, or than brick, which is too "cold." On little piles driven into the bottom of this store pond run plank gangways, so that ready access may be had to any part and the oysters lying there be removed by a pole-dredge when required for the market; the water is kept at about four feet in depth.

In order to collect the maximum amount of available spat, or, in other words, to bring all the spat within reach of the collectors, experiments have for several years been conducted under the auspices of the Nederlandsche Dierkundige Vereeniging on the principle of enclosing breeding oysters with the collectors in ponds. At present the experiments cannot be said to have been entirely successful; spat is thrown off, and a small quantity certainly adheres to the tiles; but the difficulty of oxygenating the water and supplying food artificially in the one case, and, if water be pumped through the pond, of keeping the spat from passing through the filter in the other, have so far proved too great.†

\* In some cases steam dredges are used, working six dredges simultaneously.

† Similar experiments carried out in England have in one or two cases been more successful, though not as yet financially so. Prof. Ryder, in the United States, has devised an ingenious apparatus for the purpose, but no account of its working has as yet appeared (Rep. U. S. Fish Comm., 1885, p. 321).

Such is the outline of the method of procedure, evolved by many experiments and many failures, which the Dutch have found to be the best, at least for their own locality. Good as it is, however, there must occasionally come bad years when unfavourable weather ruins the crop; in 1888, for example, the severe winter wrought havoc among the old oysters, the cold summer killed the spat. Hence the enterprise of an oyster farm must be backed with a considerable capital, not only because there can be no appreciable return on the money invested for at least four years, and a bad season may defer it even longer, but also because out of this capital some must be held in reserve in order to replace the brood-oysters in case of disaster (elsewhere of course than in the Schelde, where the brood-oysters are on the dykes). On the other hand, however large the capital, it will be utterly thrown away unless expended with the most rigid economy; and in this fact we probably find the chief reason for the failure of so many oyster culture companies in England. It has often been shown that it is perfectly possible to raise oysters artificially in England, but it must be done at a less cost than the market price of the oyster if a dividend is to be expected. Each oyster raised by the Herne Bay Company was estimated by Mr. Blake (Rep. Sel. Comm. Oyster Fisheries, 1876) to have cost them £100. Most instructive in this connexion is the history of this unfortunate company. It was founded in 1864 with a capital of £100,000 and a right of "several oyster fishery" over nine square miles at Herne Bay, in the estuary of the Thames. Before a single oyster had been laid down no less than £43,700\* had been spent; its area was utterly disproportionate to the remaining capital, and it gradually dwindled away for want of vitality.† Against this, however, must be set the fact that in a few places in England oyster farming with collectors, &c., has been carried out for many years, if not with signal commercial success at least without disaster; but the problem of raising oysters cheaply on a great scale has not as yet been solved (except on paper) so far as England is concerned; and this, it may be noted, is not for want of suitable localities.

It is not my purpose to discuss here the means by which this solution may be attained, but I cannot conclude without a reference to one great obstacle to private enterprise in this direction, which has been pointed out again and again by those who have interested themselves in such subjects; namely, the absolute impossibility in the present state of legislation of ascertaining in many cases the ownership of any particular section of foreshore. As soon as a piece

\* Preliminary and Parliamentary expenses, £12,600!

† Its melancholy history may be read in the three Reports of the Inspector under the Board of Trade, Mr. Walpole, dated 1875, 1876, and 1882.



of otherwise worthless foreshore is judged to have capabilities for oyster or mussel culture, there crop up municipal charters, private charters, manorial rights, ducal rights, and what not, backed generally by wealth which can crush intruders with long and expensive lawsuits. Sir T. H. Farrer has expressed himself clearly on the matter :—" Where there were any rights below low watermark on the bed of the sea, there it was provided by a clause inserted in the Bill [of 1868] by the House of Lords that those Orders [of the Board of Trade which are described below, p. 264] should give no power whatever; and as there exist a number of rights—some very clear and some very shadowy—over the foreshore and bed of the sea, under all sorts of feudal grants and charters, and prescriptions, it is a question to say whether that restriction may not have had a very injurious effect both in preventing people from applying for Orders and in preventing the grant or due operation of such Orders." (Rep. Sel. Comm. Oyster Fisheries 1876, Farrer 7.) It is true that under Part iii of the Sea Fisheries Act, 1868, a right of several oyster fishery may be granted by the Board of Trade, but this only after filing of petitions, inquiry by a Government Inspector, examination of witnesses—itself a tedious and expensive process\* and a check to private enterprise. Nor is this vagueness of title a cause of trouble in oyster fisheries only, but in estuarine fisheries of all kinds. An Act requiring that by a certain date all titles to estuarine and foreshore rights should be satisfactorily proved and registered with the Board of Trade, and vesting foreshores not so claimed in the Crown, would commit no real injustice and would prevent much.

## II. NOTES ON RECENT LEGISLATION RELATIVE TO ENGLISH OYSTER FISHERIES.

WHEN desirous lately to ascertain the state of the law relative to oyster culture in England, and the working of that part of the Sea Fisheries Act, 1868, which permits the Board of Trade to grant "rights of several oyster fishery" to applicants under certain cir-

\* "A fee of thirty-five pounds has to be paid to the Board of Trade in respect of Fishery Orders under Part iii of the Sea Fisheries Act, 1868, and a deposit of the same amount has also to be made to cover the travelling and personal expenses of the Inspector when making the inquiry;" but this appears to be a small item in the total legal expenses. For this and for other information, most courteously rendered, I am indebted to the Fisheries Department of the Board of Trade. The author of a recent work on this subject (S. A. Moore, *A History of the Foreshore*. London, 1888. 8vo.) is extremely severe upon the Board of Trade for not adjudicating on these claims when brought under their notice; but examination of title can hardly be said to be among their already varied functions.

cumstances, I found some considerable difficulty in the task, and have therefore put together these few notes in the hope that they may prove serviceable to others interested, by indicating in what direction to search for information. It is to be remembered that they apply only to England and Wales, the fisheries of the two other countries being under the jurisdiction respectively of the Scotch Fishery Board and of the Inspectors of Irish Fisheries.

There is no need to refer in detail to the earlier legislation in the matter ; in many places along the coast both private individuals and co-operative bodies of dredgermen enjoy rights of several oyster fishery under charters of greater or less age. The Whitstable Company is at present the best known of such societies ; the constitution of another, under the jurisdiction of the City of Rochester, may be read at length in the preamble to an Act of 1728 (2 Geo. II, c. 19) which was framed in its defence. This society, which may be taken as typical, was a close corporation of fishermen and dredgermen, admission to which was gained only by a seven years' apprenticeship to a member ; it was governed by an "Admiralty Court," the "jury" of which was elected partly from the dredgermen, partly from the Corporation of Rochester. The jury decided upon the close time, upon the temporary closure of any parts of the beds, and upon the quantity or "stint" which any dredger might take in a day ; the bailiffs appointed by them had the right to board suspected boats, and to seize oysters or implements there found in contravention of their rules, and also to impose fines and penalties on those who disobeyed them. Similar Acts are 3 Vict., c. 59 (Faversham), and 22 and 23 Vict., c. 72 (Ipswich) ; and an Act of 1756 (30 Geo. II, c. 21) permitted the City of London to make general fishery regulations affecting the Thames and Medway. The earlier legislation will be treated in detail in a general work on the Oyster, for which material is at present being collected by Mr. Bourne and myself.

The present period of legislative activity, the result of constant complaints as to the scarcity of oysters, begins with the Herne Bay, &c., Fishery Act, 1864 (27 and 28 Vict., c. 280) ; this was followed by the Ham Oyster Fishery Act, 1865 (28 and 29 Vict., c. 147), and the Roach River Oyster Fishery Act, 1866 (29 and 30 Vict., c. 145) ; all these three created "rights of several oyster fishery" in favour of the companies concerned. Facilities for further enterprise in this direction were afforded by **The Oyster and Mussel Fisheries Act, 1866 (29 and 30 Vict., c. 85)**, which arranged for the granting of private rights of oyster and mussel fishery by means of Orders of the Board of Trade ; most of its provisions were re-enacted by Part iii of the Sea Fisheries Act, 1868 (*q. v.*), and the Act itself repealed ; no further notice of it is therefore at present necessary. **The Oyster Preserva-**

tion Act, 1867 (30 Vict., c. 18), concerned with the better protection of such private fisheries as might be constituted under the last Act, was also embodied in the Act of 1868 and was itself repealed.

The Sea Fisheries Act, 1868 (31 and 32 Vict., c. 45), forms, together with the Act of 1888, the main body of the legislation by which sea fisheries are at present regulated; Part iii of this Act is exclusively concerned with the oyster and mussel fisheries of England, and the following are its most important provisions:—"An Order for the Establishment or Improvement and for the Maintenance and Regulation of an Oyster and Mussel Fishery on the Shore and Bed of the Sea, or of an Estuary or Tidal River above or below or partly above and partly below Low-water Mark" may be made by the Board of Trade on the presentation of a memorial to the Board to that effect, after due notice given to all persons concerned as "Owners or reputed Owners, Lessees or reputed Lessees, or Occupiers (if any) of the portion of the Sea Shore to which the proposed Order relates"; and after an inquiry held by the Board's Inspector on the spot (evidence may be taken on oath) and the consideration of his report. Such an Order is to be confirmed by Act of Parliament before it can take effect (but *cf. infra*, 40 and 41 Vict., c. 42); and if a petition against it should be presented in the course of its passage through Parliament, it is to be referred to a Select Committee and there opposed as a private Bill. All the expenses of the Order are to be borne by the promoters. The Order grants, for a period not exceeding sixty years (*cf.* 48 and 49 Vict., c. 79) *either a Right of several Oyster and Mussel Fishery*, i. e. "the exclusive right of depositing, propagating, dredging, and fishing for, and taking Oysters and Mussels," and permission to the grantees to "make and maintain Oyster and Mussel Beds, or either of them, and at any Season collect Oysters and Mussels, and remove the same from Place to Place, and deposit the same as and where they think fit" within the limits of the Fishery; or *a Right of regulating an Oyster and Mussel Fishery* with power to carry out restrictions on the fishery and to exact tolls from persons fishing. The grounds over which the grant extends must be duly buoyed or marked out. The Order is determinable at any period by a Certificate of the Board to the effect that they are not satisfied that the ground is being properly cultivated, or that the regulations are not being properly enforced, and an inquiry may be held by the Board's Inspector to ascertain how far this is the case. A special clause states that no Order "shall take away or abridge any Right of several Fishery, or any Right on, to, or over any portion of the Sea Shore, which right is enjoyed by any person under any Local or Special Act of Parliament, or any Royal Charter, Letters Patent, Prescription, or imme-



morial Usage, without the consent of such Person" (*cf. supra*, p. 262, and note). A Report by the Board of Trade respecting their proceedings under this part of the Act is laid annually before both Houses of Parliament.\* There follow then clauses concerned with the protection of oyster beds, whether held under this Act or independently of it, vesting ownership of the oysters absolutely in the grantees or owners of the beds "for all purposes, civil, criminal, or other," and providing penalties for such offences as dredging for ballast or depositing rubbish on the beds, supposing their limits to have been sufficiently well marked out. The first schedule to the Act contains the **Convention of 1867** between France and England relative to fisheries in the seas between the two countries; for various reasons this Convention has never come into operation, but Article xi, prohibiting the fishing for oysters between June 16th and August 31st outside the three-mile limit between lines running from the North Foreland to Dunkirk, and from Land's End to Ushant, has been brought into effect by agreement between the Governments (Rep. Sel. Comm. Oyster Fisheries, 1876, ans. 5, Mr. T. H. Farrer).

Two Acts, 32 and 33 Vict., c. 31, and 38 Vict., c. 15, deal respectively with the Langston Fishery Order and with the Herne Bay Company, and are not of general interest.

An attempt was made in 1876 (39 Vict., Bill 65) to prevent the sale of any oysters from May to August inclusive, but the Bill fell through, and a less rigorous clause was substituted for it in **The Fisheries (Oyster, Crab, and Lobster) Act, 1877 (40 and 41 Vict., c. 42).**† This prohibited the sale or purchase of "deep-sea" oysters from June 15th to August 4th, and of other oysters from May 14th to August 4th, unless (1) taken in the waters of a foreign state; (2) cured in some way; (3) "intended for the purpose of oyster cultivation within the same district in which the oysters were taken, or were taken from any place for cultivation with the sanction of the Board of Trade." Power was also given by this Act to the Board of Trade to restrict or prohibit during a period not longer than one year the taking of oysters from any particular bank or bed on the application of fishermen of the district, or of certain bodies specified. It was further enacted that an unopposed Order of the Board of Trade, under Part iii of the Sea Fisheries Act, 1868, might be confirmed by an Order in Council instead of an Act of Parliament. A Bill to repeal the restrictions laid by the last Act on the sale of "deep-sea" oysters (50 Vict., Bill 151) was dropped.

\* References to these Reports are appended below.

† This Act was the outcome of the interesting and valuable Report from the Select Committee on Oyster Fisheries, 1876.

The Sea Fisheries Regulation Act, 1888 (51 and 52 Vict., c. 54), will, it is hoped, prove of great advantage to the fisheries of all kinds. It enacts that the Board of Trade may, on the application of a county or borough council (or, if they refuse to apply, on the direct application of twenty rate-payers), create a "sea fisheries district" and provide for the constitution of a "local fisheries committee" for the regulation of the sea fisheries carried on within the district. Due notice of the proposal is to be given beforehand, and an inquiry, if necessary, to be held on the spot. The "local fisheries committee" is to be a committee of the county council, or the borough council, or a joint committee of both, "with the addition in each case of such members representing the fishing interests of the district . . . as may be directed by the Order creating the district." The committee is empowered to make bye-laws regulating the methods and instruments used for fishing, for creating a district of oyster cultivation such as is contemplated by the heading (3) quoted above (p. 265) from the Act 40 and 41 Vict., c. 42, and for "prohibiting or regulating the deposit or discharge of any solid or liquid substance detrimental to sea fish or sea fishing" but not "affecting any power of a sanitary or other local authority to discharge sewage in pursuance of any power given by a general or local Act of Parliament, or by a Provisional Order confirmed by Parliament." The bye-laws are to be approved by the Board of Trade. The committees may also impose penalties for breach of their bye-laws, and appoint fishery officers with power to stop and search suspected vessels or vehicles within the limits of the district. A meeting for consultation with the Board of Trade, to which each committee may send at least one member, is to be held annually. Special regulations define the relations of the committee to boards of salmon conservators and harbour authorities; and they may not pass bye-laws prejudicially affecting any rights of several fishery, any bye-laws of salmon conservators, or any powers of sanitary authorities mentioned above.

The Reports by the Board of Trade of their proceedings under Part iii of the Sea Fisheries Act, 1868, will be found in the following places, among the Sessional Papers:

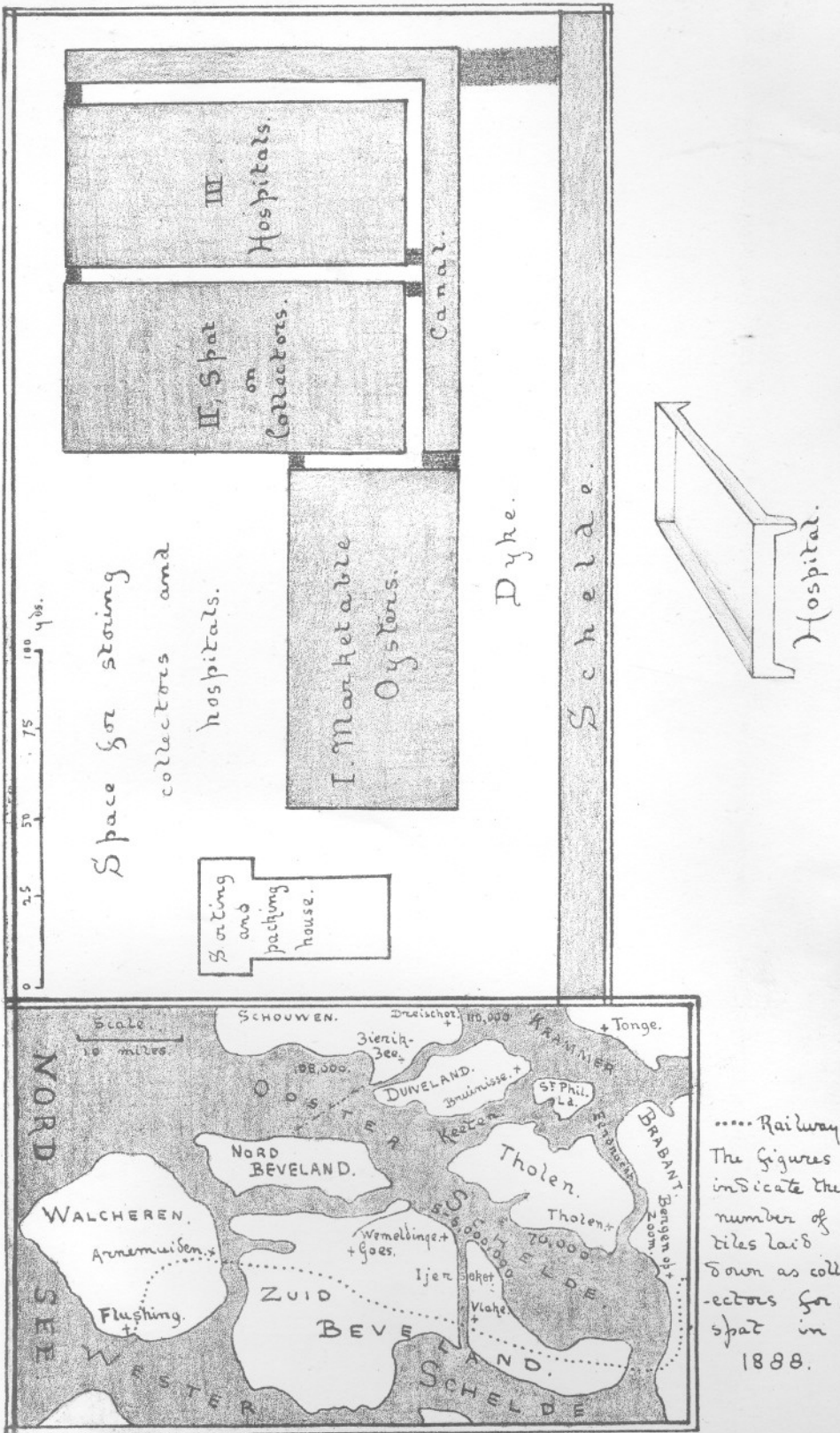
Session.	Volume.	MS. page.	Session.	Volume.	MS. page.
1868-9	... L	... 569	1879	... LXV	... 627
1870	... LVI	... 707	1880	... LXVII	... 875
1871	... LVI	... 783	1881	... LXXXIII	... 547
1872	... LVIII	... 899	1882	... LXIV	... 685
1873	... LXI	... 475	1883	... LXIV	... 759
1874	... LXII	... 613	1884-5	... LXXI	... 977
1875	... LXXI	... 707	1886	... LX	... 689
1876	... LXVIII	... 589	1887	... LXXV	... 743
1877	... LXXVI	... 501	1888 and 1889 were not bound and paged		
1878	... LXVIII	... 623	when the above paper was sent to press.		

Further information relative to these grants will be found in the Reports to the Board of Trade by their Inspectors

Session.	Volume.	MS. page.	Session.	Volume.	MS. page.
1870	... LVI	... 703	1878	... LXVIII	... 625
1877	... XXIV	... 465	1882	... LXIV	... 369

Also in the appendices to the Report of the Select Commission of 1876, and in Returns made to the House of Commons in 1872 (vol. liii, p. 891), 1880 (vol. lxxvii, p. 877), 1882 (vol. lxxiv, p. 179), and 1887 (vol. lxxxv, p. 853). Twenty-six Orders in all have been made on behalf of oyster fisheries, of which nine have been revoked; of the existing seventeen, seven are Regulating Orders made to the corporations of six towns, the remainder grant rights of several oyster fishery to individuals and companies on various parts of the coast. The Reports of the Commission on Sea Fisheries of 1863 (pp. 82—105), and of the Select Committee on Oyster Fisheries of 1876, are the two which deal with England. The latter is full of valuable information on the subject.

*Note.*—The dotted line on the map (Pl. XXI) running across the Ooster Schelde, from Schouwen to Nord Beveland, marks approximately the limit reached by the water of the upper part of the Schelde on the ebb tide (*cf.* p. 257).



G. H. F. autogr.