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SECTION X—[MONOGRAPH B.]

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A REPORT ON THE OYSTER-INDUSTRY OF THE UNITED STATES

BY

ERNEST INGERSOLL.

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# I. THE OYSTER-INDUSTRY—DESCRIPTIVE AND STATISTICAL REPORTS.

## A. THE MARITIME PROVINCES OF CANADA.

### 1. GEOGRAPHICAL POSITION AND CHARACTER OF THE OYSTER-BEDS.

DESCRIPTION OF THE EASTERN COAST OF NEW BRUNSWICK.—It is well known that eastern New Brunswick and the adjoining islands are the home of a breed of oysters, separated from those of the New England coast by more than a thousand miles of shore line.

In a study of the oysters of the United States, it is important to glance at this distant scene of their growth and industry, but more than a general view of the subject is not compatible with the purposes of the present report.

The eastern coast of the province of New Brunswick is washed by the waters of the gulf of St. Lawrence. At cape Tormentine the coast trends eastward, along Nova Scotia, to the Gut of Canso, and then turns sharply northward, on the western side of Cape Breton island, which bars out the Atlantic. This part of the gulf is a great bight, with Anticosti island on the north, and Cape Breton on the east. Down in the bottom of the bight, so to speak, lies the long irregular shape of Prince Edward island, between which and the mainland flow the shallow but troublesome currents of Northumberland strait.

The shores of New Brunswick and Prince Edward are, for the most part, low bluffs of reddish soil, and sloping meadows. There is little solid rock, few prominent headlands, but a generally continuous line of shore, shelving very gradually into water nowhere deep. Many rivers come down along the coast of the gulf, and at the mouth of each there is an estuary or inlet, proportionate to the size of the stream, from the mighty channel of the St. Lawrence to the miniature bay of Bedeque. With the exception of two or three of the greater ones, all these inlets are so shallow that it is easy to pole a raft anywhere, and they are usually protected from the swell of the outer sea and the fury of the gales by a barrier of islands, or by projecting headlands and bars. This condition of things seems highly favorable for oyster-growth, since nearly all of these inlets contain colonies of these mollusks.

SHIPPEGAN AND CARAQUETTE TO PICTOU.—Beginning at the north, on the coast of New Brunswick, the most distant point at which I could ascertain that oysters had ever been discovered, was in the rear of Miscou island, at Shippegan, and in Caraquette bay, a harbor on the southern shore of the bay of Chaleurs.

In 1849, Mr. Perley, the queen's commissioner, reported to the government:

Some oysters of very large size and good quality are found at Tabusintac; but those of the finest description are found on extensive beds in Shippegan harbor, St. Simon's inlet, and Caraquette bay, from which localities they are exported every season to Quebec. The number of bushels exported from the port of Caraquette during the last eight years, is as follows:

|           |       |           |       |
|-----------|-------|-----------|-------|
| 1841..... | 5,000 | 1845..... | 2,010 |
| 1842..... | 7,000 | 1846..... | 1,915 |
| 1843..... | 5,290 | 1847..... | 425   |
| 1844..... | 6,000 | 1848..... | 5,432 |

Twenty years later, Mr. Venning, inspector of fisheries, wrote: "In Shippegan and Caraquette, close time for the protection of the oyster-beds has, for the first time (1869), been partially enforced. These beds are extensive and widely separated, and it is a matter of much difficulty to prevent occasional violations of the law." Again, Professor Whiteaves\* was informed that oysters had been taken upon the flukes of anchors, in seven fathoms of water, "between Little and Big Caraquette banks, in the bay of Chaleurs." I see no reason why they should not also be found at the mouth of the Nipisiguit river, farther up the bay, on the same shore. South of Miscou and Shippegan "gullies" the coast seems too bold a one for oysters in great plenty, until Miramichi bay is reached, the whole interior of which is full of these mollusks. This is especially true along the south shore, where there are many islands, and at the innermost shallow extremity of the bay, where the Miramichi river comes in. Bettaouin is a particularly rich locality. Having rounded Esecuminac cape, the headland south of Miramichi bay, a group

\* *Canadian Naturalist*, vii, 344.

of islands is soon reached, lying off the coast and parallel with it, under the shelter of which, in Kouchibouguac and Richibucto harbors, there is an abundance of beds. Passing on southward, along the shore of Northumberland strait, Buctouche, Cogaigue, and Shediac bays follow in productive succession, beyond which there are no beds reported, until cape Tormentine is passed and the shallow coast of Nova Scotia is reached, extending from Pugwash to Pictou. These last two localities are of small account, and close the list for the mainland.

PRINCE EDWARD ISLAND.—Prince Edward island, however, is almost engirdled with oysters and their remains, except at the western end, where the precipitous red banks that give so picturesque an aspect to this coast, are unsuitable for oyster-growth. The localities where beds exist, or have existed, on the island are: Cascumpeque, Richmond bay, Grand river, and the Narrows, in a group; Malpeque, the harbor of New London, Hillsborough bay and river near Charlottetown, and Bedeque and Egmont bays. In addition to these main localities there is an almost continual line of shallow and sheltered coves and inlets, around the whole eastern coast of the island, where extinct or semi-fossil beds of oysters are to be found, embracing nearly every tidal bay or outlet.

CAPE BRETON AND NOVA SCOTIA.—Crossing now over to Cape Breton, a glance at the map will remind the reader that the whole interior of the island is occupied by the Bras d'Or, which enters by two narrow channels from the northeast, with Boulardrie island between them. "The Bras d'Or is the most beautiful salt-water lake I have ever seen, and more beautiful than I had imagined a body of salt water could be," says Mr. Charles Dudley Warner, in *Baddeck and That Sort of Thing*. "The water seeks out all the low places, and ramifies the interior, running away into lovely bays and lagoons, leaving slender tongues of land and picturesque islands, and bringing into the recesses of the land, to the remote country farms and settlements, the flavor of salt and the fish and mollusks of the briny sea. There is very little tide at any time, so that the shores are clean and slightly for the most part, like those of a fresh-water lake. It has all the pleasantness of a fresh-water lake, with all the advantages of a salt one. In the streams which run into it are the speckled trout, the shad, and the salmon; out of its depths are hooked the cod and the mackerel, and in its bays fattens the oyster. This irregular lake is about one hundred miles long, if you measure it skillfully, and in some places ten miles broad; but so indented is it, that I am not sure but one would need, as we were informed, to ride one thousand miles to go round it, following all its incursions into the land."

Here, as might be expected, the oyster lives in plenty, from St. Ann's to Mira river and St. Peter's bay.

"The few oysters to be met with off Nova Scotia," according to Purdy, "occur at Jeddore head, twenty or twenty-five miles east of Halifax harbor; also Country harbor, St. Mary's river, and Liscombe harbor, Guysboro' county, on the outside, and Pictou harbor, John river, Wallace, Charles river, and Pugwash (mentioned above), in Northumberland straits."

This catalogue appears to embrace the whole region known where oysters occur. In none of his dredging expeditions upon the Dominion's vessels did Professor Whiteaves meet with "traces even of oysters in any part of the area between Cape Breton and Prince Edward island, nor in any part of Northumberland straits, where the bottom is deeper than 5 or 6 fathoms—that is to say, not in any of the open parts". In a letter printed in the *Canadian Naturalist* for 1874, hereafter frequently to be referred to, the Hon. W. H. Pope, of Summerside, Prince Edward island, reiterates this assertion, but adds:

Some years ago I observed a quantity of oyster-shells on the sand at the north end of Tryon shoals (which are situated on the south side of the island); they were about a quarter of a mile from the shore. Some of the shells were filled with sand more compact than some of our sandstone rocks. When I first observed these shells, my opinion was that they had been washed ashore from beds situated in the deep water of the straits of Northumberland. It has since occurred to me that they are *in situ*, and are the remains of an ancient oyster-bed which had been destroyed by the sand. The existence of a soft, muddy bottom in the vicinity of these shells, supports the supposition that at some period this muddy bottom was more extensive than at present; that the oyster-bed was then formed, and was destroyed by the encroachment of the sand forming the Tryon shoal.

WHITEAVES ON THE SOUTHERN FAUNA OF THE GULF OF ST. LAWRENCE.—A suggestion of how it may be possible for oysters and so many other southern-dwelling mollusks to inhabit a sea so far north, and apparently so exposed to the arctic ice and freezing currents that sweep down past Labrador, as are these, is made by Whiteaves in the following paragraph:

On the admiralty charts of the gulf of St. Lawrence an irregular line of 60-fathoms soundings may be seen to extend from a little above the northern extremity of the island of Cape Breton, round the Magdalen group, and thence in a westerly direction to Bonaventure island. To the south and southwest of this line the water is uniformly somewhat shallow, while to the north, northwest, and northeast the water deepens rapidly, and in some places precipitously. Principal Dawson suggests that the subcarboniferous rocks of which the Magdalen islands are composed, and which appear again in the mainland, in Bonaventure county, may possibly cross up under the sea in the area between the northwest side of Cape Breton and the mainland of New Brunswick, as well as that of the counties of Bonaventure and Gaspé, in the province of Quebec. This may account for the shallowness of the water in the area in question. Whether this is the case or not, it seems not improbable that the submarine plateau inside of this line of shallow soundings may form a natural barrier to those arctic currents which sweep down the straits of Belle Isle in a southwesterly direction, and may tend to deflect their course in a bold curve into and up the river St. Lawrence.

SIZE AND QUALITY OF CANADIAN OYSTERS.—The oysters of this region are of large size, and have thick, strong shells. Oysters of eight or ten inches in length are not extraordinary. I have heard of shells dredged from extinct beds "as long as your forearm", but I saw none of these monsters. The best are those which

have straight and narrow or evenly-rounded shells, and grow singly. When the oysters grow in clusters, the fishermen consider it a sign of degeneracy. That, as a rule, the oysters found nowadays are smaller than those taken by the last generation, is probably a tradition, without better foundation than other popular suppositions that we live in degenerate days; the old shells dredged from the mud show no gigantic proportions.

The oysters differ in taste, and consequently in quality, with the locality. Those from Shediac, Bedeque, and Richmond bays are esteemed most highly, because they are of firm substance and strongly saline flavor. Those from the other beds are of fresher flavor, and some, for instance those in Hillsborough river, are disliked, because "thin and watery". This seems due mainly to the fact that they are subjected to more fresh water than is good for them when the tide is out. The oysters of poorest quality of all, according to common report, come from the Richibucto region, although there is the deepest water in which I have known them to be taken.\*

**CHARACTER OF THE BEDS.**—The depth of water in which they live varies, from places so shallow that they are left quite exposed by the lowest tides, to a depth of 40 feet. This last is reported from Richibucto. Perhaps the average depth may be put at 10 feet.†

The oysters occur in beds of varying size and shape. Some of them will be only a few rods, others several acres in extent. The slow accumulation of living upon dead oysters, the drifting of the sediment, and the growth of other organisms, have built many of these beds almost up to the surface, leaving a deep channel between neighboring colonies. The foundations of such beds have been proved to be in some cases more than 20 feet below their crests. Here and there, however, as in some parts of Richmond bay, and at Caraquette, the beds appear to be less well defined and of more modern origin. The height which the oyster-beds attain above the general level of the bottom, probably furnishes a solution of the well observed fact, that the ice becomes unsafe over an oyster-bank, while it is firm elsewhere; the ridge of the beds would form currents in the tides that would wear the ice over them with more force and rapidity than elsewhere.

These oysters seem to have few enemies. In a list of animals found associated with this mollusk on the beds at Shediac, Professor Whiteaves marks the mussels, *Mytilus edulis* and *Modiola modiolus*, the *Natica heros*, two starfishes and a sea-urchin, as "more or less inimical"; but he adds: "So far as I could see, these do not exist in sufficient abundance in Northumberland straits to be of any serious disadvantage." One of the old oystermen at Shediac told me he had only seen three starfishes in his whole life. The shells of all sorts of bivalves here are almost universally perforated by a sponge, but no harm seems to ensue to them when living.

## 2. MANNER OF PROCURING THE OYSTERS.

**EARLY OYSTER-FISHING.**—The methods of procuring oysters employed in the maritime provinces are substantially those followed in the United States, so far as the summer fishing is concerned. But in winter, oysters are often raked through the ice. That this is an ancient custom, appears from a paragraph in Charlevoix's *History of North America*:

Oysters are very Plenty in Winter on the Coasts of Acadia, and the Manner of fishing for them is something singular. They make a Hole in the Ice, and they thrust in two Poles in such a Manner, that they have the Effect of a Pair of Pincers, and they seldom draw them up without an Oyster.

**THE OYSTER-INDUSTRY AT SHEDIAC.**—The two most famous localities for oysters are Shediac and Summerside.

Shediac is a village of about 800 to 1,000 people, situated on the south side of Shediac bay, an inlet from Northumberland straits. The harbor extends for about four miles inland, and into its upper end flow one or two small rivers. The outermost point of the harbor is Point du Chêne, where the terminus of the Intercolonial railway from St. John is located. The harbor of Shediac is commodious, and protected by Shediac island; but the depth of water is not great, and the few foreign vessels that come here annually for deals, are obliged to anchor off the point. Their cargoes are conveyed to them, from the mills at the head of the bay, in rafts. Shediac is an ancient settlement of the Acadians, and has been the scene not only of Indian battles, but of French garrisons, and of sanguinary conflicts between French and English, during the long contest which raged for the possession of these shores during the early part of the last century and previously. Once or twice, long ago, it was burned to the ground, and has suffered a third conflagration since my visit. At one time it was hoped to make it a port of importance, but its sole fame at present rests upon its oysters; and this is a fading glory, for the beds are nearly depopulated of the excellent bivalves that formerly flourished in such abundance.

From the long railway wharf at Point du Chêne, itself founded upon oyster shells, the beds once existed in thick succession along both shores of the bay, and for some distance up the Shediac river, clear around to the

\* Oysters are abundant at Cocaigne, Buctouche, Richibucto, Burnt Church, and other places on the coast, but in general they are too far within the mouths of fresh-water streams, and their quality is greatly inferior to those affected by sea-water only.—PERLEY. *Report on the Fisheries*, 1849.

† You inquire: "Do you think oysters would thrive in somewhat deeper water than that in which they are now found, if sown there?" I think they would thrive in the deepest part of any inland water, if placed upon suitable ground.—POPE. Letter to Whiteaves, *Canadian Naturalist*, vii, 347.

Grandique, a stream that empties into the northeastern corner of the bay. The number of these beds is said to be about fifty, and they cover the soft bottom of the harbor with great mounds.

Procuring the services and guidance of Frank Giuvien, I started out one dark morning to see the beds and the process of raking. It was raining hard, the wind was chill and fitful, and the general appearance of the surroundings somber in the extreme. The boat was a large, red, yawl-shaped one, and it lay some distance out in the water, hard aground, although the tide was well up. Pulling off their shoes and stockings, Giuvien and his assistant soon had it afloat, erected the mast, and then came to carry me on board 'poose-back.

Having gone a third of a mile from shore, and crossed the deepest part of the bay (in water of 4 to 6 fathoms), we struck the first bed, finding it, by sounding with a pole, not more than five feet below the surface. Ramming the pole hard down we "hung" the boat by my holding on to it, while Giuvien thrust down his great rake, and his assistant his "tongs". But nothing was taken alive except one or two quahaugs, and we moved on. Trying several beds, all coming within a fathom or less of the surface, and some being of great extent, we succeeded in two hours in raking a dozen and a half of small oysters and about three dozen fine quahaugs, besides some mussels. This was a fair sample of the condition of the whole bay.

The rake and tongs used do not differ from those well known to oystermen in the United States, except, perhaps, that they are ruder, generally being of home manufacture.

In the winter, when the ice forms over the whole bay to a thickness of three feet or so, the oysterman finds his way out to a position over some of the beds, with the location of which he is perfectly familiar, and cuts a large hole in the ice. Through this he lowers rake and tongs, and brings up load after load of living mollusks and dead shells. Here this is the most profitable time of the year for the oysterman; or, rather, it used to be. Twenty-five or thirty years ago, not to go further back, the trade in oysters at this town was extensive, amounting to probably about 1,000 barrels a year. Most of this crop was shucked and sent to St. John in kegs. In earlier times it was not uncommon for one man to rake up a sleigh-load of oysters, through the ice, in a single afternoon. Now 200 bushels a year is all that is produced, and this in a very desultory fashion. No one devotes himself to it but the French fishermen, and farmers use their leisure in raking occasionally.

At Richibucto the oysters grow in the channel, and clear across the inlet, in water as deep as 35 feet. There, consequently, rakes are used attached to poles so long and unwieldy that they require two men for their manipulation. This great bay has been nearly depleted, however. In the Canadian Fisheries Report, Mr. J. McD. Sutherland, local officer there, wrote to Mr. Venning, inspector of fisheries, as follows:

There are a good many oyster-beds in the river, but with the exception of one at Indian island (near to the south beach), the oysters are very small, and of so poor a quality, that none have been sent away for years; in fact, they will not sell. The only beds from which any are taken at present, are two at Kingston bridge, and one or two farther up the river, and only in very small quantities, as they are of so poor a quality that it is difficult to find sale for them. There is a very large bed at Indian island, and the oysters are very large and of excellent quality; but they are scarce and hard to get. Not more than 30 or 40 barrels were taken from it last year. A man may rake all day, and perhaps get only a bushel. There are hundreds of barrels of shells on this bed, and some farmers are making arrangements to get the shells off it as manure for their farms. If anything could be done to protect or increase the oysters in this bed, I think it deserves attention. The only suggestion I can offer is, that the shells and dead oysters be removed, and raking prohibited for a number of years. There are some beds on which the oysters are all dead, from which large quantities of shells are taken every year by the farmers.—(Page 76.)

The present point of greatest abundance of the oyster on the mainland seems to be in Miramichi bay, at Bettaouin. In 1876, Giuvien went there in a small vessel, with several others from Shediac, on a raking expedition. They found the oysters were distributed everywhere over the harbor so thickly, that every square foot of the bottom seemed to be occupied. They seemed to lie in little connected clusters right upon the sand, which was so soft that mooring-stakes were easily driven into it. They found on the ground ships and schooners that took away over 4,000 barrels during the single fortnight they remained. These bought their cargoes, at the rate of \$1 a barrel, from the small boats (each operated by two men) that swarmed in the harbor. The ships took their cargoes to Quebec, various smaller craft carried loads elsewhere, and the 65 small boats that came down there from Caraquette all intended to go home with full loads when the selling season closed. Four years of this onslaught have now almost exterminated this great oyster-community.

So much for the mainland, where, I believe, the tongs and rake used from small boats in summer, and the rake through the ice in winter, upon wild beds, every man owning his own implements and fishing for his own good at odd moments, comprise the whole of oystering.

THE OYSTER-INDUSTRY OF PRINCE EDWARD ISLAND.—Crossing now to Prince Edward island, a somewhat more systematic, if not more scientific, pursuit of this industry is to be seen. The headquarters of the business is at Summerside, a small, wooden, unattractive town of about 800 inhabitants, situated at the extremity of Bedeque bay, on the southern side of the island. It is a landing place of the steamers from Shediac, and also of the line to Montreal. This district was originally settled by French; but when the island was ceded to Great Britain, these people were expelled, and the inhabitants are now almost wholly Scotch and English. From Summerside are sent the famous "Bedeque" oysters, so called from the bay in which they were found.

The true Bedeque oysters are, however, now extinct, or at least so nearly so as to be entirely unprofitable for raking. The bay is an inlet half a dozen miles long, in which the water is nowhere more than 3 or 4 fathoms deep,

except in the channel that leads to the wharves of the fort. The whole sandy bottom of this bay is described as formerly one vast oyster-bed. At the upper end it was so shallow that, when the tide was out, even children might wade about and pick up oysters, which were often found clinging to the eel-grass, with their hands; such oysters were the best of all. Finally, the head of the bay became so choked up, that in the winter, at low tide, the ice was let down until it rested full weight upon the beds. But now the bay has lost its ancient suitability as a home for the bivalves, and few remain. "Bedeque" oysters, therefore, like those of the once-celebrated "Porier" bed at Shediac, now come from elsewhere, but still pass in the market under the brand-name by which they attained their fame for excellence. The chief source of supply at present is Richmond bay, an inlet on the north shore formed by the union of several estuaries and filled with islands and sand-bars. That region, however, has many subdivisions. It consists of a great, irregular, interior basin of shallow water, sending its arms back into the country in all directions, and receiving long, wooded capes that jut out and form sheltered bays in great number. The water-access from the ocean to this lake is through Malpeque bay and the Narrows. The term "Richmond bay" is really restricted to the innermost part of it, while the western portion is called Grand river. The shores are low, the bottom is soft, sandy mud, and no force of the outside storms ever penetrates these calm recesses. Here then, if anywhere, ought we to find oysters, and here they occur in vast numbers.

The people who live on the shores of this broad estuary are of varied nationality, and nearly all own farms, or cultivate the land for others. They may therefore be called farmers, as a class. But in the spring for a little while, and from the first of September until November seals the water under its icy cover, they all become oystermen. A few of them own small sail-boats, two-masted or sloop-rigged, worth from \$30 to \$50, and of far more use than beauty. As a rule, however, they go out to the beds in rude, flat-bottomed, square-sterned, awkward boats, called "flats". These are worth \$10 each, and every family owns at least one, with its oars and the anchor. Rakes or dredges are not used at all here; only a pair of tongs, worth about \$2 50. It does not require much capital, therefore, to enter upon the business.\*

Oyster-fishing begins on September 1 and lasts until the ice forms. On this island no fishing through the ice is practiced, and all that is done, with the exception of a few days in the spring, must be done at once. During this season, therefore, all else is pretty much abandoned, and four or five hundred persons will be found engaged in the work in the western half of the island; it is considered a good day's work when a boat brings home in the evening two barrels to each of the crew. In so sheltered a place as Richmond bay the state of the weather, which is likely to be very rainy, chilly, and uncertain, makes little difference with the work.

About one-half of the fishermen are heads of families, the other half being made up of boys and young unmarried men, and the vagabond element. Some of the more well-to-do farmers buy on the shore the catch of the latter class, to a considerable extent, and add it to their own stock, paying from 50 to 80 cents a barrel on the shore. The main part of the catch, however, is hauled day by day to Summerside, from 2 to 10 miles distant, at an expense of from 10 to 15 cents a barrel, and sold to the warehouses there. Sometimes the Summerside dealers go out to the shore and buy, but more frequently procure what is not brought to their doors, by sending out empty barrels to different persons and engaging them to be filled. The barrels used are second-hand flour barrels, worth 15 to 20 cents, and holding two and a half bushels, or from three to four hundred oysters each. The price paid for these oysters varies from year to year. The highest rate ever reached was in 1875, when \$2 50 per barrel was paid at the warehouse. Since then, partly owing to the stimulus given by the high price, and the consequent increased supply, the price has declined, until this September (1879) it went as low as 80 cents a barrel, but recovered before the end of the month to \$1, which may be called the average price. A stormy season will lessen the supply and augment the value. Little distinction is made by the warehousemen in buying in respect to locality, but in selling it is found that the fine single oysters from Grand river will bring a considerable advance over those from Malpeque and other points. The rule is: the deeper the water, the better the oyster. It is conceded that the old Bedeque oyster was the best of all.

With the fall crop of oysters the farmer-fishermen expect to pay for their winter's supply of provisions, chiefly flour. But little cash, therefore, is used in the transaction, the buyer exchanging a barrel of flour for from five to seven barrels of oysters. The average receipts of the oyster-fishermen are difficult to estimate; but those best competent to judge thought that the men who paid strict attention to the business received from \$50 to \$70 a year from it. This may be put down as about one-fourth of their total annual income. The working classes on the island think they are doing very well if they make \$300 a year. Every one of them is a year in debt. When the warehouseman delivers his flour in exchange for the oysters, it is really the crop of the next fall that he is buying, for the oysters he has just received were owed to him for the previous winter's provisions. It is so with all the merchants in town, who obtain a good portion of the season's catch for their own use, in pay for dry-goods, groceries, &c.

The amount of cash capital involved in the business of oyster-dealing, therefore, is disproportionate to the apparent business done, since so great a part of it is by barter. In the vicinity of Summerside it is probably within

\* The dredge has never, to my knowledge, been employed in the waters of Prince Edward island. Oysters are fished with "tongs" from depths varying from 3 or 4 feet to 12, and even 15, feet.—POPE. Letter to Whiteaves, *Canadian Naturalist*, vii, 345.

bounds to say that \$25,000 would cover the capital of all the dealers combined; and they represent all the oyster-trade there is, on the island worth mentioning. The business is not now so good as formerly, on account of the "hard times" that now oppress the Canadas; and a profit of 20 per cent. is considered large; but in former years 50 per cent. of profit was often realized without much risk.

At the eastern end of the island the only locality for oysters, within recent times, is in Hillsborough bay and its tributaries. This water is on the south shore, and is the harbor of Charlottetown, the chief town of the province. Old men remember when oysters were so abundant there that they seemed inexhaustible. Rich beds were to be found along the west side of Hillsborough bay, over in Orwell and Pownall bays, along the channel into the inner harbor, and everywhere there and up Hillsborough, East and West rivers. The finest of all grew attached singly to the eel-grass at the heads of the various little inlets, where one could wade out and get them; and at certain places the beds were so crowded that a boat could take eight bushels in an hour.

Now, however, these bays are almost depopulated of their oysters, and not more than \$500 worth annually, it is said, are raked there. These are all used in Charlottetown, being raked and peddled by two men who make a scant business of it. Charlottetown, in addition, consumes nearly a thousand barrels from the western end of the island, esteeming her own of far poorer quality.

Concerning the oysters of the Bras d'Or I could learn but little, but became satisfied that no trade in them existed, beyond a limited home consumption by those who fished and their neighbors.

### 3. FUTURE OF THE OYSTER-BEDS AND OYSTER-TRADE.

FORMER AND PRESENT ABUNDANCE.—A few words ought now to be said upon the relative former and present abundance of the oysters of this region and the causes operating toward their increase or decrease.

To begin with: I am convinced that if it were possible to make a comparison between the actual number of oysters on the beds fifty years ago with the number to-day, the disparity would not be great. The production has changed geographically, rather than numerically. Ancient areas no longer yield so fully, but new ones have been discovered.

The most famous of the old localities was Shediac, where the "Porier bed" sent to the interior settlements the best mollusks known. This bed lay between Shediac island and the north shore of the bay, and has been abandoned for many years; but a fisherman told me, he thought a week's profitable raking might be done there now. After the exhaustion of the Porier bed, the large, salty, fat "Bedeque" oysters were placed in the market, and acquired a high reputation. The demand soon exhausted them, but a few could at present be got anywhere in the bay, now that they have rested so long. Meanwhile the eastern end of Prince Edward island had lost its oysters, and those of the productive beds on the mainland were of poor quality. The shore-people began to think the era of good oysters had passed by. More thorough and careful search was thus stimulated, and the results were, first, the discovery that the beds in Cassumpeque, Malpeque, and Richmond bays were much more extensive than had been supposed, and, second, the disclosure of wholly new localities in Miramichi bay and elsewhere.

The causes of the extinction of the old traditional beds are various. It is easy to see that the inordinate attack made upon the new locality of Bettaouin during the last four years will shortly be fatal to it. It has nearly proved so now, just as the other natural storehouses of these mollusks along the coast have been depleted by excessive and heedless use.\*

On the contrary, in the extensive region on the north side of Prince Edward island, whence the trade is now mainly supplied, there seems to be no doubt of a steady growth in numbers, and no degeneracy in size and quality.

CAUSES OF EXTERMINATION.—The general law of the Dominion forbids the taking of oysters, at any point, between the 1st of May and the 1st of September, when they are spawning. This law excites great disgust among the fishermen, who assert that the proper way to afford legal protection to the industry is to prohibit winter-fishing. As a result, the law is constantly broken.† The summer-raking, they say, does more good than harm; it is positively beneficial, for it stirs up the beds and contributes to their widening. In the constant moving of the boat the tongs or rake must rarely strike the ground twice in the same or nearly the same place, and only a few of the mollusks are taken here and there. "Oysters thrive on muddy bottoms," writes Mr. Pope, "but they will not live if imbedded in the mud. Many oyster-beds have been destroyed by mud alone. The annual fishing of oyster-beds, if not carried to excess, improves them. In the process of fishing the bed is broken up, the shells and oysters lifted out of the mud, and a supply of material (cultch) afforded, such as the oyster *spat* requires, and without which it must perish." This is undoubtedly true to a great extent, as has been proved in the United States.

\* The close time is now (1869) rigidly enforced, but these beds (in Shediac harbor) have been so much reduced by years of indiscriminate raking, that a long time will elapse before they are restored. \* \* \* The oyster-beds in Richibucto harbor and river are now greatly reduced and almost valueless; and the only mode of restoring them is to prohibit raking entirely for a number of years, or to lease them for natural and artificial culture.—VENNING, *Report on Canadian Fisheries*, 1870-76.

† Oysters are caught and exposed for sale in every month in the year, and salmon are destroyed upon their spawning-beds with the utmost impunity.—POPE. Letter to Whiteaves, *Canadian Naturalist*, vii, 347.

In fishing through the ice, on the contrary, every living thing, and most of the loose dead matter within reach of the long rake, are scraped up. A barren spot of mud alone is thus left upon the bed. In summer all the *débris* brought up by the tongs is thrown overboard, and is washed clean as it sinks waveringly to the bottom, forming a loose layer of clean shells, etc.,—precisely what the spawn needs to find support upon and cling to. It is equal to putting down “stools”.

It appears, however, that sometimes this throwing back is a great harm, because living ones may be so few and the proportion of dead shells so large. Thus the local officer, Mr. John McD. Sutherland, in Kent county, in 1869, wrote that the beds at Richibucto had been destroyed mainly through the practice of throwing back the shells and dead oysters, which covered the living ones and killed them. “I do not think,” he adds, “the digging of mud for manure in any way injures the oysters, as there are none in the mud so taken, but a large quantity of very small mussels.” The ice-rakers, contrary to this advisable method of throwing back the shells, pile the worthless stuff they bring up on the ice, where it either remains to be floated out to sea when the ice breaks up, or is carted away to be spread on the fields. The bed is not only scraped perfectly bare of its oysters, therefore, but nothing is left for even the spawn to attach itself to; present and future are both destroyed.

This is a reasonable, and I believe a true, explanation of the decline of the yield at Shediac and at many other points where it has been customary to rake in winter, so far as man’s agency is concerned. The fact that the Richmond bay region, which is never raked through the ice, thrives under steady spring and fall work, supports this notion. The midsummer rest may or may not be worth the giving, but the strength of the law should certainly be opposed to working through the ice.

Many beds have ceased to produce within historical times, apparently for no other reason, than that by the natural process of growth, one generation of oysters resting on the dead remains of the last, has built up the deposit until it has come too near the surface. The clearing of the country, and the consequent increased amount of drifted matter and sediment brought down by the streams that empty into the estuaries where the beds are situated, aid to bring about this result, by raising the general level of the bottom, clogging the surface of the beds, and thus lessening the depth of the water, until at some unusually low tide in winter the immense weight of the ice is let down upon the bed, crushing and freezing all its life. This appears to be the case in the bay of Bedeque. As for the extensive submarine deposits of oyster-shells that girdle the eastern and northern shore of Prince Edward island, we do not know how old they are nor what killed them. Possibly the general geological elevation of this coast brought them all too near the surface at once. I put much faith in this hypothesis. It has been said that drifting ice tears up the beds; but I, personally, could not learn of any appreciable damage ever occurring in this way. All the beds are well sheltered from the bergs and floes that swing up and down Northumberland strait, and follow the currents through the stormy breadth of the open gulf. It is said to be one of the most favorable conditions that conduce to the oyster-prosperity of the Malpeque region, that there the ice disappears earlier than from the confined southern coasts of the island.

I find some discussion of this subject by the Hon. W. H. Pope, in his communications to Professor Whiteaves, from Prince Edward island, already quoted by me. He says:

It is probable that many of the oyster-beds ceased to be productive of oysters ages before the settlement of the country by Europeans. Extensive deposits of oyster-shells are now found covered by several feet of silt. How were the oysters upon these beds destroyed? The natural process of reproduction and decay would cause the oyster-beds, formed on the bottom, to rise so near to the surface of the water that the ice would rest on them. The weight of heavy masses of ice upon the beds would injure the oysters, and the moving of the ice, when forced by tide or wind across the bed, would soon destroy them. I have observed the more elevated portions of an oyster-bed over which the ice had been thus forced. Several inches of the surface of the bed, including all the living oysters, had been driven before the ice, and the shells and oysters so removed had been deposited in a miniature *moraine* on the slope of the bed where the water was sufficiently deep to allow the ice to pass over it. This crushing and grinding process would destroy many of the oysters; some would be crushed and broken, others smothered in the *moraine*. The gradual silting up of the river would prevent the running of the ice, and the oyster-beds would in time be covered, as we now find them. Deposits of oyster-shells (covered with mud) 20 feet in depth, are found in rivers in the deepest parts of which there are not 14 feet of water.

Oysters upon natural beds are seldom, if ever, killed by frost. I have known oysters to thrive upon a hard and stony bottom, notwithstanding that the ice rested upon them once in 24 hours throughout the winter. Some of these oysters grew adherent to a small flat rock, about 8 inches in thickness. The oysters on the top of the rock were killed when they attained their second year’s growth, I think, by pressure, as those on the edges were never injured by ice or cold.

Oyster-beds in rivers in which sawdust is thrown in large quantities, would probably be injured by it. The sawdust would, I think, be carried by the current over the beds, and the roughness of their surface would detain some of it. The interstices between the shells and oysters would probably become filled with sawdust and mud. Mud and decomposing sawdust constitute a most offensive compound.

There is another harmful influence exerted upon the oysters, however, by civilization, namely, the mud-digging. The whole bottom of each and all of these oyster-bays is a comminuted mixture of decomposed shells and vegetable matters, which goes under the name of mussel-mud. No one has ever sounded the full thickness of this, I think; but it has been dug to the depth of 20 feet by the rude horse-power scoops that are employed to dip it up. It makes the best of manure, and hundreds of thousands\* of loads have been spread upon the neighboring farms

\*During the past ten or twelve years millions of tons of oyster-shells and mud have been taken up by our farmers from oyster-beds, by means of dredging-machines worked by horses on the ice. In many instances the beds have been cut through, and in some places the deposits of shell have been found to be upward of 20 feet in thickness.—POPE. Letter to Whiteaves, *Canadian Naturalist*, vii, 345.

every year. It is sold by the dredgers at 10 cents a load, and it costs from 10 to 15 cents a load to haul it. Three hundred loads a day might be raised, if demanded. In the excavation of this fertilizer two features work disadvantageously to the oyster. In the first place, the actual bottom is torn to pieces—the home destroyed and the mollusks themselves eradicated. Secondly, the operation sets free great quantities of fine silt, which spreads through the water far and wide, falls upon the oysters, and smothers or chokes them. The bay has lost its ancient purity, and is no longer a suitable place for oyster-habitation. When, however, the work of the mud-diggers is completed, the excavation they leave is gradually taken possession of again by mollusks. This has happened particularly at West river, near Charlottetown, where the whole bottom, for a long distance, was dredged up and taken away, oysters and all, and it encourages belief that perhaps when Bedeque and the other bays are thoroughly robbed of their manuring deposits, the desirable bivalves that once inhabited them will return to their ancient haunts to begin a new era of existence and generation.

**OYSTER-CULTURE IN THE PROVINCES.**—Nothing in the way of oyster-cultivation, properly speaking, has been attempted in the Provinces, that I could learn of. When the oyster dealers in St. John find themselves overstocked in summer, they sometimes throw a lot of oysters overboard near Navy island, raking them up as they are wanted. An attempt to plant some there several years ago, resulted in all being stolen within a few months. Occasionally a schooner-load of oysters is brought down from Buctouche, Miramichi, or some other northern bay, where they are of poor quality, and are dumped for a few months in Shediac bay to “fatten”. The improvement is said to be very rapid and striking. Near Charlottetown, some years ago, a citizen took up a large quantity of oysters from a distant part of the harbor and laid them down near his home, forming a bed convenient to his hand, and the position of which was kept a secret in the family. A similar experiment in transplanting was made by Judge W. H. Pope, of Summerside, two or three years ago, near New London, Prince Edward island, only upon a more extensive scale and with a commercial view. His experiments did not wholly succeed, but seemed to show satisfactorily that the improvement resulting from transplantment and care would be profitable, if attended to on a large scale and in an enlightened way.

Such desultory work seems to be all that has ever been attempted in the Provinces toward oyster-culture. No seed-oysters have ever been sent southward or received from the United States. They could be procured for about \$2 a barrel at Shediac and Summerside, and there remain enough of the genuine Porier and Bedeque breeds to start new beds of these varieties in favorable spots elsewhere.

**EFFORTS TOWARD PROTECTION.**—The danger of utter extinction which menaces the mainland beds is not a new one. It was long ago pointed out that such a danger exists, and that measures ought to be taken to preserve to the colonies this rich food-resource which was being so rapidly wasted. Mr. Perley announced it to the government in 1849 in these words:

From the manner in which the oyster-fishery of the gulf-shore is now being conducted, all the oysters of good quality will, in a few years, be quite destroyed. The preservation of this fishery is of considerable importance, and it might be effected as well by judicious regulations and restrictions as by encouraging the formation of artificial beds or layings in favourable situations. Several persons on the coast intimated to the writer their desire to form new and extensive beds in the sea-water, by removing oysters from the mixed water of the estuaries, where they are now almost worthless, if they could obtain an exclusive right to such beds when formed, and the necessary enactments to prevent their being plundered.

Feeling the importance of the matter, Judge Pope's experiment on Prince Edward island, already alluded to, was made only in pursuit of his belief that the matter was practicable. He wrote to Professor Whiteaves in 1874:

The area of productive oyster-beds in the Dominion is comparatively limited and altogether inadequate to supply the demand for oysters, which is now enormous, and which is increasing every year. Unless the existing beds be protected and improved, and new beds formed, the day will soon come when the oyster-beds of the Dominion will cease to produce. \* \* \* The rivers and estuaries of this island [Prince Edward] are admirably adapted for the cultivation of oysters. The oysters found in its bays are not to be excelled in flavor, and if fished late in the autumn they will keep good for months. I see no reason why hundreds of thousands of acres of oyster-beds should not be formed in these bays, which would produce vast quantities in quality much superior to the oysters of Virginia. The material for the formation of such beds is at hand in the ancient ones; the oysters with which to sow them could be had at little cost during the warm, calm days of summer.

Professor Whiteaves adds his testimony in the following paragraph, which refers chiefly to the mainland:

Many once productive beds in various parts of the gulf now yield almost nothing, and there is too much reason to fear that, unless precautionary measures are adopted, the oyster-fisheries of the Dominion will soon become a thing of the past. The raking of the beds has been palpably excessive and wasteful; no such thing as cleansing the ground and scattering the spat during the close season has ever been practiced; the pollution of the ground by refuse of mills, by silting up, and a variety of other causes, has led to the present state of ruin and decay which we now see. Neglect, waste, and excessive cupidity have almost destroyed these oyster-beds, and will ultimately entirely do so, unless remedial measures are adopted.

With the design of fostering the oyster product and industry, Mr. Venning, inspector of fisheries in New Brunswick, has made many attempts to induce the use of capital in this direction, and regulate the dredging by legal measures. He tried hard to get the government to divide the bay of Shediac into two equal portions, and to lease the oyster-privileges to responsible persons for a term of years, under regulations that should not admit of the extirpation of the mollusks. Such a hue and cry was raised by the ignorant natives, however, that the project had to be abandoned. He called a public meeting at Shediac and tried to represent how much it would be for their advantage to cease their destructive, indiscriminate raking, but utterly without effect. “My grandfadder rake

oysters, my fadder he rake oysters when he want 'em, and by Gar! I rake him too!" That was the only argument he could get. He offered to allow them to arrange that they control, in common, one of the halves of the bay, leaving to him the other half; but they would submit to no regulation, and listen to no suggestions toward an improvement of method.

EVIDENCE FROM THE SHELL-HEAPS OF ABUNDANCE IN THE PAST.—That the oyster-beds of this region had been a food-resource to the Indians for many generations before white men came to these shores, is proved by the *kjökkenmöddings* or refuse shell-heaps which occur along the coasts. These relics of aboriginal homes and feasts also stand as evidence that formerly oyster-beds flourished where none have been known within the historic period, and connect the remote, isolated fields of the gulf of St. Lawrence with the oyster-bearing regions in Massachusetts bay and south of Cape Cod. The idea prevails that an elevation of the land and sea-bottom, or a lowering of the average temperature of the climate to a fatal point, on the intermediate coasts, or both, have caused the death of the reefs which once existed.

To the very extensive submarine beds of dead shells all through the waters of that part of the gulf between Cape Breton and Gaspé and around Prince Edward island, I have already alluded. They hardly bear upon our present inquiry, except to prove the extreme antiquity of the molluscan population of that district. Passing down the coast, I heard of old beds and a few living oysters at Jeddore head, near Halifax, "also Country harbor, St. Mary's river, and Liscombe harbor, Guysboro' county, on the outside." In the bay of Fundy I could not learn of a single living oyster, but it appears that formerly they dwelt there.

In his *Field and Forest Rambles*, Dr. A. Leith Adams tells us that he examined several shell-heaps on islands in the bay of Fundy and along the fiord of the St. Croix river for many miles. "Although a large number had evidently been leveled and utilized for top-dressing, enough remain to show that, whether as articles of food, bait, or both, the aboriginal races collected vast quantities of the well-known clam and *quahog*, besides two species of oyster (*Ostrea borealis* and *Virginiana*), and the common forms of *Natica*, *Crepidula*, *Solen*, etc., the *débris* of which strew the coasts of several of the inlets in the bay of Fundy, their numbers evincing the profusion of each species. It has, however, been asserted by no less an authority than Dr. Gould, that all, especially the three first species, are becoming rapidly extinct north of Cape Ann, Massachusetts" (p. 35).

Having given the substance of the opinion of Dr. Gould and some others as to the reason for the decadence, Dr. Adams goes on to tell what he found in the *kjökkenmöddings* along the bay of Fundy, particularly at Passamaquoddy bay. The mound was one of several facing the sea on a flat, so that the waves of high tides had washed much of it away, "disclosing a perpendicular section composed almost entirely of clam-shells, interspersed with mussels, whilks, and the common *Planorbis*. The former were extremely abundant, and for the most part in fragments; however, I procured several very large ones, averaging 3 by 4½ inches in breadth, which the fishermen of the neighborhood told me were very much larger than any recent specimens they had seen." He then describes the bones of quadrupeds, birds, and fishes that occur in these refuse-heaps, and mentions the absence of charcoal.

This brings me to the border of Maine, and introduces the proper census inquiry into the "shell-fisheries" of the United States, which occupies the succeeding chapters.

## B. GULF OF MAINE.

### 4. FORMER EXTENT AND CONDITION OF THE NATIVE BEDS IN THE GULF OF MAINE. EVIDENCE OF INDIAN SHELL-HEAPS.

DESCRIPTION OF THE NEW ENGLAND SHELL-HEAPS.—In beginning an account of oysters on the coasts of the gulf of Maine, which extends from Nova Scotia to Cape Cod, the most prominent fact in relation to them appears to be their former abundance in comparison with their present extinction. The historical aspect will, therefore, be the first to be considered. The readiest way to begin this is to proceed to Damariscotta, a seaport village in Lincoln county, Maine, where exists the greatest monument extant to the antiquity of the oyster in these waters.

Above the village, the Damariscotta river pursues a narrow course between precipitous banks for about a mile, after which it expands into a shallow basin, about one mile long by one-half to one-quarter of a mile wide, known as Salt bay. At its northern extremity are rapids and cataracts, formed by a rocky ledge lying across a narrow channel, and above this is the extensive fresh-water area of Damariscotta pond. The falls at the head of Salt bay limit the tide, and furnish water-power for several sawing and flouring mills.

Salt bay is nowhere more than a few feet deep, unless it be here and there in the direct channel, plowed out by the swift tide, and the bottom is gravel, or was so anciently. It is so far inland that its waters are always comfortably warm, and it is, therefore, not surprising to find that it formed the chosen home of a large and flourishing colony of oysters, that seem to have found there the most congenial conditions for growth. The evidence of this is afforded in the great shell-heaps that have made the locality celebrated among antiquarians.

These "heaps" consist of piles of oyster-shells, varying from one to six or seven feet in depth, packed closely together, and all ready to crumble, unless handled with great care. They begin in small quantity down nearly to the falls at the bridge connecting Damariscotta and Newcastle, and thence continue uninterruptedly on both sides of the river, up to the southern end of the bay. Here the heaps reach their greatest magnitude, and are best observed upon the point of land which juts out into the southwestern part of the bay. Beyond this point, however, scattering heaps are found along the shores. It has been estimated that not less than 8,000,000 cubic feet of shells are thus piled up, and easily accessible.

It was once supposed that these beds were fossil, or that they had been formed by water in some way, and then elevated above the sea-level. But an examination soon dispelled this notion, which nobody now believes. Their position, structure, and contents, show conclusively that they are the work of human hands,\* and a product of the very earliest American oyster-fishery of which we have any knowledge.

If one digs down through them, he finds at the depth of a few feet that he comes suddenly to the earth and gravel of the natural soil. This is seen plainly in section at several points on the western shores, where the water has eroded the bank. The line of demarcation between the shells and the soil is sharp; there is no intermingling whatever.† In many places, however, the shells from above have slid down the face of the high bank, entirely concealing its face, and covering the beach below. This gives a fictitious appearance of great depth, which has deceived some writers upon the matter, I think. The shells are almost invariably single. In an hour's digging I found but one specimen where the two valves were together. They lie in all sorts of positions, in close contact with each other, and so loosely that it is easy to pick them out of the bank one by one.‡ They are all of very large size and some even gigantic. Shells have been taken out repeatedly that exceeded a foot in length, and one of 15 inches is reported. They are, as a rule, long, narrow, and somewhat curved or scimitar-shaped. Broad and straight ones are found, however. The shells are thick, but they flake away so in removal from the heap, that scarcely more than the harder, nacreous, inner layers are usually obtained. Nearly all trace of color, inside and out, has disappeared.

They are not everywhere of uniform depth, but thin here and thicker there, as though cast up in heaps, and the soil over them is very thin, and consists only of decayed loam; but there was once a small forest of spruce trees there, and there still remain some very large and aged trunks and an abundance of bushes. At one place on the eastern side the most extensive deposits of all crown the summit of a bluff or knoll 60 feet or more in height, the face of which seems terraced with shells, which extend back many rods from the river-bank.§ Scattered through the banks, also, are the shells of the soft clam, quahaug, mussel, scallop, and various other remains, as I shall mention hereafter.

When the earliest explorers landed upon the shores of North America, they found that the Indians of all regions were acquainted with the edible qualities of the various shell-fish, and ate all that we now make use of.|| They understood perfectly, also, the superior value of the clam and oyster, and everywhere along the New England coast were accustomed to assemble at favorable points and have feasts of mollusks and maize, with much merry-making. That fine old institution of Rhode Island and Connecticut, the clam-bake, almost the only thing that was allowed to warm the cockles of a Puritan's heart, and still the jolliest festival in summer experience alongshore, perpetuates the practice of the aborigines. Here, in southern Maine, appears to have been a particularly favorable spot, isolated from the southern abundance of bivalves, and here the Quoddy Indians came in great numbers. There is every evidence that these shores were much more thickly populated by the red men than the coast regions either east or west of it. The word "Damariscotta" is said to mean "river of little fishes", and its neighboring streams were equally famous for their finny wealth. In addition, the soil was fertile, the game very abundant, and the climate pleasant. It may be said that, for an Indian district, the population was dense.

\* The evidence seemed conclusive, that these shell-mounds were not extinct oyster-beds, left exposed by some former uplift of the Atlantic coast, but the work of aboriginal tribes, who repaired to this favored region at certain seasons of the year, and celebrated their feasts with the delicious bivalve which must have formerly abounded in these waters. That these feasts were held periodically and, perhaps, at considerable intervals, is shown by the condition of the larger deposits, and especially the large one which slopes to the water's edge on the west bank of the river.—MOSES, *Proceedings Central Ohio Scientific Association*, i, p. 74. See also, Dr. Jeffries Wyman's account in *Second Annual Report, Peabody Museum of Archaeology, Cambridge*, 1869.

† The deposits are entirely free from any admixture of soil or *débris* of any sort, and one is struck with the appearance which a fresh section presents, the clean, white wall of shells looking like a kiln of freshly baked porcelain.—MOSES, *loc. cit.*, 74. Wherever we found a deep section of shells so lately made that the surface had not decomposed, the open appearance of the shells was marked. They were not mingled with fragments of bone or broken shells or with sand, presenting, in this respect, an entirely different appearance from the great deposit of oyster-shells by water at the mouth of the St. Mary's river, Georgia, which I had an opportunity of carefully observing two years ago.—CHADBOURNE, *Trans. Maine Hist. Soc.*, vi.

‡ Another circumstance that strikes the explorer, is the extremely loose condition of the shells, even at the base of a deposit of great depth. The shell may be drawn out with the greatest ease from any portion of the bank, and, with a little caution, in an entire state, although readily crumbling if not handled with great care.—MOSES, *loc. cit.*, 74. The shells lie very loosely, are remarkably white and friable, being in a state of partial decomposition and readily falling to pieces when handled.—MOSES, *loc. cit.*, i, p. 73.

§ One of the deposits, as surveyed by Mr. John M. Brown and myself, has the following dimensions: Shape, oval; length, 180 feet; breadth, 100 feet; depth, 6 feet; height of base above high-water mark, 4 feet. The top of the loftiest mound is 31 feet above high-water mark. It descends abruptly toward the river, and at its base the action of the water has formed a fine shell-beach.—MOSES, *loc. cit.*, 75.

|| See paragraph 6.

No doubt, however, the chief attraction in the district was this isolated colony of oysters, and that they were made incessant use of, is attested by the size of the heaps. As a rule, there is little or no perceptible interstratification of earth to suggest a period when no shells were thrown down, and the forest had time to grow and drop its moldering leaves, the dust an opportunity to settle. Land-shells are very few, which would not be the case had weeds and bushes grown over the beds. The increase of the banks, then, as a whole, was steady from the beginning to the end.

How long ago that beginning was, is a question very difficult to answer. Most persons, I believe, are inclined to exaggerate the length of time required to pile up even so great a deposit as this. The shells are very large and heavy. They will probably average twice the size of the ordinary oysters seen in Fulton market. The greed of savages, when food is plenty, is as well known, as that a vast quantity of oysters may be eaten before the appetite cloy. It is evident that large numbers of Indians permanently resided in the vicinity, and probable that still greater numbers came from a distance to the coast in summer. This was in accordance with their habits everywhere. Taking these various considerations together, it will be seen that it would not require so extraordinary a period, as might at first appear, for the accumulation of the heaps, although so extensive; at the same time it is evident that oysters were exceedingly numerous there. But it is also probable that not only were the shells of the oysters eaten on the spot, thrown down on the bank, and thus piled up, as you can see the degenerate descendants of these Indians doing to this day, but that visiting Indians were in the habit of procuring large quantities of the mollusks, shucking them here, and carrying them away to the interior in vessels of wicker, birch-bark, and pottery. They came down the Penobscot and other rivers in large canoes in the autumn, filled up their buckets with oysters, and departed. In the cold weather of early winter they would keep good for days and weeks, and form a luxury in their up-country wigwams, that would remind them most pleasantly of sunny summer-days beside the sea. Thus this bay became a shucking-ground, as well as a place for feasts. Possibly a system of barter was instituted, by which certain men lived on the spot and devoted themselves to getting and selling oysters in exchange for clothing and weapons and game. We know there were arrow-makers and canoe-builders, and so on; why not oyster-divers and dealers? Indeed, it is not improbable that the small neighboring oyster-beds of Sheepscot and Thomaston were designedly planted by the Indians with young mollusks obtained from Damariscotta, with a view to continued and convenient supplies.

The Indians probably procured their oysters by wading out and picking them up at low tide. This was the work of the women and children, while the warriors sat on the bank and ate till they were satisfied, or superintended the proper freighting of the canoes. But many were also got, no doubt, by diving, which would be done mainly by the young men. It is doubtful whether they used anything in the shape of a rake, grapnel, or tongs. I could find no evidence of anything of this sort, but if such were used, they were doubtless made of wood (stone would be too unwieldy), and therefore would completely perish.

Another question is, how did they open these monstrous shells? There are three ways: one is by fire—roast a mollusk a few minutes and he opens his valves; evidences of fire, in the shape of ashes and charcoal, are recovered at various depths in various parts of the deposit,\* and it is probable that this was the usual and cheapest method. Another way was by striking a brisk blow on the side of the shell just over the "scar", or attachment of the adductor muscle. This seems to paralyze the animal and his muscles relax. I have seen a heavy stone implement that looked as though it had been used for this purpose, and was different from the ordinary hammering stones. At Wellfleet, also, I dug from a shell-heap a rough stone tool, evidently fashioned by men, which exhibited signs of long usage both as a hammer and as a wedge or knife with which to pry open the valves. But any of their stone knives or smaller hatchets would have been eminently suitable for this service, and there was hardly need of a special instrument for the purpose. There is an implement in the possession of Dr. R. C. Chapman, of Damariscotta, however, that appears to have been made expressly for such service, and would accomplish the matter as deftly as our modern knives.

However, Damariscotta is only one of the many points along the coast of the gulf of Maine where these shell-heaps, and extinct deposits under the water, show that the oyster once flourished. The most easterly point that I can make sure of is Mount Desert island; for at Eastport no oysters or remains of them have ever been found native, a report to the contrary notwithstanding.

In the George river are extinct beds, concerning which more will be said hereafter; then comes Damariscotta, already described, and next is Sheepscot river, where there were once plenty of oysters, but no shell-heaps of consequence, and the next point is Casco bay.

\* In these places, in deep sections, we found fragments of charcoal mingled with the shells under conditions that showed conclusively that it could have been deposited there only as the shells were deposited. \* \* \* So common did we find the coal, that I feel confident it can be found there by any careful observer.—CHADBOURNE. *Trans. Maine Hist. Soc.*, vi. In digging down from the surface of one of these heaps, fragments of charcoal were found at a depth of 3 or 4 feet, and here and there a layer of the same substance. Above and below these layers was sometimes a conglomerate mass of shells, apparently burned to lime by the action of fire.—MOSES, *loc. cit.*, 74. Mr. Morse found at the very foundation of one of the highest heaps the remains of an ancient fire-place, where he exhumed charcoal, bones, and pottery. \* \* \* These small mounds are composed of the same materials as the others, but had a larger admixture of earth. They appear to have been the heaps of refuse gradually collected around the encampments. WYMAN. *2d Ann. Report Peabody Mus. Arch.*, 1869, p. 18.

Everywhere that any digging has been done in Portland harbor, in the neighborhood of Harpswell, in the Back cove at the mouth of the Presumpscot, or elsewhere in the upper and sheltered part of Casco bay, these monster shells have been met with. In the harbor they are buried seven feet deep, so rapid has been the filling up by sewage and other refuse, but behind the city, out of the way of drifting matter, they are struck only about two feet under the surface of the bottom mud. Near Harpswell they are so accessible at low tide, that they have been dredged up to some extent and used for manure upon the neighboring farms, where they very soon go to powder. Upon nearly all the islands in the bay, also, have been found *kjökkenmöddings*, which have been extensively explored and collected from for museums of archaeology by Mr. Fuller, Professor Morse, Professor Wyman, and others. These heaps are especially noted for the great quantities of the bones of the extinct auk, *Alca impennis*, that they have yielded.

Not far southward of Casco bay are the Scarborough headlands, which were perhaps the first of all our shell-heaps to attract attention. Southgate, in his history of the town, says:

The excellent opportunities for fishing and hunting which distinguished Scarborough, made it one of the favorite resorts of the natives. The place of their most ancient residence within the town was the point (Plummer's) south of Oak Hill. The site of their village overlooks the river, marshes, and bay on the south, and was protected upon the north by a high ridge of slate. There remains at that place a large bank of shells from one to ten feet in depth, supposed to have been deposited there by these Indians. \* \* \* Some of the fields on the south side of Blue point consist almost entirely of shells brought there by the Indians, and there are similar traces of them on the opposite shore of Black point.

**SHELL-HEAPS OF OTHER LANDS.**—Shell-mounds, like that at Damariscotta, at various points along the shore of Massachusetts, and in many other parts of the Atlantic coast of America, are found nearly all over the world. They all tell the same story of savage life, and usually of an extremely degraded state of society, and an intensely hard struggle for daily bread. It is a proof of no great sagacity to discover that mollusks were good for food. Many animals, and even birds, found that out long ago. They are present in greater or less profusion upon all coasts, and are more likely to be accessible than any other form of food, since they cannot get away, do not require to be cultivated, and are equally plenty at all seasons. Nevertheless, it is only within a very few years that these heaps of shells near the beach have attracted the attention of antiquarians, as storehouses of materials out of which something of the history of now prehistoric times might be reconstructed. Indeed, their character has been mistaken altogether, until within the memory of men now living; for where they had been noticed at all they had at once been set down as "old beaches", left high and dry by the sea, and this in spite of the fact that it was well known that just such structures were even now being piled up by various tribes of savage men in remote corners of the globe. For instance, Captain Cook and Captain Grey both reported, that on the northwest coast of Australia the natives, when they had any houses at all, dwelt in the flimsiest of huts along the coast line, and that there were around them "vast heaps of shells, the fish of which we suppose had been their food". Some of these mounds were described as covering half an acre and being ten feet thick. Down in New Zealand precisely the same thing was observed. Captain Cook reported a similar state of affairs in Patagonia, while the Indians of Alaska and the Eskimos of Greenland accumulated shells and bones in vast quantities round their doors, like their neighbors in savagery on the equator and at the antipodes. Finally, it dawned upon students of archæology that the prehistoric inhabitants of Europe might have had similar habits, and, if so, masses of castaway shells would remain to mark the site of their huts and villages. This led to an examination of the "old beaches", when it was quickly seen that they were the product of human agency—were, in fact, the very remains the archæologists were searching after.

The most famous and extensive of these mounds in Europe were those of Denmark. They have often been described under the name of *kjökkenmöddings*, from two words meaning "heaps of kitchen-refuse".

Examination has made it evident that these deposits were scattered along the whole coast, following the ins and outs of the deeply-indented shore; but they never occur inland, although the changes in elevation of the coast have in some cases placed considerable new land betwixt them and the beach, just as, in other cases, the encroachment of the sea has destroyed them in part, or wholly submerged them. It is in the northern half of Denmark, however, that the most exploration has taken place; and it shows conclusively that the people who built them evidently made their homes always on the shore, just out of reach of the tide, only now and then, perhaps, following the chase into the interior.

These heaps are much like that of Damariscotta. Some are of large extent and thickness, and hillocky; others of less size, but elongated; a third sort in the shape of a ring, with a depression in the center, where we may suppose the hut was built when last the place was occupied. Sir John Lubbock's description of one of the most productive of the heaps, that at Meilgaard, in 1863, will give a good idea of the whole—

In the middle this *kjökkenmödding* has a thickness of about ten feet, from which, however, it slopes away in all directions; round the principal mound are several smaller ones of the same nature. Over the shells a thin layer of mold has formed itself, on which the trees grow. A good section of such a *kjökkenmödding* can hardly fail to strike with astonishment any one who sees it for the first time, and it is difficult to convey in words an exact idea of the appearance which it presents. The whole thickness consists of shells, oysters being at Meilgaard by far the most numerous, with here and there a few bones, and still more rarely stone implements or fragments of pottery.

The four species of shells most abundant in the Danish mounds are: the oyster, *Ostrea edulis*, L.; the cockle, *Cardium edule*, L.; the mussel, *Mytilus edulis*, L.; and the periwinkle, *Littorina littorea*, L.

All of these mollusks are still used for food; besides them, various other sea- and land shells occur in small quantities. Sir John Lubbock points out that the shells of nearly all these mollusks average of far larger size than they are ever known to attain off those coasts at the present day; while the oyster has entirely disappeared, and even in the Kattegat itself occurs only in a few places. "Some oysters were, however, still living at Isselford at the beginning of this century, and their destruction cannot be altogether ascribed to the fishermen, as great numbers of dead shells are still present; but in this case it is attributed to the abundance of starfishes, which are very destructive to oysters. On the whole, their disappearance, especially when taken in connection with the dwarf size of the other species, is evidently attributable in a great measure to the smaller proportion of salt in the water." The lack of saltiness alluded to arises from the fact, that the elevation of the shores and bottom of the Kattegat has been so great as to admit only a little of the tide, while an increased quantity of fresh water flows in.

Besides these mollusk-shells, the remains of fishes, quadrupeds, and birds are very numerous and highly interesting. Professor Steenstrup, who has paid great attention to this matter, estimated that the mound at Havelse contained from ten to twelve bones in every cubic foot.

Of the fishes, the most common are the herring, the dorse (a kind of cod), the dab (a kind of flounder), and the eel. Among the bones of birds there have been recognized skeletons of the capercaillie (a very large grouse), the wild swan, various ducks and geese, and of the great auk, *Alca impennis*, whose bones fill our American mounds also, and which has now become extinct.

The mammals are represented in the mounds by the stag, the roe-deer, and the wild boar, for the most part—97 per cent., according to Professor Steenstrup. Besides these, bones of the buffalo, dog, fox, wolf, marten, otter, porpoise, seal, water-vole, beaver, lynx, wild-cat, hedgehog, bear, and mouse. Such domestic animals as the ox, elk, reindeer, hare, sheep, and hog are absent. The dog was probably kept to be eaten; or at least it is certain that he became an article of food on occasions.

The bones, little and big, are all badly crushed and broken, and all in the same way, so that the parts missing in one skeleton will exactly coincide with those in all the rest, if they could be got together. The long bones of the arms and legs, for example, are all split open in the manner best adapted for the extraction of the marrow, "which is in itself satisfactory proof of the presence of man."

The flint and stone implements dug up from these shell-heaps are very numerous, but show little skill. "A very few carefully formed weapons have been found," says Sir John Lubbock, "but the implements generally are very rude. Small pieces of very coarse pottery have also been discovered, and many of the bones from the kjökkenmöddings bear evident marks of a sharp instrument; several of the pieces found by us were in this condition, and had been fashioned into rude pins." Sir John continues:

"The kjökkenmöddings were not mere summer-quarters; the ancient fishermen resided on these spots for at least two-thirds, if not the whole, year. This we learn from an examination of the bones of the wild animals, as it is often possible to determine within very narrow limits the time of year at which they were killed. For instance, the remains of the wild swan, *Cygnus musicus*, are very common, and this bird is only a winter visitor, leaving Danish coasts in March and returning in November. It might naturally have been hoped that the remains of young birds would have supplied evidence as to the spring and early summer, but, unfortunately, as has already been explained, no such bones are to be found. It is therefore fortunate that among the mammalia two periodical phenomena occur, namely, the shedding and reproduction of stags' antlers, which, with slight variations according to age, have a fixed season; and, secondly, the birth and growth of the young. These and similar phenomena render it highly probable that the 'mound-builders' resided on the Danish coast all the year round, though I am disposed to think that, like the Fuegians, who lead even now a very similar life, they frequently moved from spot to spot. This appears to me to be indicated not only by the condition of the deserted hearths, but by the color of the flint flakes, etc.; for, while many of these retain the usual dull, bluish-black color which is characteristic of newly-broken flints, and which remains unaltered as long as they are surrounded by carbonate of lime, others are whitened, as is usual with those which have been exposed for any length of time. Perhaps, therefore, these were lying on the surface during some period of desertion, and covered over only when the place was again inhabited.

"Much as still remains to be made out respecting the men of the Stone period, the facts already ascertained, like a few strokes by a clever draughtsman, supply us with the elements of an outline sketch. Carrying our imagination back into the past, we see before us on the low shores of the Danish archipelago a race of small men, with heavy, overhanging brows, round heads, and faces probably much like those of the present Laplanders. As they must evidently have had some protection from the weather, it is most probable that they lived in tents made of skins. The total absence of metal in the kjökkenmöddings indicates that they had not yet any weapons except those made of wood, stone, horn, and bone. Their principal food must have consisted of shellfish, but they were able to catch fish, and often varied their diet by game caught in hunting. It is perhaps not uncharitable to conclude that when their hunters were successful, the whole community gorged itself with food, as is the case with many savage races at the present time. It is evident that marrow was considered a great delicacy, for every single bone which contained any was split open in the manner best adapted to extract the precious morsel."

We have already seen that these mound-builders were regular settlers and not mere summer-visitors, and, on

the whole, seem to have lived in very much the same manner as the inhabitants of the Tierra del Fuego, who dwell on the coast, feed principally on shellfish, and have the dog as their only domestic animal. A very good account of them is given in Darwin's Journal, from which I extract the following passages, which give us a vivid and probably correct idea of what might have been seen on the Danish shore long, long ago:

The inhabitants, living chiefly upon shellfish, are obliged constantly to change their place of residence; but they return at intervals to the same spots, as is evident from the pile of old shells, which must often amount to some tons in weight. These heaps can be distinguished at a long distance by the bright-green color of certain plants which invariably grow on them. \* \* \* The Fuegian wigwag resembles in size and dimensions a hay-cock. It merely consists of a few broken branches stuck in the ground, very imperfectly thatched on one side with a few tufts of grass and rushes. The whole cannot be so much as the work of one hour, and it is only used for a few days. \* \* \* At a subsequent period the Beagle anchored for a couple of days under Wollaston island, which is a short way to the northward. While going on shore we pulled alongside a canoe with six Fuegians. These were the most abject and miserable creatures I anywhere beheld. On the east coast the natives, as we have seen, have guanaco cloaks, and on the west they possess seal-skins. Amongst the central tribes the men generally possess an otter-skin, or some small scrap about as large as a pocket-handkerchief, which is barely sufficient to cover their backs as low down as their loins. It is laced across the breast by strings, and, according as the wind blows, it is shifted from side to side. But these Fuegians in the canoe were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. \* \* \* These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, their gestures violent and without dignity. Viewing such men, one can hardly make one's self believe they are fellow-creatures and inhabitants of the same world. \* \* \* At night five or six human beings, naked and scarcely protected from the wind and rain of this tempestuous climate, sleep on the wet ground, coiled up like animals. Whenever it is low water they must rise to pick shellfish from the rocks, and the women, winter and summer, either dive to collect sea-eggs or sit patiently in their canoes, and, with a baited hair-line, jerk out small fish. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast. Such miserable food is assisted by a few tasteless berries and fungi. Nor are they exempt from famine, and, as a consequence, cannibalism is accompanied by parricide. In this latter respect, however, the advantage appears to be all on the side of the ancients, whom we have no right to accuse of cannibalism.

If the absence of cereal remains justifies us, as it appears to do, in concluding that they had no knowledge of agriculture, they must certainly have sometimes suffered from periods of great scarcity, indications of which may perhaps be seen in the bones of the fox, wolf, and other carnivora, which would hardly have been eaten from choice; on the other hand, they were blessed in the ignorance of spirituous liquors, and saved thereby from what is at present the greatest scourge of northern Europe (p. 234).

## 5. THE TIME AND CAUSES OF THE EXTINCTION OF THE OYSTER IN THE GULF OF MAINE.

DATE AND EXTENT OF THE EXTINCTION.—I attempted to show, in the last section, to how wide an extent the oyster grew north of Cape Cod, and how recent was its disappearance in many localities. It is worth while to inquire what has caused this sudden and widespread extinction. At Mount Desert, at Bath, Maine, in Casco bay, at Scarborough, New Hampshire, and Salisbury, Massachusetts, in the Parker and Rowley rivers, in the Charles, Mystic, and Weymouth rivers, Massachusetts, and everywhere on Cape Cod, the native oysters are wholly extinct. A few remain in Great Bay, near Portsmouth, New Hampshire, and at Sheepscot, Maine. Possibly, also, a few could be searched out at Damariscotta and Wellfleet, but this is very doubtful. What has killed them all? Beginning with those beds whose extinction was prehistoric, there are three theories, either of which is at the service of the reader, or he may, if he chooses, combine them. One is, that the Indians used them up; another, that the polluting of the water, by the refuse of mills and manufactures, had its influence; the third, that the elevation of the coast, which geologists tell us has been proceeding steadily for many centuries, brought about conditions fatal to this fixed mollusk, so far as the precise locality of particular beds was concerned. In George river, to begin at the extreme east, we are told that the death of the oysters is very recent. They continued plenty up to 1836, according to the account of old residents of the district, who are under the impression that their subsequent extinction was due to the sawdust coming down from lumber-mills, and brought in by the eddying tide.\*

In regard to the decline of the great deposits above Damariscotta there is much to excite curiosity. After all, there was only a limited area of this oyster-growth—at most a square mile of water suitable for their habitation, and it is certain that they were sought for year after year by a large number of persons. It would not be strange, therefore, if, unable to propagate fast enough to supply the demand, they finally became extinct. I believe that this calamity would not have been long delayed had the red men been left alone for a few decades longer. Indeed, it has been gravely doubted whether any oysters were in existence in Salt bay when the locality was first discovered by white men. The traditions are uncertain, but I think they give satisfactory evidence that the first settlers found at least a small number of oysters here, and that their disappearance is comparatively recent, probably within the present century. I am satisfied that the first white men found still alive here the remnants of the great oyster colony which the Indians had been foraging upon for many generations, perhaps, and had at last nearly exterminated.

POSSIBLE EFFECTS OF NATURAL SEDIMENT UPON THE DAMARISCOTTA BEDS.—The influence of the Indians having been considered, various other causes are assigned for the utter extinction of the oyster in this region. Dr.

\* It is convenient to mention the following facts: In 1853 oysters were planted in Oyster river, near the George, but without success. In 1864 it is said that a few living large ones were taken there, and it is probable that a few still exist. The saw-mills have all ceased to run on these rivers, and I see no good reason why the beds should not be restocked with success. The original locality was near the railway bridge. There are no shell-heaps here.—*Letter from the Hon. E. K. O'Brien.*

R. C. Chapman, of Newcastle, Maine, who has paid much intelligent attention to the matter, has constructed a theory in this wise: He points to the fact that the fresh-water pond above the island and rocky falls at Damariscotta mills is about 60 feet higher than the level of Salt bay. The tide never goes beyond these rapids. He believes that at one time the pond contained a far greater volume of water than now, and that it had either no outlet at all into Salt bay, or else a very small one; but that finally the weight of the water broke through the barrier of rock and gravel at the falls, and made for itself this new channel oceanward. This breakage would of course burden the new outrushing current with an enormous amount of loosened soil and broken rock, which would be swept onward until it settled in thick sediment all over the bottom of Salt bay, and for a long time after the water would be murky with clouds of mud. Such a catastrophe would undoubtedly kill the most, if not all, of the molluscan life in such an inclosed body of sea-water as Salt bay is; and the oysters would survive it least of all. But I am not convinced that there is evidence that any such a sudden, grand disaster ever occurred at that spot, or, if it ever did, I am of the opinion that it was antecedent to the beginning of the shell-heaps. We are all more fond of conjuring up some grand cataclysm to account for mysteries in nature, than to accept an explanation commended by its simplicity.

**POLLUTION OF THE WATER BY MILLS AND FACTORIES.**—One of the first acts of the new settlers was the erection of saw-mills at the falls, where they found a splendid water-power. These mills began at once to pour great quantities of saw-dust into the stream, which was carried out into Salt bay and the river below, where it was bandied back and forth in the tireless tides until it sank. Sawdust very soon becomes water-logged and goes down. At the same time woodmen were clearing the forests and draining the swamps, and farmers were breaking the turf. Each of these operations tends to increase the running off of the rain and the carrying away of a far greater amount of silt than under natural conditions. The oysters thus found their clear, salt home freshened by an unusual influx of rain-water, the currents always roily, and themselves gradually being smothered in the sediment of sawdust and earth deposited everywhere, except, perhaps, in the deepest and swiftest parts of the channel. Thus an end was made of what, with care, might no doubt have been nurtured into a most flourishing oyster-colony.

At the northeastern extremity of Salt bay a little stream, known as Oyster creek, comes in from toward the village of Nobleboro. The mouth of this creek is out of the way of the currents from the mills, and, in general, it is the part of the bay least likely to suffer harm from sediment. The men who fish for eels through the ice in winter say that underneath the foot or so of thick sawdust and mud that now covers the bottom, and has perceptibly lessened the general depth of the water within a hundred years, there is everywhere a layer of oyster-shells. Here in the creek, however, these are not covered up, but may be seen lying, large and white, on the bottom, as the bridge is crossed. Moreover, men now living assert, that sixty or seventy years ago a few of the bivalves were still to be had there, and that during the previous half century there were a great many in the bay. They believe that later than that scattering individuals might have been found, and some men go so far as to say that in the "quick-water" at the base of the falls a few oysters may even now be obtained. There are some supporting facts, and I do not think it unlikely.

The covering of the formerly gravelly or shelly bottom of the bay would not only smother existing mollusks, but, in the case of our subject, would prove fatal in another way. The spawn of the oyster requires some clean, firm support to which to attach itself. The soft, wet matting of sediment would not do at all, and all the ova would drift out to sea or become the food for fishes, and in either case produce nothing.

No longer than forty years ago, however, I am told, a dead spruce tree was dragged to the surface opposite the shell-heaps, whence it had fallen, top foremost, into the stream. The branches were clogged full of sawdust; but clinging to the twigs were innumerable young oysters that had not had a chance to grow to any great size before they were choked by the drifting sediment. Whence came the spawn for this growth, if there were then no living oysters in Salt bay or vicinity? It is possible some might be got, by careful search, in the Oyster creek corner yet.

As for the long, thick shells dredged up in the lower Penobscot river and in Portland harbor, indicating so extensive a habitancy there of these mollusks in ancient times, possibly the death of many of them dates back to Postpliocene days. Opposed to this thought, nevertheless, is the fact that shell-heaps upon the islands in Casco bay show that a few oysters, at any rate, still existed when Indians dwelt there. No one has ventured on an explanation of their extinction, that I am aware of, except Mr. C. B. Fuller, curator of the Portland Society of Natural History, who suggests that, by the breaking away of the barrier represented by the present chain of islands in the bay, the water of the outer sea was let fully into what had previously been a sheltered basin. This water was so very much saltier, as well as colder, than that to which the oysters had been accustomed, that they were unable to survive the change.

**CLIMATIC CHANGES.**—Professor A. E. Verrill, however, evidently considers a change in climate the cause of the loss to the world's economy of these storehouses of food. In his *Invertebrates of Vineyard Sound*, this writer remarks that the occurrence of large quantities of oyster-shells beneath the harbor-mud at Portland, associated with *Venus mercenaria*, *Pecten irradians*, *Turbonilla interrupta*, and other southern species, now extinct in that locality, and the occurrence of the first two species in the ancient Indian shell-heaps on some of the islands in Casco bay, though not now found living among the islands, indicates that the temperature of those waters was higher at a former period

than at present. These facts also point to the most satisfactory explanation of the existence of numerous southern shells, associated with the oyster and *Venus mercenaria* in the southern part of the gulf of St. Lawrence, though not now found in the intermediate waters along the coast of Maine nor in the bay of Fundy.

These remarks, it will be observed, apply to the whole coast, and are highly suggestive. In their light it is useless to speculate upon the few remaining localities until Wellfleet, on the cape, is reached.

**EXTINCTION OF THE WELLFLEET BEDS.**—In Wellfleet harbor, as has already been shown, oysters were native and widespread at the time of the discovery of the country by Europeans. The settlers began at once to make use of them, and continued to do so as long as they lasted. Here we ought to know something definitely about their extinction, but all the information is scattered and inexact.

Wellfleet was anciently known as Billingsgate, at least that part of it on the western side, on account of the abundance of the fish there, and this name became an oyster-brand during the last century. In the *Massachusetts Historical Collections*, iii, is preserved a topographical description of Wellfleet, by Levi Whitman, dated 1793, in which is given considerable information upon our subject. Mr. Whitman asserts his opinion that "no part of the world has better oysters than the harbor of Wellfleet. Time was when they were to be found in the greatest plenty, but in 1775 a mortality from an unknown cause carried off the most of them. Since that time Billingsgate oysters have been scarce, and the greater part that are carried to market are first imported and laid in our harbor, where they obtain the proper relish of Billingsgate".

Forty years later Gould wrote, in his *Invertebrates of Massachusetts*:

They say that Wellfleet, where the southern oysters are *planted* for Boston use, was originally called Billingsgate, on account of the abundance of fish, and especially oysters, found there; that they continued to be abundant until about the year 1780, when from some cause they all died; and, to this day, immense beds are shown there of shells of native oysters which perished at that time. They say that before that time no such thing was thought of as bringing oysters from the south.

The Wellfleet oysterman, whom Thoreau talked so long with on his visit to the cape in 1849, and the charming report of whose conversation is given us in that pleasant author's *Cape Cod*, placed the date of the disappearance of the oyster there as 1770. "Various causes are assigned for this, such as the ground frost, the carcasses of blackfish left to rot in the harbor, and the like, but the most common account of the matter is, and I find that a similar superstition with regard to the disappearance of fishes exists almost everywhere, that when Wellfleet began to quarrel with the neighboring towns about the right to gather them, yellow specks appeared in them, and Providence caused them to disappear."

Nowadays, the citizens of the village repeat these traditions—all but the one about Providence—I did not hear that—and hazard no new theory. It is perhaps most truthful of all to say, that excessive raking nearly depopulated the beds, and that the blowing in of sand from the stripped hills, and the polluting of the tide-water by the offal of the fishing-vessels that throng the bay, destroyed the growth of the young. No doubt rotting carcasses of schools of blackfish left on the beach (as has happened many a time) and the subtle anchor-frost helped—"that is, a degree of cold so great as to cover the bottom with a coating of ice, and thereby to cut off the oysters from all access to air and nourishment." It is very probable, nevertheless, that many native oysters are still living in Wellfleet bay, perpetuating the old stock.

**WYMAN ON THE EXTINCTION OF FOOD-MOLLUSKS IN FLORIDA AND ELSEWHERE.**—I find some exceedingly pertinent remarks on this subject in Dr. Jeffries Wyman's report on the shell-heaps of Florida. They are as follows:

It seems incredible to one who searches the waters of the St. John's and its lakes at the present time, that the two small species of shells above mentioned could have been obtained in such vast quantities as are brought together in these mounds, unless at the times of their formation the shells existed more abundantly than now, or the collection of them extended through very long periods of time. When it is borne in mind that the shell-heaps afford the only suitable surface for dwellings, being most commonly built in swamps, or on lands liable to be annually overflowed by the rise of the river, they appear to be necessarily the result of the labors of a few living on a limited area at any one time. At the present, it would be a very difficult matter to bring together in a single day enough of these shells for the daily meals of an ordinary family. That they formerly existed in larger numbers than now, is by no means improbable. It is well known, with regard to both animals and plants, that after flourishing for considerable periods in given areas, they at length yield in their struggles for existence against changed conditions. The oysters of which the gigantic shell-heaps on the Damariscotta river in Maine are built were, without doubt, obtained from the adjoining waters, but to-day they are well-nigh extinct, and the same is in a measure true of some of the deposits on Cape Cod, as at Cotuit Port. Analogous changes have been observed by European archaeologists. The oyster-banks near the mouth of the Baltic, from which many of the ancient shell-heaps of Denmark were formed, have disappeared, partly through increasing freshness of the water, and partly through the ravages of the starfish. The last of them have disappeared from the Isselfjord during a century, so that none are found further south than the northern end of the island of Seeland, and in large quantities only on the more northern shores of the Kattegat. The water chestnut, *Trapes natans*, once very abundant in some of the Swiss lakes during the age of the lake-dwellers, has now become extinct in those regions.—*Smithsonian Report*, 1865, p. 365.

As the oysters of the ancient period were very much larger than those now found on the coast of Maine, it is also the case that the shells from the mounds of the St. John's surpass in size, though to a less marked degree, those of the actual period.

## 6. HISTORY OF THE NATURAL OYSTER-BEDS IN THE GULF OF MAINE, SINCE THE SETTLEMENT OF THE COAST BY EUROPEANS.

TESTIMONY OF CHAMPLAIN, POITRINCOURT, AND WINSLOW, 1605-1620.—Beyond the most general allusion, the very earliest mention of oysters in these waters occurs in 1606. The second voyage of exploration along our coast found an anchorage in Massachusetts bay. "There were many very good oysters here," he relates, "which we had not seen before, and we named the place Port aux Huïstres." Mr. Slafter, a commentator upon the history of these voyages, says "it is plain that this port, which they named Oyster Harbor, was either that of Wellfleet or Barnstable. The former, it will be remembered, Champlain, with De Monts, entered the preceding year, 1605, and named it, or the river that flows into it, St. Suzanna du Cap Blanc. \* \* \* It is obvious that Champlain could not have entered this harbor the second time without recognizing it. \* \* \* We may conclude, therefore, that the port in question was not Wellfleet, but Barnstable. This conclusion is sustained by the conditions mentioned in the text."

In another edition of Champlain's map (1632) the "Rivière aux Escailles" is drawn emptying into the same part of the bay which Ogilby, in his map of this part of America, published in 1670, calls "Port aux Huïstres". This name survived, indeed, to a much later time. In Rees's Cyclopædia (1819), "Oyster bay" is given as "a harbour for small vessels in the southwest limits of Barnstable, Massachusetts. It derives its name from its excellent oysters".

Champlain (second voyage, 1606,) also relates that he found oyster-beds in Chatham harbor, on the south side of Cape Cod, and makes the following general statement: "All the harbors, bays, and coasts from Chocomaque [Portland, Maine] are filled with every variety of fish. \* \* \* There are also many shellfish of various sorts, principally oysters." In this case, too, Rees preserves the recollection so long, that I wonder it has ever been lost, for in his Cyclopædia he mentions an "Oyster Island Harbour on the coast of Massachusetts, which, from its latitude (lat. 41° 35', long. 70° 24'), must have been in the neighborhood of Chatham".

These records by Champlain and Poitricourt embrace the earliest notice that I can find of oysters on the northern coast, but careful searching through all the early narratives of exploration and settlement around Massachusetts bay, produces much additional testimony. For instance, in 1621, in a letter from Plymouth, preserved in *Mourt's Relation*, Edward Winslow writes to an English friend: "Oysters we have none near, but we can have them brought by the Indians when we will." This shows they were not far away. Two years later we read the sad report that "one in geathering shellfish was so weake as he stucke falt in y<sup>e</sup> mudd, and was found dead in y<sup>e</sup> place. At last most of them [Welfton's people in Massachusetts bay] left their dwellings & scattered up & downe in y<sup>e</sup> woods, & by y<sup>e</sup> water fide, wher they could find ground nuts & clames, hear 6 and ther ten".\*

HIGGINSON, WOOD, AND JOSSELYN, 1630-1638.—In 1630 Higginson, in his *New England's Plantation*, gives "muskles and oysters" as a part of the great wealth of the waters beside which the Pilgrims had placed their colony; and seven years afterward Thomas Morton added his witness: "There are great store of Oysters in the entrances of all Rivers; they are not round as those of England, but excellent fat, and all good. I have seene an Oyster banke a mile at length."†

In 1634 William Wood, in his *New England's Prospect*, speaks of "a great oyster bank" in Charles river, and another in the "Misticke", each of which obstructed the navigation of its river. Ships of small burden, he says, were able to go up as far as Watertown and Newton, "but the Oyster-bankes doe barre out the bigger Ships." In reference to the Mystic, and the large amount of ship-building upon it, Wood says, "Ships without either Ballast or loading, may floate downe this River; otherwise the Oyster-banke would hinder them which crosseth the Channell."

"The Oysters," adds Wood, "be great ones in form of a Shoe-horne; some be a foot long; these breed on certain banks that are bare every spring tide. This fish without shell is so big, that it must admit of a division before you can well get it into your mouth."

This bank appears to have been a very well-known and prominent feature in those days, though no popular tradition of it remains. For example, Winthrop's *History of New England*, edited by the Rev. John Savage, p. 106, contains under date of August 6, 1633, the following statement: "Two men servants to one Moodye, of Roxbury, returning in a boat from the windmill, struck upon the oyster-bank. They went out to gather oysters, and, not making fast their boat, when the flood came, it floated away, and they were both drowned, although they might have waded out on either side; but it was an evident judgment of God upon them, for they were wicked persons."

In Hubbard's *General History of New England*, written in 1633, is another account of the same incident, or accident, as one of several instances where the visible wrath of Jehovah, apparently so manifest to the Puritan, had instantly followed transgression. I quote the passage:

The like judgment befell those lewd persons that lived in service with one of Roxbury, who, rowing in a boat from the windmill hill in Boston, struck upon an oyster-bank near the channel, and going out of their boat before they had fastened her, to get oysters, the tide came in before they were aware, and floated away the boat; and, they not being acquainted with the channel, were both drowned on the bank, though they might at first safely have waded through to the shore.

\* Bradford's *History of Plymouth Plantation*, in Coll. Mass. Hist. Soc., vol. iii, 4th sec., p. 130.

†New English Canaan, p. 90.

There are other references to this matter. John Josselyn, Gent., in his *Account of Two Voyages to New England*, printed in 1638, describes Boston and its environs. Charles river is portrayed with minuteness, and the expansion above the "Narrows", now known as the Back bay, is indicated. "Toward the southwest," he writes, "in the middle of the bay, is a great oyster-bank, toward the northwest is a creek; upon the shore is situated the village of Medford; it is a mile and a half from Charlestown."

This is mixed, and throws small light upon the precise position of either of these banks, which must have been of considerable importance to Bostonians at that time, and particularly to the poor. This appears from the foregoing, and from a paragraph in a very interesting tract preserved in the Geneva library, written by an unknown French refugee who visited Massachusetts in 1687; describing the prosperity of Boston, the author says: "This town carries on a great trade with the islands of America and with Spain. They carry to the islands flour, salt-beef, salt-pork, cod, staves, salt-salmon, salt-mackerel, onions, and oysters salted in barrels, great quantities of which are taken here."

LOCATION OF THE CHARLES RIVER BEDS.—It is a less easy task than it would at first appear to determine the location of these ancient beds of oysters. For that in the Mystic river I have no data sufficient to guide me with any exactness; any one may guess within a mile of it. There is better information in regard to the Charles river beds.

The "lewd persons" who lost their careless lives were returning from the windmill. This, it is known, stood upon one of the hills in the common—possibly that which now upholds the soldiers' monument. The tides at that time washed the shore of the higher parts of the common, along where Charles street now passes, and boats could doubtless come almost up to the foot of the mill with their loads of grist. Returning out through the bay, they would pass close by any oyster-banks that lay off Cambridge port.

Through the discussion of a paper which I had the honor to read before the Boston Society of Natural History, in September, 1879, upon Massachusetts oysters, some new facts of interest were brought to light bearing upon the point now under consideration. Prof. F. W. Putnam remarked that when, twenty years ago, the ground was being broken at the corner of Berkeley and Boylston streets, for the foundations of the building devoted to this very society, in which we were then sitting, many immense oyster-shells in good condition were struck at a depth of several feet. This part of Boston is all "made ground", extending over former tide-flats in the "Back bay" of Charles river. It is possible that these aged buried oysters grew on the anciently noted bed, the site of which therefore is now appropriately indicated by the Natural History Rooms and the noble Institute of Technology.

PLYMOUTH AND NEWBURY, 1660-1700.—Meanwhile Plymouth had pulled her people out of where they had "stuck fast in y<sup>e</sup> mudd", and discovered that her mollusk-fisheries were valuable, as the following quotation from the records evince:

"Att the generall court held att Plymouth the fourth of June, 1661—

It is enacted by the Court that five shillings shalbee payed to the Countrey vpon every barrell of Oysters that is carryed out of the Gouv<sup>t</sup>ment, and that the Countrey bee not defrauded, hee shall enter them with the Towne Clarke before hee carry them away, or else to forfeit twenty shillings  $\text{p}$  barrell on any carryed away not entered."\*

"Att the 2<sup>nd</sup> Session of the Generall Court held att Plymouth, for the jurisdiction of New Plymouth, the seaventh of July, 1680— This Court doth order that all such as are not of our collonie be heerby prohibited of fetching oysters from Taunton River with boates or any other vessells; and incase any such shall  $\text{P}$ sist on in soe doeing after warning given to the contrary, this Court doth order John Hathway, of Taunton, and doe heerby impower him to make seizure of such boates and vessells for the collonie's vse."†

Moving a little farther eastward, I find that the oysters in Parker and Rowley rivers were valuable to the settlers in that region. In his *History of Newbury*, Mr. Joshua Coffin remarks:

Certain it is that vast quantities of lime of the best quality were annually made in Newbury for nearly a century, for export as well as for home use. Prior to this time lime was manufactured from oyster- and clam-shells. Lewis, in his *Minute and Accurate History of Lynne*, informs us, under the year 1696, that immense numbers of great clams were thrown upon the beaches by storms. The people were permitted by a vote of the town to dig and gather as many as they wished for their own use, but no more, and no person was allowed to carry any *out* of town, on a penalty of twenty shillings. The shells were gathered in cart-loads on the beach and manufactured into lime.

NEW HAMPSHIRE AND MAINE.—Still farther on, Durham river, Brainford county, New Hampshire, was known, as early as 1697, as "Oyster river", just as its neighbor was called "Lamprey river", because of the mollusks in the one and the "eals" in the other. The "Great Bay" into which the Durham river flowed was full of oysters, and tradition has it that no more than a century ago vessels used to come there and be loaded with these oysters, while previously the neighborhood had always been able to obtain all they wished with little trouble.

In Scarborough and Casco bays, and along Mount Desert, I am inclined to believe that oysters were extinct before the occupation of that region by white men. But I think, that if it is true that George river is the stream ascended by Weymouth during the first decade of the seventeenth century, he undoubtedly subsisted his crew, while there, upon the oysters, though he does no more than mention "muscles", without distinction of kind.

This George river is the most eastern point at which I have been able to discover any trace of oysters in the

\* *Plymouth Colony Records*, vol. xi, 1623-1632, Laws, p. 132.

† *Ibid.*, vol. vi, 1678-1691, p. 44.

United States. It is an insignificant stream, that flows down to the sea at Thomaston. The mouth of the stream, as is the case always along that deeply indented coast, is in the form of a deep estuary, and forms a good harbor. At a point about fifteen miles inland, measured along the river, the Knox and Lincoln railway crosses. Just above the bridge a trifling stream known as Oyster river comes in, and the confluence of the two streams is in a broad, shallow expansion, about marking the head of the tide. It was just at this point that the first-comers to this region found an abundance of oysters within a restricted space. Oyster river, a little stream that "makes in" between Thomaston and Warren, was the principal point. According to the Hon. E. K. O'Brien, of Thomaston, tradition asserts that sloops used to go there to load oysters for the neighboring colonies. They were abundant, also, on the main George river, by Edward O'Brien's ship-yard, in Warren. These old oysters are reputed to have been of huge size, a report borne out by the remains of shells which now exist. Similarly, I believe, the first settlers found at least a few oysters at Damariscotta, though history is silent and tradition is uncertain. It is positively known, however, that the ancient Sheepscot settlement found in its oyster-beds a source of constant profit, both by consumption and sale, and they are not altogether exhausted from that river yet, in spite of sawdust and chips.

LOST OYSTER LOCALITIES ALONG THE GULF OF MAINE.—It is probable that there were many other localities, now forgotten, where the oyster existed along the gulf of Maine at the beginning of the seventeenth century, besides those I have indicated, namely, Wellfleet, Barnstable, Weymouth, Boston, Ipswich, Newbury, Portsmouth, Sheepscot, Damariscotta, and George rivers. Nor must it be forgotten that this catalogue does not embrace the prolific field bordering Buzzard's bay, whence the colonies were constantly supplied overland. Add to this plenitude of oysters the inexhaustible abundance of several species of "clams", so-called, scallops, lobsters, and so forth, and it is no wonder that the shellfish are constantly alluded to in the narratives of the early struggles of the Pilgrims against starvation, as a blessed source of food; for it may well be supposed that without them they would hardly have survived the rigors of those dreadful first winters. Even their quality found a champion, who thought them first rate. Josselyn informed his readers that the Indians fed much on lobsters, and adds:

Some they rost, and some they dry as they do *Lampres* and *Oysters*, which are delicate breakfast meat so ordered; the *Oysters* are long shell'd. I have had of them nine inches long from the joynt to the toe, containing an *Oyster* like those the Latines called *Tridacuan*, that were to be cut into three pieces before they could get them into their mouths, very fat & sweet.

In the face of this testimony, briefly indicated, it is curious that it should ever have been denied that the oyster was indigenous in Massachusetts bay, as has been done more than once, and still more strange that so well informed a naturalist as A. A. Gould should not have felt strong enough to affirm it. In Binney's edition of his *Invertebrates of Massachusetts* it is stated:

It is also a question on which there are various opinions, whether the oyster was indigenous in Massachusetts bay, or whether all which grow in the various oyster-beds owe their parentage to inhabitants of the Dalaware, Chesapeake, and Oyster bay, etc. That they now [1866] grow spontaneously, and, for aught we can learn, always have grown so, on the south shore, there is no reason to doubt; and that they are occasionally found of patriarchal appearance in all parts of our bay is certainly true. But the question is, whether these places are their natural habitat, or whether they have been accidentally dropped where they were found. Many incline to this latter opinion, especially the younger oystermen and some scientific gentlemen; but the old settlers of Cape Cod are of a different opinion.

Mr. Gould would not have allowed this non-committal, and consequent doubt as to his own belief, had he consulted history. Indeed, we may fairly give him the credit of believing better than he wrote, for in his first edition (1841) he records that "old men relate that they were accustomed to go up Mystic river and Charles river, and gather oysters of great size, before it was the custom to bring them from New York. And even now individuals of enormous size are occasionally brought from both these places, and probably might be found, by special search, at any time".

## 7. OYSTER-CULTURE IN THE GULF OF MAINE.

EARLY ATTEMPTS AT OYSTER-CULTURE.—I have ventured elsewhere to suggest that the oyster-beds in the Sheepscot and George rivers may have been planted there by the Indians, who carried over from Damariscotta, by paths yet traceable, a quantity of full-grown oysters, and placed them in those streams, in order to keep them alive conveniently near home. If this supposition is correct, it is probably the earliest instance of oyster-culture in North America. Nevertheless, oyster-culture proper—that is, the propagation of oysters in permanent beds, which annually increase by their native spawn—remains almost unknown in the gulf of Maine, and uniformly unsuccessful, except at one point. This is not wholly inattention to the matter, but the lack of suitable conditions for successful growth.

In a letter from General Benjamin Lincoln, of Hingham, Massachusetts, to the Rev. Mr. Belknap, author of the *History of New Hampshire*, dated December 12, 1791, it is remarked:

We have undoubtedly been criminally inattentive to the propagation of the oyster in different parts of our shores; we can probably fill our channels with these shellfish with much more ease than we can fill our pastures with herds and flocks.

Had General Lincoln studied the case more deeply, he might have had to change his opinion of the "great ease". More than half a century before—indeed, in the year 1711—"a plan for forming an oyster-bed in Plymouth

harbor was projected by a company of thirty-one persons, whose names are on record. Oysters were procured and deposited in a certain place, deemed the most eligible, with the hope that they might thus be propagated; but it was ascertained by the experiment that the flats are left dry too long for their habit, which requires that they be covered at all times by water".\*

**OBSTACLES TO SUCCESSFUL OYSTER-CULTURE IN THE GULF OF MAINE.**—This coast is a precipitous and rocky one, affording few suitable points for oyster-culture; most of these were occupied by the native beds, which have succumbed. Other localities have been rendered unfit for oyster-life, by the pollution of the water, through various agencies of civilization. The climate, also, appears to be too severe for any but native breeds. Virginia oysters have frequently been left through the winter in deep water, but have very rarely lived; and, if they did so, would spawn at so late a day that the autumn chill proves fatal to the young. I have heard of a bag-full of oysters, supposed to be from Virginia, surviving for several years in Sheepscoot river, but the case is hardly authentic. All attempts at the cultivation and propagation of Virginia or New York oysters have, therefore, been abandoned as entirely futile on the Maine coast or in Massachusetts bay, except at Wellfleet. The severity of the winters, the violence of the tempests, the scarcity of good bottom, and the abundance of starfishes and other enemies, make planting unprofitable, if not impossible.

**EXPERIMENTS AT SALEM AND WELLFLEET.**—As an instance of the data upon which I found my conclusion, I give the following information, furnished by the Messrs. Newcomb, oyster-merchants in Salem, Massachusetts.

In regard to the advisability of planting oysters in the vicinity of that town, Mr. Newcomb had little encouragement to offer. Some that had been brought from Fire island by his father, many years ago, and were put down in the harbor channel, were found some years later to have lived and to have grown very large and good. The present firm put 1,000 bushels in water five feet deep, at low-tide, in Bass river, one season, but every one of them died during the winter. There is no very good ground for planting anywhere in that harbor.

At Wellfleet, Cape Cod, however, something is being done, with good prospects. In years past it frequently happened that the oysters bedded at Wellfleet would spawn and young ones attach themselves to stones, and to the wharfs and bridge piers, in myriads. Most of these would be left exposed at low-tide, and consequently were killed by the first frosty day. A large number, however, survived every winter, scattered here and there in submarine and protected situations. This induced the experiment of trying to preserve some throughout the year, and causing them to perpetuate themselves. This failed as far as Virginia seed was concerned, but the Taunton river or "Somerset" seed, tried by Mr. S. R. Higgins (the pioneer in this work) in 1878, lived and thrived. In 1879, having sprinkled a portion of the bottom of the bay with clean shells to catch any stray spawn, he deposited a quantity more of this hardy seed, and in 1880 will add largely to his stock, which, as yet, has suffered no serious harm. He has been followed in his enterprise by several other gentlemen in Boston and Wellfleet, and the business bids fair to be an entire success.

The planting grounds are off Great island, where there is from three to six feet of water over the beds at low tide. The bottom is hard sand, with a thin layer of mud over it, the kind of bottom most highly esteemed. The enemies of the oyster are few, and the currents so arranged as to make a large catch of spawn probable. The water is very salt, the growth of the mollusk rapid, and the result a bivalve of high quality. The great drawback is the winter, and this is not greatly feared. The harbor freezes entirely over, but the oysters are planted in a depth of water so great as to be out of reach of the ice. However, even if the ice rests upon them, provided they lie flat, it will only crowd them into the sand, and will not kill them under ordinary circumstances, but if it is shifted about by wind or tide when upon the beds, it will tear them to pieces. There is not much chance of extensive damage in this way. What will prove fatal to all of them, however, is "anchor frost", if it occurs under the beds. But the chances are that this will not happen for several winters together.

One of the gentlemen engaged gave me the following figures as an estimate of probable investment and returns, but it was considered by other shippers too sanguine a view. The cost of planting 500 bushels of seed from Somerset would be \$250. He calculated that they would at least be doubled in number at the end of the ensuing year, making 1,000 bushels, and that by the next spring (allowing 500 for loss by accidents and death) there would be 1,500 bushels on the bed. There would now be 1,000 bushels of these ready to take up, at a cost of 20 cents or so a bushel. These would sell for at least \$1 a bushel, leaving 80 cents profit. Thus—

|   |       |
|---|-------|
| Cost of original bed, 500 bushels.....                      | \$250 |
| Took up in two years, 1,000 bushels, at 20 cents cost ..... | 200   |
|   | 450   |
| Received for 1,000 bushels.....                             | 1,000 |
| Profit accruing in two years.....                           | 550   |

This doubling of the investment in two years is not unreasonable, in my opinion, besides having a good growing bed left over; but requires a continuance of good weather and other fortunate circumstances, and takes no account of the numerous petty expenses occurring, from time to time, in the care of the beds.

**SUITABLE LOCALITIES FOR OYSTER-CULTURE NORTH OF CAPE COD.**—I have been asked in particular as

\*Thacher's *History of Plymouth*, p. 170.

to the probability of success in restocking the former haunts of the oyster in the rivers of Maine, and especially at Damariscotta. I learn that occasionally oysters, of what origin I do not know, have by accident been dropped into the tide-water below the bridge, in Damariscotta, and have afterward been fished out grown to a large size. The reader will remember, that about forty years ago, a great quantity of young oysters were found collected in the branches of a tree which had tumbled over into the river near the lower end of Salt bay. These facts go to show that some kinds of oysters will live and spawn there yet; whether anything but native seed would, or not, is doubtful. Furthermore, the site of the former beds is now so covered with mud and sawdust and eel-grass, that much of the space is rendered unsuitable, while the clearer bottom of Oyster creek is liable to be drained so dry by some of the ebb-tides in winter, as to allow the ice to rest fairly upon the bottom, which would probably be fatal in that climate. Hereafter no sawdust will be thrown into the river and bay, if the law is enforced as it might be, but nothing can prevent the roiling of the water by a heavy rain. On the whole, I fear only a very limited cultivation of oysters is possible in that locality, even if a successful beginning could be made.

The same dismal remarks will apply to George and Sheepscot rivers. In the former stream I am informed that an attempt at planting was made a few years ago, but failed. In Sheepscot river nothing has been tried, but it is hinted that, even if other conditions were favorable, every seed-oyster would be secretly transferred from river-bottom to frying-pan before time had been given to begin to spawn. Police measures would prevent this, however.

At Portland, Mr. C. B. Fuller thinks the only suitable situation to attempt the cultivation of oysters, in that region, is in the mouth of the Presumpscot, where the water is shallow, warm, and comparatively fresh; but he doubts the ability of southern oysters to survive the winter. However, it is intended by one of the dealers to try the experiment with seed oysters from Prince Edward island.

In the Great bay, behind Portsmouth, New Hampshire, beds of native, living oysters still flourish, and by judicious transplanting of these a large additional yield might be accomplished. There is much suitable ground, I judge. It is likely that the present inferior quality of these oysters might be greatly improved by cultivation. It is very probable, also, that Somerset or Wellfleet seed would exist through a winter, become acclimated, and prosper in this well-sheltered and firm-bottomed inlet. I wonder that some one has not yet made the experiment.

Unless it be Mystic river or Barnstable harbor, I know of no other likely place for oyster-cultivation on the northern side of Cape Cod. Where rocks, mud, or ice are not obstacles, starfishes and other enemies are likely to annoy, or proper protection of the beds to be impracticable.

#### 8. HISTORY AND PRESENT CONDITION OF THE OYSTER-TRADE, AT WELLFLEET AND VICINITY.

**EARLY OYSTER-CULTURE: HISTORY.**—Realizing that their natural resources in oysters had disappeared, and that any attempt to preserve the beds by a system of propagation was unsuccessful, the people of the coast of Massachusetts bay turned their attention many years ago to replacing their oysters by importations from more favored regions, which should be kept in good condition during the warmer half of the year, by being laid down in the shore-water, and so held in readiness for the autumn-trade. This operation was called "planting", but it is a misuse of the word, and the other popular phrases, "laying down" or "bedding", express the fact more truthfully. It is not oyster-culture at all, but only a device of trade to get fresh oysters and increase their size and flavor, which adds proportionate profit in selling. It is neither intended or desired that they shall spawn.

Just when this practice began on Cape Cod—for Wellfleet, whence had come the latest and best of the native oysters, naturally became the headquarters of the trade—is uncertain; no doubt it was some time before the opening of the present century. There is a gentleman now living in the village of Wellfleet, Mr. Jesse D. Hawes, who is eighty-four years old. He cannot remember when they did not bring some oysters every fall from New York bay, to use at home and sell in Boston.

It is surmised that when the native beds became exhausted, the inhabitants got into the habit of going to Buzzard's and Narraganset bays, then to the Connecticut shore, and finally to New York, and laying down more and more yearly in Wellfleet harbor, until finally a considerable business grew. Egg Harbor, New Jersey, was also a ground much frequented a little later by oystermen.

By the year 1820, I am informed by Mr. F. W. True, who made inquiries for me on this subject, 12,000 to 14,000 bushels were brought to Wellfleet yearly, and ten or twelve shops were opened by Wellfleet men for their disposal in Boston and Portland. This accounts for the striking fact, that there is hardly an oyster-dealer on the New England coast, north of Cape Cod, who is not a native of Wellfleet, and a certain small circle of old names seems to inclose the whole trade. Besides the citizens, however, many strangers came in and procured the privilege of bedding down imported oysters to fatten on the flats of this hospitable harbor. In 1841, Mr. Gould, the conchologist, wrote that the whole trade at Wellfleet then employed 30 vessels of about 40 tons each, and the services of about 120 men for three months of the year. This yielded to the town a revenue of about \$8,000 annually.

**EARLY OYSTER-CULTURE: METHODS.**—The process of "bedding down" was as follows: Each proprietor of a space upon the flats chartered the services of a vessel, in the latter part of the winter, to go to some specified oyster-ground and purchase a certain number of bushels, for which he gave the captain money. The vessel was

chartered at a round sum for the trip, or else was paid at a rate varying from 15 to 20 cents a bushel freight, on the cargo. When the vessel arrived home she anchored in the distant channel, and the oysters were unloaded into dories, 50 bushels to a dory. The dories then proceeded to the grounds, which had been already divided into rectangles a few rods square, by rows of stakes, and deposited a load of 50 bushels in each rectangle or "square". In order that the oysters might be distributed as evenly as possible over the bottom, the dory was rowed to the center of a square, and anchored at both ends. The dorymen then threw out the oysters with shovels into all parts of the square. This was done when the water was high over the beds. When the tide was out the oysters were redistributed with forks or "spreading-machines". The similarity of this procedure to the seeding of a field is obvious, and sufficiently explains the phrase "oyster-planting". It afforded occupation to a distinct class of men, who did it by contract, the ordinary price being about 10 cents a bushel for placing them upon the beds. The season for bedding began in February, as soon as there was a surety of no further danger of hard freezing, and continued until April, the ground chosen being the hard surface of the flats in the western portion of the bay, where the beds would be left dry about two hours at each low-tide. The oysters had very little fresh water near them, and their growth was variable, seeming to depend on the weather, but in what way, or just how it effected them, I could not learn. In a favorable season they grew very rapidly, in respect to both shell and meat, so that the 100 bushels put down in April would fill 300 bushel measures when taken up in October. The percentage of loss was always considerable, however, probably never less than one quarter, and now and then amounting to the whole bed. Drifting sand, sudden frosts, when the beds were exposed, disease, and active enemies, were the causes that operated against complete success. I could not obtain satisfactory information concerning prices during the first quarter or half of the present century, and am inclined to believe they did not differ much from the present rates, except that selling rates were uniformly higher, and far more profit was realized than is now possible. Dr. Gould describing the winter-work in his *Invertebrates of Massachusetts*, states that in the autumn the oysters are taken up, selected, brought to market, and sold at wholesale for \$1 per bushel, the cost of planting, attending, taking up, etc., amounting to 20 cents per bushel. Thus a profit of 30 cents on a bushel, or about 40 per cent. on the cost, is realized; and the town of Wellfleet thereby realizes an income of about \$8,000 annually.

**INTRODUCTION OF VIRGINIA SEED.**—It was asserted by citizens of Wellfleet, both to me and to Mr. True, that not until 1845 were any oysters brought to Wellfleet from Virginia, and that the cause of their importation then was the high price asked for "seed", as the oysters purchased in the Somerset river, in Connecticut, and in New York, for bedding, were erroneously termed. William Dill is credited with being the first captain engaged in the Chesapeake trade. I think, however, that there is an error here, for Gould mentions in his book that in 1840, 40,000 bushels were brought to Wellfleet annually from Virginia, at a cost of \$20,000. Nevertheless, it was not until about 1845 or 1850, that the business began to confine itself to Virginia oysters, and a large business to be done. At its height, about 1850, it is probable that more than 100,000 bushels a year were laid down in the harbor; some say 150,000. One consignment alone of 80,000 bushels was remembered by Mr. S. R. Higgins, who kindly gave me the many facts noted above. The favorite ground was at the mouth of Herring river.

This great business gave employment to many men and vessels, and was eagerly welcomed by the Wellfleet people. Responsible men were accustomed to meet the incoming vessels and take contracts to bed the oysters. The ordinary price was 9 cents a bushel. They hired help at day's wages, and often made a good profit. Fifty men would thus often be busy at once.

During the summer partly, but chiefly in the fall, these great deposits, which would perish during the cold winter, but were now well-grown, were raked up and sent to the warehouses in Boston, Portland, and minor ports, in freight vessels and in packets. Usually the oysters were owned and bedded by dealers, who used them in their regular trade, but some were owned by speculators, who took them to market, or sold them to dealers as they lay upon the beds, the purchaser taking all risks. The measure used for oysters in those days was a half-barrel holding a bushel, called a "bushel-barrel".

**DECLINE OF OYSTER-TRADE.**—The war of the Rebellion, however, interfered somewhat with the oyster-trade, and it began to decline, so far as Wellfleet was concerned. Then the various dealers in northern ports, having learned something, began to bed near home in their own harbors, and so saved freightage. Finally, the steamers from Norfolk and the railways entered into so serious a competition, that fully ten years ago Wellfleet bay was wholly deserted by the oystermen, as a bedding-ground, though her vessels still continue to carry cargoes in winter from Virginia to Boston, Portland, Salem, Portsmouth, and the Providence river, to supply the active trade and fill the new beds, which the dealers at these various ports had learned could be established at home.

The reader thus discovers how important a part Wellfleet has played in the history of the oyster-trade of New England. A hundred thousand bushels of the bivalves once grew fat along her water-front, and thousands of dollars were dispensed to the citizens in the industry they created. Now, a little experimental propagation, of the value of a few hundred dollars, and about 6,000 bushels of bedded oysters from Virginia, worth perhaps \$5,000 when sold, form the total active business. The oyster-fleet, however, remains, though greatly diminished and carrying its cargoes to Boston, Portland, and elsewhere, instead of bringing them to be laid down in the home harbor. It will be long before Wellfleet, and its neighbor, Provincetown, lose the prestige of old custom as oyster-carriers.

WELLFLEET OYSTER-FLEET IN 1878-'80.—The vessels registered at Wellfleet, that habitually take part in the oyster-trade, and formed the fleet of the seasons of 1878-'79 and 1879-'80, are the following, all schooners:

| Name.                 | Tons. | Name.              | Tons. | Name.            | Tons. |
|-----------------------|-------|--------------------|-------|------------------|-------|
| Lizzie D. Barker      | 76    | Edward Rich        | 74    | Addie F. Cole    | 76    |
| Nathan Cleaves        | 80    | Alice P. Higgins   | 92    | Emma A. Higgins  | 94    |
| Effie T. Kemp         | 63    | Lizzie Smith       | 77    | Carrie G. Crosby | 58    |
| Flora A. Newcomb      | 70    | Benjamin Oliver    | 78    | Nil Desperandum  | 80    |
| Mary Steele           | 70    | Benjamin S. Wright | 108   | E. H. Norton     | 57    |
| George T. Littlefield | 112   | Gertrude Summers   | 64    | Ida R. Freeman   | 59    |
| Lucy M. Jenkins       | 70    | H. W. Pierce       | 74    | Abby Frankfort   | 71    |
| Asa H. Peroere        | 99    | Maria Webster      | 58    |                  |       |
| Mary E. Whorf         | 65    | Lucy J. Keeler     | 94    | Total tonnage    | 2,239 |
| Walter L. Rich        | 80    | Charles F. Atwood  | 70    |                  |       |
| Newell B. Hawes       | 90    | Nannie E. Waterman | 80    |                  |       |

PROVINCETOWN OYSTER-FLEET, 1878.—From Provincetown there also hails a fleet of schooners in the oyster-trade, that may as well be put down here, since all remarks will apply to both. Those running in 1878-'79 were:

| Name.            | Tons. | Name.             | Tons. | Name.             | Tons. |
|------------------|-------|-------------------|-------|-------------------|-------|
| Ellie F. Long    | 98    | Freddie W. Allton | 86    | Etta E. Sylvester | 90    |
| Freddie Walter   | 82    | M. E. Higgins     | 94    | Mary Snow         | 71    |
| Willie L. Swift  | 101   | Kit Carson        | 94    | R. A. Lumbard     | 65    |
| William Matheson | 111   | John M. Fiske     | 81    |                   |       |
| Teresa D. Baker  | 87    | Lottie Bell       | 96    | Total tonnage     | 1,539 |
| Mary Matheson    | 115   | Belle Bartlet     | 76    |                   |       |
| Lottie Burns     | 97    | Delia Hodgkins    | 95    |                   |       |

CHARACTERISTICS OF CAPE COD OYSTER-SCHOONERS.—This list of 46 schooners comprises, I think, the whole of the Cape oyster-fleet; and there are few vessels engaged outside of these ports. They were noted in the old days, as now, for their swiftness in speed and firmness of structure, and were the origin and prototypes of the famous Boston clipper-ships. The original cost of these fine vessels was, on the average, about \$7,000; now they are not worth over \$4,000 each. In summer they go on mackerel-fishing voyages, which occupy a little more than half of the year. In the winter and spring they carry oysters, varying it with frequent coasting trips. Four voyages after oysters annually would probably be a fair average, and not more than a third of the vessels' yearly receipts, as a rule, will be derived from this source. They are commanded by captains of experience, and go back and forth quickly, safely, and profitably. Capt. Jesse Freeman, now one of the leading fish-merchants of the village, told me that he had sailed between the Chesapeake and northern ports 316 times before he was forty years old, that is 158 voyages. His opinion was that no cargo wore upon a vessel less (others say the opposite), and it was usually of much profit to the owners. In the spring, oysters for bedding are brought cheaper than those designed for market in winter.

THE CREWS AND THEIR PROFITS.—The crew of an oyster-vessel usually consists of two (often three) men before the mast, with a cook, mate, and captain. One-third (as a rule), sometimes one-half, of the freight-money goes to the owners, and the remainder to pay the men and furnish food. The wages of a mate in 1879 were \$30 a month; of a cook, \$25; and of a seaman, \$15 to \$16. Food for a voyage costs from \$40 to \$50. In addition to his share, the owners give the captain \$15 a month.

Suppose, then, a load of 3,000 bushels, with freight at 18 cents a bushel, bought after 30 days' voyage. The proceeds would be divided as follows:

|                                       |              |
|---------------------------------------|--------------|
| 3,000 bushels, at 18 cents            | \$540 00     |
| One-third to owners                   | \$180 00     |
| Mate's salary                         | 30 00        |
| Three men, at \$15                    | 45 00        |
| Cook's salary                         | 25 00        |
| Provisions                            | 45 00        |
|                                       | <hr/> 325 00 |
| Remains for general bills and captain | 215 00       |

THREE SEASONS' WORK DONE BY A WELLFLEET SCHOONER.—As an example of the history of an oyster-schooner's voyages, I give a copy of what was done in two years by one of the vessels in the above list. Her length was 86 feet; breadth, 23 feet; depth, 8 feet 6½ inches; measurement, 97.95 tons. She was owned by fifteen partners, and in 1876 cost in Newburyport \$9,819 63. The record of her trips from 1877 to 1879 stands:

|  |                |
|--|----------------|
| Spring 1877, first trip, 3,000 bushels, at 18 cents freight  | \$540 00       |
| Spring 1877, second trip, 3,406 bushels, at 18 cents freight | 613 08         |
| Spring 1877, third trip, 3,012 bushels, at 18 cents freight  | 542 16         |
| Spring 1877, fourth trip, 3,550 bushels, at 18 cents freight | 639 00         |
| Spring 1877, fifth trip, 3,286 bushels, at 18 cents freight  | 591 48         |
|  | <hr/> 2,925 72 |
| Whole stock  | 460 15         |
| Great generals (or expenses charged to account of vessel)    | <hr/> 2,465 57 |

## THE FISHERIES OF THE UNITED STATES.

|   |            |
|---|------------|
| One-half schooner's share.....                            | \$1,232 78 |
| Two and one-half per cent. of whole stock to captain..... | 73 14      |
|   | <hr/>      |
| By charter on load to plant.....                          | 1,159 64   |
|   | 140 00     |
|   | <hr/>      |
| Mate's wages.....   | 1,299 64   |
| Bills paid by captain.....                                | \$289 50   |
|   | 53 42      |
|   | <hr/>      |
|   | 342 92     |
| Balance due owners.....                                   | <hr/>      |
|   | 956 72     |
| 1877.   |            |
| Nov. 26. 3,475 bushels, at 18 cents freight.....          | 625 50     |
| Dec. 26. 3,579 bushels, at 18 cents freight.....          | 644 22     |
| 1878.   |            |
| Feb. 6. 3,746 bushels, at 18 cents freight.....           | 674 28     |
| March 7. 3,621 bushels, at 18 cents freight.....          | 651 78     |
| April 16. 3,463 bushels, at 18 cents freight.....         | 623 34     |
| May 6. One load to Providence.....                        | 400 00     |
|   | <hr/>      |
|   | 3,619 12   |
| One-third schooner's share.....                           | 1,206 37   |
| To bills paid by captain.....                             | 109 08     |
|   | <hr/>      |
| Balance to owners.....                                    | 1,097 29   |
| 1878.   |            |
| Dec. 18. 3,765 bushels, at 18 cents freight.....          | 677 70     |
| 1879.   |            |
| Feb. 1. 3,885 bushels, at 18 cents freight.....           | 699 30     |
| March 4. 3,789 bushels, at 18 cents freight.....          | 682 02     |
| April 5. 3,732 bushels, at 16 cents freight.....          | 597 12     |
| April 26. 3,600 bushels, at 15 cents freight.....         | 540 00     |
|   | <hr/>      |
| Port charges.....   | 3,196 14   |
|   | 296 32     |
|   | <hr/>      |
|   | 2,899 32   |
| One-third schooner's share.....                           | 966 61     |
| Schooner's bills.....                                     | 44 34      |
|   | <hr/>      |
| Balance due owners.....                                   | 922 27     |

FINANCIAL PROFITS OF THE OYSTER-SCHOONERS.—In settlement with the owners of the schooners just referred to, for these three oystering seasons, the summaries stood as follows:

|                         | 1877.    | 1878.      | 1879.    |
|-------------------------|----------|------------|----------|
| Credits.....            |          |            |          |
| Bills.....              | \$826 89 | \$1,206 37 | \$960 61 |
| Balance due owners..... | 226 89   | 448 95     | 250 63   |
|                         | <hr/>    | <hr/>      | <hr/>    |
|                         | 600 00   | 757 42     | 716 53   |

This was divided among the owners in the following proportions:

|        |           | 1877.    | 1878.    | 1879.    |
|--------|-----------|----------|----------|----------|
| A..... | 11-32ds.  | \$200 25 | \$260 26 | \$210 50 |
| B..... | 6-32ds.   | 112 50   | 141 06   | 131 34   |
| C..... | 2-32ds.   | 37 50    | 47 32    | 44 73    |
| D..... | 2-32ds.   | 37 50    | 47 32    | 44 73    |
| E..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| F..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| G..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| H..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| I..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| J..... | 2-32ds.   | 37 50    | 47 32    | 44 73    |
| K..... | 1-32d.    | 18 75    | 23 66    | 22 39    |
| L..... | 2-32ds.   | 37 50    | 47 32    | 44 73    |
| M..... | 1-64th.   | 9 37     | 11 83    | 11 19    |
| N..... | 1-64th.   | 9 37     | 11 83    | 11 19    |
| O..... | 1-64th.   | 9 37     | 11 83    | 11 19    |
|        | <hr/>     | <hr/>    | <hr/>    | <hr/>    |
|        | 64-64ths. | 599 98   | 757 12   | 716 46   |

It is probable that this season (1879-'80) the sum of the freights paid to Wellfleet and Provincetown schooners on oyster-cargoes alone, will exceed \$75,000, and the losses and casualties will be few. The competition of the steamers between Norfolk and Boston, of the railroads, and particularly the recent custom of opening so many oysters in Virginia, has been severely hurtful, however, to the oyster-schooner interests.

I may add an odd note of interest to naturalists. At Wellfleet are found many marine invertebrates not known elsewhere north of Virginia, which the naturalists of the United States Fish Commission say were probably introduced with imported oysters.

#### STATISTICAL RECAPITULATION FOR WELLFLEET AND VICINITY:

|   |                 |
|---|-----------------|
| Number of planters, wholesale-dealers, and shippers ..... | 3               |
| Number of vessels and sail-boats engaged .....            | 46              |
| Present value of same .....                               | \$185,000       |
| Number of sailors employed (three months).....            | 250             |
| Earnings of same .....                                    | \$15,000        |
| Total earnings of schooners .....                         | \$75,000        |
| Annual sales of—  |                 |
| I. Native oysters.. .....                                 | bushels.. 600   |
| Value of same .....                                       | \$500           |
| II. Chesapeake "plants" .....                             | bushels.. 6,000 |
| Value of same .....                                       | \$5,000         |
| Total value of oysters sold annually .....                | \$5,500         |

### 9. HISTORY AND PRESENT CONDITION OF THE OYSTER-TRADE OF BOSTON.

**EARLY HISTORY OF THE OYSTER-BUSINESS.**—The natural resources of the harbor in oysters, and the extent to which they entered into its early commerce, have already been hinted at in paragraph six.

When the natural beds in the Charles and Mystic rivers gave out, Boston derived its oysters from the natural beds at Wellfleet and in Buzzard's bay, but mainly from the first named. When, in turn, these became exterminated, toward the close of the last century, Boston dealers began to bring shiploads of oysters from the shores of Buzzard's and Narraganset bays, directly to the city in winter, and in the spring bedded at Wellfleet supplies for the ensuing summer and autumn. This has been explained in the account of Cape Cod, preceding this. These cargoes were taken up in the early fall, and sent in sloops and schooners to Boston. There the schooners were dismantled and tied up, or else the cargoes were transferred to hulks (old mastless vessels) and covered with so thick a layer of sea-weed that no frost could get at them. These hulks were towed up into the docks close to Faneuil Hall, the recollection of which is preserved in the name of Dock square, and there the oysters were sold to retail-dealers, peddlers, and other customers, either in the shell or opened. Another favorite place for the oyster-vessels to lie was about where the Boston and M. ine railway station now stands, in Haymarket square. At that time a canal, well remembered by old citizens, ran through from the Charles river to the city wharf, following what is now Blackstone street. Another wharf for oyster-boats occupied the present site of the New England hotel. Prices then ranged higher than now in some respects and lower in others. A bushel in the shell (at wholesale), or a gallon opened, cost \$2: this was "in liquor", the "solid" gallon being a recent invention. In the restaurants they charged ninepence (12½ cents) for a "stew", and fourpence (6¼ cents) for a "dozen" of fourteen; or you could buy a better quality for 7 cents.

There was a queer custom in vogue in those days, half a century ago. Besides the hawking about the streets, which has survived, a few men used to "bag" them. Taking a bag of the bivalves on their backs, they would go in the evening to a house where there was a lively family, or, perhaps, where a company of friends had assembled. A carpet would be spread in the middle of the parlor on which the damp bag would be set, when the peddler would open the top, shuck an oyster, and pass it upon the half-shell to his nearest customer; then another for the next, and so on. Some lively scenes must have been enacted around that busy bagman, as his knife crunched rapidly through the brittle shells, and the succulent morsels disappeared down fair throats.

Meanwhile, more and more oysters were being brought every winter from Long Island sound, Newark bay, New Jersey, and southern waters, mainly in Cape Cod vessels, as I have shown, but somewhat, also, in Boston's own craft, for in those days there were more mackerel-fishermen hailing from the city than there now are.

**INTRODUCTION OF VIRGINIA OYSTERS.**—When oysters first began to be brought to Boston from Virginia I could not ascertain with precision. The patriarch of the business, Mr. Atwood, of the firm of Atwood & Bacon, says that when he began dealing in Water street in 1826, oysters were being brought regularly from Chesapeake bay in small quantities. He thinks the first cargo arrived about 1824. Mr. J. Y. Baker assures me that in 1830, 20,000 bushels from all quarters sufficed for Boston. About 1840 Gould estimated that 100,000 bushels would cover the consumption of all Massachusetts. Business rapidly increased, however, as the subjoined figures of the importations

\* Seventeen of these schooners, worth \$68,000, are registered at Provincetown, which otherwise does not appear as an oyster-locality.

of oysters in cargoes from Virginia, by Atwood & Bacon alone, will show. Besides these there were eight or ten other dealers in the city. Atwood & Bacon received—

|              | Bushels. |              | Bushels. |
|--------------|----------|--------------|----------|
| In 1846..... | 32,575   | In 1853..... | 123,097  |
| In 1850..... | 90,354   | In 1855..... | 105,752  |
| In 1851..... | 90,587   | In 1857..... | 83,000   |

These were by their own nine vessels alone; they had occasional cargoes otherwise. The largest lot (1853) cost them \$41,853, which gives an idea of values. Freight in those days was 17 cents.

At present very few oysters, indeed, are bedded in the vicinity of Boston, while of propagation there is none whatever. The grounds in the harbor were never very excellent, and became less so as the city increased in size. The encroachments of the building and filling in along the water-front over-ran the old limits of the bedding-grounds, and even the ancient natural beds. Where the Boston and Maine railway's car-house stands, a leading dealer not many years ago laid down 42,000 bushels in a single season. It was known as White island at that time. The South Boston flats are being graded up into streets, and the Charles, Mystic, and Malden rivers, Bird island, and other places were long ago abandoned, because the wharves or the sewerage of the city has destroyed their usefulness to the oysterman. Instead of bedding in his own harbor, therefore, the Boston dealer, as a rule, now rents ground in Buzzard's or Narraganset bays, and lays down there (the principal grounds being about the mouth of Providence river) the Virginia oysters he proposes to use for his summer- and autumn-trade, or else he has abandoned the practice altogether. The process of bedding will be dwelt upon in the chapter upon the Rhode Island fisheries.

**THE OYSTER-TRADE DURING THE REBELLION.**—The coming on of the war of secession found the Boston oyster-trade in its most flourishing condition. More cargo-oysters were brought then, than ever since; prices were high and profits large. The shipping interests fostered by it were large, too, for the competition of railways and steamers had hardly made itself felt. Most of the large dealers ran lines of vessels of their own, as well as chartering additional assistance in the spring. In the demand for fast sailers which the oyster-business created, is found the origin of that celebrated model of sailing vessel that made America famous on the seas—the clipper-ship. The first of these were made by Samuel Hall, a noted ship-builder, at his yard in East Boston, and were named *Despatch*, *Montezuma*, *Telegraph*, and *Express*. They were from 90 to 120 tons, old measurement, and carried an average cargo of 2,500 bushels of oysters. Six months in the year these clippers were devoted to bringing oysters from Virginia. There were thirty-five or forty of these "sail" running, and in the summer they would go fishing. The freight tariff on oysters was then 20 cents, and during the war it went as high as 25 cents a bushel.

The war interfered sadly with the business of oystering. Often the military operations did not admit of the cultivating and raking of the beds in Virginia and Maryland, or of the schooners from northern ports going where they wished to buy. A period of higher costs and shortened sales was in store for the dealers, and they have not yet quite recovered the prosperity of 1860. The greatest period of depression was 1874-'75, when the business was almost a failure. I think none of the dealers "suspended", however.

**ATTEMPTS AT OYSTER-CULTURE.**—In the course of this business, as long ago as the traditions of the trade go back, a few bushels were now and then laid down in various parts of the harbor to keep them from spoiling. But this was not at first a regular and systematic thing. The bedding-grounds were usually in the Charles, Mystic, Malden, and Pines rivers, often above the bridges, or on the Winthrop shore. Later all the dealers bedded on the South Boston flats, which are now being wholly filled up by the New York and New England railway. There was a large, oval, bare space here, occupied by all the dealers in the city, who had it regularly divided. Mr. J. H. Wiley's father's portion was at the extreme end, and was bounded by eel-grass. He experimented by putting oysters over, upon, and among the eel-grass, and found that they did far better than those on the open flat, which had been occupied for a long time, and ebbed dry. Mr. Wiley supposed that the reason was, that it was new ground, from which fresh and plenteous nourishment was to be derived. The grass afforded so much protection, also, that many oysters used to survive the winter.

**THE BOSTON OYSTER-FLEET OF 1878-'79.**—At present (1879-'80) the only vessels, so far as I could learn, registered in Boston and engaged in the oyster-carrying trade, are the following schooners, all the property of a single firm:

| Name.                | Tons. | Name.           | Tons. |
|----------------------|-------|-----------------|-------|
| William H. West..... | 68    | J. M. Ball..... | 87    |
| Eddy Pierce.....     | 96    | Neponset.....   | 74    |
| Alice.....           | 89    | Longwood.....   | 66    |
| Barty Pierce.....    | 95    | Leona.....      | 100   |

**OPENED OYSTERS IN THE BOSTON MARKET.**—Another great change from ancient methods of conducting the business has been caused by the introduction of opened oysters from Norfolk. These are received twice a week (Tuesdays and Fridays) by steamer direct from Norfolk, and on other days, to a less extent, by steamer from Norfolk to New York, and thence by railway. In the neighborhood of 250,000 gallons were thus handled in Boston during the winter of 1879-'80, for they come only between September and April. They are shipped in barrels and kegs

The effect of this innovation has been very marked upon the trade; whether for good or ill there are two opposite opinions, the general verdict being that this feature works against the best interests of the trade. In their favor, it is said, in general, that they can be sold cheaper than any other oysters, and hence are accessible to the poorer class of people; that they are as good as the cargo-oysters, and that in the increased number sold is compensation for the diminished percentage of profit. I will quote some opinions expressed to me in this direction:

The Boston Oyster-Company considered the innovation of Norfolk opened oysters not unfavorable to business generally, although hurtful to the cargo-trade. Although higher profits were received five or six years ago, three times as many gallons are sold now as then, and hence dealers can afford to take less. Selling more cheaply a grade of goods equal to the old stock opened here, they give better satisfaction and sell more. There is less risk, also, than with cargoes, in which they had relinquished large dealings. They washed all their oysters from Norfolk carefully, and had heard no complaint of ill-health resulting from eating them.

The Chesapeake Oyster-Company deal almost wholly in opened oysters, and believe in the Norfolk trade, for the same reasons as given in the report of the "Boston" company, and say that, with their refrigerator barrels, they have no trouble with warm-weather losses. One of the advantages of this new business is, that a man can begin it with small means, since the stock may be procured in quantities as small, or large, as desired.

R. R. Higgins thought the oysters opened in Norfolk as good by the time they got here as those of the same grade opened here out of cargoes. He used them largely, and had opened a branch-house in Norfolk in order to compete with the Norfolk shippers on their own ground. By sending to his customers full packages, he avoided the complaints against the Virginia shippers, that they sent "scant" barrels, pretending to allow for a "swell" of the contents, which does not occur.

This, I believe, completes the list of those who would not be glad to see the Norfolk opened oysters disappear from the market. Indeed, so strong is the prejudice, that an effort was made about two years ago to induce the legislature to forbid their importation into the state; but this failed, it being opposed not only by certain consumers and carriers, but by two or three of the wholesale-dealers themselves. In opposition to them it is asserted that their quality is poor; that they are unhealthy; that the losses attending them are greater than with cargoes, and that they unduly cheapen all superior grades of stock. Two grades are brought to Boston, but for one of the "selected" come ten barrels of the "common", the cheapest and poorest oysters brought to the Norfolk market. The alleged injuriousness of them is said to arise from their too great age when they arrive. It is almost impossible, any way it is arranged, to get the stock from Norfolk to Boston's customers in less than a week. If they are put upon the steamer in Norfolk immediately upon being opened, come speedily, and the weather remains cold, little fault will be found. It is rare, however, that this favorable conjunction of circumstances occurs, and a large percentage of almost every cargo is thrown away. One firm dumped overboard 300 gallons out of a single shipment recently. Under such circumstances the wholesaler will save all he can, including now and then some he ought to throw away; and the same thing will occur in the shop of the retailer, so that frequently the consumer gets oysters not fit to eat. Rumors of sickness and death resulting are common enough, but I failed to trace any to a trustworthy origin in truth. They are often dirty, and are washed again and again, until the aroma and delectable flavor is all gone from their lacerated and rinsed remains. They are only fit to be cooked in a method calculated to disguise their insipidity, by the time Vermont, Maine, or Canada get them for dinner.

Nor does it appear that a large increase of sales has followed the introduction of this new stock. Trade has changed rather than amplified, while prices have been reduced in a marked manner throughout the whole list. If, now, the wholesale-dealer clears 5 cents a gallon on Virginia oysters, in shell or out, he thinks himself doing well. Most of the business is done on a much smaller margin. Considerable profit, however, is made on the "superior grade" of Norfolk stock; but only a little of this is brought on. Worse than this, however, for Boston merchants, is the fact that Norfolk cuts out much of their regular custom. A man anywhere can buy five or ten gallons and have them sent to him just (or very nearly) as cheap as the wholesaler who gets his thousand gallons. The natural result is, that many retailers and large consumers, like the hotels, do send direct to Virginia. With the cargo-method this is out of the question. All consumers near Boston or other importing cities must go there for supplies. Take it all in all, Boston thoroughly deplores the innovation, but comforts herself with the conviction, that already she sees signs of general dissatisfaction, and looks forward to a speedy abandonment of the new for the old method.

**KINDS OF OYSTERS SOLD IN BOSTON.**—A large variety of oysters are to be found on sale in Boston from widely different points. Those from the shore of Connecticut used to be highly esteemed, but they have gone out of the Boston market. The "Cape" and "Providence" oysters are better of late, and the expense of bringing them on is much less than from Connecticut. About five years ago the very choicest brand eaten came from Wareham, at the northern extremity of Buzzard's bay. Now these are poor, and better ones come from Cotuit, on the "heel" of Cape Cod, and the best of all (in my judgment) are from the Sandwich shore, particularly Monument river. The size, fine appearance, and saltiness of the "Cape" or "native" oysters recommend them for "bench" stock, to be eaten raw. You see advertised also the Blue-point, Saddle-rock, Stamford, and Norwalk oysters, more familiar to New Yorkers; but they are kept for a special, small custom, as "fancy".

**BOSTON OYSTER-DEALERS AND OYSTER-MEN.**—It is not easy to get at the exact number of persons in Boston who derive their daily support from the oyster-business. The hired help of the wholesale dealers amounts to about 125 persons the year round, with the addition of about 250 more who are engaged with greater or less steadiness to “shuck” during the colder half of the year. The majority of these persons are married; and I believe that, including the dealers themselves, to multiply by four in each case would fairly estimate the number of souls represented—that is, the mouths fed. There are, then, in this wholesale trade, deriving their whole support, about 500 persons; deriving one-half their support, about 1,000 persons.

It is asserted that there are about 1,000 retail-shops, fish-markets, hotels, and restaurants in the city where oysters form a regular part of the sales. I was unable to verify this, but am inclined to believe it rather under than over the actual number. It would be a low estimate to say, that an average of one family of five persons in each case is supported by the molluscan share of the business, which would add 5,000 persons to the 750 in the wholesale department, and give a total of 5,750 persons in Boston estimated to derive their living chiefly out of the oyster and clam. Most of the wholesalers run restaurants and lunch-counters. The wages paid vary with the kind of employment and the employer, all the way from \$4 to \$25 per week. The lowest rates are paid to the girls in the restaurant-kitchens, who get from \$3 to \$5 per week and their board, and to the waiters in the restaurants, who receive about \$8 a week and board. The men who pack, attend to shipments and delivery of orders, who aid in bedding, and do the heavy work of the establishment, will average from \$12 to \$15 a week. The large addition employed between September and May are “openers” or “shuckers”, who are paid by the solid gallon, and work only when there are oysters to be opened. They are, as a rule, a rough, ignorant class of men. In summer they do ordinary laboring jobs, like working on the streets and carrying hods. Their pay has been a shilling (17 cents) a gallon for some years, but last season (1878-'79) 18 and occasionally 20 cents was paid; and in consequence of a strike on their part it is expected that 20 cents will be the ruling price in 1879-'80. It is rare that they earn more than \$10 a week, and often not half that. The largest day's work at opening oysters that I could learn of was performed several years ago by a man in Atwood & Bacon's employ, who opened 45 gallons between 7.30 a. m. and 10.30 p. m.; but this was “liquor” measurement, and he got only 10 cents a gallon for it. Most of the openers are married and have large families.

**PRICES.**—The cost (total, delivered) and selling prices of the various grades of oysters in Boston, are now about as follows, in 1879:

**IN SHELL (per bushel):**

|                                 | Cost.            | Sell for.        |
|---------------------------------|------------------|------------------|
| From Virginia, in cargo.....    | \$0 30 to \$0 40 |                  |
| Virginia “plants” .....         | 50 to 60         |                  |
| Bags (common) .....             | 50 to 55         |                  |
| Bags (selected).....            | 90 to 95         |                  |
| Lynnhaven (Virginia fancy)..... | 2 00 to 3 00     |                  |
| Monument River.....             | 1 40 to 1 60     | \$2 25 to \$2 50 |
| Other natives .....             | 95 to 1 20       |                  |
| Providence rivers .....         | 50 to 60         |                  |

**OPENED (per gallon):**

|                              |          |          |
|------------------------------|----------|----------|
| From Norfolk (common).....   | 55 to 60 | 60 to 65 |
| From Norfolk (superior)..... | 60 to 65 | 75 to 90 |

The dealers would feel satisfied with 20 per cent. of profit, but do not get it. Six or seven cents a bushel and five cents a gallon is the usual advance.

**DISPOSITION OF THE OYSTER-SHELLS.**—Subsidiary to the oyster-business in Boston, is the disposal of the empty shells. These are used somewhat for filling in, particularly along the Atlantic-avenue wharves, and are largely consumed by the gaslight companies to be burned into lime for purifying their gas. In addition to this there are two pulverizing establishments in East Boston that take large quantities. The shells are gathered for them by carters and boys of every grade, at odd times, from the saloons, the proprietors of which are glad to get rid of them, and taken to the factories, a few barrels at a time. The factories pay 8 cents a barrel, and often men are thus able to profitably employ their leisure. The shells are put into a crusher and then through bolts, and are thus ground into small fragments, from which the dust is sifted. The machinery employed is precisely that used for crushing bones, etc. There is a strong prejudice against the presence of any oyster-shell in the manufactured fertilizers, strange to say, and the broken shell finds a market only as food for poultry in place of fine gravel. The price is one-quarter of a cent a pound, and a barrel will weigh about 275 pounds. About 500 barrels, valued at \$375, are sold annually by these factories to the henneries near Boston, and an occasional barrel of the finer grade is sold to the bird-stores, to be used in “sanding” the floors of cages.

STATISTICAL RECAPITULATION FOR BOSTON:

|   |           |           |
|---|-----------|-----------|
| Number of wholesale dealers and shippers.....       |           | 10        |
| Number of vessels engaged.....                      |           | 8         |
| Value of same.....                                  |           | \$20,000  |
| Number of men hired by dealers—                     |           |           |
| Annually.....                                       | 125       |           |
| Semi-annually.....                                  | 250       |           |
| Annual earnings of same.....                        |           | 375       |
| Semi-annual earnings of same.....                   | \$85,000  |           |
|   | 35,000    |           |
| Number of sailors employed (three months).....      |           | \$120,000 |
| Earnings of same.....                               |           | 40        |
| Number of restaurant-servants.....                  |           | \$2,500   |
| Annual earnings of same*.....                       |           | 1,000     |
| Total number of families chiefly supported.....     |           | \$500,000 |
| Annual wholesales of—                               |           | 1,500     |
| I. Native oysters (Cape Cod).....                   | bushels.. | 15,400    |
| Selling value of same.....                          |           | \$15,000  |
| II. Chesapeake "plants".....                        | bushels.. | 1457,500  |
| Selling value of same.....                          |           | \$340,000 |
| III. Fancy stock.....                               | bushels.. | 60,000    |
| Selling value of same.....                          |           | \$100,000 |
| IV. Baltimore and Norfolk "opened stock".....       | gallons.. | 350,000   |
| Selling value of same.....                          |           | \$250,000 |
| Total wholesale value of oysters sold annually..... |           | \$705,000 |

10. THE OYSTER-TRADE OF SALEM, MASSACHUSETTS, AND VICINITY.

PRESENT CONDITION OF THE OYSTER-TRADE.—The oyster-business here, the next place north of Boston where there is any original trade, seems quite out of proportion to the importance of the town. The reason is found in the fact, that a large surrounding region derives its supplies from this point, as well as the town itself, which appears to be highly educated in the eating of all kinds of shellfish. Two schooners, the T. A. Newcomb, 130 tons, and the Lizzie Smith, 118 tons, are engaged in the trade. They cost \$22,000, but now are worth only about \$5,000 each. In the summer they go on mackereling voyages, but in the winter devote their whole time to bringing oysters from Virginia. Ten years ago 25,000 bushels sufficed for the demand, and a portion of these came from New York bay; in 1875 three vessels were employed, and Salem called for 45,000 bushels, all from the Chesapeake. At present, however, the total annual importation by sailing craft does not exceed 40,000 bushels, with about 5,000 bushels by steamer from Norfolk, in winter, added. About 500 bushels of "fancy" stock from New York are also sold. A large portion of these oysters are sold at the wharf; another large portion goes into the storehouse; a third part are opened; and the remainder (8,000 to 9,000 bushels) are laid down in Collins bay, near Beverly bar, where they are dry at each ebb-tide. No opened oysters are taken from Norfolk or Baltimore. The result is as follows:

|  |   |          |
|--|---|----------|
| Oysters imported in vessels.....         | 40,000 bushels, costing, at 36 cents..... | \$14,400 |
| Oysters imported via Boston steamer..... | 5,000 bushels, costing, at 57 cents.....  | 2,850    |
| Oysters (fancy stock).....               | 500 bushels, costing, at \$1 00.....      | 500      |
| Totals.....                              | 45,500 bushels, costing.....              | 17,750   |

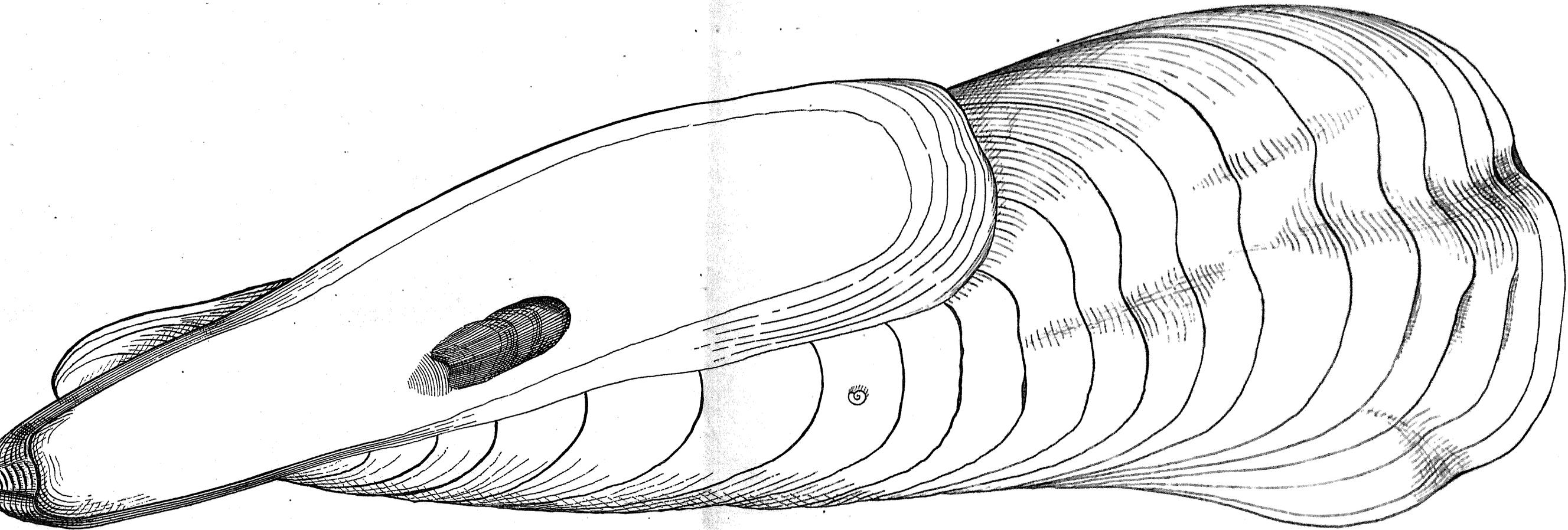
- Selling price of Virginia oysters, imported at wharf, 40 cents.
- Selling price of bedded oysters, in summer, 90 cents (common), \$1 20 (selected).
- Selling price of opened oysters (common), \$1 per gallon.
- Selling price of opened oysters (selected), \$1 20 per gallon.
- Selling price of opened oysters (in winter), 75 cents per gallon.
- Annual amount of business, \$40,000.

The firms engaged employ 43 men from November 1 to May 1; the rest of the year about 20 men. This represents about 100 persons supported by the business, since many of the men are unmarried. The weekly salaries will average \$12, and shuckers are paid 20 cents for each solid gallon.

The old shells are disposed of to the gas-company of the city at one-half cent a bushel, the purchaser paying for the carting. This does not take all of the 1,500 or so bushels a week accumulating, which are used by the proprietors to fill in water-lots, which they buy for the purpose of thus converting into land. To sell their shells is more profitable, however.

THE NEWCOMB METHOD OF UNLADING CARGOES.—The leading firm in Salem, Messrs. D. B. & J. Newcomb, boasts an economic method of transferring the cargo from the vessel to the shuckers' broad tables, ranged around the interior walls of their shucking-house down on the wharf. This building is two-storied, and is flush with the side of the wharf, so that the vessel moors alongside. A door in the end of the loft opens upon a railless platform or

\* Somewhat mixed with other duties. † Of these, 140,000 gallons opened are sold annually under the name of "Providence stock".



GIANT OYSTER, 14 INCHES LONG, FROM DAMARISCOTTA RIVER, MAINE (natural size).

The oyster-establishments employ 6 men, paid from \$6 to \$15 per week. In all, 25 persons are supported by the trade. No planting has ever been done at Portsmouth, and even those bedded down in the harbor show little growth of shell or body. To supply Dover, New Hampshire, a few miles above, about 2,000 bushels of Chesapeake oysters are brought up each spring and laid down in Cochecho river, near the town. A proportionate winter-supply comes by rail.

THE NATURAL BEDS OF GREAT BAY.—I was told by Mr. Washington Freeman, of Portsmouth, that this gentleman discovered an extinct bed of large oysters in the Cochecho river, some years ago, but no living ones are to be had there now.

A few miles up from the mouth of the river Piscataqua, and the harbor of the city of Portsmouth, New Hampshire, an extensive bay reaches southward from the river into the lowlands. It is divided into two portions: first, Little bay, nearest the river, and second, Great bay, with which the former is connected by Furber's straits, where Durham river comes in. A portion of Great bay, on the eastern side, is also known as Greenland bay; and two rivers flow into it (the Exeter and Lamprey), besides a multitude of trout-brooks. This interior basin is perhaps ten miles long and five to seven wide, but the shores are very irregular. It is so shallow that a large portion of the shores are left as dry flats at every low-tide, yet there are channels deep enough to allow large vessels to go up to Newmarket and Exeter, when the water is favorable. This spot was renowned among the Indians for the oysters living there, and considerable shell-heaps attest the constant use made of the bivalves. Whatever might have been its resources a century or half a century ago, it is certain that within more recent times the locality was forgotten, or at least made no account of, as oyster-ground, by the large population that inhabited the shores. It was therefore looked upon almost as an original discovery when, in 1874, the explorations of the Coast Survey, which was sounding and mapping out the channels, showed that there were oyster-beds still flourishing at many points from one end of the bay to the other; that is, in Great bay, for none, to my knowledge, have ever been found in the outer Little bay. There were no tools proper for the gathering of oysters in the neighborhood, and very little was done at first to make the knowledge gained available. There lived in Newmarket, however, an old Chesapeake oysterman by the name of Albert Tibbetts, who sent to Providence for oyster-tongs, procured boats, and began raking in earnest. Others imitated his example, and the following year witnessed great activity. For several months, I was told, there were probably a dozen boats, with two or three men in each boat, raking every day, the average take being about five bushels to the man. They used not only tongs and rakes, but used also dredges. In the winter, also, they would cut long holes in the ice, and dredge the beds by horse-power, stripping them completely. It was seen that this rash and wholesale destruction would speedily exterminate the mollusks, and laws were passed by the state forbidding the use of the dredge under all circumstances; making the months of June, July, and August "close time"; and forbidding fishing through the ice at any time. The last regulation was the greatest help of all, for the ice-rakers would not throw back the *débris* of dead shells, but pile it on the ice, where the hundreds of young oysters attached to it would freeze to death. But these beneficent restrictions came too late, and the business of oystering has steadily declined, until now only two or three boats keep up a desultory search for profitable beds, and a bushel and a half a day is considered good work for each man. Only seven or eight persons were engaged during the summer of 1879, and these not all of their time. All unite in ascribing the decline of the industry to over-raking of the beds, and feel disposed to pray for a law forbidding any raking whatever during several years, in order to give the oysters a chance to recuperate their depleted ranks.

The beds, as I have said, are all in Great bay. They occupy the channels at various points, and are each of considerable extent. There are perhaps a dozen well known localities or clusters of beds. These are mainly situated in Greenland bay, near Nannie's island, along the Stratham channel, up Exeter river to some distance beyond the bridge of the Concord railroad, in the Little channel near by, and up Lamprey and Durham rivers. The chief raking now is done off Nannie's island. The average of the water on the beds is hardly more than 10 feet deep, and it is pretty fresh. The tide-way, as a rule, is strong, and the bottom tough, clayey mud. The oysters are very large. I heard of specimens 15 inches long, and those of 9 and 10 are common. One man told me of a single specimen procured in 1877 which weighed three pounds and one ounce in the shell, the fleshy part alone weighing one pound and one ounce. These large ones, however, all have the appearance of extreme age, and are heavy, rough, sponge-eaten, and generally dead, though the ligament still holds the two valves of the shell together. In taste, this oyster is flat and rather insipid, which is laid to the too great freshness of the water. It takes a large quantity of them to "open" a gallon of solid meat, a bushel not yielding more than two to two and a half quarts. As a consequence, there has not been a very great demand for them, though all that can be got now are readily disposed of. Formerly the price was \$1 a bushel in Newmarket, where they were chiefly bought; but in 1879, 80 cents was the price. No culture of these or of imported oysters has ever been tried here; and the chances are against success.

Since gathering the details given above, I have received the subjoined letter, which explains itself, but must I think, be slightly "discounted" in its figures:

NEWMARKET, N. H., October 20, 1879,

DEAR SIR: Yours of the 13th at hand. I will give you what information I can by writing, though I should have been better pleased to have talked with you on the oyster-question. I could have given you more information in that way, probably; but will answer your queries as you put them.

I. Oysters were first found in Exeter river eight years ago by a government surveying vessel. Oysters were also known to be in Durham river and at Nannie's island. I claim to have found the beds in Great bay four years ago. It is my opinion that there are oyster-rocks all the way down to Portsmouth, but the bottom is not suitable for dredging, which is the only way they could be taken after you leave Great bay.

II. For two years they were tonged and dredged steadily through the summer-months by an average of 20 persons a day. Some days 70 to 80 men would be working. The average catch to a man that understood the business was 25 bushels. We could have caught more by working more hours, but the supply was greater than the demand. We worked about six hours per day.

III. The average catch now to a man is 3 bushels. A cause of the decline is that the marketable oysters have nearly all been caught. There are to-day more in number of young oysters than ever before, but they are not yet of marketable value, being in size from a five-cent piece to an old penny. If they are not properly protected they will die before they are suitable to use. An oyster needs cultivation and protection.

IV. Ten thousand bushels is a low estimate of what has been taken the four years I have been here.

V. The oyster does not find a ready market, not being a profitable oyster for any trade at the price asked for it. There is too much shell for the meat. They are a natural oyster, and no natural oyster this side of Sandy Hook finds a ready market, except for the purpose of planting. For meat and flavor they are but little better than Newark bays. They need transplanting.

VI. There has been no planting done here of Virginia or New York oysters. It would be no use to plant Virginia oysters here. They would be winter-killed. New York natural or hardy oysters would live. There have been a few Virginias bedded from spring to fall here, and they did better for the time they were overboard than oysters generally do in any water that I am acquainted with; and I have oystered in every state where oysters are worth catching—New Hampshire, Connecticut, Long Island, New York, New Jersey, Delaware, Maryland, and Virginia—having done nothing else for 20 years, and having worked for the largest firms in New York. Will send you information any time you write for it.

Yours, respectfully,

A. T. TIBBETTS.

As I have remarked in another place, I regard this body of water as a very promising field for testing whether, with Prince Edward island, Somerset, or some other hardy seed, artificial propagation is not possible at even this northern point.

#### STATISTICAL RECAPITULATION—GREAT BAY, PORTSMOUTH, AND DOVER, NEW HAMPSHIRE:

|   |                 |
|---|-----------------|
| Number of wholesale dealers .....                 | 3               |
| Number of men fishing in summer for natives ..... | 6               |
| Number of vessels and sail-boats engaged .....    | 5               |
| Value of same .....                               | \$300           |
| Number of restaurant servants .....               | 6               |
| Annual earnings of same .....                     | \$2,500         |
| Total number of persons supported .....           | 25              |
| Annual sales of—                                  |                 |
| I. Native oysters .....                           | 1,000 bushels.. |
| Value of same .....                               | \$800           |
| II. Chesapeake "plants" .....                     | 7,000 bushels.. |
| Value of same .....                               | \$7,000         |
| III. Fancy stock .....                            | 800 bushels..   |
| Value of same .....                               | \$1,000         |
| IV. Value of Norfolk "opened stock" .....         | \$1,000         |
| Total value of oysters sold annually .....        | \$9,800         |

### 13. THE OYSTER-BUSINESS OF PORTLAND, MAINE.

HISTORY AND METHODS.—No oysters are native at Portland, and the city is supplied directly from the Virginia producers. The real beginning of the oyster-trade in Portland was made by James Freeman, about forty years ago, and two ship-loads from the South, amounting to, say, 200 bushels a year, filled the demand of Portsmouth, New Hampshire, and Portland together. Sometimes, also, a ship-load would be brought from Staten Island to Wellfleet, on Cape Cod, and laid down, to be drawn upon during the summer. It was not until a few years ago that four merchants began to charter a vessel or vessels to run south and buy oysters, to be divided between them, each firm contributing its quota of purchase-money and expenses in proportion to its share of the cargo.

From 1869 to 1875, the following amount of oysters were thus brought in:

|                               | Bushels. |
|-------------------------------|----------|
| May, 1869, to May, 1870 ..... | 33,369   |
| May, 1870, to May, 1871 ..... | 49,906   |
| May, 1871, to May, 1872 ..... | 57,332   |
| May, 1872, to May, 1873 ..... | 62,786   |
| May, 1873, to May, 1874 ..... | 79,767   |
| May, 1874, to May, 1875 ..... | 71,673   |

From 1875 until the present, accurate statistics are not obtainable. The sum of the oysters now brought to the city is believed to be 75,000 bushels a year.

The cost of the cargo-oysters is about the same in all respects as at Boston, and the business is similarly conducted. The cost, in Portland, per bushel, of oysters delivered in the warehouse, then, sums up as follows, at an average:

|                    |           |
|--------------------|-----------|
| 1869 to 1872 ..... | 50 cents. |
| 1872 to 1875 ..... | 45 cents. |
| 1876 to 1879 ..... | 35 cents. |

The selling price for oysters in the shell has ranged from a dollar (ten years ago) down to 55 cents at present. This is in winter; in summer it often reaches and exceeds \$1 50 a bushel. This increase of price in summer is due to the fact that no oysters can then be got in Virginia, where the law enforces a cessation of raking, and to the extra expense entailed by "bedding".

As the weather begins to get warm in the spring, all the surplusage of each cargo which each dealer can spare, is sent about five miles down Casco bay in large, open boats, and dumped overboard upon the flats for summer-keeping. These oysters improve in quality, fatten up, and the shells add a "feather edge", often of remarkable size. It is calculated that one-fourth at least of these will perish, while the increase in value is only from 20 to 25 cents more than when they were put down. In consequence, the practice has fallen into disrepute, and only one merchant now beds extensively.

That there has been no growth in the business of importing and selling cargo-oysters commensurate with the growing population and cultivated palates of the region tributary to Portland, is acknowledged. The late depression in prosperity has made itself felt here, since the oyster ranks among luxuries. Neither so large prices, nor, proportionately, so wide profits, can now be obtained. This is ascribed by all dealers to the new fashion of buying oysters already opened in Norfolk and elsewhere in the South and bringing them here in barrels and cans.

The transactions in this branch of the trade (which must be added to the former estimates) amount to about \$1,000 a week for, say, four months. A large part of this stock is supplied at second hand from Boston. Here, as elsewhere, there are two opinions as to the real profit of dealing in this opened "barrel" stock.

The number of persons directly supported by the wholesale oyster-trade in Portland is not large, numbering between 40 and 50 families the year round, and half as much occasional help in addition in winter, to assist in opening new cargoes arriving.

The wages paid to men employed about the establishments vary from \$8 to \$18 a week, and to girls in the kitchen—for each of the wholesale houses has a lunch-room attached—about \$4 a week. They also receive their board. Those who open the oysters are here called "shuckers". They receive from 15 to 20 cents a gallon for their work, and are able to make from \$7 to \$12 a week as long as work lasts. Formerly many more shuckers were employed than at present.

The vessels employed in carrying the oysters are mackerel-schooners clearing from Cape Cod ports. They spend the summer in fishing and the winter in this trade. In 1878, the Mary Steele, Nathan Cleaves, Mary Whorf, and H. E. Willard were engaged. An average load is about 3,000 bushels, and a voyage in March has been made in ten days, but the usual time is from three to four weeks.

That in ancient times this locality was tenanted by oysters of the same race as those which lived in Damariscotta and Sheepscot waters, and have survived to the present day in the latter stream, is shown by the discovery of buried beds of shells, as has already been pointed out and commented upon.

#### STATISTICAL RECAPITULATION FOR PORTLAND:

|   |                  |
|---|------------------|
| Number of wholesale-dealers .....                       | 4                |
| Total number of families supported .....                | 100              |
| Total number of families partly supported .....         | 40               |
| Annual sales of—  |                  |
| II. Chesapeake .....                                    | bushels.. 75,000 |
| Value of same .....                                     | \$50,000         |
| III. Fancy stock .....                                  | bushels.. 5,000  |
| Value of same .....                                     | \$6,000          |
| IV. Value of Baltimore and Norfolk "opened stock" ..... | \$15,000         |
| Total value of oysters sold annually .....              | \$71,000         |

#### 14. THE NATURAL BEDS OF SHEEPSCOT BRIDGE, MAINE.

NATIVE OYSTERS IN SHEEPSCOT RIVER.—Four miles west of Damariscotta and Newcastle, in Lincoln county, Maine, is a small bed of living oysters and evidences of a greater number in the past. The Sheepscot river flows into the head of one of the inlets from the sea with which this rugged coast is filled. At the village of Sheepscot Bridge (one of the oldest communities in the United States, having been settled first by the Dutch in 1518) another little stream enters, known as Dyer's river. A quarter of a mile below the confluence of these streams is a cataract, and below this the widening expanse of one of the most beautiful of Maine's fiords.

From just below the falls (where there are some mills) to a point about three miles above, oysters were once

abundant. It is a tradition, that a hundred years ago smacks used to come from Boston and load up with these oysters; but I am inclined to doubt the veracity of the tale. The most thickly inhabited portions of this region, were the basin just above the falls, the mouth of Dyer's river, and, chief of all, a point about one and a half mile above the bridge.

The bottom of the stream is rough and rocky, and the bivalves were always difficult to get. The ordinary method was by diving. Ten years ago it was possible to get a bushel or two in a day up the Sheepscoot river; but now Mr. Manly Sargent, the most experienced man in the village, thinks a peck would prove a good day's work. They grow singly and of great size, shells a foot to fifteen inches in length have frequently been taken. They closely resemble in character those at Damariscotta, and are pronounced of very fine quality.

Speculation has been indulged as to whether this little colony of oysters is a natural one or not. There seems to be good evidence to show that it was planted designedly by the Indians, before the advent of white men, with mollusks brought from the Damariscotta beds. The position and condition of the colony; the fact that the banks of this river were thickly populated by Indians, who might be supposed to know enough to save themselves the trouble of going four miles every time they wanted oysters, by transplanting them to their own stream; the fact that no more distant stream has them, although no good reason can be discovered for their absence; and the fact that no shell-heaps of any account exist to attest ancient use of the bed, all seem to confirm this supposition. Dr. H. F. Hall, of Sheepscoot, who has studied the matter with care, and various others, hold this opinion. As I hinted before, it is probable that the isolated oyster-colony in the George river, near Thomaston, was planted in the same way, and that Salt bay is the only really native and indigenous home of the oyster anywhere in this region. These oysters have no commercial value, of course. They are much rarer than the partridges in the neighboring woods, and there is little likelihood of their increasing. Nor are there any shell-banks to afford a fertilizer for the worn and rocky soil.

## C. THE SOUTH COAST OF MASSACHUSETTS.

### 15. OYSTER-CULTURE IN BUZZARD'S BAY AND VINEYARD SOUND.

VERRILL ON THE OYSTER-BEDS OF SOUTHERN MASSACHUSETTS.—Buzzard's bay, indenting the southern shore of Massachusetts, and nearly separating Cape Cod from the mainland, has been noted since its discovery for its natural oysters, and is now the scene of wide cultivation and a large business. It was of this region that Professor Verrill wrote the ensuing paragraphs in his *Invertebrates of Vineyard Sound*, several years ago:

In Buzzard's bay the bottom is generally muddy, except in very shallow water about some of the islands, where patches of rocky bottom occur, and opposite some of the sandy beaches, where it is sandy over considerable areas. Tracts of harder bottom, of mud or sand, overgrown with algæ, occasionally occur. In Vineyard sound the bottom is more varied \* \* \* ; muddy bottoms are only occasionally met with.

Attached to the sides and surfaces of rocks and ledges along many parts of this coast, young oysters, *Ostrea Virginiana*, often occur in vast numbers, sometimes completely covering and concealing large surfaces of rocks. But these generally live only through one season, and are killed by the cold of winter, so that they seldom become more than an inch or an inch and a half in diameter. They come from the spawn of the oysters in the beds along our shores, which, during the breeding season, completely fill the waters with their free-swimming young. They are generally regarded as the young of "native" oysters, but I am unable to find any specific differences between the northern and southern oysters, such differences as do exist being due merely to the circumstances under which they grow, such as the character of the water, abundance or scarcity of food, kind of objects to which they are attached, age, crowded condition, etc. All the forms occur both among the northern and southern ones: for they vary from broad and round to very long and narrow; from very thick to very thin; and in the character of the surface, some being regularly ribbed and scalloped, others nearly smooth, and others very rough and irregular or scaly, etc. When young, and grown under favorable conditions, with plenty of room, the form is generally round at first, then quite regularly oval, with an undulated and scalloped edge and radiating ridges corresponding to the scallops, and often extending out into spine-like projections on the lower valve. The upper valve is flatter, smooth at first, then with regular lamellæ, or scales, scalloped at the edges, showing the stages of growth. Later in life, especially after the first winter, the growth becomes more irregular and the form less symmetrical, and the irregularity increases with age. Very old specimens, in crowded beds, usually become very much elongated, being often more than a foot long and perhaps two inches wide in the adult individuals; for nearly all the oyster-shells composing the ancient Indian shell-heaps along our coast are of this much-elongated kind. Nowadays the oysters seldom have a chance to grow to such a good old age as to take this form, though such are occasionally met with in deep water. The young specimens on the rocks are generally mottled or irregularly radiated with brown. They were not often met with on the shores of Vineyard sound, for oysters do not flourish well in that sandy region, though there are extensive beds in some parts of Buzzard's bay, and a few near Holmes' Hole, in a sheltered pond. The oysters prefer quiet waters, somewhat brackish, with a bottom of soft mud containing an abundance of minute living animal and vegetable organisms. In such places they grow rapidly, and become fat and fine-flavored, if not interfered with by their numerous enemies.

TOPOGRAPHY: EARLY ABUNDANCE OF SHELLFISH IN WAREHAM AND VICINITY.—The best starting point for inquiries, perhaps, is Wareham, an ancient town on Wareham river, which flows into the northern limit of the bay. Below the "Narrows" where the bridge is, there is a broad inlet, known as the Northwestern arm of Buzzard's bay, or sometimes as the Waukinco river. Above the bridge the Wareham river flows in, joined by the Agawam river

from the eastward. Both of these streams are influenced by the tide for a considerable distance above the village, are shallow, and are partially bordered by flats. From the bridge upward for half a mile, there anciently was one continuous oyster-bed, and, besides this, various other coves and rivers in the neighborhood were inhabited by these and other bivalves. In colonial days the present townships of Rochester, Matapoiset, Marion, and Wareham, which are ranged around the head of the bay, were known as Rochester, and tradition says that it was named after the city of Rochester, in England (which city was famous for shellfish), because of the abundance of oysters, quahaugs, clams, scallops, etc., along the shores.

LEGISLATION AND LICENSE IN WAREHAM.—That the earliest inhabitants valued oysters, is a matter of history; and even in colonial times they were made the subject of legislative protection by the town, for fear of their disappearance, as witness the following:

In town-meeting at Wareham, voted—

March 20, 1775, that there should be no shellfish nor shell sold nor carried out of town.

March 12, 1781, that no oyster-shells shall be caught to carry out of the town without the leave of John Fearing, Joshua Briggs, & Joshua Crocker, on the penalty of paying six shillings per bushel.

September 24, 1781, that no person shall catch any oysters or oyster-shells for to carry out of the town or carry themselves out of the town on y<sup>e</sup> penalty of forfeiting two shillings and 8 pence per bushel.

About 1840 was argued here the famous case of *Dill vs. Town of Wareham*, involving rights to oyster-fisheries and planting privileges, which the curious in such lore will find both intricate and entertaining.

As an attempt at regulation of the oyster-fishery, a few years ago, the town divided off into grants all the shores of the numerous salt rivers and inlets embraced in the extensive and sinuous sea-coast, and offered these grants, under a twenty-years' lease, as ground for the cultivation of oysters. The expense of procuring a grant was \$2 50, and it was subject to taxation at a valuation of \$50. These grants were about 125 in number, and were situated in Wareham and Agawam rivers, above the "Narrows bridge", along the shores of the Waukinco river, as the broad inlet from the Narrows down to Buzzard's bay is called, and in Broad Marsh river, Crooked river, Mark's cove, and the Weeweantit river, all of which are tributary to the Waukinco. On the shore other localities are: Brown's cove, Onset bay, Shell Point bay, East river, Long Neck shore, and Cohasset river. The average size of the grants is about two acres, giving from 250 to 300 acres of shore suitable to oyster-culture in this town, nearly all of which is already granted.

The seed which has been placed upon these grants, and is to be placed there, is entirely obtained from the natural beds, which are abundant in the Agawam, Wareham, and Weeweantit rivers. The incessant raking to which the beds were subjected to obtain it, added to the demand for market, threatened extermination so seriously that, in 1874, the selectmen decreed that no one should be allowed to fish for oysters at all, without paying to the town a duty of 10 cents a bushel, the proceeds to go to pay an officer for measuring, etc. Under this rule the town issued licenses and received pay, in 1875, from 36 licenses, \$303 60, giving 3,036 bushels; and in 1876, from 47 licenses, \$425 50, giving 4,255 bushels.

Since then few licenses have been issued, owing to the opposition and quarreling excited. The oyster-matter became a political issue. It is probable that multiplication by three of the results for 1875 and 1876, would give the approximate yield for those years, and there is said by all persons to have been a decrease since.

MARKETS AND PRICES.—About five years ago no oyster was better received in the Boston market than that from Wareham; it held the first place. Though it has lost this distinction by "opening" poorly of late, it is still of fine quality and in demand by the neighborhood markets. Wagon-loads are sent off to Plymouth, Middleboro, and elsewhere, frequently through the winter; and during the season of 1877-'78 the Old Colony railway carried 780 bushels in shell from the Wareham station, and about 150 gallons of opened stock. From East Wareham (Agawam station) there were shipped, during the winter of 1877-'78, 924 bushels in shell, while partial accounts of the next season (1879-'80) indicate a large increase. By far the larger part of the yield, however, is sold small, as "seed oysters" to be planted upon the beds along the eastern shore of Buzzard's bay and the "heel" of Cape Cod. This seed is never carried away to be sold, but the purchasers come after it in spring and fall in sloops of about 25 feet keel, locally known as "yacht-boats". This seed sells for 30 to 35 cents a bushel in spring, or 60 to 80 cents in fall, and is one and two years old, mixed. Some experiments have been made in bedding Virginia oysters through the summer, but although they lived well enough it was not found profitable. They brought only \$4, while the native oysters would fetch \$6, a barrel.

Oyster-affairs in Wareham can hardly be called a business. The title to the grants is very uncertain, the impression being that the right to operate upon them exists only through courtesy of the owners of the adjacent uplands, and a vast amount of litigation would probably arise if any one chose to object to the present status. This feeling, and the jealousy of anything smacking of monopoly, has deterred capital from being invested in any considerable degree, although efforts have been made to bring money from New York and Boston to bear upon this industry. At present the poor, ignorant, and shiftless portion of the community, for the most part, have to do with the oysters, and have found it necessary, in order to protect each other from a common thieving propensity, to decree among themselves that no man shall fish after sunset, even upon his own grant. It would be an outside estimate to say that 200 persons live upon the oyster in Wareham, at an investment of \$3,000.

SAVERY ON OYSTER-CULTURE IN WAREHAM.—Since writing the above account I have received the following instructive communication relating to this region, which I am happy to give entire :

EAST WAREHAM, MASS., *January 29, 1880.*

DEAR SIR: In order to answer understandingly your inquiries respecting the oyster-business of Wareham, I find it necessary to give you a condensed history of it.

Oysters grow naturally in the two rivers of Wareham, the Waukinco and the Weeweantit. In the former the natural beds extend from Wareham narrows, two miles above its mouth, about one mile up stream; in the latter river, the natural beds extend over a distance of about two miles. At low tide the water is about two feet deep on these beds, and the bottom is somewhat muddy. Spawn is deposited on them every year to a greater or less extent. The oysters grow in clusters, are long and thin, the meat is watery, not firm and solid, though of pretty good flavor, and on the lower part of the beds, where the water at low tide retains its saltness, they do not attain great size, even when undisturbed, but soon die, and are succeeded by a new growth. Scattering oysters are found in the channels for about one mile down stream, of fair size, firm meat, and good flavor, probably carried there when very small, by the current from the natural beds.

Prior to 1840, the privilege of taking the oysters from these beds was leased to a Wellfleet company, and several thousand bushels were carried to Wellfleet harbor, Massachusetts, and there planted for the Boston market. About 1840, fearing that the natural beds would be injured, the town annulled the contract with the Wellfleet company, and but few oysters, except for the use of the inhabitants, were taken from these beds for many years. In 1845, Peter Presho, of Wareham, got a grant from the legislature to plant oysters in a cove at the upper part of Onset bay, an arm of Buzzard's bay, in East Wareham. He there planted a few hundred bushels of Waukinco river oysters with good success, that is, they grew large, were well filled, and of excellent flavor. They did not increase in numbers, no spawn seemed to come from them, nor were any small oysters seen on the adjacent shores.

In 1855 I got a license from the selectmen of Wareham, under the general state law, to plant oysters in Onset bay, adjoining and above the Presho grant. I brought from Rappahannock river, Virginia, 2,200 bushels of large oysters in the month of May, planted them on my grant, intending to market them the next fall. They did not arrive in very good condition, and what lived did not "fill" well, so I sold but few, and let the rest remain on the grant. After the first year they "filled" well, and were of excellent quality. In a few years young oysters began to catch on the shells and on the stones of the adjacent shores, so that people made a business of catching oysters in that vicinity, and from my grant, for the home-market. I proposed planting again, but my business taking me away from Wareham, and the late war coming on, prevented my doing so. Young oysters continued to increase, and to be found on various parts of the shores of Onset bay, mostly on the sand-bars, about low-water mark. They generally lived but one year, being killed by the winter.

In 1865 I commenced gathering the young oysters early in the fall, and planting them from two to four feet deep, at low water. I found that they did well, growing rapidly, and having an excellent flavor. In 1867 I carried some to the Parker House, Boston, and the proprietors pronounced them as fine oysters as they had ever seen, and engaged all I had to sell; since which time I have furnished Wareham oysters to the Parker House whenever they have been in suitable condition for their trade. I took care to secure and preserve the spawn, placing shells and brush wherever I thought it likely to catch, and by 1869 had several thousand bushels growing finely. On the 8th of September of that year, we had a severe southeasterly gale, which washed the sand from the shores and bars, covering the oysters and destroying the greater portion of them. The water that was driven into our bay by that gale was uncommonly salt and bitter, killing nearly all vegetation, even large trees, as far as it reached, and injured many wells. The oysters were seriously hurt by it, and the next year were poor and very salt, hardly marketable. They did not fully recover from its effects until 1872. Many other persons had by this time procured licenses, and commenced planting, getting their seed mostly from the Waukinco river and the shores of Onset bay. Several cargoes of large Virginia oysters were planted in the spring, and taken up and sold in the fall, but this did not prove profitable. Spawn now began to catch in various parts of Onset bay, in water from 10 to 12 feet deep at low water; I think this came from the Virginia oysters; none has caught there since; they have all been taken up. In one year I think at least 20,000 bushels of seed, about one inch in diameter, were taken from Onset bay and planted elsewhere, some going to Providence river, and some to various parts of Cape Cod. Nearly all the available shores of Wareham were by this time granted to different persons for oyster-planting. Seed-oysters at this time, from Onset bay, sold readily at from 50 cents to 75 cents per bushel, from the boats, and large oysters brought from \$5 to \$9 per barrel, delivered at the railroad station. The business of growing oysters was profitable. The only limit seemed to be in the size of the individual grants and the amount of capital invested. The grants were too small to do a large business, and no great amount of money was invested in it.

In 1875 Wareham oysters were poor, hardly marketable, and during the winter many died; the next two years they were good, and mine brought \$7 50 per barrel; in 1878 and 1879 they were very poor, and unsalable except to peddlers, at a low price. Last winter at least one-half of our large oysters died. No seed of any consequence has been caught in Onset bay the past three years. I have tried to find out why our oysters were so poor some years and good others, and my observations lead me to the following conclusions: Onset bay has no fresh-water streams discharging into it other than small brooks, but on its shores are innumerable springs of fresh water, exuding almost everywhere between high- and low-water mark. Near where the springs flow copiously, the oysters are the best. These springs derive their supply from the rain that falls on the great wooded territory in Wareham and Plymouth, called "Plymouth woods". In 1875 the springs were very low. The previous winter had been very cold, the ground freezing to a great depth, and the woods did not thaw out until the last of May. All the water that fell, therefore, ran off the surface, and did not penetrate the ground to supply the springs. The next winter was warmer, more rain fell, the springs filled, and oysters improved. Then occurred the great fires, destroying all vegetation on thousands of acres of Plymouth woods, and leaving a sandy barren, where the rain that fell evaporated rapidly; the ponds in the woods shrank to a smaller compass than was ever known before, the swamps dried up, springs failed, many wells gave out entirely, and the streams that furnish the water-power of Wareham were, and still are, lower than ever before, and oysters are poorer. I am confident that, for the production of good oysters in this vicinity, a certain uniform supply of fresh water is required, springing directly from the ground on which they are planted. It will not do to have the water vary in saltness; if it does, though the shell may grow rapidly, the meat is watery and flavorless. Oysters are seldom of good quality in brackish water, yet when taken from salt water and placed for a short time in fresh water, they will grow plump, and improve, if not left too long.

Oysters always feed on the flood-tide. Then the water seems cloudy, while on the ebb it is clear. I have often observed, that as soon as the tide began to flow the oysters would slightly open their shells, the feathery edge of the mollusk could be seen protruding and in motion, apparently feeding. In raking oysters on the flood-tide they often catch on the teeth of the rake; I never knew this to occur on the ebb. Oysters throw off their spawn at the commencement of the flood-tide, hence it generally catches near low-water mark, and up stream from the spawning-bed, except in rivers where there is always a downward flow.

Their season for spawning here varies from the 1st of July to the 1st of September, according to the condition of the oyster and the temperature of the water; the spawn in favorable situations grows rapidly. I have known a boat, with a perfectly clean bottom, anchored over an oyster-bed, to have its bottom completely covered with oysters of over an inch in diameter in two weeks' time.

Though seed taken from the natural beds in our rivers does well when planted in other localities, the restrictions upon taking them placed by the town-authorities, and 10 cents per bushel to be paid the town, prevent their being used to any great extent. No Virginia oysters have been planted here for several years past, with the exception of a small cargo I brought from there last year, hoping to obtain spawn from them in course of time; they seem to be doing well; no oysters to any extent are opened for sale. Those sent to Boston last year brought \$5 per barrel at the railroad station. The greater quantity of oysters sold last year were to peddlers, at \$1 per bushel on the shore, who disposed of them in the adjacent towns. From the best information I can get, I think about 7,000 bushels were marketed from this town the past year, paying to the producers about \$10,000. Very little money is paid out for labor; planters do their own work, and what help is needed can be got for 15 cents per hour. The prospect for much business next year does not look encouraging. No seed, to any great extent, has been planted for the past two years. I have quite a large quantity growing, but can form no correct estimate of how many. I shall continue planting the ensuing year, if I can procure seed that will not cost over 25 cents per bushel, planted. I expect to bring some young oysters from the Great Wicomico river, Virginia, to plant here. I think they will do well if caught in shoal-water, and are young and thrifty. I have oysters planted there, but cannot yet tell how successful they will prove.

The greatest drawback to complete success of the business here, has been the lack of uniformity in quality from year to year. Much of the ground upon which our oysters are planted has too little water upon it at low tide; the oysters freeze in the winter, or are killed by the ice resting upon them. It is also impossible to catch them for market just when they bring the best prices. The most destructive enemy to our oyster-beds is a small mollusk, here called the "borer" or "white snail"; it drills a small hole through the shell directly over the "eye" of the oyster, causing its death. Some beds, particularly where the bottom is hard, are completely destroyed by them. The periwinkle also is very destructive to large oysters; one will destroy at least a bushel in a season. There are but few starfishes.

Respectfully yours,

A. SAVERY, C. E.

**OYSTER-BEDS IN SIPPECAN HARBOR, WING'S COVE, AND WEEWEANTIT RIVER.**—Southwesterly from Wareham the head of Buzzard's bay contains several oyster-localities of varying importance. They are: The Weeweantit river, for a mile or so in the neighborhood of the highway bridge; Wing's cove, and the Blankinship cove of Sippecan harbor, in the town of Marion.

In the Weeweantit natural beds of very good oysters have existed for a long time, and a few years ago a large yield was obtained from them every year by Mr. Robinson and others. Latterly, however, the quantity has decreased, and the beds have been raked almost wholly for the sake of seed. There are grants here, but no improvement, as yet, of any consequence.

In Sippecan harbor (the harbor of Marion) it is said that no oysters were known until about fifteen years ago (1864), when the shore of Ram island, on the eastern side of the harbor, near the entrance, was found strewn with young oysters, and the next year it was ascertained that these had lived and were growing. The whole cove rapidly filled, and at once began to be taken by the inhabitants in large quantities.

**OYSTER-CULTURE IN SOMERSET.**—Some gentlemen, in 1875, got permission of the town to plant oysters on the bar at the entrance of the harbor, and brought a large quantity of seed-oysters from Somerset, Massachusetts, to lay down there. Taking the hint, the town surveyed a fringe of grants around the whole harbor, which were rapidly secured by the citizens for purposes of culture. The first design was that all owning grants should seed them from abroad, leaving the natural beds in Blankinship cove and all the channels as public domain. But this was done to a very small extent, the natural beds being raked and dredged, instead, for oysters to be placed upon the grants, until it seemed likely that no mollusks at all would be left upon the beds. Legislative measures, both of state and town, were brought forward for oyster-protection, but with little avail, as restrictive measures had small support from public opinion, and now there is little attempt to restrain any one fishing to any extent. It is reported by some, as a consequence, that few oysters are left, while others say that there are as many oysters there now as ever. Meanwhile, those who had planted were not encouraged. The best grants lay in favorable spots, where the oysters had shallow water, a hard bottom, and quick tide, only lacking fresh water. One gentleman has planted about twelve thousand bushels, and has put down six to eight thousand empty shells, hoping to catch spawn; but since these were put down there has been no year in which the spawn was plenty at Marion. (The last good year for spawn in Wareham was 1877, in Somerset, 1878.) Both of these investments have proved to be losing ones. The oysters brought here from Somerset have grown pretty well in shell, but in meat are lean and watery. Last August those of marketable size produced less than two solid quarts to the bushel. This fall (1879) there has been an improvement, but a bushel does not "open" more than three quarts. These facts are true, as a rule, over the whole extent of the harbor, and in every instance the owners consider that they have lost money on their investment, and that it is probable that no great success can be looked for in raising oysters at Marion, for unexplained reasons. Even when they succeed in getting a fair quantity of oysters, they are not as hard and plump as they ought to be, and will not sell in Boston market at prices which will repay the expense of their cultivation. Among special discouragements may be mentioned the burying of two thousand bushels in one bed, on the outside of Ram island bar, by a single gale during the winter of 1878, and the sudden death of several thousand bushels up the harbor through anchor-frost. As a consequence, a large portion of the oysters which have been planted here from Somerset have been taken up and sent to Providence river, where they have been rebedded with great success. It may be that this will afford an opportunity for business, although planting will not succeed well. The seed can be bought in Somerset and laid down here for about 35 cents a bushel. Two years later it can be sold to Providence dealers for 75 cents. During these same years the natural beds near Ram island have flourished tolerably well, although the large tracts of shells about the harbor have caught no spawn. They have not opened as much nor of as good quality, however, as formerly; but there are great differences in the oysters of even this limited area.

A bed at Ram's island, on the sand, in three to five feet of water, "opened handsome," while only a few yards away oysters on a muddy bottom were of poor quality and size.

There have been about \$17,000 invested in oyster-culture in this town, but I believe the whole matter could be bought now for \$10,000. Perhaps 5,000 bushels, all told, have been disposed of annually for the last three or four years, at \$1 a bushel or gallon.

**NATURAL BEDS IN SANDWICH.**—Crossing over now to the eastern head of the bay (since there is nothing to be noticed south of Marion on the west, except a little later at New Bedford), I have to report an extensive industry. The Cohasset river divides the town of Wareham from the adjacent township of Sandwich, its neighbor on the south and east. Flowing into Buzzard's bay from this Sandwich side are several rivers, and the shore is indented with numerous inlets and shallow ponds. Nearly all of these inlets were found by the earliest colonists occupied by beds of natural oysters, and most of these beds are still living and supplying seed for cultivation. That the Indians used the oysters extensively is shown, not only by tradition and analogy, but by abundant traces of former feasts in the shape of shell-heaps. Some account of the oysters of this region more recently, is accessible in a letter from Dr. J. B. Forsyth, written in 1840, to Dr. A. A. Gould, and printed in the first edition of the latter's *Invertebrates of Massachusetts*. Dr. Forsyth says that the aged men of the vicinity assured him that oysters had never been brought there from abroad up to that time (1840); that they grew so abundantly everywhere along the Sandwich shores "that at low water you could at almost any point procure a bucketfull of them from the rocks". Dr. Forsyth also mentions Wareham as an oyster-locality. There was then a statute prohibiting a man from taking more than two bushels at one time for his own use, and forbidding their being carried out of town. "The oysters," says the writer, "are generally collected by a few men, who bring them to the village and dispose of them at 50 cents a bushel for their trouble; and by selling half a bushel or a bushel to an individual the spirit of the statute is not violated. This may be repeated every day, until the desired supply is laid in. When placed in the cellar and fed from time to time with a little meal and water, they will sometimes keep good for months."

**CULTURE AND LEGISLATION ON MONUMENT RIVER.**—Buzzard's bay is the new name for the railway station on the Old Colony line, known to all the people about there as Cohasset Narrows, because it is upon the narrowest part of the neck of the peninsula of Cape Cod. The river flowing down past Buzzard's bay station is the Monument, a clear, broad stream, up and down which the tide rushes with great force. "Wild" native oysters inhabited this stream, but had been pretty nearly exhausted by constant raking, when the attention of the town-authorities of Sandwich was called to the matter, a few years ago. They caused a survey of this and the various other oyster-waters of the township, and divided them off into "grants" of different sizes, according to the character of the bottom, but none less than about an acre and a half in extent. These grants could be taken by any citizen of the town, under certain conditions, upon the payment of \$2 50. If not improved within a year they reverted to the town. Each grant, as soon as taken, and no matter what the value of the stock upon it, was taxed at a valuation of \$50.

The special state laws passed for the benefit of this new industry, were substantially as follows:

**MARCH 26, 1834. SECTION 1.** If any person shall hereafter take any oysters or other shellfish from their beds, or destroy them therein, in the town of Sandwich, except as is hereinafter provided, he shall forfeit for every bushel of oysters so taken or destroyed, the sum of five dollars, and for every bushel of other shellfish so taken or destroyed, the sum of three dollars: *Provided, however,* That the selectmen of said town may give permits in writing to any inhabitant to take shellfish at such times and for such uses as they shall think reasonable and express in such permits, not exceeding two bushels for one family: *Provided, further,* That any inhabitant of said town may, without such permit, take one bushel of oysters or other shellfish per week from their beds in said town, for the use of his or her family, from September 1 to June 1, annually.

**SEC. 2.** If any boat, wagon, sleigh, or other vehicle, shall be found within the limits of said town with any oysters or other shellfish on board, taken in said town contrary to the provisions of this act, any inhabitant may seize and detain the same, not exceeding forty-eight hours, in order that the same, if need be, may be attached by due process of law to answer the said fines and forfeitures, with costs of suit: *Provided, however,* That as soon as the owner or master of any such vessel, boat or craft, cart, wagon, sleigh, or other vehicle, shall pay said fines and forfeitures without suit to the treasurer of said town, such vehicle shall be discharged, with the effects therein.

**SEC. 3.** If any person or persons, residing in Sandwich, shall assist any person belonging to any other town, in taking any of the fish aforesaid, or shall supply them therewith, he shall forfeit for every bushel of oysters so taken five dollars, and for every bushel of other shellfish three dollars, and the purchaser or purchasers, knowing them to be unlawfully taken, shall be subject to the like forfeitures.

**SEC. 4.** All persons not otherwise disqualified shall be competent witnesses in any prosecution upon this act.

**SEC. 5.** All the forfeitures mentioned in this act, not herein otherwise appropriated, shall enure, one half to said town, and the other half to the person or persons giving information, to be recovered by the treasurer of said town in an action of debt, before any justice of the peace for said county of Barnstable, or any court proper to try the same.

**MAY 15, 1837. SECTION 1.** Whoever takes any oysters from Monument river, Sandwich, previous to October 1, 1868, shall forfeit five dollars for each bushel so taken.

**SEC. 2.** The inhabitants of the town of Sandwich, at a legal meeting held for the purpose, may make regulations concerning the taking of oysters in said river after said first day of October; and whoever takes any oysters from said river contrary to the regulations so made, shall be subject to the same penalties as are provided in the preceding section.\*

\* On February 26, 1873, a precisely similar regulation was made for Barlow river, Sandwich, to be in effect subsequent to October 1, 1874.

VOTES OF TOWN, March 3, 1879.

*Voted*, That the Monument and Barlow rivers be closed for catching oysters from the first day of May next, until the first day of October following.

*Voted*, That the regulations concerning the taking of oysters from said first day of October until the next annual meeting, shall be the same as voted at a meeting adjourned from the annual meeting in March, 1878, to the fifth day of November in said year, which is as follows: Any inhabitant may take one bushel of oysters in each week, and no more, the same to be taken under the supervision of the fish-committee of the town, who are directed to prosecute all persons violating the regulations now voted. That Saturday in each week shall be the catching day.

*Voted*, That the town sustain the officers chosen in all legal action pertaining to their office.

*Voted*, That the town allow its inhabitants to take all the oysters they can with suitable instruments, such as drags, tongs, and rakes, wherever they can find them, except on private grants and in Monument and Barlow rivers.

*Voted*, That any person entitled to one bushel of oysters per week under the regulations for the Monument and Barlow rivers, may, by an order, empower another person to take said bushel of oysters for his or her family use.

The people were quick to take advantage of these legal permits, and it was not long before nearly all space of value was appropriated, and wild speculation began; but it is only within the last three or four years that much business has been done, or systematic efforts at transplanting and stocking have been introduced. There are now about 50 owners on Monument river, Cohasset river, and in Little bay, and a careful estimate of money invested gives \$30,000 as the probable value of grants, stock on hand (November, 1879), and appurtenances. Many of the grants are as yet very slightly stocked with oysters.

The Monument river oysters were famous in olden times for their superior quality and size. "They opened well," the oystermen said; that is, there was a large proportion of meat to the shell, which was thin, brittle, and much scalloped. The first idea was simply to hold, as proprietors, the seed which were caught upon the grants from the natural bed at the mouth of the river; and, to facilitate this catching, more or less dead shells have been thrown down. But the more enterprising planters have laid down great deposits of seed-oysters, purchased chiefly in Wareham, and these are just now beginning to produce their legitimate returns, having grown to a marketable size. Some fresh seed is put down every year, but in addition to this, it is expected that large accessions will be made by spawn caught from the natural bed and from the spawning of the planted oysters. Since 1874, however, very little spawn has been caught. In that year a vast quantity appeared, but arrangements were not made to avail themselves of it.

The amount of seed placed upon a grant varies with the pocket and theory of the owner, from 100 to 500 bushels on an acre; perhaps 200 bushels would be an average of actual planting. The seed from one to two years old is used and preferred. It is generally planted in the spring, when it can be bought for from 30 to 35 cents a bushel; but it is thought much better to plant it in the fall, although then from 60 to 80 cents is asked for the seed. It costs about 10 cents a bushel to throw down. The best bottom (and that which is found everywhere here) is hard sand, a little soft on top. The average depth of water on the beds is 3 feet; but some stock is planted where it is exposed or just covered at ebb-tide, the objection to this being the danger of damage from drifting ice, for the mere resting of the ice on the oysters is not usually harmful, provided they lie flat on the sand. The calculated cost of beginning business along this river now, would be about as follows:

|  |      |
|--|------|
| Present cost of good ground (1 grant)..... | \$40 |
| Seeding, 300 bushels at 50 cents .....     | 150  |
| Sail-boat and row-boat.....                | 55   |
| Beach, shanty, and furniture.....          | 40   |
| Rake, tongs, shovels, and tools.....       | 10   |
| Incidentals.....                           | 65   |
| Total.....                                 | 360  |

One who is really going into the matter hopefully, must expect about this outlay before he considers his grant in condition to yield. If he puts down shells for the spawn to catch upon, as he probably will, it will cost him about 10 cents a bushel.

Formerly Virginia oysters were planted and bedded here, but did not do well. The prices received for these oysters, which are all picked over and shipped to Boston in good shape, vary from \$3 50 to \$6 a barrel. In 1878, the exports from the Buzzard's Bay station by rail were 138 barrels. Up to November 1, 1879, 240 barrels were sent, making 300 barrels a probable total for that year. Besides this, in 1879, much opening was done by the oystermen to supply the neighborhood market, and about 1,000 gallons of opened oysters were carried by express companies, in small packages.

OYSTER-CULTURE IN RED BROOK HARBOR (POCASSET).—Another oyster-locality in the town of Sandwich, is Red Brook harbor, six miles south of Monument river. The railway station is Pocasset, on the Wood's Holl branch of the Old Colony line. This harbor is an indentation of Buzzard's bay, about one and a half miles long by one-third of a mile wide, and it is separated from the outer bay by an island. A branch of the harbor, also, runs up to a landing known as Barlowtown. The name Red Brook harbor is derived from a little stream which flows into it, the bottom of which is tinged with iron rust; but this brook does not freshen the water to any considerable

extent. The bottom of the main part of the harbor is hard sand, and the water is nowhere more than 8 feet deep at low tide. In some portions rocks and eel-grass exist.

On the southern shore of this harbor, about a mile from its head, exists a living bed of natural oysters, some seven acres in extent, under protection of the town for public benefit. The oysters growing upon it are reported to be large, but not of extraordinary size, scalloped and roundish, differing in no respect from aged oysters grown after transplanting to another part of the bay. Excepting this natural bed, the whole harbor has been surveyed and divided into grants; all those good for anything have been taken up, and must now be bought at an advanced price, if any one desires to possess them. The largest owner is a Boston firm, reputed to have 75 acres, but beside it are a score of other proprietors, inhabitants of the shores. It is safe to say that \$3,500 would buy out all the home interests in the whole tract, and \$15,000 cover the total investment up to January 1, 1880. There is a spirit of progress here, however, which will lead to a great increase in the value of the property within the next few years. During 1878, for example, there were shipped from Pocasset station only 85 barrels; in 1879, 500 barrels.

I spent some hours on these grounds with Mr. Edward Robinson, who exerted himself to make my visit instructive. He thought that one-half of the whole water-area was suitable for oyster-cultivation, and all of this is now appropriated, though only a portion has yet been stocked. The seed is mainly derived from the native bed in the harbor and from the shores where the native spawn has "set", and is planted in the spring and fall. The only outside seed brought in thus far is 300 bushels from the Weeweantit river, across the bay; and 1,000 bushels from Somerset. The latter did not seem to do well. A long, sandy point runs out into the harbor here, which ebbs dry at low tide. This does not come into any grant, therefore, and hence is public ground for the gathering of seed. I saw upon the pebbly beach, in places, how abundantly this was to be had. Young oysters, at this season, from the size of a dime to that of a dollar, were strewn between tide-marks so thickly that you could hardly avoid stepping upon them, and they would survive the winter well in this exposure. These are gathered by everybody who wishes and placed upon their grants. In addition to this, many thousands of bushels of old shells have been laid down, the proper time to do this work being early in July, in order to have their surfaces clear and ready to catch the spawn which begins to appear about that time. In 1876, when there was the last good quantity of spawn emitted, the shells had been put down in May, and by July were so slimy that the spawn did not set upon them. They learned wisdom by that, but no good year for spawn has occurred since. The seed is planted in varying quantity, but Mr. Robinson said he should put it down shoulder to shoulder, so as to pave the whole bottom, if he had enough. I saw tracts where the growing oysters lay so thick as to conceal the sand, and you could gather a bushel from a square yard of bottom. The natives consider the seed here better than that at Monument river, for it is rounder and less distorted. When the oysters are three to four years old, and ready for market, Mr. Robinson takes them up and lays them upon a wooden floor near his packing-shanty, in water almost wholly fresh, which takes away the very saline flavor, fills them up in size, and makes them plump and hard. It is known as the "fattening" process, after which they are ready for shipment. Bought from the boats, a dollar a bushel is paid for these oysters, but the freight to Boston and the barreling make them cost about \$1 30 a bushel to the dealer.

Here, as at Monument river, fishing is habitually done through the ice in winter. The method is to cut a large hole and use tongs. The oystermen do not complain of it as especially cold or unpleasant work. In order to keep the oysters from freezing, they dip the bag which they intend to put them in when caught, in water, and hold it upright until it freezes stiff. It thus stands conveniently open, like a barrel, and no wind can blow through its sides to the detriment of the contents.

CATAUMET AND FALMOUTH.—Below Red Brook harbor are Cataumet harbor, Currant river, Wild harbor, and Squeateague pond. All of these are inhabited by beds of native oysters, and hence were granted in lots by the town (Sandwich) under the usual regulations. They differ in no important respect from the Red Brook region, are all of small extent, and the whole money-investment, all together, will not exceed \$500.

At East Falmouth there is a small business, the facts concerning which were kindly communicated to me in a letter from Mr. Frank C. Davis, which I take pleasure in transcribing:

EAST FALMOUTH, MASS., November 20, 1879.

DEAR SIR: There are no natural oyster-beds in our locality, nor have there been within my recollection, nor is there any trace, so far as I am aware, of their existence in the past. Oysters are cultivated on a small scale here, but there is not room for a very extensive business. We have a few acres of tide-flats, but the oyster-bottom extends chiefly along the shore, varying from six feet to one rod in width. This bottom is composed of sand and gravel. Outside of this you have dead black and blue mud, where nothing will live except eels.

I should judge there were 1,000 bushels of seed planted per annum, and about the same amount of oysters sold each year. The seed is obtained in Buzzard's bay, and costs from \$35 to \$85 per 100 bushels.

The ground is granted by the town of Falmouth to the tax-payers of said town, and all of it is taken up. The oysters grow well here, but are liable to die. Our oysters bring from \$3 to \$5 per barrel; very choice, \$6.

Respectfully,

F. C. DAVIS.

NEW BEDFORD AND VICINITY.—A few words remain to be said about New Bedford and vicinity. The Acushnet river, just above New Bedford, has been found wanting in the qualities necessary to make it good planting ground for oysters. The experiment has been tried, but has failed. No cultivation exists there, therefore. The principal dealers in the town buy yearly a superior stock of oysters in the Chesapeake bay, bringing one

cargo of 3,500 bushels for bedding, and another cargo for winter use; the schooner Hastings, of nearly 100 tons burthen, is the vessel used at present. These oysters cost 65 cents when laid down, but grow very little on these beds, since there is no fresh water to start them. In addition to this, one firm furnishes oysters from Providence river, Wareham, and elsewhere. The rest of the town, as calculated by them, use about 200 bushels and 100 gallons a week for 5 months. This makes New Bedford's estimated consumption, annually, about 13,000 bushels.

Five men are employed six months, as openers, at 17 cents a gallon.

Just west of New Bedford is a little stream and inlet, known as Westport river. This was the locality of an ancient bed of native oysters, which has now nearly disappeared through too great raking. They are said to be very large and of good quality, but not more than 50 bushels a year can now be caught throughout the whole three miles from the "Point" up to the bridge, which sell at \$1 50 to \$2 a bushel in New Bedford. There is reputed to be good planting ground near the bridge.

A few miles west of Westport is the Dartmouth river, where, it is said, an oyster-bed has recently formed, but, as yet, is of little account. The bottom there, however, is regarded as very suitable for planting upon. Fifty bushels a year would cover the whole supply from here.

PLANTING IN COTUIT AND WAQUOIT.—At Cotuit and Waquoit are considerable planting interests, under similar regulations to those existing on the eastern shore of Buzzard's bay. From West Barnstable station, enough oysters were sent to Boston by rail, combined with what went elsewhere by water, to make the production of Cotuit amount to about 5,000 bushels annually; these oysters have a high reputation in Boston. Waquoit will produce half as much more, chiefly from Wareham seed. Both localities will give a census of 40 planters, and an investment of \$40,000. There is a considerable fleet of sail-boats here.

FORMER OCCURRENCE OF OYSTERS IN MARTHA'S VINEYARD.—In respect to Martha's Vineyard, only a paragraph remains to be said, quoted from a description of the island in the *Massachusetts Historical Collections*, second series, 1807, page 58:

The oyster is found in Newtown pond, and in two other ponds on the south shore, one of which is in Edgartown, and the other in Tisbury. It is fresh to the taste; but it is improved in its relish and rendered fatter, by digging a canal through the beach, and letting the salt water flow into the fresh-water ponds. As the southerly wind soon fills up the canal, the digging must be renewed four or five times in a year.

STATISTICAL RECAPITULATION. BUZZARD'S BAY AND VINEYARD SOUND:

|  |                  |
|--|------------------|
| Number of planters and shippers .....          | 150              |
| Extent of ground cultivated .....              | 500 acres..      |
| Number of families supported .....             | 400              |
| Number of vessels and sail-boats engaged ..... | 100              |
| Value of same .....                            | \$20,000         |
| Annual sales of—                               |                  |
| I. Native oysters .....                        | bushels.. 19,000 |
| Value of same .....                            | \$25,000         |
| II. Chesapeake "plants" .....                  | bushels.. 7,000  |
| Value of same .....                            | \$6,000          |
| Total value of oysters sold annually .....     | \$31,000         |

16. THE OYSTER-LAWS OF MASSACHUSETTS.

CONDENSED VIEW OF LAWS AS AMENDED IN 1878.—The oyster-laws of Massachusetts, chapter 83, as amended in 1878, are condensed as follows:

SECTION 11. Whoever takes oysters from their beds, destroys them, or willfully obstructs their growth, etc., forfeits \$2 for every bushel, including shells. [This last phrase was made necessary by the fact that, in colonial times, when the oyster first became the subject of legal restriction, the penalty was evaded by the culprit's claiming that the shells were not to be measured against him—only the oyster meats.—E. I.]

SEC. 12. The mayor and aldermen, or the selectmen, of any city and town may give permits to any person to take a stated quantity of oysters; and every inhabitant may, without permit, take oysters, for family use, from September 1 to June.

SEC. 13. Makes the same regulation in respect to other shellfish.

SEC. 14. Any boat, not owned in the place, and found with oysters on board, not taken under a permit or license, may be seized and detained by any inhabitant for not more than 48 hours, pending process of law.

SEC. 15. Native Indians are allowed to dig for all kinds of shellfish for home use; and fishermen may take bait, not exceeding seven bushels at once.

SEC. 16. The mayor and aldermen or selectmen of any city or town may \* \* \* grant a license, for a term not exceeding twenty years, to any inhabitant thereof, to plant, grow, and dig oysters, at all times of the year, upon and in any flats and creeks therein, at any place where there is no natural oyster-bed; not, however, impairing the private rights of any person, nor materially obstructing the navigable waters of any creek or bay. But no person shall take any oysters from any flats or creeks for which a license has been granted, \* \* \* between sunset and sunrise, on penalty of forfeiture of license and the oysters on his beds.

SEC. 17. Such license shall describe the metes and bounds, shall be recorded, and shall cost the applicant \$2 50.

SEC. 18. The person so licensed, his heirs and assigns, shall, for the purposes aforesaid, have exclusive use of the flats and creeks described in the license during the time therein specified; and any person who, without consent of the owner, removes oysters from licensed ground incurs a fine of \$100, or less, or imprisonment from thirty days to six months, or both.

Special laws relating to Cape Cod were passed in 1870, and remain in force, to the following effect:

SECTION I. No person not an inhabitant of the town of Wellfleet shall take any clams, quahaugs, oysters, or other shellfish within the waters of said town, without first getting a permit from the selectmen, nor shall any person being an inhabitant of said town take any of said fish for bait, at any time, exceeding three bushels, including their shells, or for the purpose of selling the same, without a permit from the selectmen of said Wellfleet, who may grant the same for such sum to be paid to the use of the town as they shall deem proper; but the inhabitants of said town may take said fish for family use without such permit.

SEC. II. Whoever takes any shellfish from within the waters of said Wellfleet in violation of the provisions of this act, shall, for every offense, pay a fine of not less than five or more than ten dollars and costs of prosecution, and one dollar for every bushel of shellfish so taken; said fine and forfeiture imposed under this act to be recovered by indictment or information before a trial justice in the county of Barnstable.

## D. TAUNTON RIVER AND COLE'S RIVER, MASSACHUSETTS.

### 17. OYSTER-CULTURE AND TRADE ON MASSACHUSETTS AFFLUENTS OF NARRAGANSET BAY.

PECULIARITIES OF THE SOMERSET NATIVE STOCK.—A discussion of this small district forms a natural division of the subject, since the Taunton river beds are isolated, and lying between Narraganset bay and the Cape Cod district, furnish seed for both. The river itself flows into Narraganset bay, and the region immediately about its mouth is included.

There lies in the Taunton river, at Dighton, a large rock, well known to archæologists, on account of some inscriptions which it bears; these, though untranslated, are supposed to be the work of Norse voyagers who early visited these waters. The foundation for this supposition is very fully and attractively stated in Thoreau's *Cape Cod*, to which the reader is referred. These earliest comers were pleased to find shellfish abundant in the region, and the English settlers, three or four centuries later, record their thankfulness on similar grounds. From time immemorial, then, oysters have been natives of this district, and no such mistake as has been made north of Cape Cod could ever be put forward to deny that they are here indigenous.

LEGISLATION AND LICENSE.—It was long ago recognized that the Taunton river was a valuable oyster-property, and legal measures were early adopted looking toward its preservation. The present plan of operations came into effect about thirty years ago, and though differing slightly in the various towns bordering the river, consists, in general, of the leasing of the ground for raking and planting purposes, during a term of years, at a fixed rental. Most of the towns do this under the general law of the state, already explained in the chapter on the south coast of Massachusetts bay district (C); but Somerset had a special act in her favor, passed by the legislature in 1847, which reads as follows:

SECTION 1. The town of Somerset shall have the exclusive control of the oyster-fishery in that part of Taunton river within the limits of said town, and may sell at public or private sale \* \* \* the right or privilege of taking oysters \* \* \* for a term of not less than three nor more than ten years at any one term; and all money arising from such sale or sales shall be paid unto the treasurer of said town, for its use, etc. (Chapter 44.)

Beyond this, every householder has the right to take three bushels each month for family use.

The privilege of this town now rents for \$800 a year, and is owned for five years by the Somerset Oyster Company, composed of citizens of the town.

In Fall River, the lease is held by a firm from Wellfleet, Massachusetts, at \$600 a year.

In Freetown, the holder of the lease is a Providence man, who pays about \$1,000 annually for the privilege.

The lessee of the privileges of Dighton, also, is a citizen of Providence, at a cost of \$475 a year.

Berkeley rents its oyster-banks to a Somerset company at \$1,300 a year, for a long term.

Assonet is leased for ten years, with Providence capital, at \$1,225 a year.

The total income, therefore, derived by the towns along the bank of this small river, only a dozen miles long, is \$5,400. This is wholly for the privilege of raking the bottom for seed, besides which the towns reserve the right of each citizen to take such oysters from the river as he needs "for family use". I know no other district in the United States which is made to serve the public treasury so well.

In respect to this matter of leases, however, it may be said, that it was evidently the intention of the makers of the law to parcel out the privilege among many persons; but the shape of the business has changed, capital has overcome weak opposition, where it existed, and where there was a score of owners of the water-front twenty-five years ago, there is now only one. It is probably to the general advantage, however, in this case, that the business should be thus centralized.

SOMERSET OYSTERS: THE HISTORY OF THEIR DETERIORATION.—The oysters from all parts of Taunton river (the producing extent is about 12 miles long) are known as "Somersets". Formerly they were considered extremely good eating, and grew to a large size. Within the last twenty-five years, however, they have assumed a green appearance and lost quality. It is popularly asserted, locally, that this is owing to the influence of the impurities discharged by the copper-works, by the rolling-mills, and by the print-works, which are situated some miles above the oyster-beds. But this has been denied, on the ground that not enough of the mineral matter thus thrown into