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EXPERIMENTS WITH THE AMERICAN HARD-SHELLED CLAM (Mercenaria mercenaria) 1969.

by

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Introduction. The American hard-shelled clam (Mercenaria mercenaria) is a valuable bivalve molluscan shellfish in the U.S.A. and Canada. This bivalve is somewhat like the cockle (familiar to most Irish people) or the palourde (Venerupis decussata) which is gathered on some parts of the Irish coast and exported to France. Unlike the cockle which lives in sand, or the palourde which is found mainly in coarse sand and shingle, the hard-shelled clam lives in sandy mud.

Some years ago this clam established itself in Southampton Water, on the south coast of England. It is thought that this particular stock originated from live clams thrown overboard from an American liner. Due to the warming effect of the outflow from a large power station near Southampton, coupled with naturally occurring high sea-water temperatures in this area, the clams were able to breed and multiply. Normally the sea-water temperatures around the coasts of Gt. Britain and Ireland are too low to permit the clams to multiply by natural breeding.

The Fisheries Division of the Department of Agriculture and Fisheries had under consideration for some time the introduction of this species and in 1969 suitable disease-free hatchery reared stock became available. Accordingly, almost 4,000 hatchery reared seed clams were obtained by courtesy of the Ministry of Agriculture, Fisheries and Food (MAFF), Fisheries Experimental Station at Conway, North Wales, in April 1969. The seed was divided into four lots which were then planted at selected sites in Wexford Harbour, Bannow Bay (Co. Wexford), Cork Harbour and Oysterhaven (Co. Cork). Because the seed clams had been reared under strict control in the MAFF hatchery at Conway, they were free of undesirable parasites and pests. A small balance of the clams were placed in the lagoon at the E.S.B. generating plant at Tarbert, Co. Kerry.

At each locality the seed clams were planted out and enclosed within plastic mesh (6mm) - covered open wooden frames, sunk in the mud surface. These frames enabled the clams to feed normally and, at the same time, to be protected by the plastic covering (through which they could not escape) from predatory shore animals such as the green shore crab (Carcinus maenas).

American hard-shelled clams have an annual growing period from April to August or September, depending upon the food supply and the water temperatures. The plantings were examined from time to time and the observations made are the subject of this leaflet.

Method. Approximately 900 seed clams were planted at each site. The balance of the seed, numbering about 400, being planted in the heated water lagoon associated with the Electricity Supply Board power station on the estuary of the R. Shannon. Data concerning the latter seed will not be available until 1970.

At Wexford Harbour, Bannow Bay, Oysterhaven and Cork Harbour sites were selected where the bottom is soft and, in each case, the wooden frames were placed at different positions in relation to low water spring levels, some being at extreme low water spring mark and others being nearer to the low water neap tide level. In choosing these four areas, widely different substrates and physical conditions were met. At Wexford the mud is quite soft, with some sand and lumps of clay through it. In Bannow Bay the substrate is entirely of soft mud, rather similar to that at the MAFF layings in North Wales, but the area is subject to considerable influence of fresh water. At Oysterhaven the substrate is of a very sticky black mud in which it is difficult to walk without sinking to a depth of 18 inches. In Cork Harbour the substrate varies from a light muddy shingle to a firm sand/mud mixture. The selected areas are shown in Fig. 1. At the time of planting, the seed clams varied in length from 8 to 16 mm, with a mean of 13 mm. They had been reared in 1968 and were, therefore, about nine months old when planted.

Results. a. First examination, July 1969.

Wexford Harbour. The mean length of seed clams planted at site A (Fig. 1), was 13.5 mm in April. This site is at the margin of low water spring tides. The clams had increased to 18.5 mm by July, the 5 mm increment representing 37.0% new growth. About 2.5% of these specimens showed very little growth and there was 17.5% mortality, but from measurements of the size of the dead clams it was clear that they had died shortly after being planted.

Site B (Fig. 1), which is higher up the shore towards low water neap tide level, showed poorer growth and higher mortality. The average length of these clams when planted was 12.5 mm and had become 14.2 mm by July, representing only 13.6% increase. Approximately 50% of these specimens showed very little growth and the 21.5% mortality seemed to have occurred throughout the period after planting. Clams at site C were not examined on this occasion.

Bannow Bay. Site D (Fig. 1) is situated almost at the margin of low water spring tides. The average size of the clams at planting was 13.5 mm and by July had reached 17.2 mm, an increment of 3.7 mm or 24.7%. Mortality was about 14.0% and it seemed to have occurred throughout the planted period.

Site E (Fig. 1) is situated midway between low water spring tide and low water neap tide marks. Reasonably good growth was recorded in this site. The mean size at planting was 13.5 mm and 16.0 mm by July, an increment of 2.5 mm or 18.6% increase. There was little growth showing on 50% of the specimens and mortality was high at 80%. There was considerable evidence that many of the seed had been attacked by the predatory green shore crab (Carcinus maenas), two large specimens of which were discovered under the mesh of the frames.

Site F (Fig. 1), is located high up on the shore near low water neap tide mark, and from it the poorest growth rate was recorded. From a mean size of 13.5 mm at planting the seed clams grew to 14.3 mm by July, an increment of 0.8 mm or 6.0%.

The mortality was 14.0% and seemed to have occurred immediately after planting.

Cork Harbour. Site G (Fig. 1) is located at the margin of low water spring tides and the mean length of these clams at planting was 13.0 mm and they increased to 17.0 mm by July, or an increment of 4.0 mm, representing a 30% increase. Mortality was 20% and appeared to have occurred in June, because most of the dead specimens were over 15.0 mm in length.

Site H (Fig. 1) is located at low water neap tide level and the clams had grown quite well, being 17.2 mm in length, an increase of 4.2 mm on their planted length and representing an increment of 31%. Mortality was again 20%, most of it having occurred in June. In both these cases, sites G and H (Fig. 1), unusual fresh water run-off could have spread over the planted area from the drained fields on the immediate shore. It was noted that these fields had been heavily treated with a herbicide some time prior to July.

Site I (Fig. 1) is located on firm sandy/mud, but by July this area had become so heavily covered with a dense growth of filamentous brown seaweed, that it was impossible to examine the seed clams and, at the same time, avoid disturbing them too much. Therefore, examination of these plantings was postponed until November, by which time the seaweed would have died away.

Oysterhaven. All seed clams were placed near the margin of low water spring tide, at site J (Fig. 1). The mean length of the clams at planting was 13.0 mm, and by July they had increased to 17.5 mm, or an increment of 4.5 mm, representing a 35% improvement. Mortality was heavy at 37% and most of this had taken place at or soon after planting, because over half the dead specimens had not exceeded the mean planting length. The mud in this area is of a heavy consistency and contains much sulphurated hydrogen and this, together with a large number of small crabs (unidentified) under the mesh of the frames, may have been largely responsible for the high

mortality. All the surviving clams were transferred to another part of Oysterhaven at site K (Fig. 1), where a more muddy sand constituted the substrate.

b. Second examination, August, 1969.

Cork Harbour. The clams had increased from 17.0 mm to 22.6 mm, an increment of 5.6 mm, represpenting a further 33% growth improvement. The yield of meat was 17% of the total whole live weight sampled. Once again clams at Site I could not be examined because of the brown seaweed covering.

Oysterhaven. The mean size of the clams had only increased marginally over their size of 17.5 mm in early July, though the effects of movement from Site J to Site K could explain this, because most bivalves suffer a severe growth check after transplantation. Mortality was again high at 35%. The yield of edible meat was found to be 13% of the whole live weight.

c. Final examination, October and November, 1969.

Wexford Harbour. The clams at site A had grown to a length of 31 mm by October, 1969, which represents a total increment of 17.5 mm, or 130% increase in the six months since they had been planted. Mortality remained constant at about 17% for the whole period. At site B further up the shore towards low water neap tide level, the final mean growth recorded was 23.1 mm, or an increase of 9.6 mm on planted size or an improvement of 71%. Mortality in this area was quite high at 27.8%. The clams at the highest section of Site C at low water neap tide level gave the poorest results, the final length of these clams being only 3 mm larger than their planted size, representing only 22% increase. This improvement was not offset by the low mortality of 6.0%.

Bannow Bay. These plantings continued to show high mortality, 44% at Site D and 42% at Site E. Growth at the best site (Site D) continued to show improvement from 17.2 mm to 20.7 mm, a further increment of about 20%. However, this was about 11 mm smaller than the best site - and 24 mm less than the neap tide site in Wexford Harbour.

Cork Harbour. By November the clams at Site G had increased from 17.0 mm to 25.0 mm and those at site H from 17.2 mm to 20.0 mm, representing increases of 47.0% and 20%, respectively. Mortality remained at over 20% in both cases.

For the first time since planting took place in April the clams at Site I were examined. Two of the frames could not be found and they may have been interferred with. The clams in the other frame had grown from 13.0 mm to 30.0 mm or an increase in size of 130% and had sustained a 25% mortality.

Oysterhaven. These clams were examined for the last time in 1969 in the month of November. They had increased in size from 17.5 mm to 22.0 mm (25%) and, at the same time, mortality dropped from 37% to 15%. These clams had been transferred from site J to site K and the drop in mortality is attributed to the better conditions prevailing in the latter site.

Discussion. The data from all these sites are given in Table 1. From these data, two sites emerged clearly to be suitable for growing clams, namely Wexford Harbour (Site A) and Cork Harbour (Site I) where, at the end of the first growing period, the increment more than doubled the length at planting. At Wexford Harbour mortality was 8% less than in Cork Harbour, suggesting it to be the best site so far tested. Neither Bannow Bay nor Oysterhaven appear to be suitable for clam culture, the growth rates being slow and the survival rates low.

Furthermore, planting the clams at or as close as possible to extreme low water spring tide level, produces the fastest growth rate. At the same time, clams so far down the shore as this present management difficulties, because there is only a small number of spring tides low enough to expose them in this situation.

Those clams placed in the heated waters of the lagoon at the outflow from the E.S.B. generating station at Tarbert, Co. Kerry have not yet been examined closely enough for details to be included in this leaflet.

TABLE 1. Results of planting Mercenaria mercenaria in four localities in 1969.

Site	Average length at 1st. planting (mm)	Average increase in length (mm) by October/ Nov., 1969.	% Mortality	Length of Clams in October/ Nov., 1969	Total increase in length as a percentage.
Wexford Harbour					
Site A (Fig.1)	13.5mm	17.5mm	17%	31.0mm	130%
Site B (Fig.1)	12.5mm	10.6mm	27.8%	23.0mm	84%
Site C (Fig.1)	13.0mm	3.0mm	6.0%	16.0mm	23%
Bannow Bay					
Site D (Fig.1)	13.5mm	7.2mm	40%	20.7mm	53%
Site E (Fig.1)	13.5mm	4.2mm	40%	18.7mm	31%
Site F (Fig.1)	13.5mm	2.3mm	40%	15.8mm	19%
Cork Harbour					
Site G (Fig.1)	13.0mm	12.0mm	22%	25.0mm	92%
Site H (Fig.1)	13.0mm	7.0mm	23%	20.0mm	54%
Site I (Fig.1)	13.0mm	17.0mm	25%	30.0mm	130%
Oysterhaven					
Site J (Fig.1)	13.0mm	4.5mm	37.0%	17.5mm	62%
Site K (Fig.1)	17.5mm	4.5mm	15.0%	22.0mm	

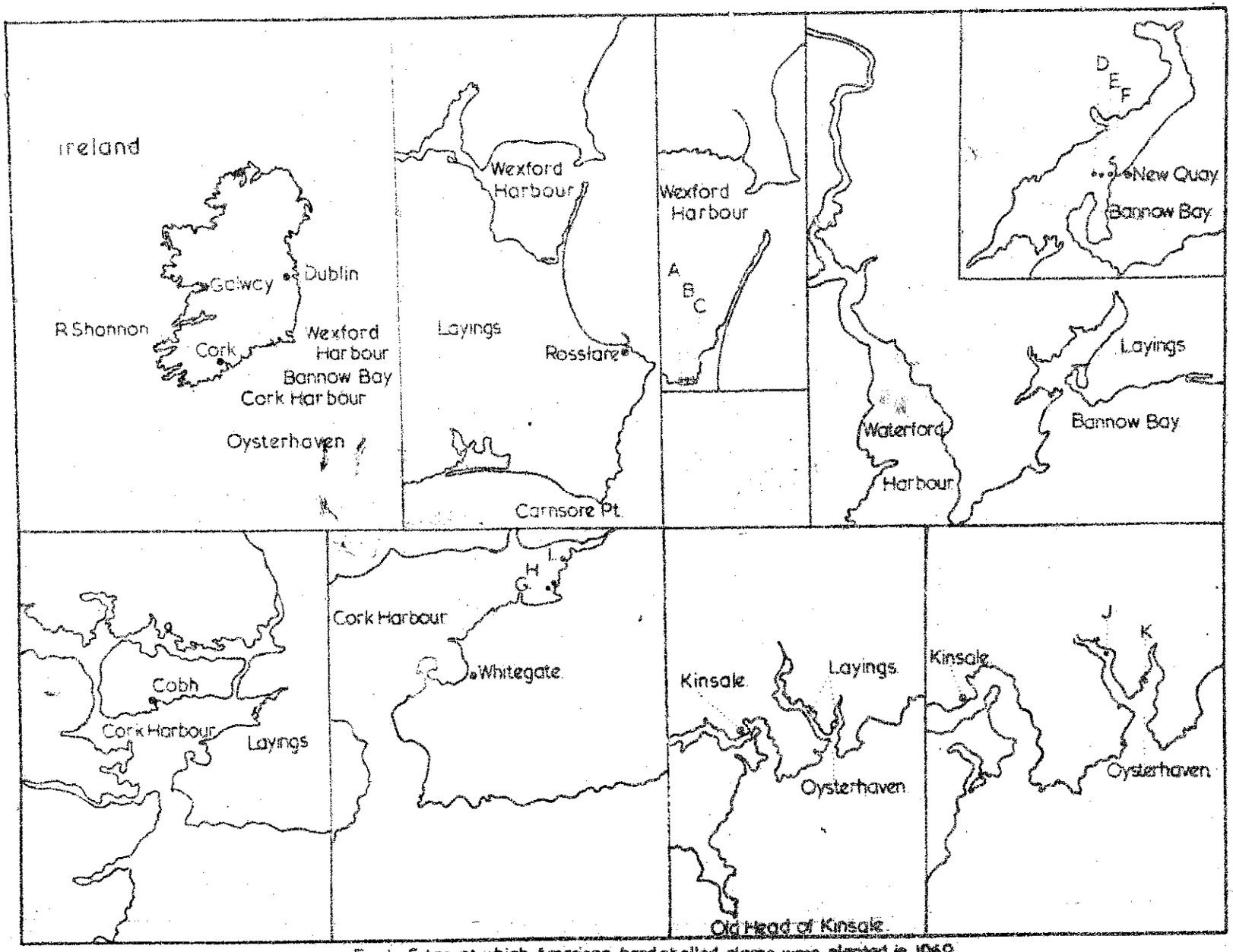

Fig 1 Sites at which American hard-shelled clams were planted in 1969