

By using the same type as the above mentioned vessels, the largest fishing unit in Spain, *Pescanova I*, will put to sea in 1963. She was the old Spanish liner *Habana* of 16,000 tons and is being transformed in Galician shipyards into a factory and mother ship. She will have an auxiliary fleet of 10 "combination" vessels, able to trawl, seine and fish with long-line. It is believed she will be able to make three voyages per year to south Atlantic fishing grounds and bring back on each voyage 4,500 tons of frozen fish—in the round and filleted—and 3,000 of fish meal and other products.

The Outlook for Europe

The creation of a power to catch fish in such quantities, destined to operate in seas richer in fish than the north Atlantic, introduces an important change in the European fishing system.

From now on Europe will have an additional source of supply which will not diminish by over fishing for many years to come. The fishing grounds of the southern seas are now open to the north, they had hardly been exploited

for many centuries and will contribute generously to the world's requirements.

It seems that the high content of phosphorous and nitrogen in these waters (recently revealed by surveys of the "Geophysical International Year") ensures a high primary productivity. This basic richness was well proved in the Pacific with its high production of shellfish, tunny, etc., but now it is the south Atlantic's turn.

Though this comes rather late for us, it should be received with hope. Japan and Russia began the re-discovery but to maintain their effort on a large scale their bases are not placed as favourably as those of western Europe.

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OYSTER CULTURE IN MOROCCO

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ALTHOUGH not yet widely known among the population, the edible oyster is no stranger to Morocco. In 1931 Professor Gruvel mentioned a sales volume of more than five million of these bivalves and suggested an attempt with the culture of oysters in lagoons on the Atlantic coast.

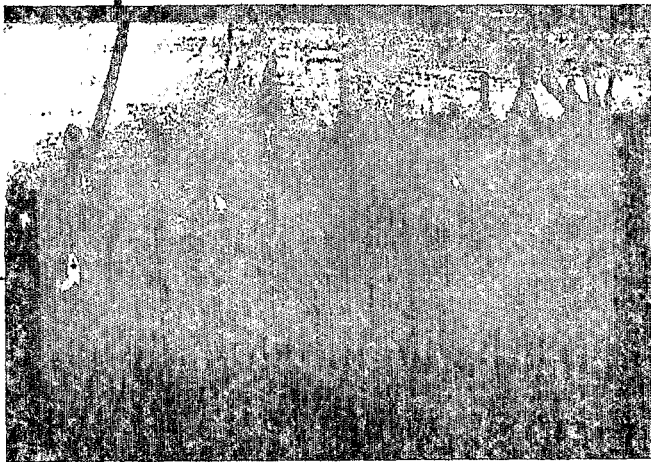
At that time oysters were imported from France and Portugal and, in order to create an equilibrium between the irregularities of importations and sales, all that could be done was to keep a certain stock in carefully prepared beds on the coastal rocks. An oyster culture in the proper sense was, however, non-existent.

Oyster Beds at Larache

An oyster culture of the European type on the Moroccan coast seemed a hazardous enterprise in view of the

geographic situation of Morocco, far south of the normal occurrence of the two species of the usual cultures, *Ostrea edulis* and *Crassostrea angulata*. However, on several spots along the coast, in particular in a lagoon north of Rabat, at Moulay Bou-Selham, shells of dead oysters had been found, and later even living oysters of the "Portuguese" kind were discovered near Larache, in the estuary of the Loukos river, about 100 km. south of Cape Spartel. The search for the main oyster bed on the coast, begun in 1956, was only successful in 1959.

Natural oyster beds of Larache consist of isolated spots, restricted to sporadic outcrops of bedrock on the otherwise sandy and muddy riverbed, stretching from just above the mouth of the river to two/three kilometres upstream. Although every outcrop of the bedrock is covered by oysters, as a whole these beds are too spotty

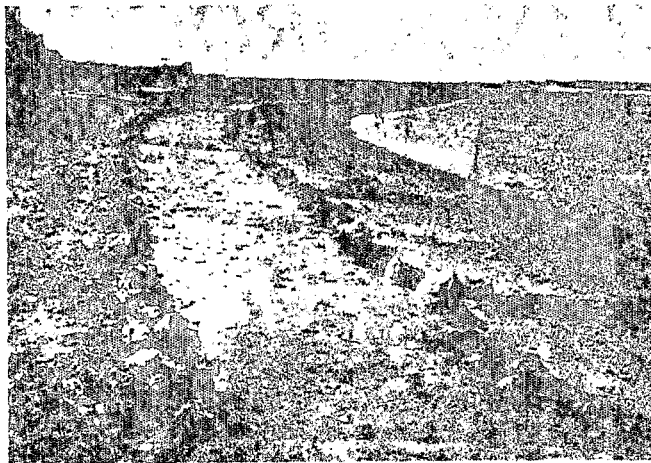


Cultches in the Loukos river at low tide.

to be economically of any value and the state of the river banks prohibits implantation of proper oyster fields. Its importance was the fact that climatic conditions on the Moroccan coast proved to be favourable for the existence and reproduction of the "Portuguese" oyster.

Beginnings of Oyster Culture

After a first unsuccessful attempt, satisfactory results with an oyster culture were obtained in two lagoons between El Jadida (Mazagan) and Safi, the lagoons of Sidi-Moussa and Oualidia.



Beds for final development in the lagoon.

After laying-out beds for stock and beds for the final development, a start was made with the implantation of seed oysters imported from Portugal and France. The most suitable stretches in the lagoons had still to be found to render economic exploitation possible. This trial-and-error method led repeatedly to serious mortality among the seed oysters but finally satisfactory conditions could be established and the oyster culture became a success. Growth of the seed oysters proved to be much

faster than in Europe, yielding in only one and a half years oysters of all sizes fit for consumption, whereas in France this takes three years. This rapid growth is probably due to:

(1) Oyster density per square metre on the cultches is much smaller than that in European fields.

(2) Water temperature during the winter months is relatively high, the lowest temperature in January is still around 13° C. Under such conditions the oyster can feed normally and grow throughout the whole year. Diagrams of weight variation are clearly indicating that rate of growth is decreasing only very slightly during the winter months.

In 1958 the two oyster farms could produce 1,500,000 oysters of excellent quality, and in the period 1961-62 more than 3,200,000. Till 1960 all these oysters originated from imported seed oysters. After the success with growing in the fields, it was tempting to start also the complete culture cycle on the spot.

Right from the beginning of exploitation of the lagoons, mature oysters were placed into deep beds together with seed oysters, the former imported from France and Portugal. This turned out to be not much of a success. The ecologic conditions being entirely different from those in European fields, adults only produced very few seed oysters and most of these usually died after a few months. On the other hand, some of the adults collected from beds in Larache produced in abundance a much more robust crop. Unfortunately, this natural bed is far too small to yield the desired quantities, and so an attempt was made to implant at Larache cultches for seed oysters.

First trials were promising and in 1961 a greater surface of cultches were placed in the river. For the cultches, or stools, different materials were tried: strings of empty shells, moulded sheets of cardboard and of asbestocement, and various others. From July on, seed oysters abounded on all cultches. In October they were transplanted into the cultivation fields and removed from their supports. They are now growing very fast and by the end of 1962 will probably be of commercial quality, a remarkably good result. In the season 1962-63, the first really important sales of genuine Moroccan oysters should reach about 500,000.

This system is unusual in so far as the cultches for the seed oysters are at a distance of about 500 km. from the culture fields, and these oysters have to be transplanted within less than six months after their fixation in order to avoid destruction by floods in the winter months. These difficulties led to the attempt to implant cultches in the lagoons with the oyster fields. Up to now the results have been disappointing, mainly because of the unfavourable hydrologic conditions. The afflux of fresh water is fairly constant but insufficient so that the salinity rarely drops below 29‰, which is altogether too high. However, oysters from the Loukos river have adapted themselves to unusual ecologic conditions and it is hoped that through natural selection a stock able to reproduce itself in water of high salinity can be bred. In any case, the perseverance of the two establishments of oyster culture, with the co-operation of the Institut des Pêches Maritimes du Maroc, has succeeded in founding a real oyster culture in Morocco within five years.