

Spent Hearing. 1933-34

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Annual Concentration of Spent Herring along the French and Belgian Coasts in 1933—1934.

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An almost unmixed concentration of spent herring appears regularly every winter in the coastal region between Cape Gris-Nez and the Scheldt. This phenomenon has been studied continually at the Ostend laboratory since the year 1930, new series being added every year to the "biological scale" of the visiting shoals (see diagram attached).

The prominent feature for last season, 1933—1934, was that the shoal remained, all the time, very far out in the western part of the coastal band, round about Calais and Cape Gris-Nez and even further west in the Channel, and a long distance from the coast. As a consequence small motor boats from Ostend were prevented from carrying on a profitable fishery, on account of the cost of fuel. The spent herring fishery of this year was in fact a complete failure as far as the fleet of small crafts using the "stroop-net" was concerned. The larger vessels, however, contrived to make paying hauls with the trawl in the West, and from these vessels we obtained for study 60 samples of spents in good condition.

The result of the complete analysis of 1479 individuals leads us to the following remarks:—

1. As shown by the diagram, the year-class 1929 attained, in the ultimate series added to the biological scale in 1933—34, the unusually high proportion of 52.7 %.

2. An additional interest is imparted to this striking feature by the fact that a very high percentage of that same class, 1929, has been noticed simultaneously by various observers, thus:—

J. J. TESCH:	52.8 %;
J. LE GALL:	50—60 %;
G. GILSON:	52.7 %.

This similarity of observations, made quite independently in different parts of the continental coast, shows the efficiency of the scalimetric method, as well as the accuracy of the work done, and can be considered very satisfactory.

3. Another peculiarity of the season is the fact simultaneously observed by Dr. TESCH, on the Dutch coast, and by Dr. BÜCKMANN, in the German Bight, of the extreme scarcity of young herring, in the first post-larval stage that usually appear off the eastern part of the coast in May and June, whilst we, on the contrary, in and around the harbour of Ostend noticed an extremely abundant concentration of

post-larval herring either in the pre-scaly stage or beginning to assume the characteristic silvery aspect. We found, by counting the vertebrae, that the catch made with a stramin-net contained only 1 % or 2 % of young sprat.

This unusual abundance of unscaled clupeids was striking enough to attract the attention of some fishermen who considered the possibility of starting a whitebait fishery, should they be plentiful next year, for the English market, whitebait not being consumed in Belgium.

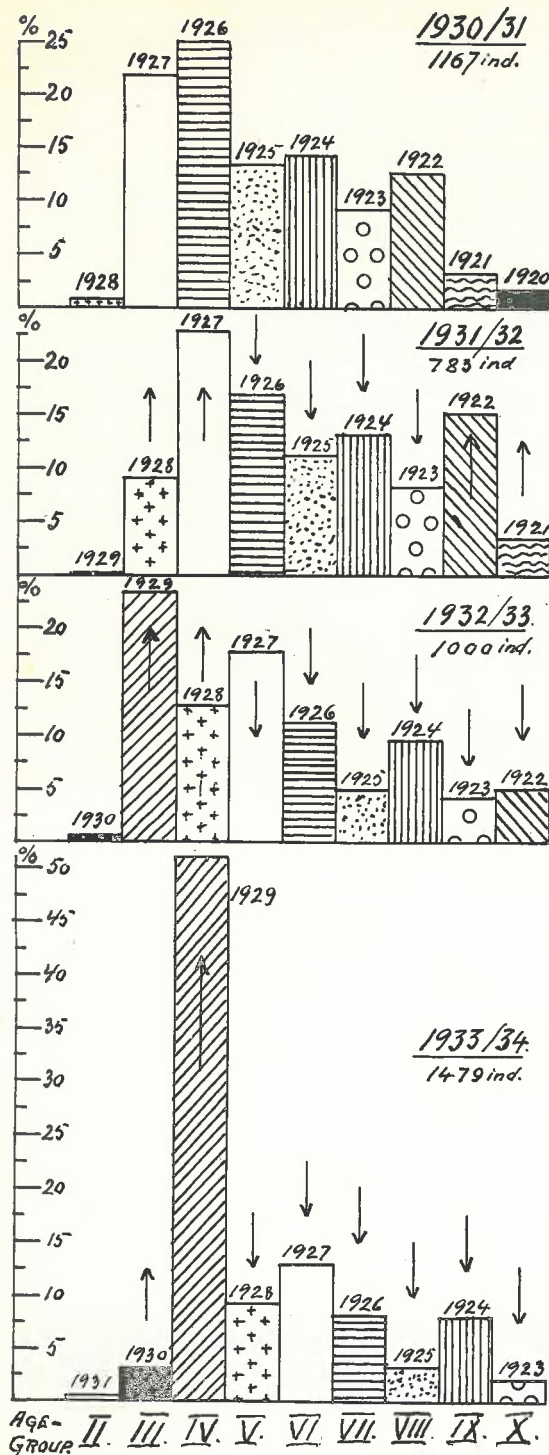
4. These three sets of corresponding facts may be noted: a scarcity of unscaled young herring in the East, — German Bight and Dutch coast;

an abundance of these same young fish in the West, — Ostend and the Belgian coast; and

the continuance in the extreme West, of spent herring, the progenitors of these shoals of unscaled young.

5. The cause of the persistence of the seasonal shoal of spent herring in the west seems to be connected with the small influx of Channel water into the North Sea as observed by British and French hydrographers. The annual submarine wave of Atlantic water, warm, highly saline and repulsive to northern herring, not having invaded the Southern North Sea as largely as it oftentimes does, the breeding concentrations coming from the north have been allowed to travel, unopposed by contrary conditions, a long way towards the Channel. The low vertebral average, observed by LE GALL, TESCH and myself in all samples of southern herring, points to this conclusion. This, as well as many other considerations, makes us anxious to obtain, at an early date, complete information from the extensive observations of the British hydrographers as well as the results of the recent cruises of the French research vessel, „Président Théodore Tissier" in Atlantic and Channel waters.

It is hardly possible, in the present state of our knowledge, to obtain a general impression of the life-history of the herring in the most southerly parts of the North Sea. As a working hypothesis, however, we may try to draw the following sketch of the phases through which the fish progress during the first years of its *curriculum vitae*:



Biological Scale, 1933—1934.

In the late summer several successive shoals, coming from a northeasterly direction, appear in the region between the Hinders and the banks of the Thames estuary. They are nearly ripe and, in accordance with LE GALL'S recent hypothesis, contranantant in regard to the residual current of CARRUTHER'S. They travel South-West, until they meet Channel waters, salt, warm and unsuited to herring. At this point they stop their contranantant migration and, gradually maturing and abstaining from food, they simply keep swimming to and fro with the tidal currents. When entirely matured, at stage VI, they plunge into deeper water and reach the bottom in order to breed. The female lays its eggs, attaching them to solid objects, burrowing more or less into the ground and often swallowing sand, broken shells and even quantities of herring eggs deposited on previous occasions.

After breeding they remain some time in a condition of bodily weakness, drifting feebly with the tidal currents, taking no food and carried away more or less directly towards the continental coast. In that condition they are subjected to active fishing, mainly by Belgians, who have a market for spent herring at Ostend. Meanwhile they rapidly recover, fatten in their mesenteric lobes and reach the stage VIII—II of HJORT. About the middle of February they begin to take food again, consisting mostly, on our coast, of small copepods, especially *Temora longicornis*, and, shortly after, they become actively denantant and swimming away with the residual current in a North-North Easterly direction, they soon disappear from the vicinity of the coast. They spend several months in some remote unknown region, perhaps in a state of dispersion, feeding, growing and developing their gonads through stages III, IV and V. After a while they become contranantant again and swim South or South East into the median area South of lat. 52°. There, in some degree feeding and maturing rapidly to stage VI they concentrate in breeding shoals and move towards the Channel in search of the above mentioned breeding grounds. The shoals may intermix, in various proportions with Channel herring, distinct from the Southern North Sea herring mainly by the higher number of vertebrae, as pointed out by LE GALL, FORD and HODGSON. Interfecundation between the two varieties, however, cannot occur frequently, as the Channel herring appear to breed later than the Southern North Sea variety, and thrive in water with a higher salinity. According to these views, the position of the spawning grounds is not necessarily the same every year, and it is very important for fishery information to locate them exactly by means of systematic dredgings, the presence of eggs and of stage VI and VII in the trawl of fishermen giving entirely insufficient indications. They may be situated in any position West of the Hinders or in the area of Sandettie—Ruytingen or even much further South, across the Straits, in the Channel.

The new generation, issued from the spent herring

still hovering in the spawning regions, is hatched from the bottom eggs in a short time and the tiny larvae with yolk sac and passively planktonic, are carried away by the residual current. They soon shed their yolk sac and commence feeding on microplankton, growing in size and muscularity. Finally they transform themselves into shore larvae, and are soon able to swim towards the coast accumulating in certain places, in the form of whitebait, as they approach the scaly stage. It seems obvious that, when their birth place is situated far away in the West as was the case in 1933—34, they may reach the stage of shore larvae in western points of the coast, like Ostend, and fail to reach the North of Holland and the German Bight before becoming scaly. Conversely, when the spawning grounds are in an easterly region they may pass the Belgian coast, still in a planktonic condition, and attain the shore-larval form only when they arrive further East, accumulating as whitebait on the Dutch and German coasts. After some weeks in the scaly condition and growing rapidly to the size of 7 to 10 cm. in the immediate vicinity of the shore and in harbours or inlets, they leave the coast altogether and are not seen again, except later on when

they are caught in abundant numbers by fishermen, intermixed in varying proportions with shoals of sprat.

Meanwhile, herring of the Channel type, with a higher vertebral mean, may have penetrated more or less into the Southern Bight, along the English coast (LE GALL), very likely under the different hydrological conditions prevailing there. They may be a really distinct local variety with a *curriculum vitae* somewhat diverging from those already described. There can, however, be a divergence of views about the fate of that larval offspring which is swept away by the residual current, such as also occurs in the case of planktonic larvae of the Southern North Sea variety. Do they afterwards separate and return to the Channel? A long series of observations is required before the real affinity and relationship between the two groups can be definitely settled.

This attempt to summarize the successive phases of the life-history of our southern herring is strictly conjectural, and in no way dogmatic; it is intended to emphasize mainly the necessity of international co-operation to solve the question of the annual return of the Southern Herring and of the frequent checks in its migration.
