

larva. It supplies the information of where the young are and what they are doing during this period. For the eastern oyster all stages of development between the egg and the spat are in the water about the parent oysters. For the western oyster the eggs and younger stages of development are retained in the mantle-cavity of the mother for about half the period, and the later stages from the straight-hinge to the full-grown umbo stage of the larva, are free in the water above oyster-beds. The free-living larvæ of both species can only be obtained for observation by some adaptation of the plankton method such as was first applied by myself. All the literature of this subject, with the exception of the little that has been copied by others without acknowledgment, has been written by myself. It includes the facts of their existence, their appearance, measurements, shape, and organization, the distinctions from other bivalve-larvæ and other plankton organisms, the time of year, place of occurrence, manner of life, rate of growth, age, when and at what size full-grown—in fact, all that seems useful to know about when, where, and how to procure, observe, and recognize the larvæ.

Up to the time of the earliest spawning and for one or two weeks afterwards there are no shell-bearing oyster larvæ in the water and consequently none in plankton collections. About two weeks after spawning has begun there appear little straight-hinge oyster larvæ in the catches. From this time onwards there come to be several sizes; the earliest have grown older and larger and other broods of younger and smaller larvæ have come on. The oldest grow to a limit in size beyond which there are no representatives in the plankton collections. They either become set as spat or they perish for lack of cultch or from other causes. In good places it is possible to go on taking plankton with oyster larvæ of various sizes in it for two or three months. As soon as one brood grows up and disappears a new brood ordinarily takes its place, so that the collections preserve a certain uniformity of appearance, although it is not from the same larvæ or the same broods. But the broods are not equal in numbers of individuals. The first that come on are few because they are from eggs that were spawned at the beginning of the warm weather, when only those oysters were ready to spawn that were in most favourable places. A little later a much greater number of oysters would be ready to spawn at one time. If the culturist has kept in touch with the conditions of the oysters on the beds he will know when the greatest amount of spawning has taken place and at what time to expect the largest swarms of larvæ. His plankton catches should agree with and verify this information and show when there will be the greatest number of full-grown larvæ in the water ready to set as spat. *This is the time to plant cultch.* As soon as the first of these larvæ attain to the maximum size the prepared shells should be distributed so as to offer a vast and suitable surface for attachment at a time when the masses are ripe for fixation. Good, fresh, clean, white shells put out at the time when there is an abundance of full-grown oyster larvæ in the water searching for places for attachment cannot fail to catch a good set of spat.

This is the information to which all my observations of structure, development, habits, and surroundings converge, as well as to which all my experiments point—when to bring together these two most important factors of abundance of full-grown larvæ and abundance of suitable cultch. The successful capture of immense numbers of spat is not only the cheapest way of obtaining one's own seed, but is the most satisfying intellectual and practical achievement within the grasp of the culturist.

All the information gained from former experience, from the examination of ripening oysters, from the observation of the process of spawning, from the finding of spawned-out individuals, from the procuring of older and younger broods of larvæ in the plankton collections, even from the putting-out of a few shells to see if occasional specimens of spat can be secured from the earliest broods of larvæ; all this information fits together as one piece and points to one conclusion—the proper time to plant prepared cultch. If this occasion is allowed to pass by unused the labour of gaining the information as well as of procuring, preparing, and planting of the cultch is largely lost. Cultch is of no use unless it is planted. If put out late it may still secure a fair although not so great a set. It is not possible to catch too many spat. If not captured in this way they will inevitably be lost. There may be more attached to some pieces of cultch than can find room to grow, but other pieces will not be overstocked. The loss from the many accidents to which they are exposed will not fail to thin them out in the end.

There is another reason why it is advisable to get the cultch into the water for the first large swarm of larvæ. Early spat are likely to have advantages over late ones in the fact that they have before them a longer period of warm weather and abundant food and will be