with water running in at one end and out at the other, and muslin round it to prevent anything running out," and never found any change in the condition of the spat; "it never assumed the form of an oyster, but was simply globules of matter, whereas the black spat, just when you see it, is a small oyster alive, oozing from the body."

Mr. F. Pennell, who has given considerable attention to the study of the oyster, says that it "has not been and cannot be ascertained that the white sick oysters become black sick, or *vice versâ;*" while it has been found that some oysters are white sick and some black sick, and that in a common-sense view it is natural to assume that one is a female and the other a male. As against this view Mr. G. Hart—no mean authority on oyster culture—states that "he kept the white spat for a period of fourteen days, and during that time it gradually changed into black spat." During this period he daily put one or more of the spat under a solar microscope, and making drawings from it he found that the black spat developed itself into small oysters. He therefore concluded that the spat when white should not be emitted from the shell, "it lying in the mouth of the oyster like a mass of cream, and, if things are going on rightly, it will remain there until it turns black before it is thrown out;" in fact, that the emission of white spat arises from accidental circumstances, the seed not being matured until it becomes of a black colour, when it is ready to adhere to its future home.

If Mr. Austin's theory be correct, and the emissions of the white and black spat are distinct, and similar in nature to the milt and roe of the herring, they must amalgamate for reproduction to take place. It is therefore important that the waters in which these substances are floating about, seeking to be intermingled, should not be disturbed by dredging, and thus their fusion be prevented. This important point will be further dealt with towards the end of this report.

9. *Age at which Spatting commences.*—Even the age at which an oyster begins to spat has not been clearly determined. Mr. Buckland is of opinion that an oyster spawns sometimes at three and sometimes at five and six years old, generally at from four to six, "when they become adult, and that would be before they were six years old." The age of the oldest oyster with which he was acquainted was from twelve to fifteen years, judging from the ridges upon its back. From three to seven years is the age at which an oyster is marketable in England, though at Arcachon, in France, it is fit for the market much earlier. He is also of opinion that oysters do not spat every year, for he says that "if all the oysters bred every year, there would be nothing but oysters at the bottom of the sea." Mr. Austin believes that oysters begin to spat at two years old, when about the size of half-a-crown. Mr. Baker is also of opinion that oysters spawn earlier than allowed by Mr. Buckland; in fact, oysters have been known to spat at a year old, but the spat was considered immature. There seems, however, to be no agreement among authorities on this point—a subject of regret, as it is highly undesirable that a bed should be dredged for sale before the oysters have had an opportunity of at least twice "proclaiming the story of their birth," otherwise their extermination becomes simply a question of time; it being borne in mind that all the oysters in one bed do not spat the same year. The Home oyster begins to be white sick, or to brew its spat, about the middle of May, and in the middle of June it begins to spat. The process is thus described by Mr. Buckland: "The old oyster opens her shells, and gives a quick clap with them, and sends out its spat in a great cloud. The best illustration I can give of it is to see the smoke of a railway engine on a frosty morning, or, as Mr. Pennell says, 'When it (spat) is emitted, it is more like a puff of dust from the road.'" M. Figuier, in the *Ocean World*, thus describes the process: "Nothing is more curious to witness than a bank of oysters at the spawning season. Every adult individual of which it is composed throws out a phalanx of progeny. A living dust is seen to exhale from the oyster bank, troubling the water, and giving it a thick cloudy appearance, which disseminates itself little by little in the liquid, until it dissipates and loses itself far from its focus of production."

10. *Movements of Spat.*—The parent oyster not being able to move, it is natural to expect the young fry should be provided with such means of locomotion as would enable them to colonize fresh tracts of ocean bottom, and, to quote Mr. Buckland, "Nature has provided each little oyster with a ciliated coronet: it is covered with a great number of very minute hairs or cilia; these minute hairs or cilia play with a very rapid action indeed, and they give these little oysters the power of swimming in almost any direction that the oysters like. I have observed that oysters when put in a large glass of water will remain mostly at the bottom; and that is very important to recollect, because what happens in the bottle is happening at the bottom of an oyster bed. They then remain at the bottom of the bottle, where they move about in a very rapid way, exactly like ants when you move an ants' nest. Then from time to time the little oysters swim up to the top with a wavy motion, and having got to the top they play about at the surface of the water just in the same way, or nearly in the same way, as you see the whirligig beetles on the top of ponds. Then, having done that, they sink again, and I think they close their shells when they sink, because they go down just like a balloon out of which the air is leaking."

To quote M. Figuier, "The spat is soon scattered far and wide by the waves, and unless the young oyster finds some solid body to which it can attach itself, it falls an inevitable victim to the larger animals which prey upon it. In this its infant state, when it has just left the protection of the parent shell, the microscope reveals the young bivalve as having a perfect shell, and having an apparatus, which is also for the time a swimming-pad, ready to adhere to the first solid body which the current drives it against. This pad or cushion is furnished with vibratile cilia disposed round the young shell. Aided by the powerful abductor muscles, with which it is also provided, this cushion is projected through the water at the will of the young inhabitant, which has every facility for the purpose." In fact, the baby oyster is blown into existence quite complete, the image of its mother, shell and all, with more than the usual advantage of youth over age in the matter of volition. It can not only open and shut its shell like its mother, but can, during its brief spring-time of life, go where it chooses or is driven. The wisdom of this provision of nature for volition is apparent, for the parent oysters would undoubtedly be smothered by their offspring were they all to remain on the same bed, and fresh ones would not be formed.

11. *Formation of Oyster Bed.*—Mr. Buckland mentions several instances of the establishment of