



BLIGHTS OF THE WHEAT.

CHAPTER V.

The fungi described in the previous chapters are those to which the principal fungal diseases of wheat are due; and that portion of this treatise being completed, it is time to proceed to the consideration of the ravages of certain minute animalculæ and insects whose effects are known to the farmer, without his being generally aware of the real character of the causes which produce them. The blights of this kind proposed to be investigated are such as are the results of the attacks of true and extremely small parasites. For the notice of other destroyers of the wheat there is no space; nor is it necessary, since they are within the reach of common observation, and do not require the aid of the microscope to reveal them. The first insect to be brought before the reader is one of the most singular of living creatures; and were its habits not thoroughly investigated and proved, they would seem almost incredible. Its attacks are confined to the farinaceous portion of the grain, which it destroys and replaces, producing the diseases known by the name of ear-cockle, pepper-corn, or purples. A grain of wheat infected by this blight assumes the appearance of a black pepper-corn, whence the second name is clearly derived. The whole ear is altered in appearance; the chaff husks open, and the awns become curiously twisted, so that such ears are easily distinguished from the healthy crop. The grains first turn dark green, and then black; and, as has been said, look exactly like little black pepper-corns. If one of them be divided into two with a pen-knife, it will be found completely filled with a dense white cottony mass, occupying the place of the flour, and leaving merely a little glutinous matter. These contents seem to the eye like a quantity of fibres, closely packed together in parallel directions; but if a little morsel is taken on the end of a pin, and put on a slip of glass and moistened, it will soon be seen to divide, and give a milky appearance to the water. But, on submitting it to a powerful microscope, the astonished observer will soon discover that the cottony mass is a dense body of living cel-shaped animalculæ, which often wriggle about with great vivacity.

Accordingly the name given to the disease is *vibrio tritici*, the cel of the wheat. The annexed diagram is a faithful representation of a grain of wheat cut across when occupied by these *vibriones*, and the downy mass as is seen, filling the interior.



Transverse section of a grain of wheat filled with *vibrio tritici*, magnified ten diameters.

In the other drawings, the cels are seen, as they are viewed by the microscope, magnified 130 diameters, and also the egg of one of them, with the young *vibrio* coiled up in it, magnified 200 diameters; to which reference will be subsequently made. Although it is only



Egg with the *vibrio* coiled up, magnified 200 times. The *vibriones*, magnified 130 diameters.

within the last four or five years that the attention of our men of science has been awakened to the real nature of this curious insect, for which we are more particularly indebted to pro-

fessor Henslow, its real character was not unknown to observers of the last century. In an interesting publication, which came to a second edition in 1764, entitled "Employment for the Microscope, etc.," by Henry Baker, Fellow of the Royal Society, this *vibrio* is noticed. His remarks on it are as follows: "The discovery of a certain kind of *anguilla*, or animals resembling eels, in blighted wheat, was accidentally made by my very ingenious friend, Mr. Turberville Needham, in the summer of the year 1743, in the manner described by himself in his curious book of New Microscopical Discoveries. These animalculæ are not usually lodged in such blighted grains of wheat as are covered externally with soot-like dust, whose inside is likewise frequently converted into a black powder; but abundance of ears may be observed in some fields of corn, having grains that appear blackish, as if scorched; and such, when opened, are found to contain a soft white substance, that, attentively examined, seems to be nothing else but a congeries of threads or fibres, lying as close as possible to each other in a parallel direction, and much resembling the unripe down of some thistles, on cutting open the flower-heads before they begin to blow. This fibrous matter discovers not the least sign of life or motion, unless water be applied to it; but immediately on wetting, (provided the grains of wheat are newly gathered,) the supposed fibres separate, and prove themselves to be living creatures, by motions that at first are very languid, but gradually become more vigorous, twisting or wriggling themselves somewhat in the manner of eels in paste, but always much slower than they, and with a great deal less regularity; for in them the head and tail are constantly moving contrariwise, and alternately, with the same kind of bending or undulation in the bodies of them all; whereas the animalculæ we are now describing have no uniformity in their motion, but bend their extremities sometimes differently, and sometimes in the same direction. If the grains of wheat are grown dry by keeping, and you cut them open in that condition, the fibrous matter is very distinguishable, and, on putting water to it, will separate with great readiness, and seem like fine tubes or threads tapering at both ends; but not the least motion or symptom of life will be perceived till they have been in water for some hours; nay, frequently they will never revive or come to move at all. But if the same grains be steeped in water for some hours, or buried for three or four days in earth, till they are fully saturated with moisture, and then opened with a penknife, on taking out a small portion of the white matter carefully, and spreading it thin upon a slip of glass, the animals may be seen bundled together, and extended longitudinally, but without motion; and though, upon the application of water, they will not revive so soon as those taken from fresh grains, whose moisture has never been exhales, yet, after abiding an hour or two in water, we have constantly found them alive and vigorous; and that notwithstanding the grains have been kept in a dry condition even for some years, of which I have a remarkable instance now before me.

"In the month of August, 1743, a small parcel of blighted wheat was sent by Mr. Needham to Martin Folkes, Esq., President of the Royal Society, with an account of his then new discovery; which parcel the president was pleased to give me, desiring I would examine it carefully. In order so to do, I cut open some of the grains that were become dry, took out the fibrous matter, and applied water to it on a slip of glass; but could discern no other motion than a separation of the fibres or threads,—which separation I imputed wholly to an elasticity in the fibres; and perceiving no token of life, after