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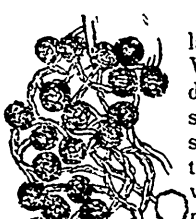
BLIGHTS OF THE WHEAT.

CHAPTER IV.

The fungus now to be described affects only the grain, and is one of the most common diseases to which wheat is subject. Unless, indeed, the precautions that will be pointed out are taken to prevent it, scarcely a field will be found free from its encroachments, which often extend to a most injurious degree. The botanical name of this fungus is *uredo fœtida*, or stinking rust, so called from its most disgusting odour, which may be perceived on passing through the field where it prevails; and if an ear or two be broken in the hand, the smell is intolerable. It resembles the stench of putrid fish, and adheres to the fingers, from which it is not easily removed. The farmers, as usual, have given it a variety of names, as bladder-brand, bunt, pepper-brand, and sometimes smut; which, however, properly belongs to the last-described fungus. The *uredo fœtida*, or bunt, its most general name, confines its ravages to the grain, completely filling the seeds it enters, and replacing the flour by a black disgusting fetid powder. This powder is a mass of spores. To examine them, open an infected grain, which is easily distinguished by its rounded, scaly, and dead appearance. The black matter will be found to have occupied the whole interior, and may be now looked at with the microscope. As in the case of the other fungi, take a very small quantity, and lay it on a strip of glass with a globule of water. Over this place a bit of the thin glass previously alluded to as useful in microscopic examinations. This will prevent a lens of high power touching the water. If considerably magnified, the spores present the appearance of a number of spherical fungi on their *mycelium*, or spawn, as they are here accurately drawn from some specimens given to the artist, Mr. Leonard, for that purpose. The group below shows the fungi magnified 375 diameters, while the single spore above is magnified 1,000 diameters; and the thread of mycelium is also magnified to the same extent.

Single spore magnified 1,000 diameters.



Group of *uredo fœtida* magnified 375 diam'rs.

Small as these spores are, they are much larger than those of the *uredo segetum*.—When a spore has been magnified 1,000 diameters, it has been seen by some microscopists to emit a cloud of sporules, but so small that no definite forms could be distinguished. The mycelium is remarkably well shown in these diagrams; and every person who examines this fungus with an eighth-of-an-inch achromatic, may very readily see the pedicels by which the spores are attached to it.

This uredo was very carefully examined by M. Bauer, and his drawings of the various points of interest in which it should be viewed, are made with his accustomed skill. He has not, however, shown the mycelium as it is shown here. Opinions seem in favour of the entrance of this fungus by the spongioles of the roots, and of their being propelled through the tissues by the ascending sap, as was stated in the case of the *uredo segetum*. This question will be discussed presently. It is when it enters the young ovum that it finds a suitable place for vegetating. When once there, all fecundation is destroyed by it; there is no development of the parts of fructification, and no embryo whatever can be detected. Still the grain swells on; and when the harvest is cut, the diseased grains are actually larger in circumference than those which are sound. Before they assume their final brown hue, the diseased grains are of a very dark green colour, and emit, when broken, the peculiar fetid smell previously mentioned. Singularly enough, the stigmata of the flowers are not destroyed.

M. Bauer's remarks on the progress of this fungus are well deserving of a place in every treatise upon it. He says,—"The earliest period at which I discovered the parasite within the cavity of the *ovule* of a young plant of wheat (the seed grain of which had been inoculated with the fungi of *uredo fœtida*, and sown the 14th November, 1805.) was the 5th June, 1806, being sixteen days before the ear emerged from its hose, and about twenty days before the sound ears, springing from the same root, were in bloom. At that early stage, the inner cavity of the ovum is very small, and, after fecundation, is filled with the albumen or farinaceous substance of the seed, and already occupied by many young fungi, which, from their jelly-like root or spawn, adhere to the membrane which lines the cavity, and from which they can be easily detached in small flakes, with that spawn. In that state their very small pedicels may be distinctly seen. At first, the fungi are of a pure white colour; and when the ear emerges from its hose, the ovum is much enlarged, but still retains its original shape; and the fungi rapidly multiplying, many of them have then nearly come to maturity, assumed a darker colour, and having separated from the spawn, lie loose in the cavity of the ovum. The infected grains continue growing, and the fungi continue to multiply till the sound grains have attained their full size and maturity, when the infected grains are easily distinguished from the sound ones by their being generally larger, and of a darker green colour; and if opened, they appear to be filled to excess with these dark-coloured fungi. But the grains in-

A healthy grain of wheat. A grain of wheat affected by the *uredo fœtida* with which it is filled.

fected with the *uredo fœtida* very rarely burst, and these fungi are seldom found on the outside of the grain; but if a grain be bruised, they readily emit their offensive smell, which is worse than that from putrid fish. When the sound grains are perfectly ripe and dry, and assume their light brown colour, the infected grains also change, but to a somewhat darker brown, retaining, however, the same shape which the ovum had at its formation, the rudiments of the stigma also remaining unaltered."

The sketches here given will convey to the reader a correct idea of the form assumed by the grain when occupied by this fungus. The dark green colour of the infected grains is merely a common effect of the presence of the mycelium of fungi. Mr. Berkeley, in a note to his masterly paper in the Journal of the Horticultural Society on the disease of the potato, remarks—"It is well known that the presence of the mycelium of fungi acts as a stimulant to the chlorophyl: witness the rich tint of fairy rings. A curious instance has, within a few days,