

It will enable us to guard against and counteract some of the diseases to which our most valuable crops are subject, and save in this manner thousands to the State. I have, as far as my limited time allowed, been making some observations on the nature and causes of rust in wheat, a disease which frequently, in a few hours, destroys the labor of a whole year, and I am certain that a remedy will be found for this destructive enemy of the wheat crop. I shall give a brief abstract of the reasons on which this belief is founded, so that they may be corrected by the observations of others, if unsound: and I hope that some who may have greater opportunity than myself, may study the subject, and give the public the benefit of their investigations.

Rust in wheat has been attributed to many and various causes, but as some of them are not always present, and in some cases all are absent, it cannot be said that the exact cause of it has hitherto been determined. Many circumstances may attend the development of this disease, but until some connection be shown between them and the production of the disease, they can only be viewed as accidental and not as essential attendants.

If we find rust occurring always under particular circumstances, all of which are in action when it is produced, we must attribute its production to the influence of those circumstances. We shall then know, from a knowledge of the causes, how they can be counteracted. To understand fully the nature of these causes, it is necessary to remember that the stalk of wheat is filled with numerous sap vessels, by which the matter in the soil necessary for the perfection of the grain, is carried to it. If those vessels be broken, burst or injured in any manner, the supply of nutriment to the grain being cut off, it cannot be perfected. I believe that the rust is nothing more than a fracture or bursting of the vessels of the stalk, destined in the economy of the plant to carry nutriment to the grain—I believe it for the following reasons: It always occurs in warm damp weather, at a time when the external pressure of the atmosphere, from its lightness, is least, and when the outward pressure of the *juices* of the stalk, from heat, is greatest. We have here two efficient causes for the bursting of the vessels, either one of which being absent, rust is never produced; for no matter how damp the weather may be, if it be cool, there is no rust; and no matter how warm it may be, if the weather be dry, (in that condition in which the pressure of the atmosphere is greatest,) there is still no rust. Again, rust occurs in that particular stage of the growth of wheat when the stalk commences to harden; it does not happen before, because the vessels would expand without breaking, it cannot happen afterwards, because they have become sufficiently strong to resist the expansion of whatever sap they may contain.*

*These fractures are distinctly visible by means of a good microscope. This instrument, which has afforded such great facilities to many other branches of science, had never, as far as I can