

## RUST IN GRAIN FIELDS.

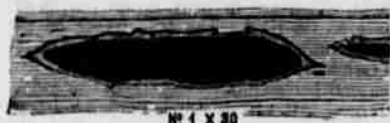
The manner in which the rust insinuates its mycelium (answering to the roots of other orders of plants) into the substance of the grain, disrupts the epidermis and turns the material intended for grain maturing into a mass of reddish spores or "powder" may be seen by the small engraving on this page. This engraving shows a part of the rusty grain stem or leaf as it appears under the microscope. The thread-like "rooting" of the fungus is seen in Fig. 2, working its way into and among the cells which compose the substance of the grain plant, and Fig. 1 shows the opening made in the surface or epidermis, which is filled with the reddish spores or dust which is discharged upon the hand or clothing which touches the grain, and which by agitation is thrown into the atmosphere in such numbers that men and animals working in the rusty grain are tinged with red, very much as are the workers in deposits of red iron ore. The rust fungus assumes various forms at different periods of its growth and has spores or reproductive bodies of different characters. The engraving shows at Figs. 3 and 4 two forms of spores which the fungus throws out at other periods of its growth.

The ruinous effect of rust upon grain, the disheartening spectacle of a promising field covered quickly with a destroying fungus growth, are known to most grain growers. The ill effects of the rust upon harvest laborers, and the danger of feeding rusty hay or straw to animals are also points of frequent observation. It is interesting to know in what the poisoning power consists. Upon this point there are a few interesting observations to make. The spores of different fungi have different effects upon the systems of men or animals. The analysis of one, for example, that known as ergot, shows the existence of an organic poison, ergotism, which is violent in its action. Other fungi spores produce transient illness and discomfort, probably by their irritating effect upon the tissues of which the organs of the system are composed. Of this class is the fungus known as corn smut (*Ustilago maydis*). Corn smut was analyzed last year by Prof. Kedzie, chemist to the Kansas State Board of Agriculture, and found to contain no active poison as exists in ergot, and yet smutty corn stalks fed to cattle produce ill effects. Prof. Gamgee, at one time employed by the U. S. Government to investigate this question, decided that the smut in connection with the hard indigestible fodder of the corn stalk induced impact of dry matter in the stomach of the animal and produced the disease commonly known as "mad itch." The spores then acted as a dry insoluble mechanical irritant and prevented the stomach from disposing of the hard stalks, but the spores in connection with moist food and plenty of water did not injure a cow which, in one series of experiments, ate more than 20 pounds of clear smut in her mashes.

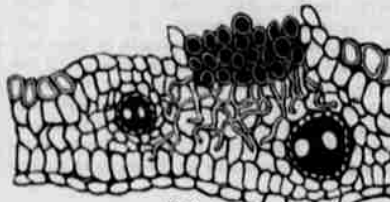
It is quite probable that rust spores are similar in their effect upon the animal to corn smut; that is they act as a temporary irritant, and if conditions are favorable the system conquers and disposes of them. Were it not so there would be a far greater mortality among animals fed upon rusty hay. Where the animal is well nourished, and has plenty of water and moist food, the influence is temporary; if the food is hard and dry and spores very abundant the danger is greater. Every year that rust is prevalent in grain fields there are reports of sickness among cattle in different parts of the States. We have also on record numerous instances of poisoning by rust spores in other parts of the world, and they are quite similar in their symptoms and results. For example, a German report tells of seven oxen fed on rusty barley straw, which lost flesh, stood with their backs arched and necks twisted, dribbling saliva from their mouths, unable to get food into the oesophagus, coughing hoarsely, evidently from the

presence of food in the pharynx irritating the epiglottis, voiding hard faeces with great effort, and some of them after several days undergoing paralysis of the hind quarters and were then killed. The others were put upon a diet of green clover and a little hydrochloric acid put in their water, and recovered slowly but completely. These indications point to mechanical irritation from the rust spores rather than true poisoning, for the trouble passed away as soon as the system was thoroughly purged of the cause.

The effect produced by the rust upon harvest laborers is also compatible with the idea of mechanical irritation. Not long ago at the Botanic Gardens in Edinburgh, the assistant to the botanical professor was preparing for demonstration some dried specimens of a large puff ball, filled with dust-like spores, which he accidentally inhaled and was for some time confined to his room under medical attendance from the irritation which the spores caused. And yet there are fungus spores which are said to be dreadful in their effects. There is a black rust which attacks the large reed (*Arundo donax*) growing in the south of Europe, the spores of which produce violent headaches and other disorders among the laborers who cut the reeds for thatching. These spores are also credited with producing violent eruption of the face, and symptoms of inflammation and swelling in other parts of the body much like those known to attend poisoning by "poison oak." It cannot be that grain rust is so grievous a poison as this reed-



No 1 X 30



No 2 X 100



No 3 X 200



No 4 X 200

## GRAIN RUST, AS SEEN WITH THE MICROSCOPE.

rust of Europe, because, although laborers in rusty grain fields get their bodies colored and their systems charged with the spores, the effects though very uncomfortable, are not fatal nor ultimately dangerous.

The most important feature in all the wide range of discussion of the rust fungus is to determine some method by which our grain growers may be relieved from the great loss which it occasions them. This most vital point is the most obscure, although widely studied and experimented upon. As we stated recently, the Australians are discussing the advantage of offering a premium of \$25,000 for a successful antidote. The nature of the fungus and its dissemination make it impossible to reduce its spread as is done with smut by soaking the seed in blue-stone water. The rust is wholly independent of the seed. It will grow on other plants than cereals, as on certain shrubs and weeds, and then when conditions favor its reproduction it rises in its might and ruins the growing grain. One line of avoiding rust is by selecting varieties of wheat which are shown to be less liable to rust than others. Investigations for rust-proof wheats have been long pursued, and it has been shown in England that the softer stemmed wheats are more liable than the harder.

## LANGSHAN FOWLS.

The Langshan fowls are now occupying considerable attention in English poultry circles. The writer says he is convinced from examination that whatever affinity they may have to the Cochins race, they possess sufficient characteristics to entitle them to the possession of a claim as a separate class from Cochins. It appears to him also that they are well adapted for farmers' poultry, and that few breeds are more suitable for farmyards. These fowls are remarkable as winter layers, at a time other hens are idle. Beginning in the autumn, they will lay from 90 to 100 of fair and rather over the average size of eggs. They are careful mothers. The male birds weigh from 8 to 12 pounds, the hens from 7 to 10 pounds. They make weight rapidly on ordinary fare, averaging something like a pound a month for the first six months. The writer has not tested them as table birds, but is informed that they rank only second to game for the flavor of the flesh. Thus, they are hardy, fertile, and possess plenty of weight for the table—three most essential qualities for the farmyard. There were some beautifully feathered birds among the flock examined, so level and smooth as they, and the neck and wing feathers a beautiful beetle green, shine and scintillate in the sun in a variety of hues. They also possess the pink skin between the toes, which is not found in the Cochins, and the tails and other contour of the Langshans are dissimilar from Cochins. The gentleman who is raising them extensively in England says that so long as they are supplied with green food occasionally in the form of a sod of grass, they thrive and lay almost equally as well as those which have the range of the farm. The hen chickens begin to lay at five months old.—*Agricultural Gazette*.

**THE MONT VENTOUX METEOROLOGICAL OBSERVATORY.**—Some time ago M. Bouvier, Engineer-in-Chief of Bridges and Highways in the Department of Vaucluse, took the initiative in advocating the construction of an observatory at the summit of Mont Ventoux. Considerable subscriptions in aid of the good work have since flowed in from friends of agriculture and of science, and at its last meeting the Conseil General of the Department, at the instance of M. E. Raspail, voted a sum of 20,000 francs towards the construction of a road giving access to the site. The contemplated work may now, therefore, be considered on the high road to success, and its completion will be regarded as a subject of legitimate congratulation, for an observatory at this point should furnish valuable data, which, combined with those collected at Pied-du-Midi and Puy-de-Dôme, will render complete the system of meteorological studies for the whole of the south of France.

**RECORDING THERMOGRAPH.**—An ingenious arrangement, capable of being utilized for recording the temperature of mines, has been patented by Mr. Bowkett, of the Leeds Fever Hospital. It consists of a hollow tube similar to that in the Bourdon pressure-gauge bent into a semicircle and filled with a suitable fluid, one end hermetically sealed, the free arm of the other operating a lead-pencil which marks on a dial, moved by clock-work, and which is divided by radii into hours, and provided with concentric circles for indicating the range of expansion and contraction.

A PRETTY girl won a musket in a lottery. When they gave it to her she asked, "Don't they give a soldier with it?"

THE compositor who made it read, "In the midst of life we are in debt," wasn't much out of the way.

THE frog is the only animal that gives up tale-bearing after its period of adolescence.

ONE thing in which two heads are better than one—A barrel.