

insects carrying the sticky ooze on their bodies, or by incompletely disinfected tools. Bacteria have not the same power of directly entering the tissues of plants which many fungi possess, the cuticle or protecting membrane which envelops the greater portion of a plant being sufficient to keep them out. They can only obtain entrance where this has been broken by wounds, insect-punctures, etc., or where it is naturally absent, as at water-pores, breathing-pores (stomata), or delicate structures like nectaries or growing points. Once inside the plant, however, they usually show their effects rapidly, either killing the host-cells outright as in fire-blight, or plugging up the sap-tubes with their masses, thus causing various "wilts." In some cases, however, as in crown-gall, the cells are not killed, but stimulated to increased division, forming masses of abnormal tissue. Owing to the way in which infection takes place, spraying has not the same direct effect in controlling bacterial diseases that it has in many fungus ones. On the other hand, spraying and other measures for the reduction of insect pests are of the greatest importance indirectly, owing to the part played by insects in spreading such diseases. The complete and prompt destruction of affected plants or parts of plants which would otherwise serve as centres of infection is also of the utmost importance.

IMMUNITY AND RESISTANCE.

It is well known that some varieties of a plant are much more subject to certain diseases than are others; in other words, the former are more susceptible and the latter more resistant. Among apples, for example, the McIntosh Red is much more resistant to fire-blight than is the Spitzenberg. This relative resistance, however, may be completely reversed if taken with reference to some other disease; e.g., McIntosh Red is one of the most susceptible of all varieties with respect to apple-scab. Similarly, different individuals of the same variety under identical conditions may show different degrees of resistance to a disease, while the condition as regards growth, nutrition, etc., may make a vast amount of difference. Trees making an excessive sappy growth are much more susceptible to fire-blight; roses subjected to sudden chills are more liable to be attacked by mildew. Resistance is, therefore, the resultant of a complex set of factors, including the nature and constitution of the host-plant, the nature and vigour of the parasite, and the various factors which may modify one or the other. A parasite may be grown under artificial conditions in such a way that it almost or quite loses the power of attacking a living plant. On the other hand, it may be cultivated in such a way that it becomes increasingly virulent.

By immunity we mean a resistance so complete that the diseases cannot develop at all in the "immune" plant. Complete immunity of one cultivated variety of a plant to a disease affecting other varieties of the same kind of plant is rare; e.g., while there is much difference amongst varieties of apples in the resistance they show to fire-blight, there is no variety known which is absolutely immune. On the other hand, the less closely related plants are, the less likely are they to suffer from the same disease. Fire-blight, for instance, is only known to attack plants belonging to the family Rosaceae. Plants outside this family are immune. The fungi causing apple and pear scab resemble each other so closely as to be practically indistinguishable, but the apple-scab fungus will not produce scab on the pear, and *vice versa*. The *Rhizoctonia* fungus, however, which sometimes causes serious injury to the potato-crop, is apparently able to attack a wide variety of plants, ranging from potatoes to garden asters. It is probable that in future the greatest advances to be made in the control of plant-diseases will be in the development of resistant varieties by means of selection and hybridization. At the same time, it is to be borne in mind that the type of plant desired by the consumer, and consequently by the cultivator, is usually one far removed from the "normal" as seen in the natural plant, and in the nature of things more susceptible to disease. The so-called "improved" plants are usually only such from the consumer's point of view, and not from the standpoint of the vitality of the plant. The juicy, high-flavoured fruit or vegetable usually