

The fruits are infected shortly after blossoming, and at this stage may be seen to be partially covered by the fungus. At this stage the delicate epidermis becomes damaged, so that later, when the fruits approach maturity, the epidermis is seen to be decidedly russeted, the markings appearing either as a delicate brown or yellowish tracery over the surface (Fig. 4), or as scabbed and deformed areas on one side, but more frequently on the stalk end of the fruit. This may be followed later by the appearance of concentric cracks which usually extend some distance into the flesh and afford opportunity for the entry of spores of soft-rot fungi; consequently fruit from trees infected with mildew rarely keeps well for any time. The writer has not observed the hyphæ of the fungus on other than very small fruits. The fruits of all varieties do not appear to be attacked, as russeting has not been observed on fruits of Cleopatra, although the leaves and shoots of this variety suffer severely.

LIFE-HISTORY OF THE CAUSATIVE ORGANISM.

Powdery mildew is caused by *Podosphaera leucotricha*, a fungus having two spore stages in its life-cycle. The first or conidial stage is produced throughout the growing season on the felt-like masses of mycelium which cover the surfaces of infected leaves and shoots; the second or perithecial stage in New Zealand appears about the middle of March (although it would appear to be common in midsummer in North America) in the form of small black bodies (perithecia) partially embedded in the mycelial masses. The conidial stage is the more important one, as apparently the perithecia play little if any part in the perpetuation of the organism.

If a small portion of the felt-like mass of mycelium is examined under a microscope it is seen to consist of very numerous, colourless, closely woven threads (hyphæ) closely applied to the surface of the host (Fig. 5, *m*). From these at intervals arise upright stalks (conidiophores) (Fig. 5, *con*) bearing on their free ends chains of colourless oblong conidia (Fig. 5, *c*). These are produced in such enormous numbers as to give the leaves and shoots upon which they may happen to be growing the appearance of being covered with flour. Should one of these conidia be carried by wind or other agency to the surface of a growing leaf or shoot, and conditions prove favourable, it germinates and produces a slender germ-tube (hypha), which grows over the surface of the substratum, branching repeatedly to form a mycelium. This consists of very numerous interwoven hyphæ, and derives its nourishment from the epidermal cells, into which small branches (haustoria) penetrate (Fig. 5, *h*) to absorb therefrom the necessary food substances. It is thus seen that with the exception of these small haustoria all the fungus is superficial. The hyphæ continue to spread over leaves and shoots during the whole of the growing season.

About the middle of March the perithecia make their appearance on the shoots, leaves, and petioles, appearing as small, globose, black objects densely crowded together, and partially embedded in the mycelium (Fig. 7). Each perithecium has on its free surface several