

Failure to do so has wrought much confusion in the fugitive literature on the subject. As popular distinguishing terms, it would be well to call the former the "powdery grape-vine mildew," and the latter the "downy grape-vine mildew."

It is my purpose here to deal chiefly with the latter, but it will be desirable first to briefly consider the characteristics of the former, that the differences between the two may the more readily appear.

THE POWDERY GRAPE-VINE MILDEW.

This is the *Uncinula spiralis* (Berkeley and Curtis), and the conidial form has long been known by the name of *Oidium Tuckeri* (Berkeley).

General Appearance.—This particular fungus produces a white, powdery appearance on the upper surface of the leaves, which at first looks not unlike dust, and which is much less conspicuous on the lower surface. Beginning in spots, these grow larger and larger until they cover the whole leaf and include even the young stems and berries.

Structural Characteristics.—The powdery spots consist of mycelial threads attached to the epidermis of the leaf by suckers. These filaments have a diameter of .004mm. Portions of this mycelium rise up from the surface of the leaf and become constricted or intersected (Fig. 47a), thus forming cells. As these cells, which are the conidial spores, multiply, the terminal ones enlarge, ripen, and drop off, so that a succession of conidial spores is formed. The spores germinate at once by pushing out a germinating-tube, generally at one end.

Late in the summer and autumn the perithecia and asci are formed, ripening about the first of October. These are the resting or winter spores, and are small black bodies occurring on both surfaces of the leaf and on the stems. They consist of an opaque sac with a cellular wall, from which a number of appendages radiate to from three to five times the length of the diameter of the perithecium, and some of them are either uncinuate or spiral at tip. The perithecium measures from .07mm. to .12mm. in diameter, and the number of appendages varies from 15 to 32. Inside the perithecia are the asci or sacs which contain the spores. The asci vary from four to eight in number, nominally six; the spores also vary in number, the average being six. The *Uncinula spiralis* therefore appears in two phases—first, as a white flocculent mould; secondly, as perithecia with more or less uncinuate or spiral appendages.

Variation in Habit.—One of the most interesting facts in connection with this fungus is that only the conidial form known as *Oidium Tuckeri* occurs or is, so far, known in Europe. There is some question as to the actual specific identity of *Oidium Tuckeri* as found in Europe and the conidial stage of *Uncinula spiralis* as found in this country. The bulk of opinion is, I think, that they are identical, for, while Von Thümen, in his "Fungi Pomicola" and in his "Pilze des Weinstockes," follows Fuckel in giving *Spherotheca castagnei* (Lev.) as a synonym of *Oidium Tuckeri*, thus implying that this last is the conidial form of the former, Fuckel merely makes the conjecture without positive proof, and there is great improbability in the conjecture being correct. We have, in fact, in this case, so far as the evidence goes, one somewhat parallel to that of the grape-vine Phylloxera. The gall-making form of this insect upon the leaf is of very common occurrence, and the form most easily observed in America; whereas in Europe the species very rarely produces the gall. Yet the historic evidence is conclusive as to the introduction from America of *Phylloxera vastatrix*, and almost as conclusive as to the similar introduction of this Oidium; and, to my mind, they both furnish admirable illustrations of a change of habit in an organism sufficiently marked that, without the historic evidence, the question of the exact specific identity of the parent and its transcontinental issue might well be raised. The interesting question, philosophically considered, is, why, if the winter spore is necessary to the perpetuation of the *Uncinula* in America, the species can propagate for an indefinite period without it in Europe?

Effect on the Vine.—This fungus is less injurious to our hardier native grape-vines than to the European *Vitis vinifera* and hybrids of it. Hence it is more to be dreaded in California and in Europe than in the Eastern United States.



EFFECTS OF THE OIDIUM.