

## STUDIES IN PHYLLOSTICTA AND CERCOSPORA.

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During the years 1912 and 1913, while Dr. F. L. Stevens was dean of the College of Agriculture and Mechanic Arts in Porto Rico, he made extensive collections of parasitic fungi. When he came to the University of Illinois, he donated this collection to the University. In my studies I have made use of this material, working chiefly on the two genera *Cercospora* and *Phyllosticta*, both of which belong to the group of Imperfect Fungi.

The genus *Cercospora* of about 700 species, contains many important parasites, chiefly causing leaf-spotting. The spots are variable in size and color, often bordered by a narrow reddish or purple margin, with a sordid-white center due to the fungal hyphae which penetrate into the leaf. The spots are usually definite, though in some instances indefinite, or even lacking when the leaf is covered with a smoky brown mass. If conditions are such that growth is abundant, the spots become hoary, due to the large number of spores. The fruiting bodies are conidia which are borne on the ends of hyphae or conidiophores, which vary in number and size, may be simple or branched, and are brown in color. They are often abruptly bent at the point of spore production, and thus conidial scars are left. Conidiophores are usually fasciculate, and may arise singly or in numbers from the stomata of the leaf. As a rule, they vary in length and septation with age. The conidia are hyaline, several septate and they vary in size and shape. They are usually elongate, clavate or fusoid, straight and sometimes attenuate at the end farthest from the conidiophore. Each cell of a conidia is capable of germination, and very often when spores fall on a leaf, they produce germ-tubes which infest the host through the stomata. Very few cross inoculations have been made, and, little is really known concerning the limitations of the species. When the host plants are different, minor variations in size, color, septation, etc., of the conidia and conidiophores, or in the macroscopic appearances of the spots are generally employed in distinguishing species.

The genus *Phyllosticta* is very large, comprising nearly 1200 species, only a few of which have been determined by comparison or cultural studies. These forms produce leaf spots which may be circular, angular or indefinite. This genus differs from *Phoma* in that it inhabits only the leaves, while the latter may spread over the fruit, twigs or stems, also in that *Phoma* never produces a definite spot. The leaf blotch

caused by *Phyllosticta* is due to a weakening or killing of the leaf-tissue by the mycelium, which spreads throughout the leaf. When conditions are favorable, the spots develop rapidly and the greater part of the leaf from the margin to the mid-rib may become involved. Sometimes the spots are brown, giving the appearance of sunburn, or again they may be of yellowish color, or sordid-white, or perhaps gray, with a reddish-purple margin which may be concentrically zonate. The center of the spot often falls out, and eventually, when affected to such an extent that they can no longer function, the leaves fall, thus weakening the vitality of the tree. Instead of being borne on conidiophores as in *Cercospora*, the conidia are produced in pycnidia. They are usually on the upper surface of the leaf, though sometimes below, and appear as tiny black specks when large enough to discern with the aid of a lens. They may occur singly or in clusters, and may be immersed, erumpent or superficial. When immersed a beak pierces the epidermis, thus facilitating the escape of conidia. The pycnidia are lenticular to globose, usually brown or black, opening by a pore or ostiole which is often dark-bordered. The conidia are hyaline, usually ovate to elliptical, though sometimes spherical, and they vary in length from 2 to 60  $\mu$ . The perfect stage of this fungus is known in but few cases.

It has been the custom when creating new species to designate as new those forms which have never been reported on the particular host or any genus of the same family, and which are distinct from any form on a related host. In working over some 50 different forms, I have found 15 which are distinctly new species. However, I am somewhat hesitant to describe these as *Phyllostictas*, rather than *Phomas*, since I believe there is no tenable distinction between these two genera. They are alike in conidia and pycnidia, and these parts seem to me to be the most characteristic. The general nature of the spots cannot serve as distinguishing features since they are both definite and indefinite on the leaves, nor does it seem justifiable to make the location of infection of a plant a basis for distinguishing species.