

LEAF SPOTS OF MANHATTAN.

BY

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LEAF SPOTS OF MANHATTAN.

LEAF SPOT DEFINED.

GENERAL DESCRIPTION.

Strawberry leaf spot taken as the type.

ECONOMIC IMPORTANCE OF THE GROUP.

Illustrated by some of the most destructive members.

LIST OF FUNGI.

With their host plants, date of collection, and name of collector, and description of the four principle genera.

INDEX TO HOST PLANTS.

With the names of the fungi found on them.

LEAF SPOTS OF MANHATTAN.

The term "leaf spot" is one that is not easily defined, but in this work it shall be made to include all those parasitic fungi, belonging mostly, to the group Pyrenomycetes, whose conidial stage only is known (and a few also whose complete life history has been worked out) and which form more or less clearly defined spots on the leaves of the higher plants.

GENERAL DESCRIPTION.

As only the conidial stage is known it is, as yet, impossible, in most cases, to say exactly where they belong in relation to other fungi. The conidia are to facilitate the spread of the fungi during the summer; and it is supposed that there is, for each species, another stage growing either on the same, or on another host plant, in which flask shaped perithecia containing asci, are born later in the season for perpetuating the species over winter. In some cases this has been proven to be true; but for the majority of the species the truth or falsity of this theory is yet to be determined.

That the different stages may be more clearly understood, we will take as an example the strawberry leaf spot (*Sphaerella Fragariae*) which is typical of the group, and of which we have now the complete life history.

Strawberry Leaf Spot (*Shaerella Fragariae*).

(See Plate I)

This disease attacks the strawberry wherever that plant is found.

It first appears as minute purple or deep red spots on the upper side of the leaves. These spots grow rapidly and soon become whitish in the centre with a reddish brown border. Frequently neighboring spots coalesce and form irregular patches. If the leaf is badly affected it soon begins to dry up at the tip, and finally dies altogether and falls off. Sometimes the calyx petioles and pedunkles are affected also.

After the centre of the spot has become light colored the mycetium within the border becomes more dense at certain points on both sides of the leaf, and finally bursts through the epidermis. On the free ends of the branched hyphae that protrude from the openings are born the conidia; elongated in shape and either one celled or once or twice septate. These conidia are transparent, thin walled, and filled with a slightly granular fluid. They are very light, and are readily blown about by the wind; and germinate as soon as conditions of heat and moisture are favorable. They are the chief means of the spread of the disease through the summer.

During the autumn and early winter, the mycetium forms minute, globose bodies which rupture the epidermis and appear as tiny black specks. These are the spermogonia and bear spermatia about three times as long as broad. Their function is not well understood.

Along with these spermogonia, and much resembling them in external appearance, are formed numerous black perithecia. They are a little larger than the spermogonia, darker colored, and more opaque; and protrude a little farther from the surface. At the top of each,

is a small opening for the contents to escape.

Each of these perithecia contains several elongated transparent sacs or asci, which taper towards the base, where they are attached. These asci contain the ascospores, usually eight in each. These ascospores are narrowly ovoid and divided into two cells by a transverse septum. These spores, protected by the thick walls of the perithecium, are designed to perpetuate the fungus under conditions destructive to the conidia.

The outer walls of the perithecia and spermogonia, near the opening, bear conidia also, identically like those described above.

The mycelium ceases to produce conidia when cold weather sets in, but lives over winter, and when spring opens produces another crop which causes the early spreading of the disease. Thus we see that the ascospores, in an ordinary winter are not necessary to perpetuate the fungus till the next season.

This is the life history of the strawberry leaf spot; and though it has not been worked out for greater number of the species of this somewhat indefinite group, yet we have reason to believe that is similar for all of them.

The damage done by this parasite is so great that until a remedy was found, it was feared that the strawberry industry would be entirely ruined. The leaves become so diseased that they cannot perform their functions and the fruit on such plants either does not come to maturity, or ripens without reaching its normal size. A fruit grower in Connecticut lost fifteen hundred dollars in a single season by the ravages of this disease.

Economic Importance of this Group.

A considerable number of leaf spots and anthracnoses (which are essentially the same, except that they occur on the stems) attack plants under cultivation, and do very serious damage.

In addition to the one just described, the following, not all of which are found near Manhattan, will give the reader an idea of their importance to the farmer and the horticulturist.

1. Blackberry and Raspberry Anthracnose. (Gloesporium venetium S peg.)

The genus Gloesporium contains about sixty species, a large number of which are parasitic upon plants of economic importance. The one under consideration may be taken as a good representative of the genus.

It attacks the canes and the veins of the leaves of both the blackberry and the raspberry, forming greyish dried sunken spots. In the centre of these spots are born the oval, one celled, transparent spores on club shaped basidia. These spores are stuck together by a gelatinous substance until washed apart by rains; after which they blow about to attack other canes.

The mycelium attacks the bark, cambium, and sometimes the wood also; and in bad cases the canes die above the infected part. Fruit on even slightly affected canes is very poor and often worthless; and not infrequently the crop is entirely ruined.

2. Apple Scab (Fusicladium dentriticum) (See Plate II.)

This first appears as olive-green roundish spots on the leaves and fruit of the apple; which increase in size until they are one

eight to one fourth of an inch in diameter.

The mycetium attacks the epidermis and sometimes a few cells deeper, and causes the affected part to shrivel and die. In these dried spots, the one or two celled, brown spores break out and are scattered by the wind.

The power of assimilation in the leaves is much lessened by the disease; and the fruit, if attacked when small never develops properly; or if attacked later in the season is made unsightly and unfit for the market. Being almost universally distributed, the disease causes a great amount of damage. The annual loss in Kansas is estimated at one fourth the entire crop.

3. Leaf Blight of Celery. (*Cercospora Apii.*)

This disease attacks the leaves of celery, breaking out in greenish-yellow spots on both sides of the leaf. Soon all above the ground turns brown, and later is covered with whitish conidia. The part below the ground remains yellow on the outside, but is streaked on the inside with brown, so as to be unfit for use.

The affected plants are unsightly and are not fit for the market or table; and in some cases, they are killed outright. Much damage is thus caused by the disease.

4. Leaf Blight of Beet. (*Cercospora beticola.*)

This disease occurs wherever the beet is grown, and is one of its worst enemies.

The spots are round at first, but often coalesce into large irregular patches. They appear on both sides of the leaf. The affected leaves are unable properly to perform their functions and soon shrivel and drop off. Though generally the plants are not killed they are

much weakened, and fail to produce as large roots as those not diseased.

5. Leaf Spot of Cherry (*Cylindrosporium Padii.*)

This attacks the cherry and plum, both wild and cultivated, and also the peach and apricot. The disease appears as pale or reddish spots on the upper side of the leaf. These are round, and rarely become more than one eighth of an inch in diameter. The centre of the spot frequently falls out, making the leaves appear as if riddled with small shot. The whole leaf turns yellow, and falls prematurely, so that the trees are frequently almost or entirely defoliated. The damage resulting from this is often very great especially in nurseries.

In addition to the foregoing descriptive list, the following are a few of the most important in the United States.

1. Leaf Spot of Cotton (*Sphaerella grossularia.*)
2. Leaf Spot of Currant and Gooseberry (*Septoria Ribes.*)
3. Leaf Spot of Pear. (*Entomosporium maculatum.*)
4. Anthracnose of Tomato. (*Collectotrichum phomoides.*)
5. Leaf Spot of Alfalfa. (*Pseudopezizia Medicaginis.*)
6. Anthracnose of Bean. (*Collectotrichum Lindemuthianum.*)
7. Anthracnose of Cucumber. (*Collectotrichum Lagenarium.*)
8. Leaf Blight of Grape. (*Cercospora viticola.*)
9. Anthracnose of Potato. (*Vermicularia sp.*)
10. Leaf Blight of Tobacco. (*Cercospora Nicotina.*)

Having given a description of the general characteristics of this group, and treated briefly of their economic importance, the remainder of this paper will be devoted to a list of the leaf spots found near Manhattan, and their host-plants. The list must necessarily be open for additions as probably not all have yet been found.

It will be noted that nearly all are included under the genera Cercospora, Phyllostycta, Romularia, and Septoria. Drawings of these typical species of these four genera, and also of strawberry leaf spot and apple scab will be found at the end of the list. The last two mentioned are reproduced from drawings in the United States Department of Agriculture Report for 1886.

Descriptions of the four principal genera are given; but as the other genera are represented by only a few species each, it is not considered worth while to give descriptions of them.

LIST OF FUNGI.

Ascochyta Sisymbrii E. V K.

On Sisymbrium canescens.

Kellerman & Swingle, April 22, 1888.

Cercospora. (See Plate IV. A.)

Conidia hyaline, or nearly so, cyllindrical, one celled at first, but becoming septate at maturity, generally attenuated above, and usually born terminally, but sometimes from small projections below the apex of the hyphea. These hyphae are brown or sometimes nearly hyaline, often nodose, and born in little tufts on discolored spots on the leaf, but not in a definite perithecium. In a very few cases the conidia are decidedly brown. Those species with hyaline hyphae are always attenuated.

Cercospora Acalyphae, Pk.

On Acalypha.

W. A. Kellerman, Sept. 5, 1884.

On Acalypha Virginiaa.

D. B. Swingle. June, 1899.

C. Ampelopsis, Pk.

On Ampelopsis quinquefalia.

W. A. Kellerman, Aug. 4, 1884.

C. Angulata, Winter.

On Phyladelphus Columbina.

Kellerman & Swingle, Sept. 4, 1889.

On P. Cult.

Kellerman & Swingle, Aug. 8, 1889.

On P. zehri.

Kellerman & Swingle, Sept. 10, 1889.

C. *Altheina*, Sacc.

On *Callurhae involucrata*. Gr.

W. A. Kellerman.

On *Hibiscus trionum*. L.

W. A. Kellerman.

C. *Apocyni*, E. V. K.

On *Apocynum camabinum*, L.

W. A. Kellerman, Aug. 1884.

D. B. Swingle, June 10, 1899.

C. *Aquilegiae*, K. V. S.

On *Aquilegia Canadensis*.

Kellerman & Swingle, June 21, 1889.

On *A. vulgaris*.

Kellerman & Swingle, June 10, 1899.

C. *Armoraciae*, Sacc.

On Horseraddish (*Nasturtium Armoracia*.)

D. B. Swingle, June 23, 1899.

C. *Asclepiadis*, Ellis.

On *Asclepias Gamesii*, Ton.

W. A. Kellerman.

C. *Avicularis*, Winter.

On *Polygonum aviculare*.

Kellerman & Swingle, July 25, 1889.

C. *Ceanothi*, K. V. S.

On *Ceanothus ovatis*.

Kellerman & Swingle, April 20, 1887.

C. Aphalanthi, E. & K.

On *Cephalanthus occidentalis*, L.

W. A. Kellerman.

D. B. Swingle, June 29, 1899.

C. Cercidicola, Ellis.

On *Cercis Canadensis*. L.

W. A. Kellerman, Aug. 4, 1884.

C. Chenopodii, Fres.

On *Cercis Canadensis*, L.

W. A. Kellerman, July 20, 1884.

C. Circumscissa, Sacc.

On *Prunus Virginicum*.

W. A. Kellerman, Aug. 19, 1887.

C. clavata, (Ger.) Pk.

On *Asclepias cornutii*.

W. A. Kellerman, Aug. 10, 1887.

C. condensata, E. & K.

On *Gleditschia tricanthos*. L.

W. A. Kellerman & Swingle, Sept. 29, 1889.

C. consociata, Winter,

On *Ruellia ciliosa*.

W. A. Kellerman, Aug. 1, 1884.

C. Cucurbitae, E. & E

On *Cucurbita perennis*.

Kellerman & Swingle, Aug. 23, 1887, Nov. 1888.

C. *Desmanthii*, E. & K.

On *Desmanthus brachylobus*, Benth.

W. A. Kellerman, July 30, 1884.

Kellerman & Swingle, June 30, 1887.

C. *Desmodii*, E. & K.

On *Desmodium accuminatum*, Dec.

W. A. Kellerman, July 30, 1884.

D. B. Swingle, June, 1899.

On *Desmodium brachylobus*.

Kellerman & Swingle, June 30, 1887.

C. *Diantherae*, E. & K.

On *Dianthera*.

W. A. Kellerman.

C. *Effusa*, (B & C.)

On *Lobelia cardinalis*. L.

W. A. Kellerman.

C. *flagellaris*, E & M.

On *Photolacca decandra*, L.

W. A. Kellerman.

C. *Franini*, E. & K.

On *Fraxinus Viridis*, Mx.

W. A. Kellerman, Sept. 20, 1884.

D. B. Swingle, June, 1899.

C. *Geranii*.

On *Geranium Carolinianum*.

Kellerman & Swingle, May 30, 1887.

C. glandulosa. E. & K.

On *Ailanthus glandulosa*. Desp.

W. A. Kellerman.

C. granuliformis. E. & H.

On *Viola cucullata*, Ait.

W. A. Kellerman.

C. *Gymnocladii*. E. & K.

On *Gymnocladus Canadensis*.

W. A. Kellerman, July 9, 1884.

Kellerman & Swingle, Sept. 2, 1887.

C. *Helianthi*. E. & E.

On *Helianthus doronicoides*.

Kellerman & Swingle, Aug. 20, 1887.

C. *Isanthi*, E. & K.

On *Isanthus caeruleus*, Mx.

W. A. Kellerman, Aug. 10, 1884.

C. *Lippiae*, E. & E.

On *Lippia lanceolata*.

Kellerman & Swingle, July 9, 1887.

C. *microsora*, Sacc.

On *Tilea Americana*. L.

W. A. Kellerman, Aug. 4, 1885.

C. *monoica*, E. & H.

On *Amphicarpaea monoica*.

Kellerman & Swingle, July 12, 1887,

C. moricola, E. & K.
 On Viola esculata Ait.
 W. A. Kellerman.

C. murina, E. & K.
 On Viola cuculata, Ait.
 W. A. Kellerman.

C. oculata, E. & K.
 On Vernonia Baldwinii, Ton.
 On V. fasciculata.
 W. A. Kellerman, June 25, 1886.

C. omphacodes, E. & H.
 On Phlox divaricata.
 Kellerman & Swingle, July 20, 1887.

C. pachypus, E & K.
 On Helianthus annuus.
 Kellerman & Swingle, Aug. 16, 1887.

C. Pentstemonis, E. & K.
 On Pentstemon cobaea, Nutt.
 W. A. Kellerman, June 15, 1884.

C. Physalidis, Ellis.
 On Physalis lanceolata, Lam.
 Var. laevigata, Gr.
 W. A. Kellerman.

C. Plantaginis, Sacc.
 On Plantago Major, L.

C. *Prenanthis*, E. & K.

On *Prenanthis aspera*.

Kellerman & Swingle, Aug. 20, 1889.

Aug. 13, 1889.

June 26, 1887.

C. *rasemosa*, E. & M.

On *Teucrium Canadensis*, L.

W. A. Kellerman.

C. H. Thompson, Sept. 19, 1891.

C. *rhuina*, C. & E.

On *Rhus glabra*, L.

W. A. Kellerman, Aug. 10, 1884.

C. *Smilacis*, Thunb.

On *Smilax hispida*.

Kellerman & Swingle, Sept. 4, 1887.

C. *Teucriti*, E. & K.

On *Teucrium Canadense*, L.

W. A. Kellerman, Aug. 18, 1884.

C. *tuberosa*, E. & K.

On *Apios tuberosa*.

W. A. Kellerman, May 15, 1884.

D. B. Swingle, June 27, 1899.

C. *vagrans*, Pers.

On *Rhus glabra*.

Kellerman & Swingle, Aug. 13, 1887.

C. velutina, E. & K.

On *Baptisia Australis*.

Kellerman & Swingle, Aug. 17, 1887.

C. Vermoniae, E. & K.

On *Vernonia Baldwinii*, Torr.

W. A. Kellerman.

C. Violae, Sacc.

On *Viola* sp. Cult.

W. A. Kellerman, Sept. 15, 1884.

Cladosporium Triostei, Pk.

On *Triosteum perfoliatum*.

W. A. Kellerman, July 3, 1887.

Cylindrosporium Ranunculi, (Bon.) Sacc. Var *Thalictri*, E. & E.

On *Thalictrum purpurescens*.

Kellerman & Swingle, July 1, 1887.

C. Triostii, Kell. & Sw.

On *Triosteum perfoliatum*.

Kellerman & Swingle, Sept. 1, 1889.

Cercospora Apocyni, E. & K.

On *Apocynum*.

W. A. Kellerman, Aug. 15, 1884.

Scolecotrichum maculicola, E. & K.

On *Phragmites communis*.

Kellerman & Swingle, June 29, 1887.

Dinemasporium pulchrum, Leo.

On *Cornus asperfolia*.

M. A. Carleton, Oct. 31, 1885.

Discosia Maculicola, Ger.

On Apple Cult.

W. A. Kellerman.

D. rugulosa, B. & C.

On *Carya* sp.

W. A. Kellerman, Sept. 5, 1887.

Fusicladium dentriticum, (Lib.) Fuckl.

On Apple, Cult.

Kellerman & Swingle, Aug. 6, 1889.

F. fasciculatum, C. & E.

On *Euphorbia petalocdea*, Englm.

W. A. Kellerman, Aug. 12, 1883.

Gloeosporium Acerinum, West.

On *Acer dasycarpum*.

Kellerman & Swingle, July 30, 1887.

G1. apocrytum, E. & E.

On *Negundo Aceroides*.

Kellerman & Swingle, Aug. 20, 1887.

G1. Toxicodendron, E. & M.

On *Rhus radicans*.

D. B. Swingle, June 28, 1899.

Graphium clavisperum, B. & C.

On *Vitis riparia*.

Kellerman & Swingle, Sept. 14, 1887.

Heterosporium gracile (Wall).

On *Iris pumula*.

D. B. Swingle, June 21, 1899.

Gyroceras Celtis, Ment.

On *Celtis occidentalis*.

Kellerman A Swingle, Aug. 23, 1887.

May Varney. Oct. 31, 1889.

Kellermania Yuccogena, E. & E.

On *Yucca asperifolia*.

Kellerman A Swingle, June, 1888.

On *Yucca fillamentosa*.

C. H. Thompson, June 24, 1892.

Macrosporium truncatum, E. & K.

On *Euphorbia marginata*.

Kellerman & Swingle, Sept. 4, 1887.

Melasinia Gleditischiae, E. & E.

On *Gleditischia tricanthos*.

Kellerman & Swingle, Aug. 10, 1887.

Sept. 10, 1889.

Aug. 21, 1889.

Ovularia Quercina. E. & K.

On *Quercus prinoides*.

W. A. Kellerman, Nov. 5, 1884.

Phaeospora Aceris. (Lib.)

On *Acer dasycarpum*.

W. T. Swingle, July, 1887.

P. *Anemonis*, E. & K.

On *Anemone Virginica*.

C. H. Thompson. July 1, 1892.

On *A. Pennsylvanica*.

Kellerman & Swingle, July 11, 1887.

P. *Chenopodii*, E. & K.

On *Chenopodium album*.

D. B. Swingle, June 10, 1889.

Phyllostycta. (See Plate III, A.)

Conidia hyaline, one celled, ovoid, not more than twice as long as wide, and born in a lenticular, membranaceous perithecium, with a small hole or fissure at the top.

Ph. *Acericola*, B. & C.

On *Acer dasycarpum*.

W. A. Kellerman, Sept. 12, 1885.

Ph. *Amarantl*, E. & K.

On *Amarantus retroflexus*, L.

W. A. Kellerman.

D. B. Swingle, July, 1899.

On *A. blitoides*.

A. S. Hitchcock, July 29, 1893.

Ph. Ampelopsidis, E. & M.

On Ampelopsis quinquefolia.

W. A. Kellerman, Sept. 5, 1884.

Ph. Cassiaecola, K. & S.

On Cassia chameacrista.

Kellerman & Swingle, May 9, 1889.

Ph. Comicola, Desm.

On Cornus paniculata, L ' Her.

W. A. Kellerman.

Ph. Cornutii, E. & K.

On Asclepias Cornutii, Dec.

W. A. Kellerman. Aug. 15, 1884.

Ph. cruenta, Fr.

On Polygonum giganteum.

W. A. Kellerman.

D. B. Swingle, June 23, 1899.

Ph. destruens, Desm.

On Prunus Americana.

Kellerman & Swingle, Sept. 24, 1889.

Ph. Fraxinii, E. & M.

On Fraxinus viridis, Mx.

W. A. Kellerman.

Ph. Labruscae, Thim.

On *Vitis cordifolia*, Mx.

W. A. Kellerman.

On *V. riparia*.

Kellerman & Swingle, 1889.

Ph. maculatus, E. & E.

On *Populus monilifera*.

M. A. Carleton, Oct. 18, 1893.

Ph. Phasedius, Sacc.

On *Phasedius diversifolius*, pers.

W. A. Kellerman, Aug. 8, 1883.

Ph. Populina, Sacc.

On *Populus monilifera*.

M. A. Carleton, Oct. 18, 1893.

Ph. serotina, Cke.

On *Prunus serotina*.

W. A. Kellerman, Aug. 5, 1884.

Sept. 5, 1884.

Ph. Smilacis, E. & M.

On *Smilax hispida*.

W. A. Kellerman, Aug. 15, 1883.

M. A. Carleton, Oct. 7, 1893.

Ph. Smilaceae, E. & K. var. subeffusa, E. & K.
On Smilax.

Kellerman & Swingle, Sept. 4, 1887.

Ph. sparsa, E. & K.
On Quercus coccinae,

W. A. Kellerman, Nov. 10, 1884.

Ph. Sphaeropsoides, E. & E. (?)
On Aesculus glabra, Willd.

W. A. Kellerman.

Ph. Spinosa, E. & E.
On Sida spinora.

Kellerman & Swingle, June 30, 1887.

Ph. Ulmicola, Sacc.
On Ulmus fulva, Mx.

W. A. Kellerman.

Ph. Verbascicola, E. & K.
On Verbascum Thapsus, L.

W. A. Kellerman.

Ph. Vignae, E. & E.
On cow Pea (Vigna catjang.)

D. B. Swingle, June 21, 1899.

Pyricularia grisea (Oke) Sacc.

On Panicum sanguinale.

Kellerman & Swingle, July 12, 1887.

Ramularia. (See Plate IV. B.)

Conidia and hyphae both hyaline, the latter born in little tufts, much like the Cercosporas. The conidia vary all the way from sub-globose to elongated cylindrical, but are never attenuated, which distinguishes them from the Cercosporas with hyaline hyphae. They are born terminally on the hyphae, and often in long chains, being connected end to end.

R. *Amoriciae*. Fuckl.

On *Nasturtium Amoricum*. Fr.

W. A. Kellerman.

R. *arvensis*, Sacc.

On *Potentilla Norvegica*.

W. A. Kellerman.

R. *Astragali*, E. & H.

On *Astragalus Canadensis*.

W. A. Kellerman.

R. *Celastris*, E. & M.

On *Celastrus scandens*.

Kellerman & Swingle, Aug. 1886.

Sept. 1887.

R. *decipiens*, E. & E.

On *Rumex crispus*.

C. H. Thompson. April 20, 1891.

On *Rumex Brittanica*, L.

W. A. Kellerman.

R. *Desmodii*, Cke.

On *Desmodium*.

W. A. Kellerman, Sept. 5, 1884.

July 20, 1889.

On *D. Illinoensis*.

C. H. Thompson, Aug. 17, 1892.

R. *Euonymi*, E. & K.

On *Euonymous atropurpureous*.

Kellerman & Swingle.

R. *Grindiliae*, E. & K.

On *Grindilia squarosa*. var *grandiflora*, Gr.

W. A. Kellerman, Aug. 15, 1884.

R. *obovata*, (Cke.)

On *Rumex crispus*.

W. A. Kellerman, May 30, 1884.

R. *occidentalis*. E. & K.

On *Rumex Brittanica*, L.

C. D. Fairchild, Sept. 1, 1887.

C. H. Thompson, July 20, 1891.

R. *rufro-maculous*, Pk.

On *Polygonum muhlenbergia*.

W. A. Kellerman.

On *P. Amphibium*, Var. *terrestre*.

W. A. Kellerman.

R. *Fuslanei*, Sacc.

On *Fragaria* St. Cult.

W. A. Kellerman, Oct. 20, 1884.

R. *Urticae*, Ces.

On *Urtica*.

Kellerman & Swingle, May 24, 1887.

R. *Variabilis*, Fuckl.

On *Verbascum Thapsus*.

W. A. Kellerman.

R. *Virga-aureae*, Thim.

On *Solidago Lindheimeriana*.

W. A. Kellerman.

Scolecotrichum maculicola, E. & K.

On *Phragmites communis*.

Kellerman & Swingle, June 29, 1887.

Septoria. (See Plate IV. A.)

Conidia born on fertile hyphae in the bottom of a definite perithicium, which is lenticular or globose and membranaceous, with an opening for the escape of the contents. Conidia hyaline, cylindrical, more than twice as long as wide, and pleuriseptate at maturity. They often protrude in a twisted gelatinous bundle.

S. *Betulae*, (Lib.) West.

On *Betula alba* var. *Populifolia*.

Kellerman & Swingle, July 2, 1887.

S. *Cacaliae*, E. & K.

On *Cacalia atriplicifolia*, L.

Kellerman & Swingle, June 4, 1889.

D. B. Swingle, June 27, 1899.

On *C. tuberosa*.

D. B. Swingle, June 27, 1899.

W. A. Kellerman, Aug. 1884.

S. *Campanulae*, Math.?

On *Campanula Americana*.

W. A. Kellerman, July 20, 1884.

S. *Canabina*, West.

On *Canabis sativa*, L.

W. A. Kellerman.

S. *Cephalanthi*, E. & K.

On *Cephalanthus occidentalis*.

W. A. Kellerman.

S. *dryina*, Cke.

On *Quercus tinctoria*.

Kellerman & Swingle, July 9, 1887.

S. *Erigerontis*, Pk.

On *Erigeron Canadensis*, L.

W. A. Kellerman.

S. *Guarina*, E. & K.

On *Gaura parniflora*.

W. A. Kellerman, Aug. 1, 1883.

- S. Helianthi, E. & K.
On Helianthus lenticularis, Dougl.
W. A. Kellerman, May 30, 1884.
- S. Mulae, Sacc. & Spegz.
On Helianthus molis, L an.
W. A. Kellerman.
- S. Gussiaeae, E. & K.
On Gussiaea repens, K.
W. A. Kellerman, Sept. 20, 1884.
- S. Kellermaniana, Thiin.
On Vitis cordifolia, Nx.
W. A. Kellerman.
- S. Leptostachya E. & K.
On Phryma Leptosachya. L.
Kellerman & Swingle, May 24, 1887.
- S. Labeliae Ph.
On Labelia sylphilica, L.
Kellerman & Swingle, June 30, 1887.
- S. noctiflorae, E. & K.
On Silene.
Kellerman & Swingle, April 22, 1888.
- S. lythrina Ph.
On Lythrum alatatum, Ph.
W. A. Kellerman.

S. *Oenotherae* West.

On *Oenothera biennis*, L.

W. A. Kellerman, Aug. 12, 1884.

On *Oe. serrulata*.

W. A. Kellerman, June 25, 1885.

S. *Prunii*, Ellis,

On *Prunus Americana*.

W. A. Kellerman, Aug. 16, 1884.

Sept. 5, 1884.

S. *psilostega*, E. & M.

On *Galium* sp.

W. A. Kellerman.

S. *Rhoidis*, B. & E.

On *Rhus glabra*.

W. A. Kellerman, Sept. 4, 1884.

S. *Pileae*, Thim.

On *Pilea pumilla*.

D. B. Swingle, June 10, 1899.

S. *Quercus*, Thim.

On *Quercus rubra*.

D. B. Swingle, June 27, 1899.

S. *Ribis*, Desm.

On *Ribes rotundifolium*, Mx.

W. A. Kellerman, Aug 1, 1883.

On *R. aureum*, Rh.

W. A. Kellerman.

S. Rubi, (Duby.)

On *Rubus vilosus*, Ait.

W. A. Kellerman.

On *R. Canadensis*.

D. B. Swingle, June 27, 1899.

On *R. occidentalis*.

D. B. Swingle, Aug. 1899.

S. Sii, Desm.

On *Cicuta maculata*, L.

W. A. Kellerman.

S. Silenes, E. & M.

On *Silene noctiflora*, L.

W. A. Kellerman.

On *S. Antinhina*.

D. B. Swingle, June 6, 1899.

S. Scrophulariae, Pk.

On *Scrophularia nodosa*,

Var. *Marylandica*.

D. B. Swingle, June 10, 1899.

S. Silenicola, E. & M.

On *Silene stellata*. D. B. Swingle, June 23, 1899.

D. B. Swingle, June 23, 1899.

S. Speculariae, B. & C.

On *Specularia perfoliata*, D. C.

W. A. Kellerman.

S. Stenosephonis, E. & K.

On Stenosiphon virgatus, Spact.

W. A. Kellerman.

S. Verbenae, Rab. & Desm.

On various species of Verbena.

W. A. Kellerman.

S. xanthifoliae, E. & K.

On Iva ciliata, Willd.

W. A. Kellerman.

On G. xanthifolia, Nutt.

W. A. Kellerman.

S. Teucris.

On Teucrium Canadensis.

D. B. Swingle, June 27, 1899.

S. unicolor, Winter.

On Lactuca Canadensis.

Kellerman & Swingle, Aug. 16, 1887.

Tricothecium grisseum. C. & E.

On Panicum.

W. A. Kellerman, July 30, 1884.

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EXPLANATION OF PLATES.

PLATE I.

Strawberry Leaf Spot. (Sphaerella Fragaria.)

- a. Diseased leaf, natural size, attacked by summer stage of the fungus.
- b. Tuft of conidiophores and conidia which have broken through the upper surface of the epidermis.
- c. Section of perithecium showing asci within. The asci are born upon a small mass of parenchyma at their base. (a) Ostiolum.
- d. Perithecium bearing conidiophores around the ostiolum.
- e. Conidia more highly magnified. Three of them have sent out germ tubes.
- f. Five asci containing ascospores, much enlarged.
- g. Ascospores.

PLATE II.

Apple Scab (Fusicladium dentriticum.)

- a. Scab on fruit.
- b. Leaf attacked by the fungus.
- c. Section through a spot on the fruit showing growth of the fungus, highly magnified.
- d. Spores of fungus greatly magnified. Four of them are germinating.

PLATE III.

A Phyllostycta mespilina, Mont.

On *Mespylus germanica* L.

- a. Diseased leaf natural size showing spots.

- b. Cross section through leaf showing perithectum breaking through the epidermis of the host plant.
- c. Highly magnified.
- e. Conidia highly magnified, showing exact form.

B. Septoria Cercidis Fr.

On *Cercis Siliquastro*, L.

- a. Diseased leaf showing infected areas.
- b. Cross section through leaf showing perithecium and mycetium of the fungus. Highly magnified.
- c. Conidia, showing minute structure. Highly magnified.
- d. Tuft of conidia growing from the perithecium in a gelatinous bundle.

PLATE IV.

A. Cercospora rosaecola, Passa.

On *Rosa*.

- a. Diseased leaf, natural size showing spots.
- b. Cross section of leaf showing minute structure of two tufts of conidia. Highly magnified.

B. Ramularia Tulasnei, Sacc.

On Cultivated Strawberry.

- a. Diseased leaf showing spots.
- b. Cross section through leaf, showing atuft of conidia. Highly magnified.
- c. Conidia showing minute structure. Highly magnified.

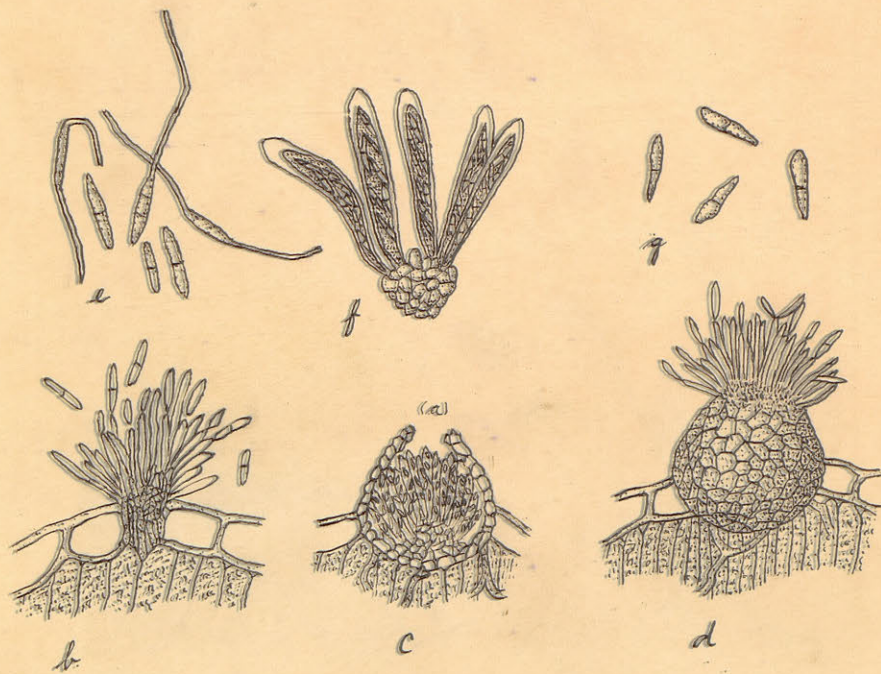


Plate II.

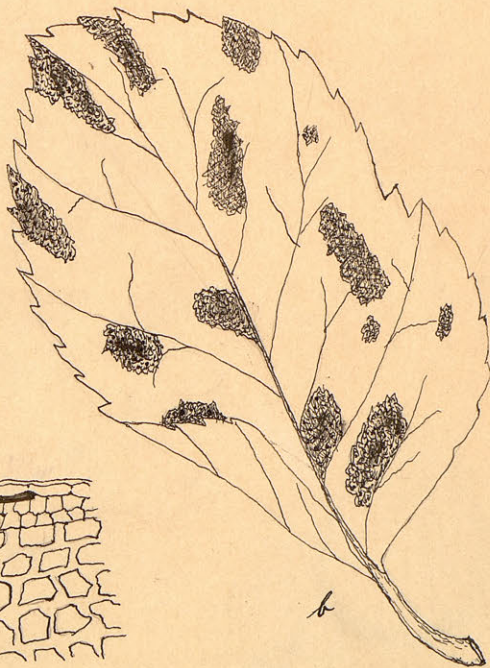
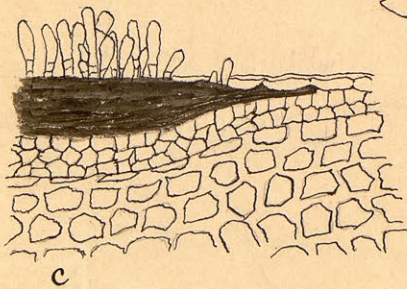
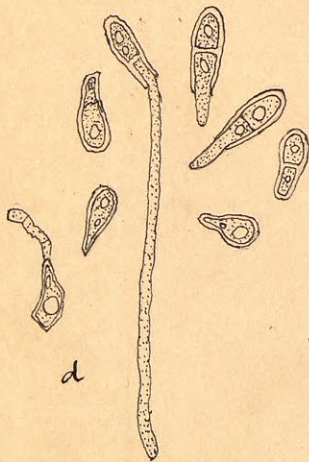
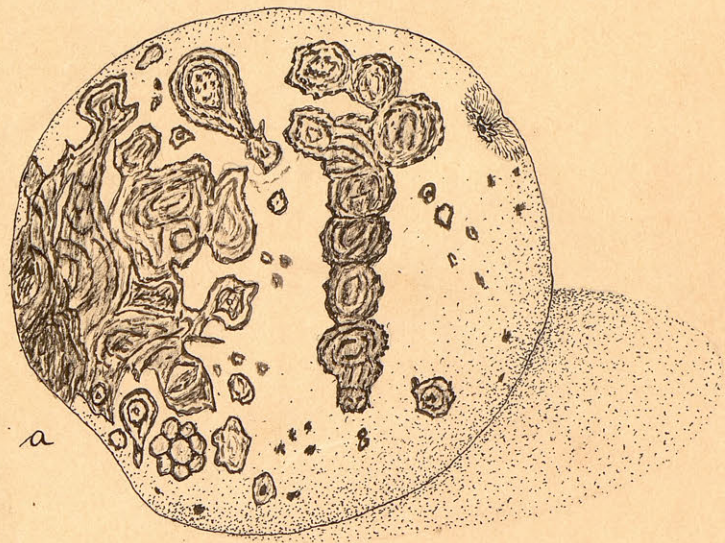
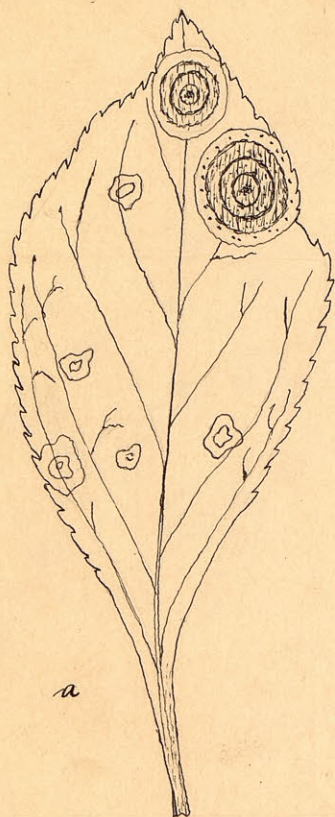
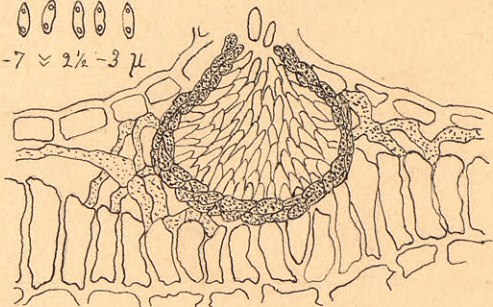


Plate III.

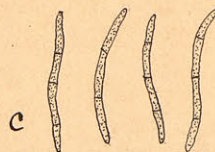
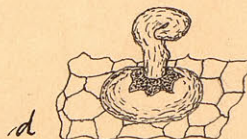
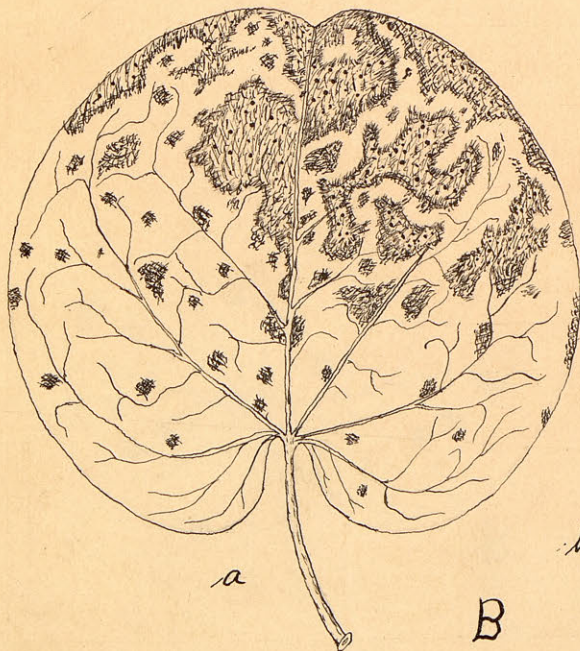


c ○ ○ ○ ○ ○ ○
6-7 \approx 2½-3 μ

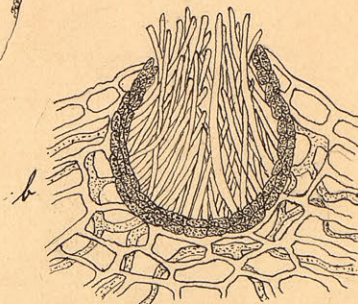


A

b



40-50 \approx 3-3½ μ .

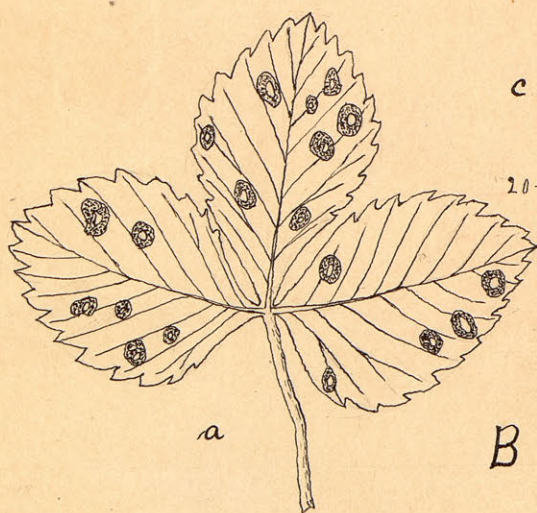
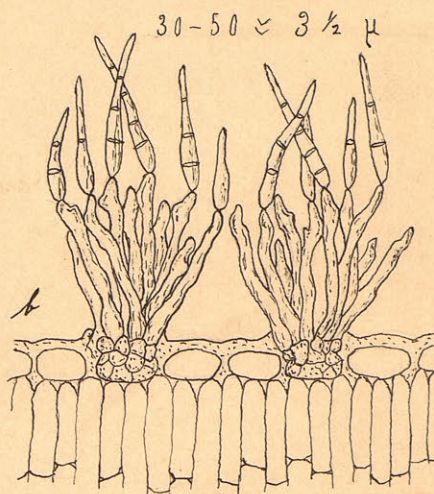


B

Plate IV.



A



B

