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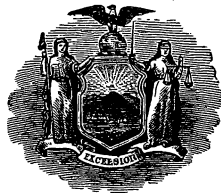
GENEVA, N. Y.

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A FRUIT-DISEASE SURVEY OF THE HUDSON  
VALLEY IN 1899.

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F. C. STEWART AND F. H. BLODGETT.



PUBLISHED BY THE STATION.

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\*Connected with Fertilizer Control.

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A FRUIT-DISEASE SURVEY OF THE  
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**SUMMARY.**

This bulletin contains an account of the fruit diseases occurring in the Hudson Valley in 1899. The various diseases are considered individually with reference chiefly to their distribution and the amount of damage done; but descriptions and additional notes have been given wherever it has been thought that they would be of interest either to the fruit-grower or the vegetable pathologist.

The data have been obtained by two methods: (1) From replies to letters of inquiry sent to fruit-growers, and (2) From personal observations made by the authors.

The season has been an unusually dry one and as a consequence fruit of all kinds has been remarkably free from disease. Some of the diseases usually very common and destructive have, this season, done little or no damage.

Apples have suffered from no disease—not even from scab. Rust has been the worst disease of blackberries. It has a tendency to reduce the number of prickles. Cherries have suffered most from fruit-rot which has been severe in a few localities. In the Hudson Valley black knot is common on the cultivated cherries but

does not occur on the wild black cherry. Cane blight has been the worst disease of currants. In the Hudson Valley it is not caused by *Nectria* but by a sterile fungus. It is wide spread and destructive. The four-lined leaf-bug causes a currant leaf-spot which is confused with that due to fungi. An obscure dewberry disease was observed. Gooseberry powdery mildew has been troublesome in Ulster and Columbia counties. A gooseberry root rot has been found at Marlboro. Grape black rot has done serious damage in a few instances. Grape root rot due to *Dematophora* and grape black knot occurred in Orange Co. Winter injury to fruit-buds caused heavy losses to peach growers. Peach leaf curl has been conspicuous by its absence, but the yellows is common. Pears have suffered from no disease. In former years black knot ruined the plum orchards, but it has probably not spread much in 1899. Plum fruit-rot has been destructive. Quinces have been affected considerably with fruit-spot and leaf-blight. The worst disease affecting the raspberry this season is an obscure one which may be caused by *Phoma*. Raspberry anthracnose was rare on new canes, but abundant on fruiting canes. Strawberry leaf-blight has been severe on some varieties. None of the above diseases were so destructive as in 1898.

## INTRODUCTION.

Since its organization, in 1897, the Eastern New York Horticultural Society has had a standing committee on plant diseases. The membership of this committee is as follows: F. C. Stewart, Geneva; F. A. Taber, Poughkeepsie; E. W. Barns, Middle Hope; P. W. King, Athens; and L. E. Covert, Clintondale.

The two published reports<sup>1</sup> of the Committee are brief for two reasons; namely, lack of data and lack of space for publication. During the past season the committee has endeavored to do more thorough work. A considerable amount of data has been gathered, and to present it in as much detail as seems desirable would make a longer paper than the Society would be willing to publish in its Proceedings. Moreover, much of the matter is of more than local interest, making it desirable to publish it where it will have a wider circulation than has the Proceedings of the Society. Hence the publication of this bulletin.

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<sup>1</sup> Fifty-seventh Ann. Rep. of the N. Y. Agr. Soc. 1897 : 735-738.  
Fifty-eighth Ann. Rep. of the N. Y. Agr. Soc. 1898.

## THE SURVEY: METHODS AND GENERAL RESULTS.

### TERRITORY COVERED BY THE SURVEY.

The territory covered by the survey includes only the counties bordering upon the Hudson River between Albany and New York City; namely, Albany, Rensselaer, Greene, Columbia, Ulster, Dutchess, Putnam, Orange, Rockland, and Westchester counties. In order that the region investigated might be as nearly as possible a natural plant region, and yet cover the greater part of the territory included in the membership of the Society, Long Island and Staten Island were excluded. The usual climatic conditions prevailing there are markedly different from those which obtain in the Hudson Valley. The district under consideration is about 160 miles in length and 45 to 50 miles in width with the Hudson River running through the middle. (See Plate I.)

### WEATHER CONDITIONS.

It is well known that weather conditions, especially rainfall and temperature, exert a powerful influence upon the growth of fungi. Fungous diseases of plants are much more destructive in wet seasons than in dry ones. In the Hudson Valley, the spring and summer of 1899 were unusually dry and the temperature somewhat higher than normal, offering a marked contrast to the season of 1898 which was very wet. The monthly precipitation for the season of 1899 is shown in the accompanying table:

PRECIPITATION IN THE HUDSON VALLEY.—APRIL TO SEPTEMBER, 1899.<sup>2</sup>

Station.	April.	May.	June.	July.	August.	Sept.	Total for six months.
	<i>In.</i>	<i>In.</i>	<i>In.</i>	<i>In.</i>	<i>In.</i>	<i>In.</i>	<i>In.</i>
Albany . . . . .	1.03	2.23	1.61	2.69	1.77	6.23	15.56
Catskill . . . . .	2.26	2.12	1.24	3.59	2.21	6.49	17.91
Poughkeepsie . . . . .	0.20	1.27	1.74	5.56	1.68 <sup>3</sup>	4.99	15.44
West Point . . . . .	1.70	2.31	4.85	5.78	1.90	6.39	22.93
Bedford . . . . .	2.11	2.36	4.73	6.65	0.89	5.03	21.57

<sup>2</sup> The records for April, May, and June are taken from the U. S. Monthly Weather Review; those for July, August, and September, from the N. Y. Climate and Crop Service monthly reports

<sup>3</sup> The August record for Poughkeepsie is lacking; the figures here given are for Wappinger's Falls, the nearest record station.

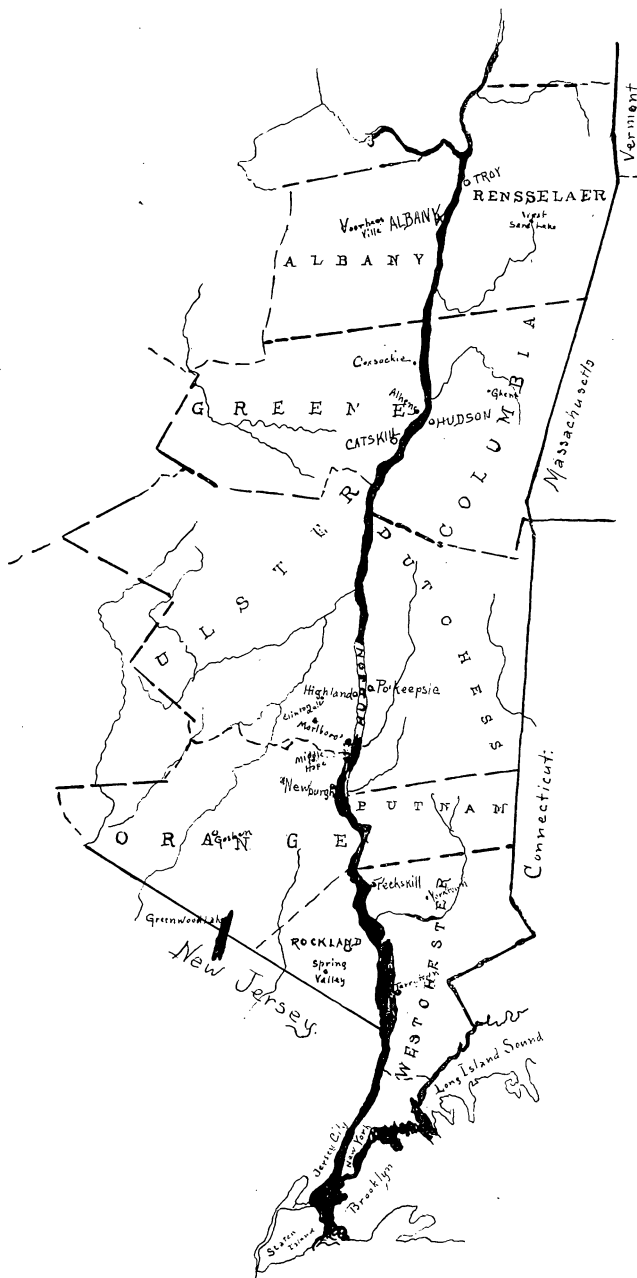


PLATE I.—TERRITORY INCLUDED IN SURVEY.

## METHODS OF OBTAINING DATA.

It is a favorite method with plant disease committees to send out circulars of inquiry to fruit growers asking for information concerning fruit diseases which have appeared during the season. We have done this and gotten considerable valuable information ; but this method is applicable only to a few of the most common and best known diseases. In the first place the majority of fruit growers will pay no attention to such a circular. Out of a total of 250 circular letters enclosing self addressed envelopes for the reply we have had returned to us only 59. Secondly, the replies are often misleading. They are usually based not upon careful observations properly recorded, but upon loose general impressions. Furthermore, the laity are able to identify accurately only a very few diseases. Frequently, two or more distinct diseases pass under one common name. Blight, leaf-spot, rust, fruit-rot and root-rot are examples of this. What is commonly called pear leaf-spot is caused by two quite different fungi, but there are very few persons not experts who know the difference between them. We have in New York, three fungous diseases and an insect trouble which are covered by the one common name, currant leaf-spot. Even so well known a disease as peach leaf curl is sometimes confused with the distortions caused by plant lice.

Appreciating the limitations and inaccuracies of the circular-letter method, the committee planned to supplement the data obtained in that way with data obtained from observations made by experts. For this purpose the Chairman associated with himself Mr. F. H. Blodgett, Assistant Botanist and Entomologist, who made three two-day and three three-day trips to different localities in the southern half of the district for the purpose of inspecting fruit plantations, taking notes on fruit diseases and collecting specimens. The Chairman made six similar trips of inspection to localities in the northern half of the district.

This combination of circular-letter method and expert inspection is a good one. The two methods supplement each other admirably.

The following is a copy of the circular letter sent to fruit growers, the spaces for answers being omitted:



## CIRCULAR LETTER OF INQUIRY SENT TO FRUIT GROWERS.

GENEVA, N. Y., Nov. 15, 1899.

DEAR SIR :

The undersigned, a Committee on Plant Diseases appointed by the Eastern New York Horticultural Society, wish to get together information in regard to the most troublesome diseases prevalent the past season among orchards, vineyards and nurseries in the Hudson River Valley. They issue the following circular in the hope that prompt replies may enable them to prepare a valuable report for the next meeting of the Society. Will you kindly fill out the blanks below and return AT ONCE? Please answer only those questions concerning which you can give positive information. Address your reply to the chairman, F. C. Stewart, Geneva, N. Y.

I. Which of the following plant diseases have caused serious injury in your locality during the past season?

## ORCHARD DISEASES.

*Apple.*

Pear blight (Fire blight).  
Scab.  
Leaf spot.

*Pear.*

Leaf blight.  
Pear blight (Fire blight).  
Scab.

*Quince.*

Fruit spot and leaf blight.  
Pear blight (Fire blight).

*Plum.*

Black knot.  
Fruit rot.  
Leaf blight.

*Peach.*

Fruit rot.  
Leaf curl.  
Yellows.  
Little peach.

*Cherry.*

Fruit rot.  
Leaf blight.

## NURSERY DISEASES.

*Apple.*

Powdery mildew.

*Pear.*

Leaf blight.  
Pear blight (Fire blight).

*Cherry.*

Leaf blight.  
Powdery mildew.

*Plum.*

Leaf blight.

*Quince.*

Leaf blight.

*Peach.*

Root knot.  
Powdery mildew.

## VINEYARD DISEASES.

Black rot.  
Downy mildew (brown rot or gray rot).

Powdery mildew.  
Anthracnose.  
Rattling or shelling

## SMALL FRUITS.

*Raspberry.*

Anthracnose.

*Strawberry.*

Leaf blight.

*Currant.*

Leaf blight.  
Cane blight.

*Gooseberry.*

Mildew.

2. Of the diseases mentioned please name the worst three.
3. In each of the above cases give, if possible, the percentage of the crop injured, stating the basis upon which you make your estimate.
4. What remedies, if any, have been used for plant diseases in your locality?
5. With what success have these been used?
6. Have any new or unusual diseases appeared; if so, give description, amount of damage done, and any other items concerning them.

F. C. STEWART,	}	Committee.
F. A. TABER,		
E. W. BARNES,		
P. W. KING,		
L. E. COVERT,		

#### MAGNITUDE OF THE FRUIT INDUSTRY.

Fruit growing is one of the leading industries throughout the whole district. In several localities it is practiced to the exclusion of all other branches of agriculture. The most prominent of these special fruit growing localities is in the southeastern part of Ulster County around Marlboro, Milton and Highland.

The fruits grown extensively are apples, cherries, currants, grapes, peaches, pears, raspberries and strawberries. There are several commercial plantations of gooseberries, blackberries and quinces. Plums are grown to a considerable extent, but not so much as formerly. Apricots and dewberries are rare.

There are but few nurseries in the district.

#### GENERAL STATEMENT OF RESULTS.

Fruits generally have been remarkably free from diseases of all sorts<sup>4</sup>. Nearly all fruit growers with whom we have talked upon the subject say that all fruits have been freer from disease the past season than for many years. There has not been an epidemic of any disease and some of the common destructive diseases have been almost entirely absent. Fruit diseases have been conspicuous by their scarcity. Consequently, quite as much is said in this bulletin about what has *not* been found as what *has* been found.

It is to be regretted that a thorough survey of fruit diseases in the Hudson Valley was not made in 1898. The season of 1898 was very

<sup>4</sup> This statement does not apply to insect injuries.

wet and fruit diseases generally were unusually destructive. A comparison of the two seasons would be instructive.

The replies to questions two and six of the circular letter were so few and so unsatisfactory that they have not been considered. The replies to questions four and five indicate that Bordeaux mixture, although used to a considerable extent, is not in as general use as it should be.

#### APPLE DISEASES.

In quantity, the apple crop of 1899 was, perhaps, no more than an average one; but the fruit was remarkably fair, being unusually free from blemishes of all sorts. Nevertheless, apples have not kept well. This is due partly to the warm autumn<sup>5</sup> and partly to the fact that the fruit ripened prematurely. Certain winter varieties, for example Baldwins and Greenings, have in some cases behaved more like late fall varieties.

#### SCAB.

(*Venturia inæqualis* (Cke.) Aderh. Syn. *Fusicladium dendriticum* (Wallr.) Fckl.)

This arch enemy of the apple has done very little damage. It has been reported as occurring to a slight extent in all the counties in the district except Albany, Ulster and Putnam, but only one correspondent (Old Chatham, Columbia Co.) reports it troublesome. On June 20 we sought in vain for a single specimen of scab in an 80-acre apple orchard at Poughkeepsie. In 1898 this orchard suffered severely from scab. At Washingtonville scab spots were common on the twigs of the Lady apple, which is a variety very susceptible to this form of attack.

#### LEAF SPOT.

(*Phyllosticta* spp.)

What a correspondent thought to be leaf spot occurred injuriously at Schodack Landing, Rensselaer Co. In some orchards

<sup>5</sup> It is believed by some that the very heavy frost on October 3 (25 degs. at Honeymead Brook, 27 degs. at Wappinger's Falls) seriously injured the keeping qualities of apples.

25 per ct. of the foliage was affected. Upon investigation it was found that the so called leaf spot was the work of an insect<sup>6</sup>, the resplendent shield-bearer (*Aspidisca splendoriferella*).

The true fungous leaf spot has been much less common than scab, but traces of it have occurred at various points in the district. No attempt was made to distinguish between the two species.

#### TWIG BLIGHT.

(*Bacillus amylovorus* (Burr.) DeToni.)

Rare. A few affected twigs were observed in Albany Co.; and three correspondents, one each in Orange, Ulster and Rensselaer counties report its occurrence in small quantity.

#### CANKER.<sup>7</sup>

(*Sphaeropsis malorum* Pk.)

This disease has killed a good many Spitzenberg trees in the vicinity of Voorheesville and New Scotland in Albany Co. It occurs destructively at Pomona and Blauvelt in Rockland Co. At Blauvelt it is especially troublesome on the variety Sour Bough. It has also been observed at Yorktown and Poughkeepsie.

#### SOOTY BLOTCH.

(*Phyllachora pomigena* (Schw.) Sacc.)

Rare. A little found on apples received from Newburgh and Yorktown.

#### RUSSETING OF FRUIT.

Russeted apples are reported to have been common in the vicinity of Hudson. We have seen the disease on Baldwins and Ben Davis at Poughkeepsie. The affected fruits were frequently misshapen and showed irregular areas on which the skin was rough and light brown in color. This appearance is sometimes due to spraying and sometimes to weather conditions alone.<sup>8</sup> It is often incorrectly called rust.

<sup>6</sup> On the authority of Mr. F. A. Serrine who examined some of the affected leaves.

<sup>7</sup> For an account of Apple Canker see Bulletin 163 of this Station.

<sup>8</sup> See Bulletin 84 of this Station, pp.29-33.

## RUST.

(*Gymnosporangium* spp. Syn. *Ræstelia* spp.)

This is a fungous disease in which circular yellow spots appear on the leaves in June. It may attack the fruit also. The red cedar, the host of the teleuto stage of the fungus, grows spontaneously throughout the entire district and "cedar apples" were found quite commonly upon it during early May in Ulster and Rockland counties; but the æcidial stage upon the apple has been entirely absent.

## SUN-CRACK.

On June 2 some apple-tree trunks were observed at Ghent on which the bark was loose and dead over areas from two to four inches in width and from one to four feet in length. These injuries were on the southwest side of the trunks and usually, but not always, extended quite to the ground. It first appeared in the spring of the present year. The trees were unusually thrifty, about seven years old and of the variety Willow Twig. They stood in well drained soil. We are of the opinion that it was caused by the sun's rays heating the bark intensely in early spring while the soil about the roots was still deeply frozen. That is to say, this is a case of what Hartig<sup>9</sup> calls sun-crack (*Sonnenriss*).

A sun-crack or perhaps sun-scald of apple tree trunks locally known as "southwest blight" is of common occurrence in the vicinity of Washingtonville.

BROWN, SUNKEN SPOTS ON THE FRUIT.<sup>10</sup>

A disease of this description has been reported as occurring on Greenings and Baldwins at Clintondale.

<sup>9</sup> Hartig, R. Text Book of the Diseases of Trees; (p.296). Translated and revised by Somerville and Ward. The Macmillan Co.: New York, 1894. Dr. Hartig informs us that Fig. 159 which purports to illustrate sun-crack is misnamed. The injury was caused by lightning.

<sup>10</sup> A description of this disease and an account of an investigation into its causes are given in Bulletin 164 of this Station.

## APRICOT DISEASES.

Apricots are not cultivated to any extent within the district. The only disease with which we met was one occurring at Ghent. Some trees which have been planted for several years have been dying off mysteriously one at a time for a few years past. A tree may die either in part or wholly at any time during the growing season. Some died in the spring of 1899. Just above the surface of the ground the bark is dead, often for considerable distance up the trunk; but the wood is not laid bare. Sometimes the bark shrinks tightly to the wood. Between the bark and the wood there may be much fungus mycelium, probably the mycelium of *Irpex lacteus* Fr. since pilei of that fungus were found on one of the dying trunks. One of the diseased trees was dug up for the purpose of examining the roots, which were seemingly healthy and free from fungus. There was no sharp line of demarcation between the diseased and healthy wood at the point where the scion joined the stock.<sup>11</sup> The trees were thrifty, having been well cultivated and cared for. The cause of this disease is unknown to us. It occurs in other parts of the State, sometimes causing heavy losses.

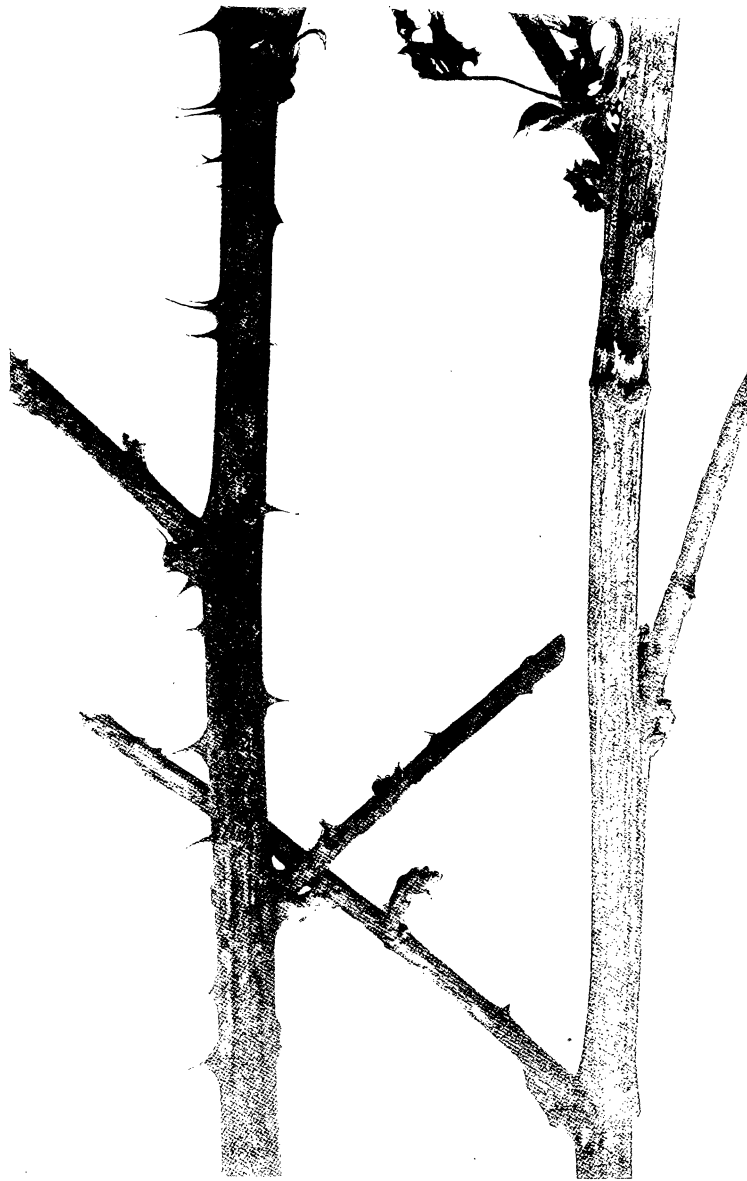
## BLACKBERRY DISEASES.

## ORANGE RUST.

(*Puccinia peckiana* Howe. Syn. *Cæoma nitens* Schw.)

Orange rust, although less destructive than usual, was abundant and undoubtedly the worst blackberry disease. For several years W. D. Barns & Son of Middle Hope have persistently fought the disease by digging out and burning the affected plants. It is probable that this treatment has materially lessened the ravages of the disease, but in spite of their efforts it continues to cause considerable damage every season. To get the best results from such treatment the diseased plants should be removed promptly upon the first appearance of the disease to prevent the spores from ripening.

<sup>11</sup> The stock was peach.



HEALTHY.

RUSTED.

PLATE II—A HEALTHY AND A RUSTED BLACKBERRY CANE  
FROM THE SAME HILL.

At Mr Barns' place our attention was called to an interesting effect which rust has upon the canes of raspberries and blackberries. *Canes affected with rust were much freer from prickles*<sup>12</sup> than were healthy canes.

These observations were made on May 8, at which time the rusty canes of the preceding season's growth were easily recognized although the æcidiospores were not yet mature. Among blackberries of the variety Wilson Jr., the rust-affected canes were almost or even wholly destitute of prickles. It is not an uncommon thing to find healthy canes and rusted canes of blackberry in the same hill<sup>13</sup>. Such cases offered an opportunity for close comparison and it was found that the difference in the number of prickles on the two sorts of canes in the same hill was very marked. (See Plate II.) The difference is so great that Mr. E. W. Barns says he can pick out the diseased canes in winter by their freedom from prickles. On affected raspberry canes the reduction of prickles was very evident but not so marked as with the blackberry.

After these observations at Middle Hope, we examined, during the season, many rusty blackberries, raspberries and wild dewberries (*Rubus canadensis* L.) in various localities. With all of these plants we found that rust in some cases caused a great reduction of prickles; in other cases, partial reduction; and in still others, no reduction at all. At Yorktown badly rusted blackberries of the variety Minnewaska were observed which showed no apparent reduction of prickles.

#### LEAF SPOT.

(*Septoria rubi* Westd.)

Rare. Observed only at Poughkeepsie.

<sup>12</sup> No reference to this phenomenon has been found in the literature at hand. Mr. W. Paddock informs us that he has observed it at Oaks Corners, Ontario Co.

<sup>13</sup> This has also been observed by Clinton; Orange Rust of Raspberry and Blackberry. Ills. Agr. Exp. Sta. Bul. 29: 276. D. 1893. It occurs less commonly with the raspberry, probably on account of the more compact habit of growth at the crown.



## CHERRY DISEASES.

## FRUIT ROT.

(*Monilia fructigena* P.)

As usual, fruit rot has been the worst cherry disease, but was not nearly so destructive as in 1898. From Westchester Co. it is reported "bad on some varieties." In Rockland Co. it destroyed about 25 per ct. of the latest sweet cherries. Orange Co. correspondents report but little damage from it. At Kinderhook, Columbia Co., it was "unusually developed." In the vicinity of Delmar, Albany Co., it is reported to have destroyed about 10 per ct. of the crop; and in one orchard about 50 per ct. A correspondent at Highland, Ulster Co., reports the loss of one-half his crop; but from personal observations we would say that, in general, cherries suffered but little from rot in that locality.

## LEAF SPOT.

(*Cylindrosporium padi* Karst.)

This disease has occurred in small amount over the whole district, but no case has been reported in which it has done serious damage.

## BLACK KNOT.

(*Plowrightia morbosa* Sacc.)

Throughout the Hudson Valley black knot is common on cultivated cherries of some varieties. English Morello probably suffers most. Trees of this variety are frequently ruined by it. At Middle Hope, Orange Co., Montmorency and Early Richmond cherries are said to knot considerably. At Coxsackie, Greene Co., we found knots on English Morello cherries producing summer spores as early as June 1. Black knot is exceedingly common on plums over the whole district. In former years it has been a veritable scourge. With these facts before us it is an interesting observation that, although the wild black cherry, *Prunus serotina*

Ehrh., is very common and we have searched carefully, *not a single specimen of black knot has been found upon it.*<sup>14</sup>

The wild red cherry, *Prunus pennsylvanica* L. f., is common in Albany Co., but we have failed to find any affected by black knot. In the central part of Rensselaer Co. we have examined the choke cherry, *Prunus virginiana* L., which grows wild there, but found no knots upon it. However, at Washingtonville, Orange Co., the latter species is said to be much affected.

What has been said applies only to old knots. The observations furnish no information as to the number of knots produced by infections occurring in 1899, for the new knots do not appear until late in autumn, after the time when the survey was finished.

#### WITCHES' BROOMS.

(*Exoascus cerasi* (Fckl.) Sadeb.)

Knowing that this disease is not uncommon in some other parts of the State<sup>15</sup> we expected to find it in the Hudson Valley, but failed to find a single specimen.

#### POWDERY MILDEW.

(*Podosphaera oxyacanthæ* (D.C.) De By.)

On July 20, a single bearing cherry tree affected with powdery mildew was observed at Delmar, Albany Co. A few leaves at the ends of the twigs were affected.

#### FUNGUS ON DEAD TRUNKS.

(*Irpex lacteus* Fr.)

On a fruit farm at Middle Hope we observed many dead cherry trees bearing numerous pilei of *Irpex lacteus* Fr.<sup>16</sup> The trunks

<sup>14</sup> Peck, also, has noted the absence of black knot from *Prunus serotina* in Eastern New York. See Forty-second Ann. Rep. N. Y. State Mus. Nat. Hist. 1888: 125. On Long Island black knot is abundant on this species.

<sup>15</sup> See Fourteenth Ann. Rep. of this Station, 1895: 532-533; also, Fifteenth Rep., 1896: 459. In May, 1899, we found a single large specimen on an Oxheart cherry (*Prunus avium*) at Sodus Center in Wayne Co., about five miles from the shore of Lake Ontario.

<sup>16</sup> Identified by Dr. C. H. Peck.

were from three to five inches in diameter and in many cases were thickly covered with the fungus to a height of from three to five feet. The owner explained that the trees were of the variety Elkhorn, which is not hardy. Most of the trees had died during the past three or four years, apparently from winter injury. The fungus probably had nothing to do with the death of the trees. It is mentioned here because it is a conspicuous thing which might be mistaken for a parasite.

#### WINTER INJURY.

At Athens, Greene Co., three cherry trees 15 years old died mysteriously. They had been very thrifty, but last spring when the leaves were partly grown the trees suddenly died. They grew in a slight depression where water stands in wet seasons. It is likely that the trees went into the unusually severe winter of 1898-9 with "wet feet" and were winter killed. This theory is supported by the fact that another tree of the same age and variety standing only about 16 feet away but outside of the depression was not affected. Some pear trees standing within the depression and close beside the dead cherry trees were not killed.

Another case of what we consider to be winter injury occurred at Monsey in Rockland Co. Some cherry trees which had been planted in the spring of 1898 and made a vigorous growth that season were found badly injured in the spring of 1899. A few of the trees were killed outright, but with a majority of them only the branches were killed back for a distance of from 12 to 24 inches from the tips. The affected portions did not put out leaves. Trees standing in exposed situations suffered most. The owner thought that the injury might have been caused by bands of tarred paper which had been placed about the bases of the trunks to protect them from mice; but this theory is made untenable by the observation that the bark under the tarred paper bands was perfectly healthy.

Some other cases of the unaccountable dying of branches in cherry trees may also be due to winter injury.

A BRANCH PARASITE.  
 (*Polyporus sulphureus* (Bull.) Fr.)

On a cherry tree in Greene Co., five pilei of this fungus were found on the uninjured bark of a large limb which was rapidly dying. The fungus was apparently parasitic.

CURRANT DISEASES.

LEAF SPOT.

The fungi which cause leaf spot of currants in the Hudson Valley are *Septoria ribis* Desm., *Cercospora angulata* Wint., and *Glcosporium ribis* (Lib.) Mont. & Desm. During the season of 1899 none of these did any damage worth mentioning. Only traces of fungous leaf spot were found in a few localities. Experiments by Pammel,<sup>17</sup> Goff,<sup>18</sup> and others have shown that at least the first two and most common of these fungous leaf spot diseases can be controlled by spraying with Bordeaux mixture. However, at various times complaints have been received that spraying does not prevent currant leaf spot.

The observations in the Hudson Valley throw some light on the cause of these failures. One of the best informed fruit growers in Columbia County called our attention to a bad case of currant leaf spot which he had tried in vain to prevent by spraying with Bordeaux mixture. Several thousand currant cuttings had been sprayed with Bordeaux during the first week in May and again about two weeks later. In spite of this treatment the plants were severely attacked during the last week in May by a disease which the owner did not doubt was the fungous leaf spot said to be amenable to treatment. An examination of the affected plants revealed the fact that the trouble was entirely the work of the four-lined leaf-bug,<sup>19</sup> *Pæcilocapsus lineatus*. The leaves were thickly covered with small, reddish-brown, angular

<sup>17</sup> Pammel, L. H., Iowa Agr. Exp. Sta. Bul. 13: 45-46; Bul. 17: 419-421; Bul. 20: 716-718; Bul. 30: 289-291.

<sup>18</sup> Goff, E. S., Wis. Agr. Exp. Sta. Bul. 72: 30.

<sup>19</sup> For an account of the habits, life history, etc., of this insect see Cornell Agr. Exp. Sta. Bul. 58. O. 1893.

spots. In the early stage the spots were black and water soaked in appearance, but they soon became brown, dry and transparent. (See Plate III, fig. 1.) The epidermis, on both sides of the leaf, was depressed, but no gnawing of the tissue was evident. The insect thrusts its beak into the leaf and sucks out the juices.

Later, the work of the same insect was found sparingly at Kinderhook, Highland and Clintondale and very abundantly at Tarrytown ; but in all these cases on bearing bushes.

It seems probable that the injuries of the four-lined leaf-bug are often mistaken for fungous leaf spot. Currant growers should learn to distinguish between these two kinds of leaf spot. The insects, being small and very active, are not much in evidence. The spots which they produce differ from fungous spots in being transparent. They attack chiefly the leaves near the tips of the canes.

#### CANE BLIGHT.

The most destructive disease of currants in the Hudson Valley the past season was a cane blight. The leaves on one or more canes in a hill suddenly wilt and soon thereafter the canes die and become dry. The disease may be confined to a single short branch or it may affect several large canes. The entire hill may eventually succumb, but this rarely happens during the first season of attack. It commenced early in May and continued throughout the whole season, being most active while the fruit was ripening.

We first became acquainted with this cane blight in June, 1896, when specimens of it were sent to us from Marlboro. From these specimens it appeared that the trouble was due to a sterile fungus working in the pith and under the bark. Through the kindness of Mr. S. A. Beach it was learned that Mr. D. G. Fairchild had made a brief study of the same disease in 1891 and had given a talk upon it before the Botanical Club of the American Association for the Advancement of Science at its meeting in Washington in August, 1891. He attributed it to a sterile fungus. A short account of this talk was published in the *Botanical Gazette* for September, 1891, page 262.

Before having an opportunity to study the disease in the field

we learned that Dr. E. J. Durand, of Cornell University, was investigating a currant cane blight having the same symptoms, in Western New York. Upon the appearance of his bulletin<sup>20</sup> in which it was stated that *Nectria cinnabarina* Tode was the cause of the disease, we concluded that the sterile fungus observed by Fairchild and by us was probably only a saprophyte; but our observations during the past season have convinced us that it is really an active parasite. The disease occurs to a greater or less extent throughout the entire Hudson Valley. In many plantations it is very destructive. We have cut open and examined several hundred, perhaps as many as a thousand, of the affected canes, and almost invariably found the sterile fungus in the pith and under the bark. Its presence can generally be determined with the unaided eye and nearly always with the aid of a good hand lens. In a very few cases, perhaps half a dozen, we have found borers; but in no case have we found *Nectria cinnabarina* either in its perithecial or conidial stage. *The currant cane blight occurring in the Hudson Valley is not caused by Nectria cinnabarina but by a sterile fungus.*<sup>21</sup>

When a cane of the previous season's growth first shows wilting of the leaves it appears normal externally. But on splitting an affected stem there will usually be found a place near the base of the affected portion, where the bark is dead and the wood and pith dead and discolored for an inch or more. The presence of the fungus is manifested by delicate cobwebby patches of hyphæ in the pith. This is the seat of the trouble, and from it as a center the fungus spreads both ways; upward so as to frequently occupy the whole wilted branch, and downward so as to kill successively the lower branches of the cane. The disease seems to strangle the canes near the point of infection, killing the portion beyond by cutting off the supply of sap.

In canes of the present season's growth the fungus spreads upward so rapidly that the whole cane is discolored and permeated by the fungus hyphæ throughout its entire length soon after the

<sup>20</sup> A Disease of Currant Canes. Cornell Exp. Sta. Bul. 125. F. 1897.

<sup>21</sup> Exact proof by inoculation experiments is lacking. But the large number of cases in which the sterile fungus has been found associated with the disease is considered sufficient proof for this statement.

leaves are wilted. In the pith of such specimens the hyphæ are especially conspicuous.

In the currant cane the hyphæ are white or dirty white, but on bean stem cultures they soon become smoke colored or even black. No spores or other indications of fructification have been observed and nothing is known of the manner in which the fungus is disseminated. It occurs upon both red and white currants, *Ribes rubrum*, and has also been observed in one case upon the black currant, *R. nigrum*.

The diseased canes should be cut out and burned. In doing this care should be taken to cut well below the lowest point of the disease; otherwise the labor is wasted. Also, the pruning knife should be frequently dipped into some disinfecting solution; for example, a 5 per ct. solution of carbolic acid. If this is not done pruning may serve to spread the disease instead of checking it.

It is hoped that a thorough study of this disease may be made in the near future.

#### DEWBERRY DISEASES.

There are probably other commercial plantations of dewberries in the Hudson Valley, but we have made observations upon one only, which was located at Highland in Ulster County. The plants were of the variety Lucretia. They were trained up to stakes, several canes to each stake. During the previous winter they had been allowed to lie upon the ground. In the spring they put out leaves normally, but later a good many of them died. Some were just commencing to wilt at the time of our observations (June 21). It was rare to find all of the canes in a hill dead. Usually, from one to four of the canes were dead and the rest apparently healthy. As a rule the affected canes were green and healthy for a few inches above the soil; then there came a blackened (but not constricted) portion a few inches long which seemed to be the seat of the trouble. No fungus was visible upon any of the dead parts and no fungus hyphæ were found in the bark or pith. It is not likely that this was winter injury or the effect of drought. We cannot account for it.

A small amount of leaf spot (*Septoria rubi* Westd.) occurred in this plantation.

## GOOSEBERRY DISEASES.

POWDERY MILDEW.<sup>22</sup>

(*Sphaerotheca mors-uvæ* (Schw.) B. & C.)

This is the most destructive gooseberry disease. It is reported to have been very bad in Ulster and Columbia counties. One correspondent reports that his Downing gooseberries sprayed four times with Bordeaux mixture were almost free from mildew while with the variety Industry, given the same treatment, one-half of the crop was ruined. The disease occurred also in Dutchess County.

## ROOT ROT.

During the past five years a destructive root rot disease has existed in a gooseberry plantation at Marlboro. It started at one corner of the plantation and gradually spread, killing every plant as far as the disease extended. At the present time the affected area measures about 40 by 50 feet. The plants die gradually, living from one to four years after the appearance of the first symptoms of disease. Dead canes and living ones occur in the same hill, but the leaves on the living canes are more or less dwarfed. Early in May we had the privilege of examining about a dozen of the affected plants which had recently been dug up. Upon the roots of all of them there was a conspicuous white mycelium. It was at once concluded that this fungus was the cause of the trouble, and from the nature of the rhizomorphs referred it provisionally to the form-genus *Dematophora*.

In November the Horticulturist had occasion to remove a lot of seedling gooseberries which had been growing between the rows in one of the Station vineyards for six seasons. Although but few of these plants had been grown thriftily none of them had shown pronounced symptoms of disease. Accordingly, we were surprised to find the roots of many of them covered with the same fungus which had been found on the diseased gooseberries at Marlboro. The fact that it occurred on apparently healthy plants caused us to doubt the correctness of our former conclusions.

<sup>22</sup> For experiments on the treatment of this disease see Bulletin 161 of this Station.



Pieces of the fungus-infested roots were stuck in moist sterilized sand in a Mason fruit jar previously made sterile by a solution of corrosive sublimate. In about six weeks they began to show conidial fructification like that of *Dematophora*.

From diseased grape roots placed in the Mason jar sand cultures we had previously obtained the conidial fructification of a *Dematophora*. (See Grape Root Rot.) The rhizomorphs of the gooseberry fungus were strikingly like those of the grape *Dematophora* except that the hyphæ composing them were slightly smaller. Accordingly, we expected to get the same sort of conidial fructification; but the spores of the gooseberry fungus were larger and the branching of the sporophores different. We believe the gooseberry fungus to be a species of *Dematophora*, but there is some doubt about it being an active parasite.

During the past season the gooseberry disease at Marlboro spread but little owing probably to the dry season. In the wet season of 1898 it made rapid progress. The owner of the diseased gooseberries believes that the plants have died through some evil influence of a large black walnut tree<sup>23</sup> which stands at the corner of the plantation where the disease started; but it is scarcely possible that this can have been the direct cause.

#### DWARFED FOLIAGE.

In another gooseberry plantation we saw a few plants which appeared healthy except that all of the leaves were abnormally small. The owner states that in 1898 there had been many plants so affected. The affected plants were intermingled with healthy ones.

#### GRAPE DISEASES.

##### BLACK ROT.

(*Laetia bidwellii* (Ell.) Viala & Ravaz.)

Black rot has been, as usual, the worst grape disease, but was not nearly so destructive as in 1898. The worst case we have

<sup>23</sup> For another case of supposed injury by black walnut tree, see Grape Root Rot on pages 297-298.

seen or heard of this year occurred at West Nyack, Rockland County, where 75 per ct. of the crop was ruined by it. In some vineyards in Westchester County, it is reported to have caused a loss of 50 per ct. From various other localities it is reported destructive in unsprayed vineyards.

Bordeaux mixture, properly applied, is an almost certain preventive of this disease. It should be more generally used in the Hudson Valley.

#### DOWNY MILDEW.

(*Plasmopara viticola* (B. & C.) Berl. & De Toni.)

This disease appears to have been scarce except in the southern part of the district where it was destructive in a few vineyards. At West Nyack it was severe on several varieties, but showed a decided preference for the variety Delaware.

#### ROOT ROT.

(*Dematophora necatrix* (?) Hartig.)

While on a visit to Middle Hope we were informed that in a vineyard near that place grape vines had been killed by a black walnut tree. We visited the vineyard and found that the tree, which was of enormous size, stood about 40 feet from the edge of the vineyard. Opposite the tree all of the vines over a small semi-circular area had died. The owner stated that peach trees had been planted in the vacant area but they, too, had died. We dug up some of the dead vines and found the roots covered with a white mycelium. Pieces of the fungus covered roots were stuck into wet sand in a sterilized Mason fruit jar. In this culture the white mycelium was gradually replaced by numerous light brown rhizomorphs and after three months the roots became thickly covered with the conidial fructification of *Dematophora*. The sporophores measured from one to one and one-half millimeters in height. To the unaided eye they appeared to be short, brown stalks with colorless or purple ovoid knobs on their ends. Under the microscope the brown stalks proved to be compound sporophores, composed of brown, septate hyphæ; and the colorless, ovoid knobs were com-

posed of small, colorless, ovoid spores borne on the branched free ends of these hyphæ. The fungus agreed closely with Hartig's description<sup>24</sup> of *Dematophora necatrix* except that the hyphæ composing the rhizomorphs were destitute of pyriform swellings at the septa.

The *Dematophora*, and not the walnut tree, was probably the cause of the death of the vines. Some of the dead vines were certainly beyond the reach of the roots and shade of the tree. The soil was a sandy loam and well drained. See Gooseberry Root Rot, page 295.

#### CHLOROSIS OR YELLOW FOLIAGE.

In an old but well cared for vineyard at Coxsackie we found many plants showing yellow foliage by June 1. The yellow leaves were much dwarfed. Sometimes the whole vine was affected but it often happened that a part of a vine would be diseased and a part healthy. According to the owner, affected canes die the following winter. When all of the canes are affected and die new canes come up from the root. The affected plants were scattered irregularly over the vineyard.

Chlorosis may be due to several causes. Not having had opportunity to study this case thoroughly no statement is made as to its cause.

#### BLACK KNOT.

A considerable number of specimens of this disease were found in an old vineyard at Middle Hope. At a distance of from six inches to two feet above the ground the stems showed warty excrescences of spongy texture. (See Plate IV.) No knots were found on the roots or at the crown. These excrescences bear a striking resemblance to the black knots on plums and cherries caused by the fungus *Plowrightia morbosa* (Schw.) Sacc., but they have an entirely different origin. European investigators hold that they are due to the action of frost.<sup>25</sup>

The disease appears to be rare in the Hudson Valley, but in

<sup>24</sup>Hartig, R. *Dematophora necatrix* n. sp. Untersuchungen aus d. forstbotan. Institut zu München. III., 1883.

<sup>25</sup>See Frank, A. B. Die Krankheiten der Pflanzen, 1:209-210. Breslau, 1895.



FIG. I.—CURRANT LEAF INJURED BY FOUR-LINED LEAF BUG.

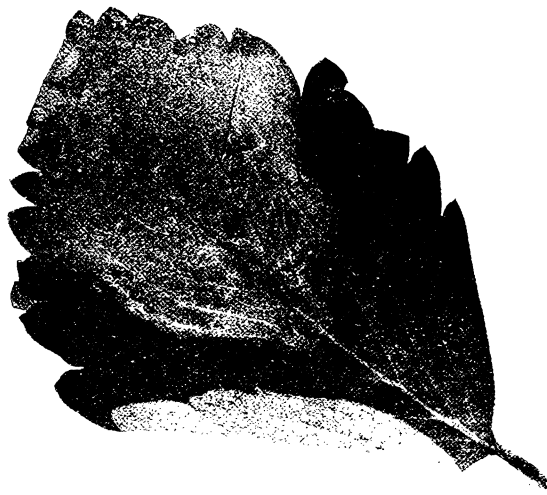


FIG. II.—STRAWBERRY LEAFLET AFFECTED BY SUN-SCALD.

PLATE III.

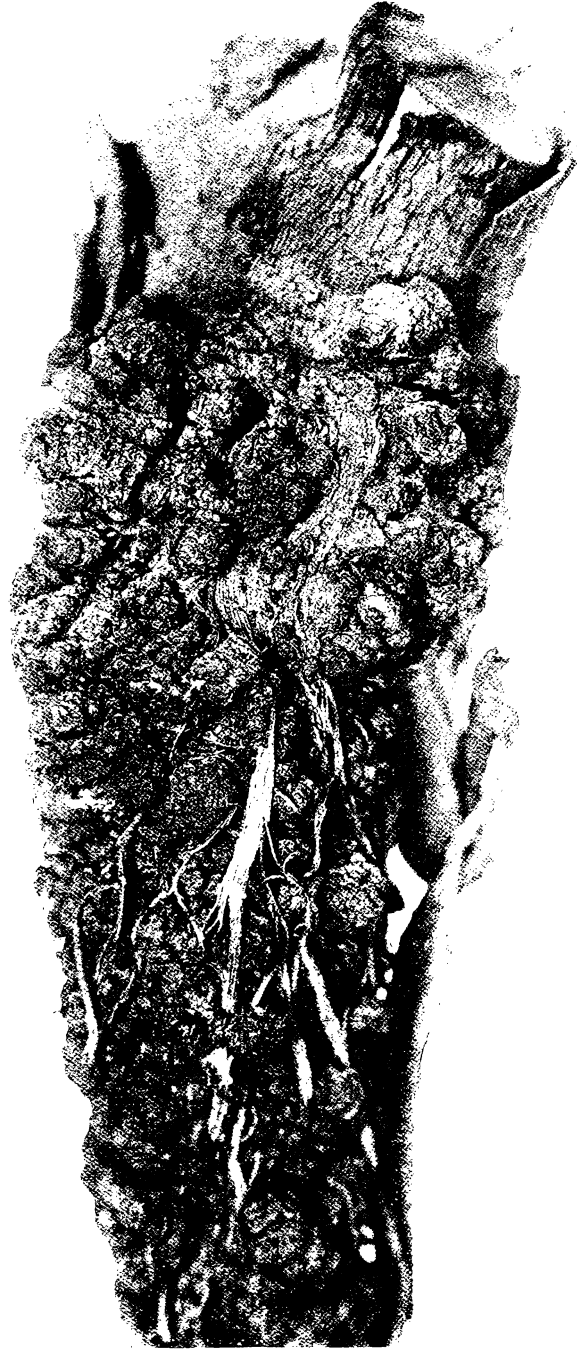


PLATE IV.—BLACK KNOT OF THE GRAPE.

Central and Western New York it is met with frequently. It is also reported from Pennsylvania,<sup>26</sup> California<sup>27</sup> and Canada.<sup>28</sup> From American writers on plant diseases it has received very little attention although it has a considerable literature in French, German and Italian.

## PEACH DISEASES.

### WINTER INJURY.

The Hudson Valley peach crop of 1899 was almost a complete failure owing to the hard freeze in February which killed nearly all of the fruit buds. There were very few orchards that bore any fruit. In many orchards the twigs also were much injured and in some the trees were killed outright. The severe attack of leaf curl in 1898 probably made the trees unusually susceptible to winter injury.

### LEAF CURL.

(*Exoascus deformans* (Berk.) Fckl.)

Leaf curl has given very little trouble. Over the greater part of the district it is reported as occurring only to a slight extent. Correspondents at Stockport, Columbia Co., and Annandale, Ulster Co., report it severe; but it is possible that in these cases the fungous leaf curl may have been confused with the work of plant lice.<sup>29</sup>

It appears that the weather conditions in early spring exert a marked influence upon leaf curl. In 1898 it was very destructive.

### YELLOWS.

This disease is common throughout the Hudson Valley and in some localities very destructive. From year to year it fluctuates

<sup>26</sup> Galloway, B. T. Botanical Div. U. S. Dep. Agr. Bul. 8: 63.

<sup>27</sup> Woodworth, C. W. Cal. Exp. Sta. Bul. 99:2. This, however, may be a different disease.

<sup>28</sup> Fletcher, Jas. Canada Experimental Farms Rep. for 1889:87.

<sup>29</sup> Some fruit growers know the *Exoascus* disease by the name "red blister" and the work of aphides by the name "leaf curl." This tends to confusion.

somewhat in virulence, but may be depended upon to appear to a considerable extent every season. It is one of the most troublesome peach diseases in this section.

#### FRUIT ROT.

(*Monilia fructigena* P.)

Usually this disease is common, but in 1899 it was scarce because there was little fruit to rot. It has been reported from Tarrytown, Milton, Ghent, Middle Hope and Washingtonville.

#### LEAF TIP-BURN.

In a small orchard of young trees at Monsey, Rockland Co., a leaf trouble was observed which may be called tip-burn. The tips and margins of the leaves on the new wood appeared water-soaked<sup>30</sup> and transparent. Upon drying, the diseased portions became yellowish white. The trees were of the variety Red Cheek and had suffered severely from leaf curl the previous season. The observations were made on May 24, at which time the tip-burned leaves were abundant. The cause of it is unknown to us, but it is probably not of fungous origin.

#### POWDERY MILDEW AND SCAB.

Neither powdery mildew nor scab, *Cladosporium carpophyllum* Thüm, is known to have occurred anywhere in the Hudson Valley during the past season.

#### PEAR DISEASES.

##### SCAB.

(*Venturia pirina* Aderh. Syn. *Fusicladium pirinum* (Lib.) Fckl.)

Pears have been remarkably free from scab. Many of our correspondents report none of it; several report "a little"; and a few report its occurrence in considerable quantity. Judging from

<sup>30</sup>The watersoaked condition may not be a character of the disease but due to a rain which occurred a short time before the observations were made.

these reports it appears to have been worst in Columbia Co., but in no case was it so bad as last season.

LEAF BLIGHT AND LEAF SPOT.

(*Entomosporium maculatum* Lev. and *Septoria piricola* Desm.)

Only eight correspondents report the occurrence of pear leaf blight, and none of these report it destructive. Not having succeeded in taking a single specimen ourselves we do not know which of the two diseases was the more common.

FIRE BLIGHT.

(*Bacillus amylovorus* (Burr.) De Toni.)

Although more common than either scab or leaf blight, the fire blight has been destructive in only a few localities.

“ BODY BLIGHT ” OR ROUGH BARK.

There is a disease of the trunks and larger branches of pear trees commonly known as “ body blight.” Over areas which are at first small and more or less circular but later coalesce into large patches of various shapes, the bark is dead and dry and clings tightly to the wood. By the shrinkage of the bark in drying the affected areas become slightly depressed and bounded by a crack which separates them sharply from the adjacent healthy bark. This gives the affected trunks and branches a rough, cracked unhealthy appearance. The trees are seldom killed outright, but their growth is checked, often to such an extent as to hopelessly stunt them.

“ Body blight ” has generally been considered to be a form of the fire blight caused by the microorganism *Bacillus amylovorus* ; but according to Paddock<sup>31</sup> it may be caused by the apple canker and black rot fungus, *Sphaeropsis malorum* Pk. It is not our purpose to discuss here the nature of the disease but to report its common occurrence in the Hudson Valley. In all of the counties within the district excepting Rockland, Putnam and

<sup>31</sup>Paddock, Wendell. The New York Apple-Tree Canker. Bul. 163 of this Station, page 203.



Westchester it was found in great abundance. In a severely attacked orchard in Greene County, portions of several trees appeared to have been killed by it. The branches were thickly covered with the pycnidia of *Sphaeropsis malorum*. A few trees after struggling along in a half dead condition for several years finally died, apparently from *Sphaeropsis*.

#### WINTER INJURY (?)

In each of several orchards in the vicinity of Athens, Greene County, a few pear trees died mysteriously. They seemed to have died from some cause which killed the bark just below the surface of the soil. The parts above ground appeared normal. To the unaided eye no fungus was present on the roots or on the dead bark of the subterranean portions of the trunk. There were no signs of insects. In all cases the dead trees stood in a heavy clay soil and were scattered irregularly through the orchard among healthy trees.

#### PLUM DISEASES.

##### BLACK KNOT.

(*Plowrightia morbosa* (Schw.) Sacc.)

About 20 years ago plum growing was an important industry in the Hudson Valley, particularly in Greene Co. About 1884 there was an epidemic of black knot which ruined most of the plum orchards and so discouraged fruit growers that few have had the courage to replant on a large scale. Another but less destructive epidemic occurred in 1891. At the present time the Japanese plums are being planted quite largely. They are not affected to an injurious extent by the black knot. On the European varieties it is still very troublesome and an epidemic may be expected whenever a favorable season occurs. It has probably spread but little during the past season.

##### FRUIT ROT.

(*Monilia fructigena* P.)

The Hudson Valley plum grower has another serious enemy in the brown rot of the fruit. In spite of the very dry season this

disease has been quite bad in some localities: At Millbrook, Dutchess Co., it is reported to have destroyed two-thirds of the crop; at Old Chatham, Columbia Co., 50 per ct. of the crop; at Annandale, Ulster Co., Newburgh, Orange Co., and at Blauvelt, Rockland Co., 25 per ct. It was also abundant in Westchester Co., and occurred to a considerable extent in Greene and Rensselaer counties.

LEAF BLIGHT OR "SHOT HOLE" DISEASE.

This disease is commonly caused by the fungus *Cylindrosporium padi* Karst., but Duggar<sup>32</sup> has recently shown that it may be produced by Bordeaux mixture, especially if improperly prepared; by other chemicals and even by certain weather conditions. Leaf blight has been reported from a few localities but does not appear to have been serious except in a few cases where it was evidently caused by spraying. At Yorktown Japan plums were observed which were severely "shot holed" by spraying with carefully made dilute Bordeaux mixture.

A correspondent from Stockport, Columbia Co., writes: "The plums both sprayed and unsprayed looked well until after the first heavy rain, when, on the trees that had been sprayed, the leaves spotted, turned red and fell off. I think this must have been due to the spray, as the unsprayed trees were not affected." We think that this opinion is correct.

LEAF CURL.

(*Exoascus mirabilis* Atk.)

A few shoots of Wild Goose plum affected with this fungus were observed at Tallman, Rockland Co.

QUINCE DISEASES.

FRUIT SPOT AND LEAF BLIGHT.

(*Entomosporium maculatum* Lev.)

Fruit spot and leaf blight are caused by the same fungus. It is reported to have been abundant in Columbia, Westchester and

<sup>32</sup> Duggar, B. M. Peach Leaf-Curl and Notes on the Shot Hole Effect of Peaches and Plums. Cornell Agr. Exp. Sta. Bul. 164. F. 1899.

Orange counties: A correspondent at Ghent dug out all of his bushes because of it. This was quite unnecessary because Bordeaux mixture would have prevented the disease at a very small cost.

FIRE BLIGHT.

(*Bacillus amylovorus* (Burr.) DeToni.)

The fire blight on quince is the same as that occurring on pear and apple. It was reported by three correspondents to have occurred in small quantity.

RASPBERRY DISEASES.

ANTHRACNOSE.

(*Glaosporium venetum* Speg.)

The replies to our circular letter of inquiry indicate that raspberry anthracnose has been common. Although not so stated, these replies probably relate to anthracnose on last year's canes. Judging from our own observations we believe that canes of the present season's growth have been but slightly affected.

RUST.

(*Puccinia peckiana* Howe. Syn. *Cæoma nitens* Schw.)

Rust has occurred in several plantations but not to a destructive extent except in a very few cases. Under some conditions rust has a tendency to reduce the number of prickles. For a more detailed discussion of this subject see Blackberry Rust, page 286.

ROOT GALLS.

We know of but one occurrence of this disease in the Hudson Valley. Others probably exist however. In April a fruit grower at Madalin, Dutchess County, sent us a red raspberry root bearing several rough, spongy, roundish knots or galls varying from the size of a pea to that of a walnut. The sender wrote that in the spring of 1898 he had purchased 30 Loudon raspberry plants from a Rochester nurseryman. A year later half of them had died from the root galls.

The cause of such root galls is not known. There is some evidence that the disease is communicable from one plant to another, and also from raspberries to peaches and *vice versa*. Plants showing root galls should not be planted, not even after the galls have been removed.

#### WINTER INJURY.

Red raspberries not laid down were injured by the severe winter. At Poughkeepsie red raspberries of the variety Marlboro winter-killed nearly to the ground, while Miller's Red in the same field and under parallel conditions suffered but slightly. In a plantation of red raspberries at Marlboro, canes which passed the winter tied up to stakes were killed back from six to eighteen inches. The injury was worse on low ground.

#### CANE BLIGHT.

(? *Phoma*.)

In various localities in the northern part of the district there is a common disease of raspberries, which may be called cane blight for want of a better name. On June 1 it was observed at Coxsackie on black raspberries. Its attacks were confined almost exclusively to old canes. The owner states that it rarely attacks young canes but did so to some extent last season. Some canes were dead, others nearly dead and still others showing the first symptoms. The affected canes showed a brownish black discoloration of the bark which was dead. Usually the discoloration extended the whole length of the cane on one side only, the bark on the other side remaining alive and green. Numerous pycnidia of at least four different species of fungi were found on the dead bark. The predominating form was a species of *Phoma* having small, round or slightly ellipsoidal spores with a brownish tinge.

At Poughkeepsie on June 20, we found what appeared to be the same disease killing the canes of black raspberries. It was destructive. Canes here and there were dying and their abundant fruit, which was nearly ripe, was drying up. The owner thought it the effect of drought. Here, as at Coxsackie, only the fruiting

canes were affected. The affected plantation was an old one. An adjacent plantation of young plants of the same variety was not affected. The tendency of the canes to die on one side was not so pronounced as at Coxsackie, but pycnidia of the same *Phoma* were abundant and occurred so close to the healthy bark as to indicate that the fungus was parasitic.

On July 19 the same disease on black raspberries at was found Voorheesville. Here it had ruined one-third of the crop. It was in a plantation five years old. The owner states that it occurs chiefly in old plantations, those two and three years old usually being exempt. It is worst on high ground and occurs in wet seasons as well as dry ones. The canes commenced to die about the time the fruit began to ripen. Often the entire cane was affected, but frequently only a part of it. Healthy and diseased branches occurred on the same cane. Sometimes a cane would be dead upon one side and in a semi-living condition upon the other. The pycnidia of the *Phoma* were to be found on almost every affected cane, and where one was killed back only part way the pycnidia would be clustered just above the boundary between the living and the dead tissue.

At Voorheesville the disease was noticed attacking also red raspberries of the variety Cuthbert. Berries, leaves and wood suddenly dried up while the fruit was ripening. Usually, but not always, the whole cane was affected. At some point on the cane there were numerous pycnidia of the same *Phoma* found on black raspberries. When only a portion of a cane was affected the pycnidia were commonly clustered (as on black raspberries) just above the boundary between the diseased and healthy bark. On the red raspberry the pycnidia appear to the unaided eye somewhat different from those on the black raspberry.

A disease having the same symptoms attacks the Marlboro, a red variety extensively planted in the Hudson Valley. On this variety it is especially destructive and is everywhere known as "the Marlboro raspberry disease." A bad case of this was observed at Delmar, but the examination was so hasty that little can be said concerning it. It is certain, however, that the *Phoma* was not so abundant as in the previously mentioned cases. At this place the yellow variety, Golden Queen, was also attacked by it.

At West Sand Lake it was destructive on the variety Shaffer, being worse in the older portions of the plantation. Correspondents report it from various other localities. It is a widespread and destructive disease.

It seems probable that the disease of red raspberries is the same of that of the black varieties. It may, perhaps, be aggravated by drought, but the evidence in hand is opposed to the theory that drought is the sole, or even the principal, cause. In the first place the symptoms are not those of drought. On raspberry canes suffering from drought the foliage becomes yellowish, the berries are abnormally small and the whole plant gradually dries up. All of the fruiting canes in a hill are about equally affected; in fact the whole plantation, if on fairly uniform soil, will be uniformly affected. Whereas, in the disease under discussion, canes die here and there with diseased canes and healthy canes occurring even in the same hill.

We are not prepared to say positively that the *Phoma* found on the affected canes is the cause of the disease because no inoculations with it have been made; but it is certainly to be regarded with suspicion. This disease is a worthy subject of investigation.<sup>33</sup>

#### LEAF SPOT.

(*Septoria rubi* Westd.)

Rare. Observed only at Poughkeepsie.

### STRAWBERRY DISEASES.

#### DROUGHT.

Strawberries were damaged more by drought than by all diseases combined. The few persons so situated that they could irrigate their strawberries reaped a harvest of profit.

<sup>33</sup> The supposedly bacterial disease of Turner and Marlboro raspberries described by Freda Detmers in Ohio Agr. Exp. Sta. Bul. 6, page 128, seems to be different.

LEAF BLIGHT OR LEAF SPOT.  
 (*Sphaerella fragariae* (Tul.) Sacc.)

The situation with regard to this disease may be summed up in a phrase used by several of our correspondents ; namely : "Severe on some varieties." It has not been nearly so virulent as in 1898, but the more susceptible varieties have suffered considerably. It is well known that varieties differ greatly in their susceptibility to leaf blight. At Poughkeepsie the variety Gandy was severely attacked, while the variety Clyde growing in adjacent rows under parallel conditions was almost entirely exempt.

At Ghent we had an opportunity to observe the disastrous effect of leaf blight upon the crop of the following year. A row of Hunn stood beside a row of Parker Earle. In 1898 the Hunn blighted very severely while the Parker Earle was but slightly affected. On June 2, 1899, the Hunn promised a very trifling yield. Many of the plants did not even start in the spring. In marked contrast to the condition of the Hunn, the Parker Earle was making the best showing for a berry crop that we have ever seen.

It may be that some of our correspondents have confused the leaf spot caused by *Sphaerella fragariae* with that caused by *Ascochyta fragariae* Sacc. The two diseases resemble each other considerably, but the *Ascochyta* spots are redder and show minute black pimples at the center. On May 31 we collected fruiting specimens of the *Ascochyta* at Athens, Greene Co., but we do not believe that it was anywhere as abundant as the *Sphaerella*.

SUN-SCALD (?)

On June 2 we observed at Ghent a peculiar disease on the Hunn strawberry. The leaflets showed dead, brown V-shaped areas at their tips (see Plate III, fig. 2). These dead areas often extended half way down the midrib. They were generally situated at the tip of the leaflet but occasionally occurred at the side. The disease occurred only on the Hunn, on which it was common but not destructive. It did not appear to be due to fungi and certainly not to insects. We are at a loss to account for it unless it may possibly have been a case of sun-scald.