

**THE MARYLAND AGRICULTURAL  
EXPERIMENT STATION; BULLETIN NO.  
57; AUGUST. 1898:  
REPORT ON THE SAN JOSE SCALE IN  
MARYLAND, AND REMEDIES FOR ITS  
SUPPRESSION AND CONTROL**

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**WILLIS G. JOHNSON**

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PROF. C. V. RILEY.

R. I. Smith

THE MARYLAND

# AGRICULTURAL EXPERIMENT STATION



BULLETIN No. 57.

AUGUST, 1898.

## Report on the San Jose Scale in Maryland, and Remedies for its Suppression and Control.

BY WILLIS G. JOHNSON, A. M., ENTOMOLOGIST.

### INTRODUCTORY.

It was the intention of the writer to have embodied this report in a more exhaustive one, including all the work of this department for the years 1896 and 1897, but the lack of funds precluded its publication. This report, therefore, in its present form, is published exclusively out of the funds of the State Horticultural Department, and embraces my observations and experimental operations as State Entomologist and Entomologist of the Agricultural Experiment Station.

I wish to acknowledge here my grateful appreciation of the encouragement and hearty cooperation I have always received from President R. W. Silvester, of the Agricultural College, in the development of my department and the prosecution of my work. I am also under many obligations to Mr. Franklin Sherman, Jr., who voluntarily assisted me from July, 1896, to April, 1897. My thanks are also due to Mr. Robt. H. Miller, former director of the station, and especially, to Mr. Robert S. Emory, who has so materially assisted me in my experimental work. I have also been shown many favors by Dr. L. O. Howard, the United States Entomologist, for which I am very grateful. Mr. E. Dwight Sanderson, my assistant, has also rendered much valuable service. I am also indebted to the fruit growers and nurserymen who have ever been ready to assist me and cooperate with me along any line of experimental work. I desire also to thank Mrs. C. V. Riley for the excellent photograph of her late husband, which is herewith reproduced.

The author regrets exceedingly that he cannot give, at this time, all the experimental work that has been completed, and is now ready for publication. The results, however, will be given to the general public as rapidly as possible, in this series of bulletins, of which this is the second, published in accordance with the Laws of Maryland 1898, Chapter 289.

## PROF. C. V. RILEY.

It is a pleasure for me to preface my report with a short sketch of my predecessor as station entomologist, the late Professor C. V. Riley. The frontispiece shows him in his characteristic position at work, and is reproduced for the first time from one of his latest photographs, taken in 1893, about the time he became officially connected with the Maryland Agricultural Experiment Station.

In June, 1893, Prof. Riley was elected Entomologist and Physiologist of the Station a position he occupied up to the time of his death. During his connection with the station he attended to the correspondence of his department and published two bulletins. The first, (Bul. No. 23) appeared in December, 1893, and was a popular account of some injurious species, the first of a series which he intended to have issued upon the insects of Maryland. The second, (Bul. No. 32) was issued in April, 1895, and embodied an account of the San Jose scale in this state. It was his intention to have added to the station cabinet a set of the insects he had in duplicate in his collections. This collection had been started, and eight cases of beetles and two of butterflies had been transferred to the station before his death occurred.

As an officer of the station, and for the entomology of Maryland, Professor Riley had planned to prosecute some original research and investigate many unsolved problems of economic importance; but all was cut short by his untimely end.

The circumstances which occasioned the death of Professor Riley are very sad. September 14th, 1895, shortly after nine o'clock, he mounted his bicycle, and in company with his son, started from his residence on Wyoming Avenue in Washington, D. C., for the central part of the city. Before reaching Connecticut Avenue, a short distance away, he was accustomed to going down a rather steep hill, and on this occasion those who saw him noticed that he was riding more rapidly than usual. At the intersection of Connecticut avenue and S street the front wheel of his bicycle struck a piece of granite lying on the concrete, and, turning suddenly at right angles, Professor Riley was thrown with great force, head downward on the pavement. His apparently lifeless body was picked up and laid on the parking, and in a few minutes several physicians were present. Everything possible was done for the unfortunate man, but to no avail. He died shortly after midnight September 15.

The following biographical sketch is too brief for us to do homage to the man who, pre-eminent above all others, has done so much to place economic entomology upon a footing with other allied sciences; but space will not permit me to say more in this place.

Charles Valentine Riley was born in London, September 18, 1843. He spent his early boyhood days in the village of Walton, on the Thames, and at an early age exhibited a fondness for collecting, and took a keen interest in painting and drawing. When ten years of age he began collecting notes and making drawings of the insects in his neighborhood, with a view, as he said, of describing the transformations of all the species in that vicinity. Dr. L. O. Howard, the present United States

Entomologist, who has seen these early drawings, says they "indicate a most unusual artistic talent."

By the death of his father, who was a clergyman of the Church of England, young Riley soon developed a self-reliance and sense of responsibility that characterized him later in life. When eleven years of age he was sent to boarding school in France, and later to Germany. His familiarity with these languages was of invaluable service to him in his professional life, as he spoke both with exceptional accuracy.

It appears that his views were not at all in accord with those who had encouraged him to take a classical education, as we find him, at the age of seventeen, setting sail for New York, where he arrived after a seven weeks' voyage with little means and "a stranger in a strange land." That young Riley was of a practical turn of mind was again exhibited after his arrival here from the fact that he settled upon a farm in Illinois where he remained for four years until he had acquired an experience of practical agriculture. He then went to Chicago, where he took up journalistic work, drawing portraits, and at the same time paying special attention to botany and entomology. Finally he became associated with the *Prairie Farmer*, and his writings on economic entomology were enthusiastically received by the general public. As an attaché of this agricultural newspaper he attended farmers' and fruit-growers' meetings, and soon had a large number of friends and acquaintances. It was at the meetings of the Illinois Horticultural Society that he subsequently became acquainted with Benjamin D. Walsh, a man of remarkable character and unusual ability, of English university education, who was in 1867 appointed the first State Entomologist of Illinois. They became close friends, and Walsh exercised a great influence upon Riley's future. They founded and edited the *American Entomologist*, and it was mainly through the influence of Walsh that Riley was chosen State Entomologist of Missouri, when the law was passed for the creation of that office in 1868.

He was now twenty-five years of age, and he shouldered the responsibilities of his new office with great energy and enthusiasm. The golden opportunity of his life had now come, and before he had completed the last of his now famous nine Missouri Reports, he was recognized, not only in this country, but in all parts of the civilized world, as the foremost living economic entomologist.

These reports are based almost entirely upon original observations, and are replete with original drawings of life-like characters of marvelous scientific accuracy. This remarkable work was accomplished single-handed, and in a field that was distinctly his own. It has been called epoch-making in its character, and any one reviewing this pioneer work must admit that it is the product of a master—a most extraordinary man.

Through his efforts the United States Entomological Commission was established by Congress in 1876, and his services in connection with this commission as its Chief were of great value to the general agricultural public. He accepted the position of Entomologist to the Department of Agriculture in 1878, but gave up the place shortly afterward, retaining, however, his connection with the Entomological Commission, and continued his work for the government.



4. MARYLAND AGRICULTURAL EXPERIMENT STATION.

When the Division of Entomology of the Department of Agriculture was created in 1881 Professor Riley was placed at its head, a position which he held continuously until the time of his resignation, in 1894, on account of impaired health. His influence in the Department of Agriculture was very great, and he was the prime mover of many important reforms.

He was a member of many scientific and agricultural societies in this country, and always took an active part at the meetings of the Society for the Promotion of Agricultural Science from the time he joined it in 1882. He was also an honorary member of many foreign societies.

After his resignation from the Department of Agriculture in 1894 it was his intention to have devoted himself solely to pure scientific research. In 1896 he gave his collections of insects, comprising about 20,000 species, which represented over 115,000 pinned specimens and other material, to the United States National Museum, Department of Insects, of which he was Honorary Curator. Had Riley lived, no doubt the greatest work of his life would have been produced in his later publications.

## REVIEW OF THE ENTOMOLOGICAL FEATURES OF 1896.

Immediately after assuming charge of the Entomological work of this State on July 1st, 1896, I began an inspection of the orchards and nurseries in accordance with the provisions of the Trees and Nursery Stock Law, Chapter 290, Laws of Maryland, 1896. I found very soon that the San Jose scale was very widely distributed throughout the State, and that considerable damage had been done to bearing orchards in several counties. This work is reported in detail at another place in this report.

Next to the San Jose scale, the melon plant louse, *Aphis gossypii*, caused more damage in our State than any other insect the season of 1896. Hundreds of acres of canteloupes were destroyed by it in Baltimore, Anne Arundel, Prince George, Charles, Calvert, St. Mary's, Wicomico, Dorchester and Somerset Counties the latter part of June and early in July. After making a number of preliminary tests, we found that under spraying of the leaves with kerosene emulsion, diluted with 20 parts of water, was the most convenient method of treatment.

Anticipating a repetition of this outbreak in 1897, I prepared and published Bulletin No. 48, of this Station, in which I gave an account of the habits and life history of the melon plant louse, together with suggestions and remedies for its destruction and control. This bulletin also contained an account of several other injurious species of plant lice which are common in this state.

The asparagus beetle, *Crioceris asparagi*, was exceedingly abundant and destructive over a large part of the state. I saw large numbers of larvae on asparagus in Kent, Dorchester, Montgomery and Washington Counties during the month of August. The 12-spotted species, *C. 12-punctata*, was also quite common throughout these counties, but not nearly so abundant as the foregoing. The spotted species, however, seem to be increasing to a considerable extent, especially in the counties where asparagus is grown over large areas. I am of the opinion that it will become as serious a pest as the old species in the near future.

The potato stock weevil, *Trichobaris trinotata*, did considerable mischief to potatoes in Baltimore and Howard Counties. August 10th I inspected potato fields in the vicinity of Greenwood, Baltimore County, at the solicitation of J. G. McComis, and found that nine-tenths of the vines had been killed by this insect. Nearly every stem contained one or more larva or pupa. Later observations throughout other parts of the state, especially in lower Washington and upper Montgomery Counties, I found that the same insect was doing considerable damage.

The Colorado potato beetle, *Doryphora 10-lineata*, and the blister beetle, *Epicauta cinerea*, also did great damage over a large portion of the state.

Cabbage especially, suffered severely from the attacks of the cabbage worm, *Pieris rapae*, the cabbage Plusia, *Plusia brassicae*, and the Har-

lequin cabbage bug, *Murgantia histrionica*, over the entire State. This latter insect being of considerable importance and gaining in numbers over the state. We will give a detailed account of it, with illustrations of its various stages in a bulletin to be published this fall.

The strawberry weevil, *Anthonomus signatus*, appeared in great abundance the early part of the season, and was especially injurious to certain early varieties. The greatest damage was done in Anne Arundel, Baltimore, Caroline and Somerset Counties.

The plum curculio, *Conotrachelus nenuphar*, concentrated its attacks upon peach, and did great damage to pear in the tide-water section of this state, much of the former fruit ripening prematurely and falling from the trees.

The codling moth, *Carpocapsa pomonella*, was especially conspicuous in the apple-growing sections of the state, and did considerable damage.

The imported elm leaf beetle, *Galerucella luteola*, was very abundant on English elms throughout the state, and many trees were completely defoliated by the larvae of the first brood. The most serious effect was noted, however, later in the season, as the second brood were reaching maturity.

Another insect which is making considerable headway in this state as a shade tree defoliator, is known as the locust leaf beetle, *Odontota dorsalis*. I saw the ravages of this pest in all the lower Counties of the state, especially those bordering the water ways. In many instances the trees scattered over large areas had their leaves completely seared and were as brown as if they had been burned.

In September I found the army worm, *Leucania unipuncta*, very abundant near Berlin, Worcester County. In some fields, corn had been stripped of its blades, nothing being left except the mid-rib. Millet had also been injured to a considerable extent. September 17th, the worms were abundant in corn shocks that had been recently cut on the farm of R. C. Peters. I also noted the ravages of the insect in Washington County above Hagerstown, near Chewsville, September 12th. The principal damage was done to millet, although grass and corn were injured to some extent. September 10th, Randolph Humphreys, of Salisbury, Wicomico County, sent specimens of this insect to the College for examination. He stated that the pest was doing much damage in his County.

The Hessian fly, *Cecidomyia destructor*, was not uncommon in Washington, Howard, Montgomery and the Southern Counties. In St. Mary's County, wheat planted as late as October 8th to 18th was badly attacked. In Washington County the insect was worse in wheat planted previous to September 20th. I could find little or no fly in fields sown between September 25th and October 1st. A bulletin, giving a detailed account of this insect, with suggestions for its control, is now in press.

## ENTOMOLOGICAL FEATURES OF 1897.

The first insect that attracted any considerable attention throughout the state during the season of 1897 was the clover leaf weevil, *Phytonomus punctatus*. The larvae were first observed by me here at the Station on crimson clover April 14th, but no complaints of injury were re-